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CCC-17-CD-02
(CEMEX)
JULY 13, 2017

EXHIBITS

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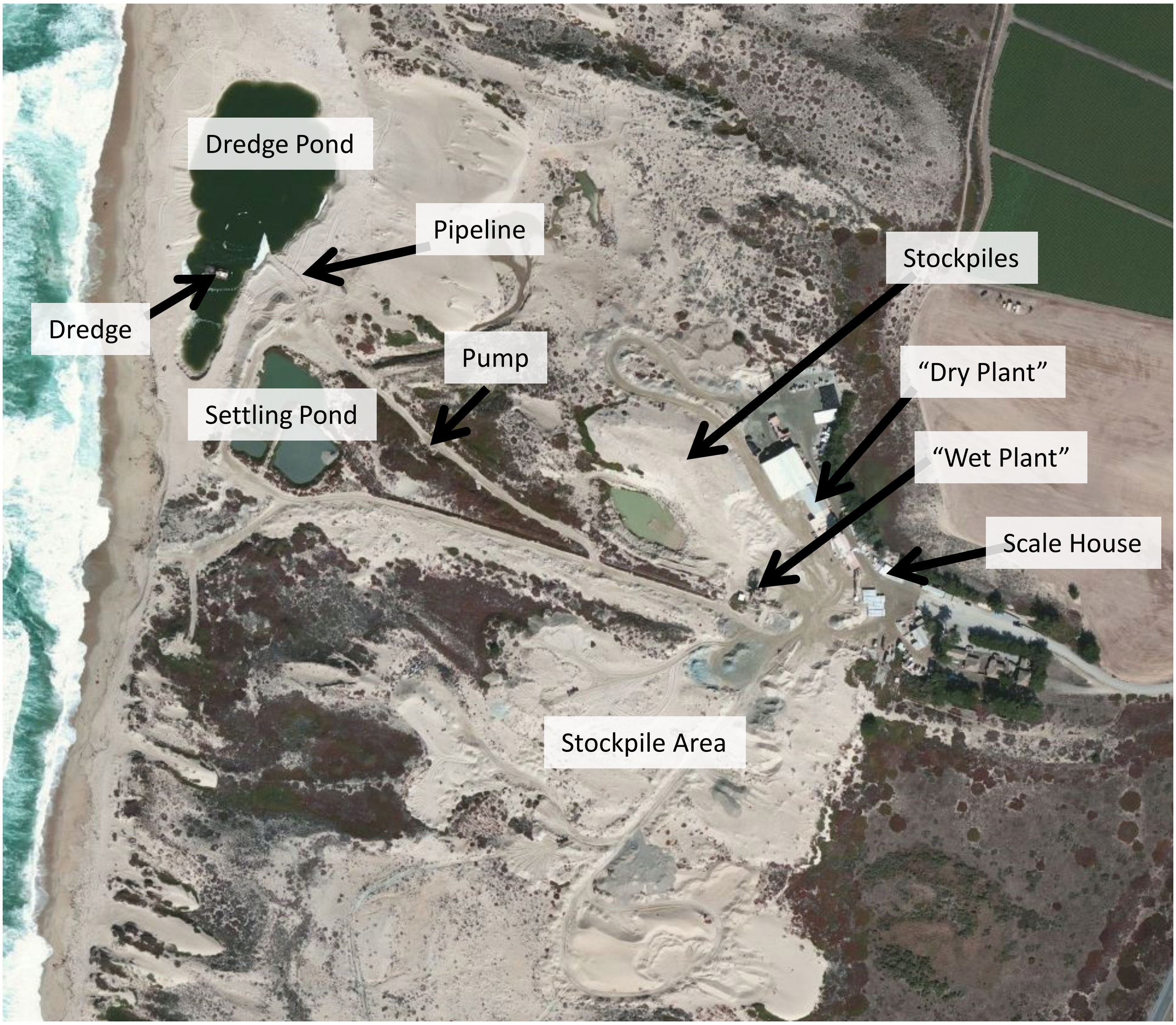
Dredge Pond
Pipeline
Dredge
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Site Photographs

Dec. 12, 2015 – Dredge pond open to ocean

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Site Photographs

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Site Photographs

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Erosion in Vicinity of Site

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April 7, 2016 – Dunes Drive view platform (red arrow) undermined. Looking downcoast, beach access to left

CALIFORNIA COASTAL COMMISSION

TO: Lisa Haage, Chief, State-wide Enforcement
cc: Alex Helperin, Senior Staff Counsel
Justin Buhr, State-wide Enforcement Analyst
John Del Arroz, State-wide Enforcement Analyst

Signature

FROM: Lesley Ewing, Ph.D. PE, D.CE. Sr. Coastal Engineer

RE: Coastal Processes affecting the Southern Monterey Bay (SMB) Littoral Cell
With focus on the CEMEX Mine at Marina, CA

DATE: June 26, 2017

The purpose of this memo is to provide detailed and current information about the Southern Monterey Bay (SMB) Littoral Cell, the location of the CEMEX beach pond sand mine (the CEMEX Pond) and the effects of the CEMEX sand mining operation on this cell. Littoral cells and sand budgets are the main ways that coastal scientists study beaches and dunes changes. This memo broadly explains both littoral cells in general and the SMB Littoral Cell in particular, sources of the sand mined from the CEMEX Pond and the consequences of the mining. To help the reader, this memo has been organized in the following manner.

1. Summary of Littoral Cells and Effects from the CEMEX Pond
2. Consequences of Removing Sand from the SMB Littoral Cell
3. Littoral Cells and Sediment Budgets and Sediment Transport
4. The Littoral Cell and Sediment Budget for the SMB Littoral Cell
5. Sources of Sand Mined from The CEMEX Pond
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1. Summary:

- Littoral cells, such as the SMB Littoral Cell, are dynamic and complex systems.
- Major sand sources to the SMB Littoral Cell are dune erosion, sand from the Salinas River, and offshore sand supplies.
- Major sand sinks (losses) from the SMB Littoral Cell are the Monterey Bay Submarine Canyon, and the CEMEX Pond. Dunes and offshore sand can be both sources and sinks.
- Natural/coastal processes and human activities together influence littoral cells, and affect whether beaches within the cell will expand or retreat.
- Storms, river flows, and sea level rise are three significant coastal processes that alter sand supplies within the SMB Littoral Cell
- Sand mining and reductions to the Salinas River sand supply are the two major human activities that reduce sand supplies within the SMB Littoral Cell.
- Each time sand is removed from the CEMEX Pond, the Pond becomes a sand sink.
- Unlike inland mines, the CEMEX Pond does not expand to continue to operate; the mining operation stays in one location and high-energy waves bring sand from the nearshore and beach into the CEMEX Pond.
- Mining impacts are both incremental (from each mining cycle) and cumulative (from decades of extraction).
- The on-going extraction of sand from the CEMEX Pond prevents the mined sand from being used to build up beaches and dunes in the SMB Littoral Cell.
- If sand mining were to stop, the CEMEX Pond would fill with sand, and the area would naturally restore back to a beach.
- If sand mining from the CEMEX Pond were to stop, the rate of shoreline retreat and dune erosion within the SMB Littoral Cell would likely reduce significantly.
- Sand mining removes sand from the littoral cell, causing direct and adverse impacts on local sand supplies.
- Incremental and cumulative reductions in littoral sand supplies contribute to erosion within the beach and dune system and contribute to increased land form and habitat alteration.
- As noted in a separate memo on biological impacts, erosion and increased land form and habitat alteration degrade habitat values due to disturbance to ESHA, modifications to marine resources and changes to biological productivity.
- Mining sand from the beach at Marina contributes to an adverse impact on local sand supply in conflict with Section 30235 of the Coastal Act; contributes to both habitat degradation and land form alteration, in conflict with Sections 30231, 30240 and 30251 of the Coastal Act.
- The CEMEX mining operation is a visual intrusion to the beach environment, in conflict with Section 30251 of the Coastal Act, and the degradation of the dunes creates a barrier to beach access, in conflict with Section 30211 of the Coastal Act.

2. Consequences of Removing Sand from the SMB Littoral Cell: Sand in the CEMEX Pond has come from the littoral sand supply of the SMB Littoral Cell, and when sand is mined from the CEMEX Pond, the sand is removed from the SMB Littoral Cell. Mining sand from the Pond has to an adverse impact on local sand supply and is causing or worsening shoreline retreat and dune erosion in SMB. As noted in a separate memo on biological impacts[1], the dunes in the Marina area are important habitat, and increased dune erosion is degrading this habitat, disturbing ESHA and causing changes to the biological productivity of the dunes.

Mining volumes compare with reductions from Salinas River modifications: Sand mining is one of the two major activities that, over the past century, have changed sand supplies in the SMB Littoral Cell. Movement of the mouth of the Salinas River and three dams on the Salinas River and tributaries[2] have reduced the volumes of sand brought into the SMB Littoral Cell. Based on information provided by CEMEX, an average of 243,000 cy/yr (298,817 tons/yr[3]) was dredged from the Pond over a 28-year period between 1986 and 2013 (Figure 1). The three dams diminish the annual average Salinas River output of beach sand on the order of 200,000-300,000 cy/yr (Willis and Griggs, 2003; Thornton 2016). Therefore, the loss of sand from the SMB Littoral Cell due to the CEMEX mining operation is comparable in scale to the reduction in sand supply in the SMB littoral cell resulting from all three upstream dams.

Mined Sand Volumes Exceed Central Sub-cell Riverine Sand Supplies: At present, the Salinas River is discharging far less coarse grained sand into the Central sub-cell than is being removed by the mining operation, where the annual river discharge volumes range between 3% and 30% of the annual mining volume[4]. Thus the volume of sand removed each year by mining vastly exceeds the volume of sand being added to the Central SMB sub-cell from the Salinas River.

Cumulative Volume of Mined Sand that will Never Return to the Beach: The cumulative amount of sand mined from the CEMEX Pond, from 1986 to 2013 was more than 6.8 million cubic yards (8.4 million tons)[5]. This volume of sand is more than six times the beach-dune loss during the 1997-98 El Niño, estimated to be about 1 million cubic yards (Thornton, 2006). But, while some

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[1] Garske-Garcia 2017

[2] The mouth of the Salinas River moved in about 1910 and the dams were built in 1941, 1956 and 1965.

[3] This memo uses Englich units, providing sand volumes in cubic yards. When the original source used other units, those values are provided in parentheses. In changing from tons of sand to cubic yards, the conversion was 1.23 tons = 1 cubic yard (from Slagel and Griggs, 2008).

[4] Estimates of total river discharge volumes of sand sized sediment vary from 50,000 cy/yr to 273,000 cy/yr, as explained in the section entitled Salinas River's Sand Contributions to the Littoral Cell, in the main section, The Littoral Cell and Sediment Budget for the SMB Littoral Cell. Not all sand from the Salinas River is carried to the south, and estimates of southerly transport range from 15 to 27% of the total sand discharge volumes, also described further in section on the Salinas River's Sand Contributions to the Littoral Cell.

[5] Much more sand has been extracted from the littoral cell over the full life of the mining operation, but the mining results have only been provided for the 1986 – 2013 time period.

of the sand moved offshore during stormy El Niño winters returns to the beach and beaches recover following a storm (Dingler and Reiss, 2001); none of the mined sand returns to the beach.

Sand Losses due to the CEMEX Pond cause Impacts to the SMB Littoral Cell: The consequences of sand loss are not isolated to the location of removal; they spread throughout the cell as shown by the regions of erosion in Figure 2. Some coastal scientists assume that sand mined from the CEMEX Pond causes no impacts to the area since it will ultimately go down the Monterey Submarine Canyon (Leatherman 2017). This assumption overlooks the sand depositional area offshore of Sand City that supports the southerly transport of some of the sand, and more importantly, it overlooks the miles of beaches and dunes between the CEMEX Pond and the sand sinks that need sand for accretion, or reduced erosion.

Mining Sand from the CEMEX Pond Contributes to Dune Erosion: The average shoreline retreat and dune erosion rates, at present, range from 3 – 6 ft/yr, with a loss of about 200,000 cy/yr (Thornton 2016). Due to the linkages between the beach-dune system and the unarmored nature of most of the Southern Monterey Bay backshore area, the landward retreat of the shoreline is not resulting in a significant narrowing of the beach, but rather in greater erosion of the dunes. Once dune sand is mobilized, it moves throughout the littoral cell, replenishing beaches and the nearshore, and some will refill the CEMEX Pond.

Dune Erosion causes Impacts to Access and Habitat: Shoreline retreat and dune erosion has had adverse impacts on coastal resources in the SMB Central sub-cell, reducing dune areas available for public access, recreational use, and habitat. In locations where there is access across the dune face, the access paths have steepened as waves erode the toe of the dune, and access can be compromised until the dune face re-adjusts to the new dune toe location. The impacts of mining, similar to seawalls and revetments are not just from the physical displacement of access created at the physical location of the mine or seawall; but, this type of unpermitted development could and does have the consequence of affecting access, including through erosion and resulting beach loss, regardless of whether or not the development itself blocks access. Also, parking at Marina State Beach, at Reservation Road is being undercut by ongoing dune erosion. In addition to concerns with erosion and dune retreat, the mine also results in significant and on-going landform alteration by repeatedly removing sand from the beach area.

Adverse Impacts to Sand Supplies are Cumulative and Significant: The CEMEX Pond is not the only source of dune erosion and beach change. Large storms, waves, reductions in riverine sand supplies, sea level rise, and other coastal forces can also cause sand losses, and all losses of sand in combination contribute to beach retreat and erosion of the dunes. Also, while Sections 30235 and 30253 of the Coastal Act do not identify some threshold or to address only those losses that are the most significant; rather these sections of the Coastal Act address impacts, the volumes of sand losses due to mining the CEMEX Pond are significant and compare in volume to those from other causes of sand loss.

Benefits from Ending of Drag-Line Mining at Sand City: Drag-line mining activities in the SMB Littoral Cell stopped in 1990 and observed changes in beach and dune erosion provide an example of changes that could happen if mining at the CEMEX Pond stops. Between 1940 and 1989, drag-line mines removed between 130,000 to 200,000 cy/yr from the surfzone at Sand City and Marina, a volume slightly less that the average volumes that are mined each year from the CEMEX Pond. After the drag-line mining stopped, the erosion rates south of Sand City dropped significantly (Thornton 2006). Figure 3 shows the average long-term erosion (shoreline recession) of the downcoast beaches at two different locations, near the La Playa development about 0.6 miles north of Wharf 2 and at the Ocean Harbor House development about 1.9 miles north of Wharf 2, and the shallower slope of the line shows the decrease in erosion that occurred once sand mining stopped in Sand City in 1990. In addition, the region with maximum erosion rates shifted from the area near Sand City where drag-line mining was previously most intensive, to Marina where the CEMEX Pond remains in operation (Figure 2 from Thornton 2016). Additional reductions in erosion are expected if mining at the CEMEX Pond were to stop (PWA, 2008).

The Sand Sink at the CEMEX Pond will End after Sand Mining Stops: If mining at the CEMEX Pond were to stop, the Pond would fill one more time with sand, after which it would no longer be a sand sink. The Pond would return to being a beach area. But, with the current dredging activities, the Pond is a persistent sink, and sand trapped in and removed from the Pond will not be able to build or accrete beaches, dunes or offshore areas.

3. Littoral Cells and Sediment Budgets and Sediment Transport: A littoral cell is a section or reach of coast in which various barriers divide the coast into smaller, definable areas. Normal barriers that establish the boundaries of a littoral cell are headlands, canyons or sometimes inlets and river mouths. These zones do not have sharply delineated boundaries, but the general limits of the littoral zone are shown in Figure 4, and the littoral zone for the SMB Littoral Cell is shown in Figure 5. A sediment budget is a way to track sand within a littoral cell – examining sand that comes into the littoral cell, how it travels through the cell and where it leaves the cell.

Sand comes into a cell from sources such as rivers, cliff and dune erosion, and offshore sand deposits. Beach nourishment is an additional human source of sand into the littoral cells. Sand losses occur when sand leaves or is carries out of the littoral cell. Natural loss areas, called sand sinks include offshore areas, coastal dunes and submarine canyons. As discussed in Section 4, sand mining from the CEMEX Pond is an additional human-created sand sink.

The natural mechanisms for sand transport in a littoral cell are: river flows that carry sand from inland areas to the nearshore (including the surfzone); waves and currents that erode sand from the dunes and that carry sand through coastal water – from the offshore, along the nearshore, the surf zone, and wet beach; and aeolian forces (wind) that can carry sand along the dry beach and from the dry sand to inland areas such as sand dunes. Humans also alter these natural mechanisms with tools, mechanized equipment, excavators and dredges.

Beaches are temporary storage areas for sand. Beaches expand and contract due to seasonal and inter-annual wave action. Typical seasonal changes to the beach profile are for the dry beach to widen during the summer months due to the gentle seasonal wave conditions that carry sand onto the beach, and to narrow and steepen due to the more energetic winter wave conditions that carry sand off of the beach (Figure 6). Seasonal changes are not limited to the visible beach; much of the sand carried off the dry beach in the transition from summer to winter and during the winter is deposited in nearshore sand bars and this sand is returned to the dry beach during the summer and the winter to summer transition. During El Niño winters, successive energetic storms increase erosion of the upper beach (Barnard et al. 2017) and recovery may take multiple years.

The littoral cell and sediment budget help characterize the large-scale, average changes of beaches and movement of sand. However these large-scale changes to the beach do not fully characterize the extensive movement of individual sand particles. Waves constantly move sand particles and reshape the beach. Wave-driven movement of sand particles occurs throughout the full extent of wave coverage in the nearshore, surf zone, swash and wave run-up areas. Wind-driven sand movement, while not as constant as wave-driven movement, occurs throughout the dry beach area, moving sand from dry beach areas and the dunes along the beach, onto the dunes or onto areas of wet sand and into the reach of waves. Also, while winter waves result in a net transport of sand off of the beach, the actual transport paths for individual sediment particles is not a direct path from the beach face to the offshore bar. Sand follows the pathways of the water, moving on and offshore and along the shore through very circuitous routes.

4. The Littoral Cell and Sediment Budget for the SMB Littoral Cell: The SMB Littoral Cell is bounded at the north by the Monterey Bay Submarine Canyon and at the south by Point Piños on the Monterey Peninsula. This cell is occasionally subdivided into smaller segments; the North sub-cell that extends from the Monterey Submarine Canyon and Elkhorn Slough south to the Salinas River; the Central sub-cell extends from the Salinas River south to Sand City; the South sub-cell extending from Sand City to Monterey Harbor or Wharf 2; and the West sub-cell extends from Monterey Harbor to Point Piños (Patsch and Griggs, 2007; Thornton, 2016). The CEMEX Pond is in the Central sub-cell (Figure 5), where the main sources of sediment to this littoral sub-cell, as well as to the SMB Littoral Cell, are erosion of coastal dunes, discharge of sand from the Salinas River, and offshore sand deposits. Each is summarized below and discussed in more detail in the rest of the section.

- *The Beach-Dune System and Dune Erosion:* Beach-dune systems have an active exchange of sand onto and off of the dunes. The dunes provide a reservoir of sand that is pulled onto the beach during times of erosion and then rebuilt during times of beach accretion. The dunes in the SMB Littoral Cell are actively eroding and little build-up has been observed. As discussed in more detail below, the annual average dune erosion rates at present range from about 3 to 6 feet, with a loss of dune sand of about 200,000 cy/yr (Thornton2016). This rate is in excess of the rates of retreat that can be attributed to a change in the profile from sea level rise. Large volumes of dune sand are eroding each year to provide sand that is removed by the dredge pond.

- *Salinas River's Sand Contributions to the Littoral Cell*. Rivers are often an important source of sand to a littoral cell and the Salinas River is the main river source to the SMB Littoral Cell. As discussed in more detail below, over the years, the volume of beach-compatible sand delivered by the Salinas River has been reduced due to upstream dams and the diversion of the river mouth to its current location. Best estimates of the current volume of sand being supplied to the SMB Littoral Cell are from 50,000 to 273,000 cy/yr. Not all river sand will go south into the Central Sub-cell. Estimates are that, at most, 27% of the Salinas River sand will be transported south, resulting in the Central sub-cell river sand volume of about 74,000 cy/yr (Thornton 2016).

- *Offshore Sand:* Sand can be transported offshore by waves or by cross-shore currents and rip currents. When sand is moved offshore it can be carried into the Monterey Submarine Canyon where it is lost to the littoral cell, or onto offshore deposits such as bars or shoals where there can be an exchange between the offshore and the active littoral cell. However, little is known about the volumes of sand that move between these offshore and nearshore areas.

The Beach-Dune System and Dune Erosion: Beach-dune systems have an active exchange of sand onto and off of the dunes. The dunes provide a reservoir of sand that is pulled onto the beach during times of erosion and then rebuilt during times of beach accretion. The dunes in the SMB Littoral Cell are actively eroding and little build-up has been observed. The annual average dune erosion rates at present range from about 3 to 6 feet, with a loss of dune sand up to about 200,000 cy/yr. This rate is in excess of the rates of retreat that can be attributed to a change in the profile from sea level rise. Large volumes of dune sand are eroding each year to provide sand that is removed by the dredge pond. Dune retreat is likely to lessen significantly if mining from the CEMEX Pond stops.

Most of the SMB Littoral Cell shoreline is a beach - dune system. Waves move sand onto the beach and wind and waves then moves some of the sand from the beach onto the dunes. When the beach is not wide enough to dissipate all the wave energy, waves attack the dunes, pulling sand from the dunes onto the beach. This is a cyclic process of beach and dune build-up, followed by wave attack that adds more sand into the beach zone, then further build up. The dunes along the Monterey Bay shoreline are part of this on-going beach-dune sand exchange and they also reflect the beach-dune processes from hundreds and thousands of years earlier.

The dunes immediately next to the beach normally have a fairly active exchange with the beach. But, the dunes farther inland were formed many thousands of years ago, and they were the active beach-dune system during earlier sea level stands (Chin et al., 1988). During subsequent Ice Ages and Interglacial periods, these dunes were buried by newer, more seaward dunes. There can be fairly regular exchange of sand between the active dune face and the beach and the active dunes tend to grow and shrink with these exchanges. The more ancient dunes are less flexible to change, and if erosion goes into the older dune complex, that erosion is removing sand that was deposited during an earlier sea level stand and is moving beyond the active dunes into the remnant, prehistoric dunes, and such erosion is more difficult to reverse. The shoreward-most portions of the Monterey Bay dunes have been eroding throughout the Holocene and this erosion has been a source of sand to the littoral cell. The coastline retreated landward about 8 miles over the last 18,000 years (2.3 ft/yr) (Thornton et al., 2006).

Over a shorter time period, Hapke et al. (2006) combined historical topographic sheets, constructed using surveying plane tables, with recent laser (LIDAR[6]) measurements, collected with a precisely located (GPS[7] and IMU[8] equipped) airplane, to assess shoreline change along the California coast over the last century. In southern Monterey Bay, coastline change is predominantly erosive (Figure 7). Over the long-term (1853-1998) the beach expanded within a few miles south of the Salinas River mouth by about 3 ft/yr., transitioning through the next 1 to 2 miles to erosion ranging from about 1.6 to 3.2 ft/yr south through Seaside and Sand City. The short-term rates (1945-1998) show a general exacerbation of erosion (3 to 6 ft/yr) relative to the long-term rate (1853 – 1998).

As the shoreline position has retreated, so to have the dune fields that back the beach unless the back of the beach is fixed by shoreline armoring. This dune retreat helps to maintain, over the long term, the width of the beaches. Thornton et al. 2006 and Thornton 2016 measured the dune toe and dune-top edge from Monterey to the Salinas River using a combination of stereo-photogrammetry, LIDAR, and GPS ATV/walking surveys. These surveys found eroding trends of about 3 - 5 ft/yr, for the years 1940 - 1989 (Figure 2), which are comparable to the short-term shoreline retreat rates calculated by Hapke et al. 2006. These current erosion rates exceed the dune retreat of 2.3 ft/yr estimated to have occurred over the past 18,000 years; they also greatly

[6] Light Detection and Ranging
[7] Global Positioning System
[8] Inertial Measurement Unit

exceed the current retreat of approximately 0.1 ft/yr that could be proportionally attributed to recent sea level rise[9].

Thornton (2016) multiplied the observed dune retreat rate by the observed dune height and integrated alongshore, to estimate a dune volume loss of 249,000 cy/yr (190,000 m^3/yr) from 1940-1989, and 202,000 cy/yr (155,000 m^3/yr) from 1989-2011, for the central sub-cell[10]. Using observed grain size distributions, Thornton (2016) used a sand size of approximately 0.65mm as the mean diameter for beach sand and estimated that only ¼ of the eroded dune sand was compatible with the local beach in the central sub-cell. This would mean that for every cubic yard of sand eroded from the dune, only 0.25 cubic yards would remain on the beach, or, alternatively, that 4 cubic yards of dune sand would be eroded to replace 1 cubic yard of beach sand. An earlier Regional Sediment Management Study (PWA 2008), used a smaller sand diameter for matching beach and dune sand and estimated that about 50% of the dune sand, by volume, could remain on the beach. Using either assumption about the percentage of dune sand that remains on the beach, it is clear that large volumes of dune sand are eroding each year to maintain a fairly stable beach width as the shoreline moves inland.

Salinas River's Sand Contributions to the Littoral Cell. Rivers are often an important source of sand to a littoral cell and the Salinas River is the main river source to the SMB Littoral Cell. As discussed in more detail below, over the years, the volume of beach-compatible sand delivered by the Salinas River has been reduced due to upstream dams and the diversion of the river mouth to its current location. Best estimates of the current volume of sand being supplied to the SMB Littoral Cell are from 50,000 to 273,000 cy/yr. Not all river sand will go south into the Central Sub-cell. Estimates are that, at most, 27% of the Salinas River sand will be transported south, resulting in the Central sub-cell river sand volume of about 74,000 cy/yr (Thornton 2016).

Comparison of Sediment Delivery from Large and Small Rivers: Globally, rivers annually discharge approximately 18 billion tons (14.6 billion cubic yards) of sediment to the oceans (Farnsworth and Milliman, 2003), and in many littoral cells, rivers are the main source of sediment to the cell. Generally sediment volumes from large rivers such as the Mississippi are rather consistent year-to-year; however, smaller rivers tend to be more influenced by local conditions and variability in storms and precipitation and this results in significant variability of

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[9] Shoreline retreat over the past 18,000 years occurred during the rapid sea level rise that occurred at the end of the last Ice Age as well as the slower rise that occurred during the past few thousand years. The rates of sea level rise and bluff retreat have a correlation so that as sea level rise slowed, so too did bluff retreat, explaining the rather low rate of bluff retreat that is related to the rise in sea level observed over the past century.
The modern day beach loss/dune retreat can be estimated from a geometric relationship between the beach and the water level, often called the Bruun Rule. Based on the upper estimate of sea level rise over the past century of 0.6 ft/century (https://tidesandcurrents.noaa.gov/sltrends/sltrends.html, 1.94mm/yr at SF from 1897 to 2016. 1.39mm/yr at Monterey from 1973 to 2016), and a beach face of approximately 1:10 (Dingler and Reiss 2001), sea level over the past century would result in a retreat of ~0.1 ft/yr.

[10] By comparison, the southern sub-cell lost 14,000 cy/yr from 1940-1989 and 8,000 cy/yr from 1989-2011.

annual sediment delivery. The Salinas River, a small river system is the main source of river sediments coming into the SMB Littoral Cell and sediment supplies from this river vary greatly from year to year, with infrequent peak events carrying orders of magnitude more sediment than the average (Inman and Jenkins 1999; Farnsworth and Milliman 2003).

<u>20th Century Changes to the Salinas River Sand Supplies</u>: In addition to the variability in the natural sediment discharges, the Salinas River has been greatly modified over the past one hundred or so years. Early in the 20th century the river mouth migrated from Elkhorn Slough and Moss Landing (east of the head of the Monterey Submarine Canyon) to its current location where it was diked in place, about 4 miles south of the Canyon. In the mid-20th century, dams were constructed on the Salinas River (the Salinas River Dam, built in 1941) and two tributaries to the Salinas River (one on the Nacimiento River in 1956 and another on the San Antonio River in 1965). Finally, agricultural activities in the Salinas River valley often divert river water for irrigation, which reduces river flows and sediment transport capacity. Thus the current location of sediment delivery and the volume of sediment differ from earlier historic conditions.

<u>Research on Sediment Delivery by the Salinas River</u>: Several researchers have attempted to quantify various aspects of the Salinas River sediment delivery and each tends to focus on different aspects. For example, Inman and Jenkins (1999) examined the variability of sediment loads for average climatic conditions compared with wet or El Niño periods. Their research found average annual sediment loads for the Salinas River to be 1.4 million cy/yr (1.7 million tons/yr) for the total study period (1944 – 1995), but also found that the sediment yields increased by about 50% to 2.29 million cy/yr (2.82 million tons/yr) during the 'wet' period from 1969 – 1995 which included 3 heavy precipitation El Niño years. Farnsworth and Milliman (2003) estimated annual sediment discharge[11] for a larger time period than Inman and Jenkins (1930 – 2000), finding annual sediment delivery ranging from less than 0.08 million to over 24 million cy (0.1 to 30 million tons) and averaging 2.7 million cy/yr (3.3 million tons/yr). In 31 of the 70 years of study, sediment delivery was less than 0.08 cubic yards (0.1 tons), and only 6 years had loads equal to or greater than 12 million cubic yards (15 million tons) and 4 of these 6 peak discharge years were after construction of the dams. More recently, Gray et al. (2015) analyzed the time-dependence of sediment loads and the significance of prior hydrologic conditions for estimates of sediment yield. Using data from 1967 – 2011, Gray et al. (2015) estimated average sediment loads of 1.6 – 2.6 million cy/yr (2.0 – 2.9 million tons/yr), comparable to Inman and Jenkins (1999) and Farnsworth and Milliman (2003). The analysis concluded that information about the basin prior to the flood flows is useful for evaluating sediment estimates and, as found by Inman and Jenkins (1999) and Farnsworth and Milliman (2003), sediment loads during wet El Niño years are vastly higher than during non-El Niño years.

[11] Based on stream flow monitoring from the USGS gauging station at Spreckels from 1929-1999 and a rating curve developed from 10 years of suspended sediment measurements to correlate sediment loads with stream flow.

Influences of Dams and Relocation of the Salinas River Mouth on Sediment and Sand Delivery: As part of studies on the state-wide influences of dams on river-borne sand, Willis and Griggs (2003) and later Slagel and Griggs (2008) estimated the impacts from the three major dams on delivery of sand-sized sediment to the coast.[12] Willis and Griggs estimated that the Salinas River carried approximately 719,000 cy/yr (550,000 m^3/yr) of sand to the coast prior to the dams, and that this was reduced, by 33% to only 489,000 cy/yr (373,664 m^3/yr) after the dams were built. Slagel and Griggs (2008), in general agreement with Willis and Griggs, estimated post-dam construction sand delivery to be 498,000 cy/yr (381,000 m^3/yr). Both these studies use a cut-off diameter of 0.062mm for sand and this grain size is much finer than the 0.25mm or greater sands typically found on the Southern Monterey shoreline. These studies do not quantify the coarse sand ($\geq$ 0.25 mm diameter), but they do provide insight into the effects of dams on the delivery of sand by coastal rivers, as well as an upper estimate of beach-compatible sand volumes that reach the coast from the Salinas River.

Prior to the state-wide work by Willis and Griggs (2003) and Slagel and Griggs (2008), McGrath (1987) used stream gauge data and rating curves to estimate the suspended sediment volume of coarse-grained, beach compatible sand ($\geq$ 0.25 mm diameter) delivered to the coast by the Salinas River. McGrath hypothesized that the lower section of the Salinas River was 'depositional', with much of the sand that was carried through the river system below the dams was being deposited in the riverbed and was not being carried to the ocean[13]. This analysis was based on river conditions and a calculated bedload volume, rather than an assumption that bedload would be proportional to suspended sediment. His work, as summarized in the Coastal Regional Sediment Management Plan for Southern Monterey Bay (PWA 2008), found that only about 50,000 cy/yr (38,230 m^3/yr) was carried to the coast. PWA (2008) expanded this estimate by McGrath to include all sand with a diameter greater than or equal to 0.125 mm and estimated that the Salinas River was providing approximately 65,000 cy/yr of this beach quality sand. PWA (2008) also noted that McGrath's estimate for sand supplies from the Salinas River might underestimate longer-term or current sand delivery since this work did not cover the post-1986 conditions of higher precipitation during a positive Pacific Decadal Oscillation.

A recent paper by Thornton (2016) probes further into the delivery of beach-quality sand ($\geq$ 0.25 mm diameter). Thornton (2016) used grain size distributions to modify the sand discharge estimates from Willis and Griggs (2003) and Gray et al. (2014) to cover only the sand that was

[12] Willis and Griggs, 2003 used stream flow at the Spreckels gauging station from 1929-1999 whereas Slagel and Griggs, 2008 used data from 1929-2004. To convert stream flow to suspended sediment, empirical rating curves were developed. Slagel and Griggs 2008 allowed for different rating curves in different flow regimes. Willis and Griggs, 2003 assumed that bedload was 10% of the measured suspended load for the Salinas River, whereas Slagel and Griggs, 2008 estimated 20% based on Griggs 1987

equal to or greater than the beach-quality sand size, producing sand delivery estimates of 488,000 cy/yr (373,000 m^3/yr) for the period of 1910 – 1945; 273,000 cy/yr (209,000 m^3/yr) for the period of 1940 - 1989; and 165,000 cy/yr (126,000 m^3/yr) for the period of 1989 – 2011. All these studies are summarized in Table 1.

Table 1: Salinas River Annual Average Sediment Discharge

Time Period	**Average Sediment Discharge (cy/yr)**	**Sediment Type**	**Source**
1944 - 1995	1.4 million	Suspended sediment	Inman and Jenkins (1999)
1969 – 1995	2.29 million	Suspended sediment	Inman and Jenkins (1999)
1930-2000	0.08 million - 24 million	Suspended sediment	Farnsworth and Milliman (2003)
1967 – 2011	1.6 – 2.6 million	Suspended sediment	Gray et al. 2015
1929 – 1999 No Dams	719,000	Sand ≥ 0.062 mm	Willis and Griggs (2003)
1962 – 1999 With Dams	489,000	Sand ≥ 0.062 mm	Willis and Griggs (2003)
1929 - 2004	498,000	Sand ≥ 0.062 mm	Slagel and Griggs (2008)
?- 1986	50,000	Sand ≥ 0.25 mm	McGrath (1987)
? - 2007	65,000	Sand ≥ 0.125 mm	PWA 2008
1910 – 1945	488,000	Sand ≥ 0.25 mm	Thornton (2016)
1940 – 1989	273,000	Sand ≥ 0.25 mm	Thornton (2016)
1989 - 2011	165,000	Sand ≥ 0.25 mm	Thornton (2016)

Summary of Salinas River Inputs to the SMB Littoral Cell: This discussion and Table 1 demonstrate that sediment loads are difficult to quantify, and, there is a broad range of estimates for the Salinas River. The Salinas River can have very different stream flows from one year to the next. As indicated by the range of sediment discharge amounts estimated by Farnsworth and Milliman (2003), average discharge is not often observed; discharges tend to be very low or very high, resulting in an "average" that is a summary of the long-term condition, but that does not

[13] For example, during a February 1969 flood, peak stream flow at the Soledad gauging station was 117,000 cfs and dropped to only 83,0000 cfs at the downstream gauge at Spreckels.

represent normal condition. Thus, the time periods for developing averages can heavily influence the results and none of the results are necessarily more correct than the others.

It is important to understand how the current sediment budget has been modified by historic actions such as the dams on the Salinas River. However, it is the current sediment supplies that represent current contributions to shoreline change. The estimates of sand from the Salinas River that are most relevant to the current sediment budget are the estimates for the time periods since the dams were installed. Based on the available information, the post-dam beach-sized sand yield ranges from 50,000 – 273,000 cy/yr. This range of sand delivery from the Salinas River is an indication of the dynamics and complexity of the SMB Littoral Cell and inter-annual variability of sand supplies coming into the littoral cell.

<u>Northern and Southern Transport of Sand from the Salinas River</u>: The Salinas River is located in the northern section of the SMB Littoral Cell; however it is not at the northern-most part of the cell. Sediment transport varies throughout the cell, with some of the sediment from the Salinas River moving north and some moving south. To examine how the beaches at Marina and south of the Salinas River are altered by sediment supplies from Salinas River, researchers have attempted to make estimates of the volumes of river sand that are transported south.

Alongshore currents. Once sand reaches the coast, waves move sand along the coast in the direction of the waves. Waves coming from the north, relative to the beach face, tend to move sand to the south, and waves from the south move sand to the north (Figure 8). In most locations, sand will move both north and south and sediment budgets characterize 'net' transport, or the difference between all the movement to the south and all the movement to the north. The red arrows in Figure 5 show a representation of the net transport of sand within the SMB Littoral Cell, with net transport north of the Salinas River carrying sand to the north, ending at the Monterey Bay Submarine Canyon, and net transport south of the Salinas River carrying sand going south as far Sand City, ending in an offshore deposition area. Figure 9 shows an opposing representation of the net transport of sand, with a single direction of transport from south to north, and no Salinas River sand being carried to the south. However, the focus of this image was on the Monterey Submarine Canyon, rather than on net littoral transport. As noted by Kim Fulton-Bennett, the MBARI staffer who prepared this image, "I drew the lines and arrows in this illustration based on my personal, qualitative understanding of the generalized pattern of sand movement along the beaches of Monterey Bay. These lines and arrows were NOT based on any scientific data. I'm sure that sand movement, particularly in the southern half of Monterey Bay, is much more complicated than what is shown in this illustration. Because I did not consult any recent scientific studies before creating this illustration, this illustration should not be used to represent the state of current scientific knowledge about sand movement in Monterey Bay."[14]

Figure 5 shows a more complex sediment transport situation, with net northern transport shown in the North, South and West sub-cell and net southern transport in the Central sub-cell. Yet, a detailed, localized study of currents indicates that sediment can be carried either north or south depending upon the variability in the wave climate and currents. Drifter releases in the spring of 2017 at Sand City (Reiners et al. 2009; McMahan et al. 2010) show complex current patterns for the nearshore zone, adjacent to about a 1.200-foot long section of coast (Figure 10). Larger-scale observations of surface currents have been obtained throughout Monterey Bay for several decades, using high frequency radar, and, "(a) key finding is the seasonal variability in circulation patterns that are associated with wind direction and persistence." George (2017). Figure 11 shows the day to day variability in surface currents that were observed this year, during a large flood event on the Salinas River (February 19 – 28, 2017). These surface currents are representative of the upper water column, whereas sediment concentrations are typically highest at deeper depths, but their erratic paths suggest similarly complex sand transport patterns.

The Salinas River contributes sand to the beaches along Marina and farther south both in instantaneous longshore transport (Figure 10) and net longshore transport (Figure 5). PWA (2008) assumed that about 15% of the Salinas River sand would be transported south of the river. Thornton (2016) used an estimate of 27% of the Salinas River sand traveling south by relating historical (before dam construction and sand mining) shoreline accretion near the river mouth (Hapke 2006) to river flow. Using the broad range of possible sand supplies from the Salinas River (from Table 1), Table 2 shows the ranges of sand from the Salinas River that could contribute to the sand supplies south of the Salinas River.

Table 2: Volumes of Sand from the Salinas River estimated to move south[15]

Percentage of Sand moving South from the Salinas River	**Volumes of Sand moving South from the Salinas River (cy/yr)**	**Reference**
0	0	Leatherman, 2017
15	7,500 – 41,000	PWA 2008
27	13,500 – 74,000	Thornton 2016

Offshore Sand: Sand can be transported offshore by waves or by cross-shore currents and rip currents. When sand is moved offshore it can be carried into the Monterey Submarine Canyon where it is lost to the littoral cell, or onto offshore deposits such as bars or shoals where there can be an exchange between the offshore and the active littoral cell. However, little is known about the volumes of sand that move between these offshore and nearshore areas.

[14] Fulton-Bennett (2017) E-mail communication
[15] Based on the Table 1 sand delivery, with diameter ≥ 0.25 mm, range of 50,000 to 273,000 cy/yr.

Within this sub-cell, the offshore areas and the coastal dunes are both sand sources and sand sinks. As a sink, sand can travel offshore beyond the littoral cell boundary by avalanching down Monterey Bay canyon (Paull et al. 2003; Smith et al. 2007), or may be pushed offshore by large waves and currents that converge in the alongshore and send sand offshore. Combellick and Osborne (1977) and Hunter et al. (1988) found a lobe of beach sized sand offshore of the convergence zone at Sand City (Figure 5). Rip currents can carry sand from the beach to the offshore and McMahan et al. 2010 and many others have studied some of the rip currents observed throughout the Southern Monterey Bay. Nevertheless, offshore sand source contributions to the littoral cell for the SMB Littoral Cell and for most littoral cells in California are poorly characterized and they have not been well quantified.

5. Sources of Sand Mined from the CEMEX Pond:

The vast majority of sand in the CEMEX Pond would have come from either dune erosion or discharges from the Salinas River. It is not possible to determine the transport pathways of all the sand on the beach or all the sand in the Pond. However, information on the sediment budget, transport mechanisms and sand dynamics provide strong evidence that the vast majority of sand brought to the pond comes from the littoral zone, seaward of the Mean High Tide Line (MHTL), and the vast majority of sand in the Pond is carried by waves.

Beach Sand Mining is Different from Inland Mines: Sand mining from the Pond is quite different from inland mining operations. For inland sand mining, the majority of sand that is extracted from a quarry or pit would be in-place sand coming from the existing sand sources on site. Inland sand mining can continue only by excavating deeper into the site or by expanding the mining area to remove sand from new locations as the available sand from one section is depleted. The sand mining operation at the beach Pond stays in one location and waves and wind carry sand to the CEMEX Pond as automatic replenishment.

The CEMEX Pond is a Sand Sink: Sand mined from the Pond consists of two types of sand – in-place sand excavated to develop or expand the Pond; and, new sand carried from the SMB Littoral Cell into the Pond. Once sand was excavated or dredged to establish the initial Pond location, the in-place sand was gone. Since the CEMEX Pond location has been relatively stable for a number of years, little, if any of the sand that is being mined now can be considered in-place sand. The sand that is mined now from the Pond is sand that is being carried into the Pond by waves, and a much lesser extent, by wind (Figure 12). Every year, winter waves carry sand into the CEMEX Pond and fill the Pond with sand. It is this action of filling the Pond that makes the Pond a sand sink. When sand is excavated from the Pond, it again creates a sand sink into which more sand will be trapped.

Ways that Sand is Carried into the CEMEX Pond: Waves wash over the beach and berm and carry sand into the Pond or wind blows sand into the Pond from the beach and dunes. Figure 13 shows the general routes that sand from these locations will use to reach the Pond; however, most of this sand would have previously traveled on circuitous routes through the littoral cell. Also, the Pond functions as a sediment sink that removes sand from the littoral cell. If not for the Pond, this sand would continue to move throughout the littoral cell.

Sources of the Sand Carried into the CEMEX Pond: Sediment coming from the Salinas River can range in size from silts and clays to sand, gravel and cobbles. The types of sediment carried by the river will depend upon the types of sediment in the riverbed and bank and the velocities of the river flows; higher velocities will expand the sizes of the sediment that can be carried by the river to larger diameter sediments. Waves carry the bulk of the suspended, small diameter, silts and clays into deep water and move the sand-sized sediments off the bar and into along-shore currents. All berm, beach and dune sand that originated in the Salinas River followed a pathway seaward of the MHTL. Also, sand originating from offshore clearly would have traveled from a location seaward of the Mean High Tide Line before reaching the berms, beach or dunes. Only sand eroded from the dunes inland of the pond could possibly have followed a pathway to the Pond that never took it seaward of the MHTL.

Dunes are characteristic of most of the Central Monterey littoral cell back beach and dunes throughout the region supply sand to the beach. Dune erosion occurs under three major conditions: when waves hit the base of the dunes and scour or erode material from the dune face; when wind pulls sand off the dune face; or, when there are slumps or slides. These activities will transport sand from the dunes to the beach. Once sand is carried from the dunes to the beach, it can be carried offshore and along shore by waves, or carried across the beach by wind. From a 1968 study by Dorman, the wind carried approximately 6,000 cy/yr inland along the 1.8 miles section of coast that includes the Pond. The Pond spans about 1,000 ft of shoreline, or about 10% of the 1.8 mile section of coast for which the windblown sand was calculated. Thus, for a general estimate, the Pond would receive approximately less than 1,000 cy/yr of wind-blown sand -- a small volume compared with the volumes carried by waves.

CEMEX Pond Sand comes from Locations Seaward of the Mean High Tide Line: In summary, the vast majority of sand in the Pond is carried by waves (Figure 13, middle panel), traveling into the Pond from a location seaward of the Mean High Tide Line. Wind-borne sand might reach the Pond using a pathway that would avoid going seaward of the Mean High Tide Line; however the wind would probably carry less than 1,000 cy/yr of sand from the beach to the Pond. In addition, a small volume of sand immediately inland of the Pond could reach the Pond through slumping and slides. The bulk of sand in the Pond that originated from the dunes will have followed a pathway with segments seaward of the Mean High Tide Line. All the sand from Salinas River and the offshore would have followed a pathway that included segments seaward of the MHTL.

6. References

Barnard, P. L., Hoover, D., Hubbard, D. M., Snyder, A., Ludka, B. C., Allan, J., ... and McCandless, D. (2017). Extreme oceanographic forcing and coastal response due to the 2015–2016 El Niño. *Nature Communications, 8*.

Chin, J. L., Clifton, H. E. and Mullins, H. T. (1988). Seismic stratigraphy and late Quaternary shelf history, south-central Monterey Bay, California. *Marine Geology*, *81*(1-4), 137-157.

Clark, R.A. and Osborne, R.H. (1982). Contribution of Salinas River sand to the beaches of Monterey Bay, California, during the 1978 flood period: Fourier grain-shape analysis. Journal of Sedimentary Petrology, 52, 807-822.

Combellick, R.A. and Osborne, R.H. 1977. Sources and petrology of beach sand from southern Monterey Bay, California. Journal of Sedimentary Petrology, 47, 891-907.

Dingler, J. R. and Reiss, T. E. (2002). Changes to Monterey Bay beaches from the end of the 1982–83 El Niño through the 1997–98 El Niño. *Marine Geology*, *181*(1), 249-263.

Dorman, C.E. (1968). The southern Monterey Bay littoral cell: A preliminary sediment budget study. Master's Thesis, US Naval Postgraduate School, Monterey, CA

Farnsworth, K. L. and Milliman, J. D. (2003). Effects of climatic and anthropogenic change on small mountainous rivers: Salinas River example. *Global and Planetary Change*, *39*(1), 53-64.

Fulton-Bennett, K. E-mail correspondence dates June 15, 2017; provided in response to a question by staff from June 15, 2017

Garske-Garcia, L. (2017) Staff memo, June 2017 related to the CEMEX Mine Activities.

George, D., Losekoot, M., and Largier, J. (unpublished) Surface circulation in Southern Monterey Bay based on high frequency radar data, for the Coastal Commission June 21, 2017.

Gray, A.B., Pasternack, G.B., Watson, E.B., Warrick, J.A., Goni, M.A., 2014. The effect of El Nino Southern Oscillation cycles on the decadal scale suspended sediment behavior of a coastal dry-summer subtropical catchment. Earth Surf. Process. Landf.

Griggs, G. B. (1987). The production, transport, and delivery of coarse-grained sediment by California's coastal streams. In *Coastal Sediments:* (pp. 1825-1838). ASCE.

Hapke, C. J., Reid, D., Richmond, B. M., Ruggiero, P. and List, J. (2006). *National assessment of shoreline change Part 3: Historical shoreline change and associated coastal land loss along sandy shorelines of the California Coast* (No. 2006-1219). Geological Survey (US).

Hunter, R.E., Dingler, J.R., Anima, R.J. and Richmond, B.M. 1988. Coarse sediment bands on the inner shelf of southern Monterey Bay, California. Marine Geology, 80, 81-98.

Inman, D. L and Jenkins, S. A. (1999). Climate change and the episodicity of sediment flux of small California rivers. *The Journal of geology*, *107*(3), 251-270.

Leatherman, S. (2017) "Causes of Beach Erosion in Southern Monterey Bay" provided as Expert Opinion at the City of Marina, City Council Meeting, June 7, 2017.

MacMahan, J., Brown, J., Brown, J., Thornton, E., Reniers, A., Stanton, T., ... and Scott, T. M. (2010). Mean Lagrangian flow behavior on an open coast rip-channeled beach: A new perspective. *Marine Geology*, *268*(1), 1-15.

Patsch, K. and Griggs, G. (2006). Littoral cells, sand budgets, and beaches: understanding California's shoreline. Institute of Marine Sciences, University of California, Santa Cruz.

Patsch, K. and Griggs, G. (2007). Development of sand budgets for California's major littoral cells. Institute of Marine Sciences, University of California, Santa Cruz.

Paull, C. K., Ussler, W. I. I. I., Greene, H. G., Keaten, R., Mitts, P. and Barry, J. (2002). Caught in the act: the 20 December 2001 gravity flow event in Monterey Canyon. *Geo-Marine Letters*, *22*(4), 227-232.

(PWA) Philip Williams & Associates with Thornton, E., Dugan, J. and Griggs, G. (2008) Coastal regional sediment management plan for Southern Monterey Bay, Prepared for Association of Monterey Bay Area Governments

Slagel, M. J., and Griggs, G. B. (2008). Cumulative losses of sand to the California coast by dam impoundment. *Journal of Coastal Research*, 571-584.

Smith, D. P., Kvitek, R., Iampietro, P. J. and Wong, K. (2007). Twenty-nine months of geomorphic change in upper Monterey Canyon (2002–2005). *Marine Geology*, *236*(1), 79-94.

Thornton, E. B., Sallenger, A., Sesto, J. C., Egley, L., McGee, T. and Parsons, R. (2006). Sand mining impacts on long-term dune erosion in southern Monterey Bay. *Marine Geology*, *229*(1), 45-58.

Thornton, E. B. (2016). Temporal and spatial variations in sand budgets with application to southern Monterey Bay, California. *Marine Geology*, *382*, 56-67.

Willis, C. M. and Griggs, G. B. (2003). Reductions in fluvial sediment discharge by coastal dams in California and implications for beach sustainability. *The Journal of Geology*, *111*(2), 167-182.

7. Figures

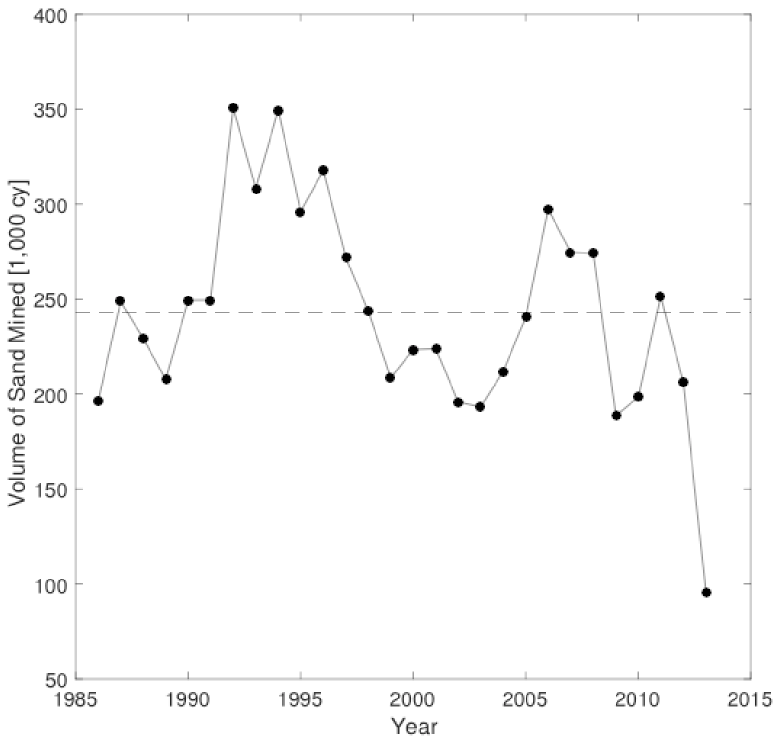

Figure 1: Volume of sand mined based on extraction figures made public by CEMEX as tons/yr. Conversion of 1.23 tons per cubic yard from Slagel and Griggs 2008.

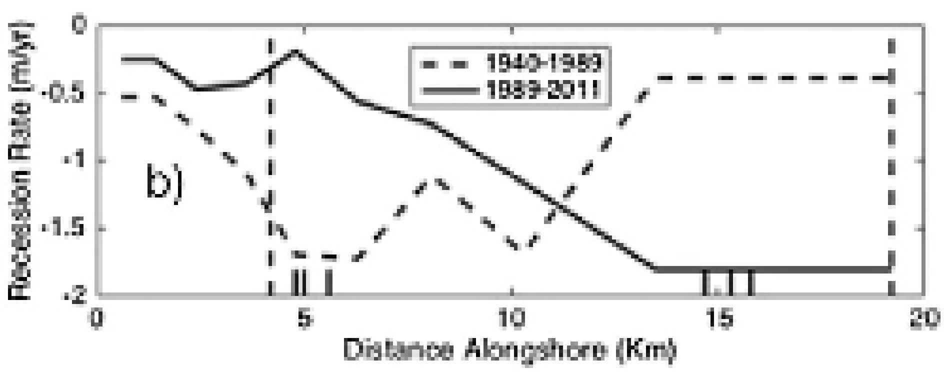

Figure 2: Dune recession rate from Wharf II, Monterey (0) to the Salinas River (20) from Thornton 2016. The location of the five drag-line sand mines plus the dredge pond sand mine (most north) are indicated by the short vertical lines on the horizontal axis. The alongshore variation of dune recession rates are compared between time of intensive dragline mining in the south (1940–1989) and after dragline mining ceased with only the dredge-pond sand mine operating at alongshore distance ~16km (1989–2011).

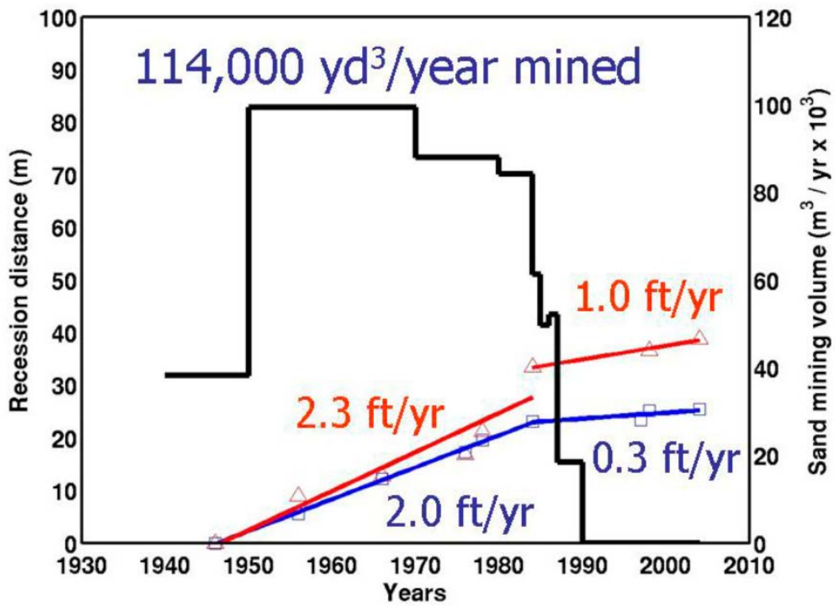

Figure 3: Erosion rates during sand mining operations in Sand City and after cessation. Blue and red lines 0.6 miles and 1.9 miles, respectively, north of Wharf 2, City of Monterey. Figure from PWA (2008), adapted from Thornton et al., 2006.

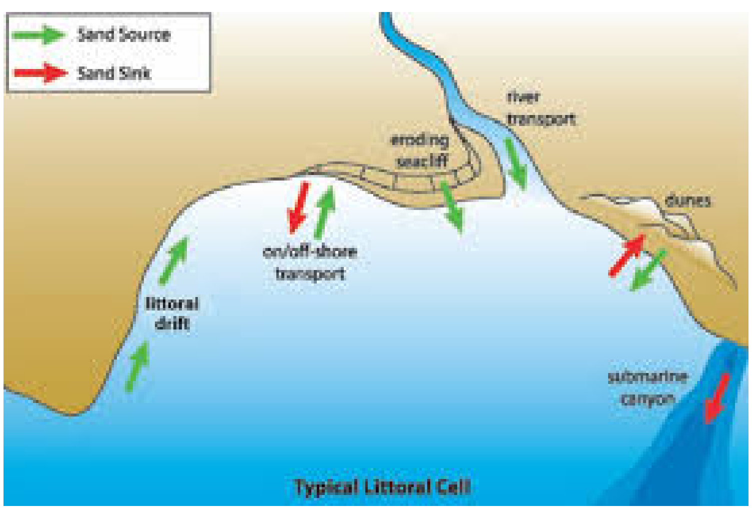

Figure 4: Schematic representation of a littoral cell. Figure from Patsch and Griggs, 2006

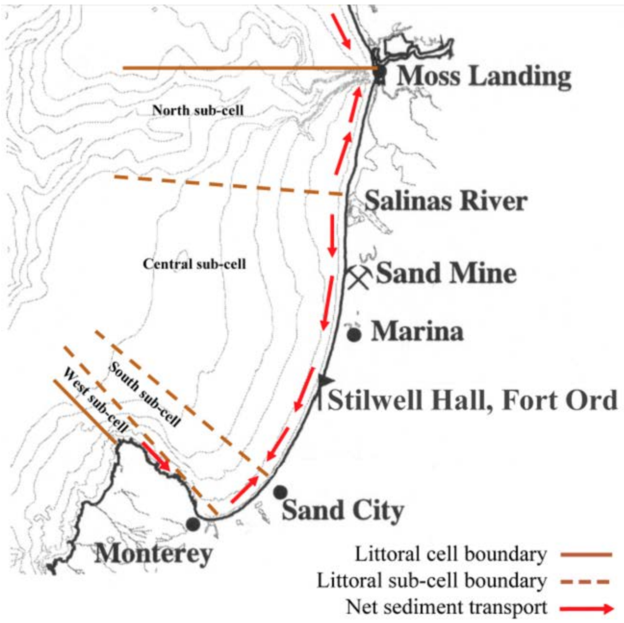

Figure 5: Littoral cell schematic of the southern Monterey Bay from PWA (2008).

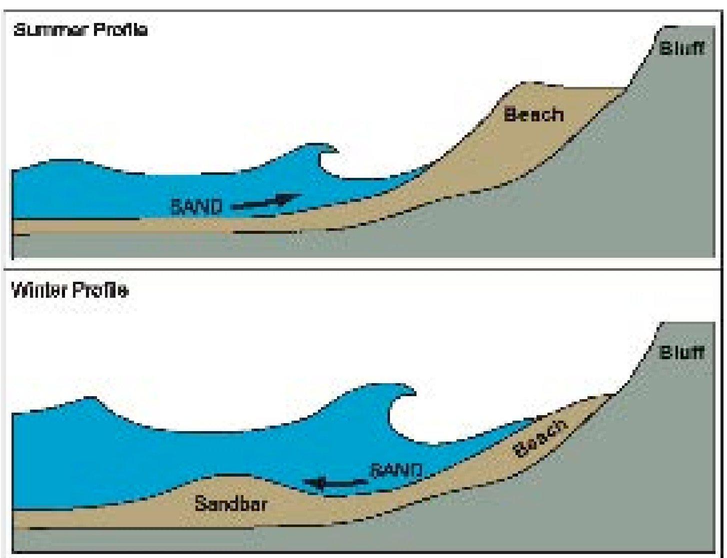

Figure 6: Schematic comparison of summer and winter beach profiles.
Figure from Patsch and Griggs, 2006.

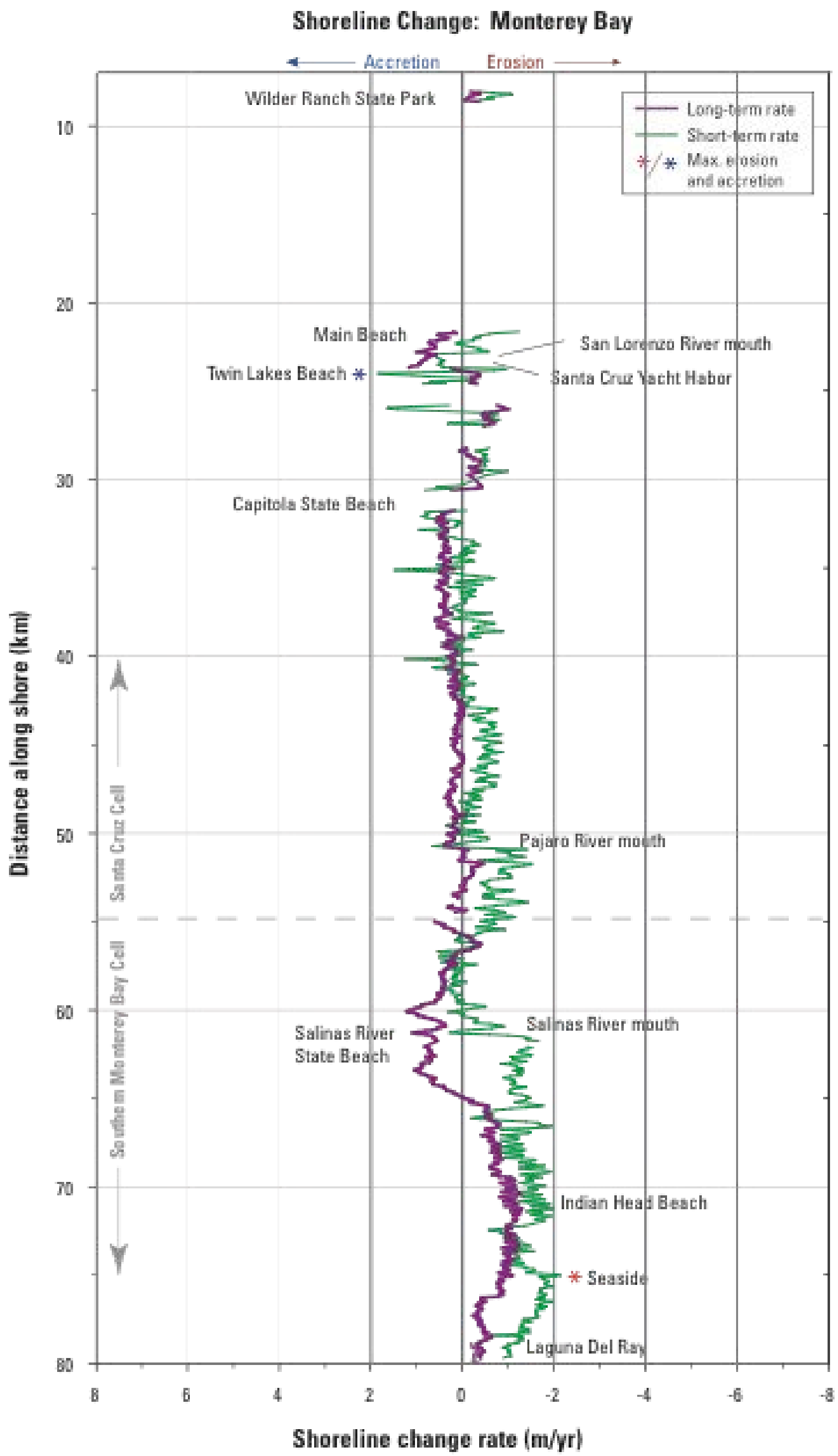

Figure 7: Shoreline change rates in Monterey Bay from Hapke et al. 2006. Purple long-term curve is the retreat rate from 1853-1998, while green short-term curve represents change between 1945 - 1998.

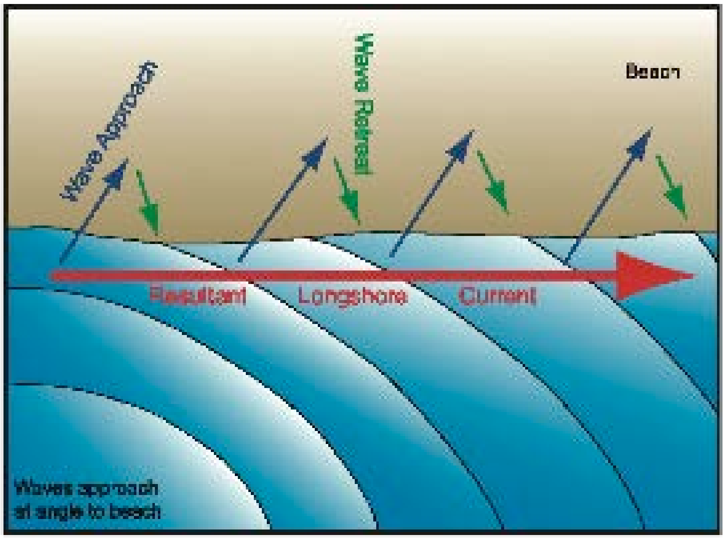

Figure 8: When waves approach the beach at an angle they create a longshore current. The waves rush up and down the beach in the direction of the longshore current.
Figure from Patsch and Griggs, 2006.

Source: Image by David Fierstein, courtesy of and copyright 2000 Monterey Bay Aquarium Research Institute.

Figure 9: Monterey Bay and Monterey Submarine Canyon. Figure prepared by MBARI and provided as evidence of net northerly longshore transport (From Leatherman, 2017) As noted by Mr. Fulton-Bennett from MBARI, "I drew the lines and arrows in this illustration based on my personal, qualitative understanding of the generalized pattern of sand movement along the beaches of Monterey Bay. These lines and arrows were NOT based on any scientific data. I'm sure that sand movement, particularly in the southern half of Monterey Bay, is much more complicated than what is shown in this illustration. Because I did not consult any recent scientific studies before creating this illustration, this illustration should not be used to represent the state of current scientific knowledge about sand movement in Monterey Bay."

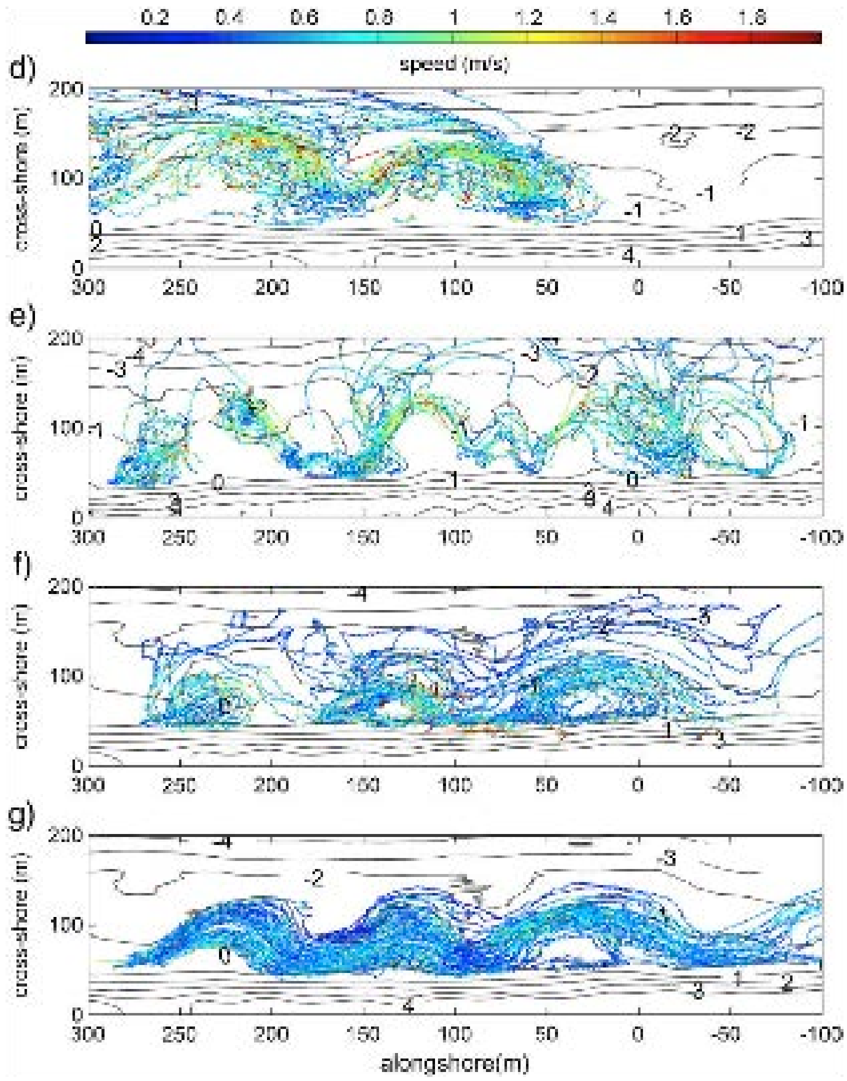

Figure 10: Drifter paths and their speed (color) at Sand City
Figures from McMahan et al. 2010

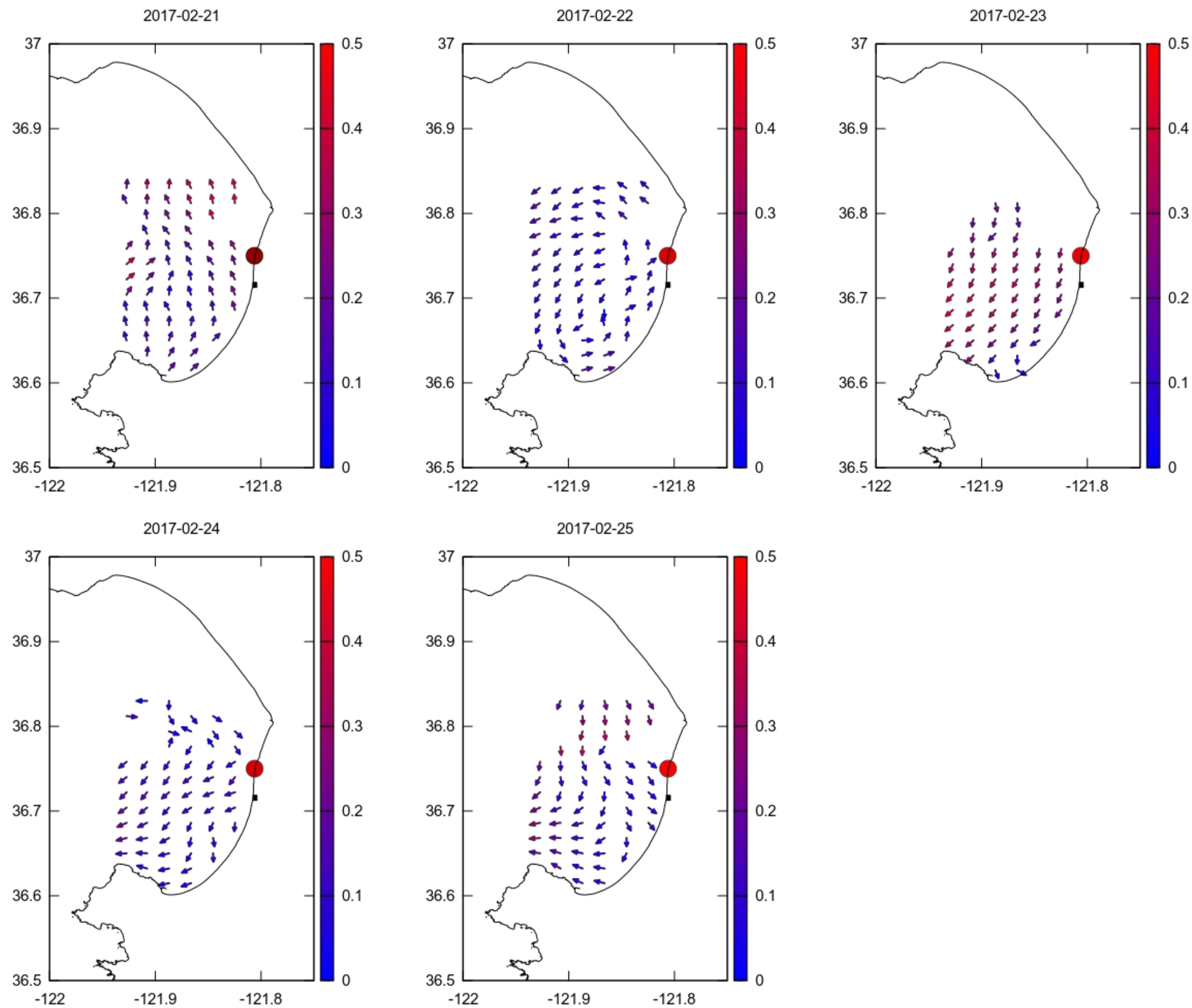

Figure 11: Consecutive average daily surface currents in Southern Monterey Bay during the largest discharge event from the Salinas River in 10 years. The arrows point in the direction of the average surface current. The location of the Salinas River mouth is at the red circle and the location of the CEMEX sand mine is at the black square. Dates of the observations are at the top of each image, as Year – Month – Day.
Figures from George et al. 2017.

Figure 12: Lapis dredge-pond sand mine in Marina, CA, southern Monterey Bay.
Left - Pond and dredge during operation.[16]
Middle - Waves washing over the berm into the pond.[17]
Right - Mine filled with sand.[18]

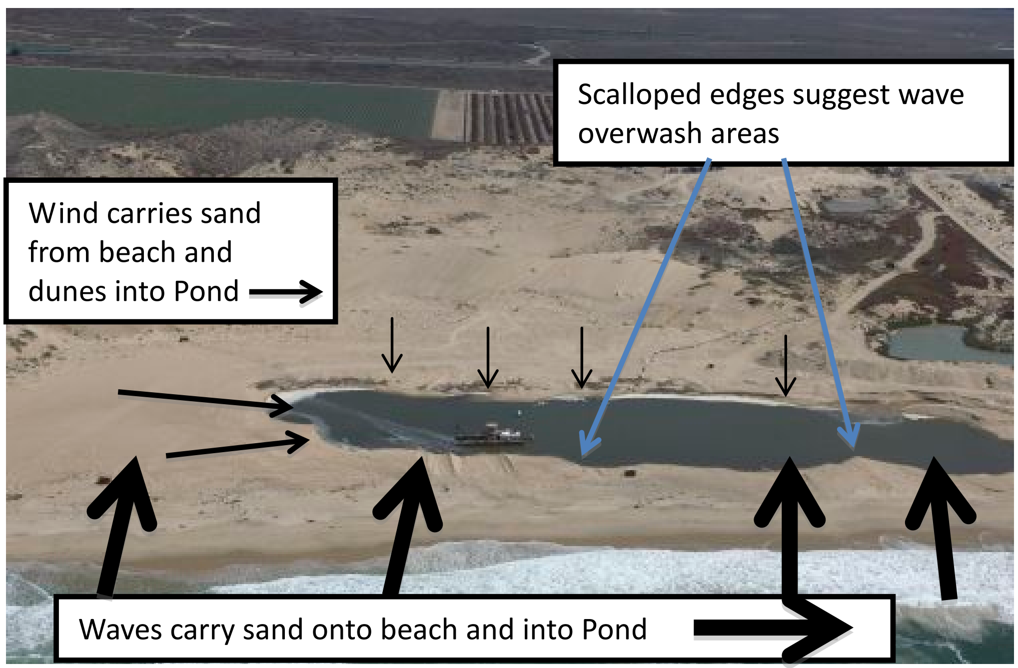

Figure 13: General routes taken by sand to enter The Pond. Weigh of arrows indicate the dominance of each transport mechanism.
Image from the California Coastal Records Project.

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[16] April 2005. Copyright 2005 Kenneth and Gabrielle Adelman, California Coastal Records Project, www.Californiacoastline.org
[17] morning of February 8, 2012 by Gary Griggs, Coastal Care, Org. (www.coastalcare.org/2014/09/Monterey-bay-california-beach-sand-mining-from-a-national-marine-sanctuary-by-gary-griggs/)
[18] 15 January 2008 by Rob Wyland

MEMORANDUM

FROM: Lauren Garske-Garcia, PhD, Ecologist
TO: Lisa Haage, Chief, State-wide Enforcement
Alex Helperin, Senior Staff Counsel
Justin Buhr, State-wide Enforcement Analyst
John Del Arroz, State-wide Enforcement Analyst

SUBJECT: CEMEX: Ecological Resources

DATE: June 22, 2017

Materials Reviewed:

- CalFlora records
- California Invasive Plant Council (Cal-IPC) records
- California Natural Diversity Database (CNDDB) records
- CalAm Monterey Peninsula Water Supply Project maps, prepared by AECOM (2016)
- CalAm Monterey Peninsula Water Supply Project Draft Environmental Impact Report/Environmental Impact Statement (CalAm MPWSP, January 2017)
- Site photos from CCC Staff visits to the CEMEX property
- Technical literature (see *Cited Literature* section)

The Enforcement Division requested that I prepare a memorandum on the ecological resources occurring, or likely to occur at the CEMEX property, and to determine the presence of environmentally sensitive habitat areas (ESHA). The primary focus of my assessment has been on the active mine area (roughly 100 acres) near the central part of the property. This includes the dredge and settling ponds, stockpiles, facilities, and surrounding habitat areas. Since I have not had the opportunity to visit the site, the following is based on publicly-available records for the region including those from the site, a general understanding of sensitive resources within the southern Monterey Bay region, and photos from previous CCC Staff site visits. With limited knowledge of the operational details on-site, my comments concerning potential threats and impacts should be seriously considered but taken as neither definitive nor exhaustive.

The entire CEMEX property (~400 ac) is situated between the Martin Dunes owned by the Big Sur Land Trust to the immediate north (~128 ac with restricted access) and the Marina Dunes Preserve owned by the Monterey Regional Parks District immediately to the south (~47 ac of former sand mines undergoing restoration since 1990). Just north of the Martin Dunes lies the Salinas River National Wildlife Refuge (~367 ac, established in 1973). To the south, the Marina Dunes Preserve is closely followed by Marina State Beach and the Fort Ord Dunes State Park established in 1995 (~990 ac of former military land now undergoing restoration). Extending down to the northern part of the City of Monterey, this roughly 11-mile stretch of coastline is often recognized as the Monterey dune complex, which extends from 4-6 miles inland and constitutes a total area of approximately 40 square miles (Cooper 1967). Though development has largely limited the extent and condition of the complex south of Fort Ord and east of Highway 1 into the future, the remaining ~8.5 miles represents a largely continuous stretch of viable habitat for native flora and fauna. Though significant stretches of this area have been degraded by human activities in the past, ongoing efforts throughout the southern Monterey Bay region are restoring the dune communities and helping to reestablish native habitat corridors. Much of this land is publicly-owned or included in conservation easements, thus making the potential for recovery and maintenance as a natural system into the future very promising. Positioned within the Monterey dune complex, the privately-owned CEMEX property is no exception in importance. Indeed, rare coastal dunes, animals such as western snowy plovers and black legless lizards, and plants such as Menzies' wallflower and the Monterey spineflower have all been documented here.

Sensitive Habitats & Communities

The CEMEX property consists of beach and dune habitats that are physically and biologically linked, and that are components of the Monterey dune complex. Beaches are generally recognized as the relatively narrow strip of sand where the sea meets land. Dune-backed beaches account for roughly a quarter of California's shoreline but together, beach-dune complexes constitute only 2-3% of the State's landmass (Pickart & Barbour 2007), making them one of the rarest landscapes. Where they do occur, coastal dunes are characterized by a number of topographical features and rapidly-transitioning vegetation zones as they reach inland. Across each of these areas, a variety of habitats and uniquely-adapted biological communities occur, each associated with microclimate conditions that are driven by an array of dynamic physical processes including winds, waves, tides, sand supply and moisture retention. Biological adaptations by plants include specialized root systems to tap into deep-residing water stores, micronutrient absorption from aerosol inputs such as fog and sea spray, succulent leaves to dilute naturally-high salt accumulation, hairs to trap sand, low growth habits to accommodate wind, and unique dispersal mechanisms such as floating seeds (Pickart & Sawyer 1998). Similarly, beach and dune-associated animals have adapted to tolerate extreme conditions through mechanisms such as camouflage and counter-shading, timing reproductive seasons to parallel host plants, and living beneath the sand surface.

Beaches & Coastal Strand

Beaches are one of the definitive habitats of the California coast. At the interface of sea and land, they are the setting for a multitude of physical forces shaping our landform and effectively act as sediment reservoirs, episodically storing and releasing sediment to the nearshore littoral system. Coastal strand begins at the upper edge of the dry beach and is characterized by low hummocks, embryonic dunes, and a presence of simple vegetation that can tolerate extremely windy and salty conditions as well as periodic burial; it is a transitional zone to inland habitats. Together, beaches and coastal strand provide valuable ecological resources to marine, terrestrial, and avian species. For example, wrack (organic material from marine plants and algae) provides nutrient subsidies to infaunal organisms dwelling within the sand or living adjacent to the sea where such nutrients may not be otherwise available. Many species of birds also use these areas to forage on associated marine invertebrates such as crabs, infauna, and surf-dwelling fish, or to nest in open spaces. In addition, beaches and coastal strand provide critical ecosystem services to humankind including not only scenic and recreational opportunities but also protective benefits where buffering the shoreline during erosional and flooding events. Whether natural or anthropogenically-driven, processes that reduce sand supply such as sediment diversions and erosion as well as sea level rise threaten to degrade or even eliminate beaches, coastal strand, and the array of important contributions they provide.

Central Foredunes

Moving inland from the coastal strand, the foredune complex can be composed of several subcomponents: foredunes, dune crests, dune ridges, and dune swales. Foredunes are typically described as the larger semi-stabilized features that run parallel to the shoreline and with attenuation of the most extreme physical forces, and generally host a progressively more diverse plant community than does the strand. Dune mat vegetation begins here and is characteristically composed of annuals and herbaceous to somewhat woody-based perennials. Along the seaward face of foredunes, vegetation may exceed 50% cover with dune mat species (Barbour *et al* 1975), which gradually transitions to dense dune scrub as it progresses across dune crests (definitively the highest region in the complex), and to ridges (high points supporting the greatest percent cover of vegetation in the complex). Dune swales, where they occur, are characterized as low points between ridges that possess distinctively more hydrophytic vegetation assemblages; swales do not typically occur in the Monterey dune complex though they do elsewhere in central foredune systems. Collectively, the foredune complex provides a range of topographic features that support a variety of microclimates suitable for vegetation communities and fauna that have specifically-adapted to such conditions.

Central foredunes of California generally occur from mid-Santa Cruz County to Point Conception, Santa Barbara County, and are characterized by a dominance of endemic and circumarctic forb species. In the 2010 update to the status of the State's natural communities, the California Department of Fish and Wildlife classified central foredune habitats and communities as G1 S1.2 (CDFW 2010). Of the three regional foredune communities in California, central foredunes are the rarest. In the southern Monterey Bay region, common dune mat species associated with foredunes include hummock-forming yellow sand verbena (*Abronia latifolia*) as well as beach bur (*Ambrosia chamissonis*) and beach sagewort (*Artemisia pycnocephala*).

Central Dune Scrub

Backdunes in central California are typically characterized by diverse coastal scrub communities along more or less stabilized slopes, ridges, and flats. These areas intergrade with foredune dune mat vegetation and inland chaparral, and are often recognized as dense scatterings of shrubs, subshrubs, and forbs, generally reaching less than 1m in height (Holland 1986). Central dune scrub is identified as G2 S2.2

(CDFW 2010). In the Monterey Bay region, common species in central dune scrub vegetation communities include California goldenbush (*Ericameria ericoides*), dune bush lupine (*Lupinus chamissonis*), beach sagewort (*Artemisia pycnocephala*), bluff lettuce (*Dudleya farinosa*), lizard tail (*Eriophyllum staechadifolium*), common sandaster (*Lessingia filaginifolia*), branching phacelia (*Phacelia ramosissima*), and common phacelia (*P. distans*) (Bluestone 1981). Several sensitive species also occur here, many of which are largely limited to the southern Monterey Bay dune complexes. For example, federally-endangered Monterey spineflower (*Chorizanthe pungens* var. *pungens*) and Monterey gilia (*Gilia tenuiflora* ssp. *arenaria*) are both concentrated in, if not completely limited to, the Monterey area and both tend to largely occur within scrub habitat.

Sensitive Species

Several sensitive plant and animal species occur or are likely to occur on the CEMEX property, including a number that are locally endemic or have significant portions of their populations concentrated in the area.

Flora

Within the Monterey dune complex many sensitive plant species exist. Six have been documented at the CEMEX property while at least another four are likely to occur there to some extent.

Species Known to Occur on the CEMEX Property

Sandmat manzanita (*Arctostaphylos pumila*)

An endemic shrub in California, sandmat manzanita has a California Rare Plant Rank of 1B.2. The Bureau of Land Management also classifies it as a sensitive species. It occurs in sandy to coarse-grained soils found in coastal and dune habitats in Monterey County, with populations largely concentrated in the southern Monterey Bay. Sandmat manzanita is typically associated with coastal strand, chaparral, and northern coastal scrub communities, and occasionally occurs within closed-cone pine forests as well. Historically, it has been documented in the sand flats and dunes just south of the CEMEX property, at Marina State Beach, the Fort Ord Dunes, and in Seaside as well as areas inland of the coastal zone (CalFlora; CNDDB). It has also been recently observed during botanical surveys along Lapis Road at the CEMEX property, within dune scrub habitat (CalAm MPWSP 2017).

Monterey spineflower (*Chorizanthe pungens* var. *pungens*)

Monterey spineflower is a tiny annual herb that is endemic to California, and is protected under the Endangered Species Act as a federally-threatened species. It is also has a California Rare Plant Rank of 1B.2. As its name suggests, the species is concentrated within the Monterey Bay area. Monterey spineflower is found primarily in dune and coastal habitats, and is associated with coastal scrub, chaparral, and occasionally with foothill woodland vegetation communities. It is often found within disturbed areas or those without dense vegetative cover, conditions that favor its recruitment. Records of occurrence in the local area are numerous, reaching from just south of the Salinas River mouth down to the Monterey Peninsula (CalFlora; CNDDB). At the CEMEX property, the species has been documented during botanical surveys and mapped along the periphery of the stockpile yard (AECOM 2016; CalAm MPWSP 2017). The USFWS has designated critical habitat for Monterey spineflower across the dunes both north and south of, but excluding, the CEMEX property (USFWS 2008).

During site visits to other dune areas in southern Monterey Bay region in May 2017, I observed areas where Monterey spineflower had been previously mapped as individual plants or small populations but has since grown to occupy considerably larger areas. This is likely the result of having emerged from seed banks following an unusually wet winter season, and I would expect that the species' distribution is presently at a peak following several years of drought. I would also expect that while this means seed banks will be replenished this year and enable persistence should drier conditions return in immediately subsequent years, it does not eliminate threats to the species but rather provides a basis to anticipate that its presence on the CEMEX property could be even more significant than documented thus far.

COAST BUCKWHEAT (*ERIOGONUM LATIFOLIUM*)

Although coast buckwheat is a perennial herb native to California, it is not in and of itself recognized as a sensitive species; however, it is one of only two host plants for the federally-endangered Smith's Blue Butterfly (see following *Fauna* section). Coast buckwheat is commonly documented throughout northern California and down to the Monterey Bay region, where it is associated with coastal strand and coastal scrub vegetation communities (CalFlora; CNDDB). Note that the second host species for Smith's Blue Butterfly is the closely-related seacliff buckwheat (*E. parvifolium* – see below), which also occurs in the area. While only coast buckwheat has been directly observed on the CEMEX property so far (AECOM 2016; CalAm MPWSP 2017), it appears that it is likely prolific here, including over large areas seaward of the stockpile yard and within the foredune complex.

SAND-LOVING WALLFLOWER (*ERYSIMUM AMMOPHILUM*)

Two sensitive wallflower species are known to occur on the CEMEX property. The sand-loving wallflower has been mapped on-site recently (AECOM 2016; CalAm MPWSP 2017) near areas heavily disturbed by mining operations. Sand-loving wallflower is a perennial herb endemic to California and has a California Rare Plant Rank of 1B.2; the Bureau of Land Management also classifies it as a sensitive species. It occurs in three disparate regions – the southern Monterey Bay, the outer northern Channel Islands of Santa Rosa and San Miguel, and coastal San Diego County – but it is consistently associated with dunes and coastal strand communities. In the southern Monterey Bay region and around the Marina Dunes, it has been reported as occurring from inland of dune crests and occasionally in backdune areas, in association with other native species such as sea thrift (*Armeria maritima*), beach sagewort (*Artemisia pycnocephala*), seaside paintbrush (*Castilleja latifolia* – see above), Monterey spineflower (*Chorizanthe pungens* var. *pungens* – see above), coast dudleya (*Dudleya caespitosa*), and coast buckwheat (*Eriogonum latifolium* – see above) (CalFlora; CNDDB).

Menzies' wallflower (*Erysimum menziesii*)

The other sensitive wallflower known to occur at the CEMEX property, the distinctive Menzies' wallflower, is also sometimes referred to as Yadon's wallflower (*E. menziesii* spp. *yadonii*). Similarly, it is a perennial herb native to California but is considered to be even more seriously threatened than the sand-loving wallflower (*E. ammophilum* – see above) – it is federally-listed as endangered and has a California Rare Plant Rank of 1B.1. Most records of the species are from four particular areas – Humboldt Bay, just north of Fort Bragg in Mendocino County, the Marina Dunes, and the Monterey Peninsula. In the Marina Dunes area, Menzies' wallflower has been recorded from locations between the Salinas River mouth and Marina State Beach, typically occurring along the foredunes where it has been associated with other native species such as the beach evening primrose (*Camissonia cherianthifolia*) and beach burr (*Ambrosia chamissonis*) (CalFlora; CNDDB). Note that this orientation is shoreward relative to the backdune areas where its conspecific, the sand-loving wallflower typically occurs. Menzies' wallflower has been observed during botanical surveys at the CEMEX property (CalAm MPWSP 2017).

Monterey gilia (*Gilia tenuiflora* ssp. *arenaria*)

The federally-endangered Monterey gilia is perhaps the most frequently recorded sensitive plant species in the area, including and immediately surrounding the CEMEX property. It is an annual herb endemic to California and has a California Rare Plant Rank of 1B.2. The geographic distribution of Monterey gilia is limited to the southern Monterey Bay where it is associated with coastal strand, coastal scrub, and chaparral vegetation communities in coastal dune habitats; however, its occurrence within this narrow region appears to be prolific (CalFlora; CNDDB). It is also known to occur on the CEMEX property (CalAm MPWSP 2017).

Species Likely to Occur on the CEMEX Property

Seaside bird's beak (*Cordylanthus rigidus* ssp. *littoralis*)

Seaside bird's beak is listed by the State as endangered and as a sensitive species by the Bureau of Land Management. It is an annual hemiparasitic herb endemic to California and has a California Rare Plant Rank of 1B.1. There are only two areas where the species has been documented, the southern Monterey Bay and Lompoc regions. In the Monterey region, populations have been historically concentrated in the Monterey dune complex near Seaside and Sand City though occurrences have also been documented at Marina State Beach and to some extent, further inland (CalFlora; CNDDB). Between the two regions of its occurrence, Seaside bird's beak has been found to associate with coastal strand, coastal scrub, chaparral, southern oak and foothill woodlands, and closed-cone pine forest communities. The proximity of records to the CEMEX property suggests good potential for this rare plant to occur there.

Seacliff buckwheat (*Eriogonum parvifolium*)

Closely-related to coast buckwheat, seacliff buckwheat is also a perennial herb native to California. Similar to its conspecific, it is not in and of itself recognized as a sensitive species but is especially valuable because it is the second (of only two) host plant species for the federally-endangered Smith's Blue Butterfly (see *Fauna* section below). The two species occupy similar vegetation communities but seacliff buckwheat occurs from the southern Monterey Bay south to the Mexican border, in dunes as well as further inland in scrub, chaparral, and grassland communities (CalFlora; CNDDB). Thus, the two buckwheat species overlap in the southern Monterey Bay. Though seacliff buckwheat is reportedly less common around the Marina Dunes, it is known from areas downcoast of the CEMEX property, at Marina State Beach and Fort Ord Dunes State Park (CDPR 2013) and therefore, has good potential to occur.

Kellog's horkelia (*Horkelia cuneata* var. *sericea*)

Kellog's horkelia is a perennial herb endemic to California with a California Rare Plant Rank of 1B.1. The US Forest Service also considers it to be a sensitive species. It occurs throughout the central coast, between the Bay Area and Point Conception in Santa Barbara County and associates with northern coastal scrub, coastal sage scrub, and closed-cone pine forest vegetation communities. Though in the Monterey area it most often appears to occur at localities at few miles inland of the coast, it has also been reported from dune areas near Marina and Seaside (CalAm MPWSP 2017) as well as around Del Monte and Asilomar (CalFlora; CNDDB). Thus, there is potential for it to occur at the CEMEX property.

Point Reyes horkelia (*Horkelia marinensis*)

The Point Reyes horkelia is another perennial herb endemic to California, occurring between the Monterey Bay and Fort Bragg region of Mendocino County. It has a California Rare Plant Rank of 1B.2. It typically associates with coastal strand, northern coastal scrub, and coastal prairie vegetation communities in coastal dune habitats. There is a single historical occurrence reported from sandy areas west of Highway 1 in Marina, which suggests some potential to occur at the CEMEX property as well (CalFlora; CNDDB).

Fauna

Three sensitive wildlife species have been reported to occur at the CEMEX property and a fourth appears to be present, at least some extent, based upon review of CCC Staff photos from site visits.

Black legless lizard (*Anniella pulchra nigra*)

A subspecies of the California legless lizard (*A. pulchra*), the black legless lizard is a California Department of Fish and Wildlife Species of Special Concern (SSC), State-ranked as S2, and considered sensitive by the US Forest Service. Its very few populations are restricted to the southern Monterey Bay and Monterey Peninsula where much of its habitat has been lost due to human development, including agriculture, housing, sand mining, and the introduction of invasive exotic plant species that have altered its native ecosystem (Papenfuss & Parham 2013). The lizards typically occur on beach dunes and chaparral, in sparsely vegetated areas with occurrences of native bush lupines (such as *Lupinus arboreus* and *L. chamissonis*) and mock heather (*Ericameria ericoides*). They are tolerant of low temperatures and live mostly underground, burrowing in loose sandy soil and foraging on insects, beetles, and spiders within the leaf litter of surrounding vegetation.

FIGURE 1 ADJACENT TO A SAND STOCKPILE (RIGHT), SPARSE DUNE MAT VEGETATION AND WHAT APPEARS TO BE A SERIES OF MEANDERING BLACK LEGLESS LIZARD TRAILS IN CENTER-VIEW. *PHOTO CREDIT: CCC STAFF (27 AUGUST 2015).* INSET: A BLACK LEGLESS LIZARD (*ANNIELLA PULCHRA NIGRA*) FROM MONTEREY COUNTY. *PHOTO CREDIT: GARY NAFIS.*

Black legless lizards have been observed in the vicinity of and on the CEMEX property, including from areas directly north of the dredge pit, along the southern portion of the property, and near the stockpile areas (CNDDB). In addition, photos near the stockpile area taken by CCC Staff during an August 2015 site visit appear to include legless lizard trails as well as appropriate vegetative cover in the proximate area (see **Figure 1**). Additionally, there are records of another subspecies in the area, the silvery legless lizard (*A. pulchra pulchra*), which is also a California Department of Fish and Wildlife SSC, State-ranked as S3, and considered sensitive by the US Forest Service (CNDDB)[1].

WESTERN SNOWY PLOVER (*CHARADRIUS ALEXANDRINES NIVOSUS*)

Featured in a multitude of conservation status ratings, western snowy plovers are perhaps one of the most iconic and vulnerable beach and dune animal species on the West Coast. In addition to being federally-listed as threatened since 1993 and listed by the State as a SSC (State-ranked as S2), they are also considered by the US Fish and Wildlife Service to be a Bird of Conservation Concern, and are on the Red Watch List for the North American Bird Conservation Initiative. The Pacific Coast breeding population of western snowy plovers, recognized as a Distinct Population Segment separate from inland populations, extends from Damon Point, Washington to Bahia

[1] In addition to the CNDDB record, silvery legless lizards have been reported to occur north of the CEMEX property at the Salinas River National Wildlife Refuge - https://www.fws.gov/refuge/Salinas_River/black_legless_lizard.html.

FIGURE 2 WESTERN SNOWY PLOVERS NESTLED INTO SMALL DEPRESSIONS ALONG THE BEACH AT THE CEMEX PROPERTY. *PHOTO CREDIT: CCC STAFF (18 MARCH 2016).*

Magdalena, Baja California (Mexico) but has suffered from habitat fragmentation and is now much reduced from historic populations (USFWS 2007). There are many records of their residence and nesting in the areas surrounding and inclusive of the CEMEX property (for example, see **Figure 2**) and in 2012, the US Fish and Wildlife Service designated critical habitat from Moss Landing to Monterey (Unit CA22; USFWS 2012). At the CEMEX property, this includes the area adjacent to the active dredge pond.

Western snowy plovers depend upon access to undisturbed sand spits, dune-backed beaches, coastal strand, open areas near estuaries, and beaches near river mouths for nesting and roosting (Stenzel *et al* 1981). They often nestle in small depressions in the sand or in the lee of beach wrack, relying on their pale color to camouflage them with the sand. Plovers feed on beach infauna and sometimes dune-associated insects. Human activities are a source of significant disturbance (Stenzel *et al* 1981; USFWS 2012), and such have been the mechanisms of bird deaths as well as interrupted and discontinued nesting across the western United States (Page & Stenzel 1981). Habitat loss and degradation due to coastal development (including sand mining) and invasive species are considered to be the overall leading threats to the western snowy plover (USFWS 2007).

SMITH'S BLUE BUTTERFLY (*EUPHILOTES ENOPTES SMITHI*)

Smith's blue butterfly is listed as federally-endangered and is ranked by the State of California as S1. Its known range extends from the Salinas River mouth to northern San Luis Obispo County, and while the US Fish and not designated critical habitat for the species, it does recognize two distinct regions within the its range (USFWS 2006). The northern region foredune and dune scrub habitats, between the Salinas River and the City of Monterey, are considered to be the butterfly's most threatened habitat overall. A notable gap in habitat between the City of Monterey and the

FIGURE 3 ADULT MALE SMITH'S BLUE BUTTERFLIES (*EUPHILOTES ENOPTES SMITHI*) FEEDING ON HOST PLANTS (*ERIOGONUM SP*.). *PHOTO CREDIT: LEFT, DIANE KODAMA; RIGHT, DON ROBERSON.*

Carmel River area acts as a dispersal barrier that effectively isolates this area from the more stable southern region, which extends from the Carmel River area south to northern San Luis Obispo County.

Importantly, the butterfly is obligate to its host plants throughout its life cycle, these being two species of buckwheat that occur in the coastal zone (*Eriogonum latifolium* and *E. parvifolium*; see *Flora* section above). Adults feed exclusively on buckwheat nectar and deposit their eggs on the flowers (see **Figure 3**). Larvae consume buckwheat flowers and seeds, and pupate on or directly beneath the plants where they overwinter until the following flight season (Arnold 1991; USFWS 2003). The butterflies have evolved to emerge from their pupal cases in synchrony with the peak buckwheat flowering period to take advantage of the available resource (Arnold 1991). The average home range of individual butterflies is relatively small, roughly between 2 and 8 acres (Arnold 1986), and thus their ability to disperse is quite limited.

While not all areas with host plant species are occupied by the butterflies, population trends are believed to parallel that of the available habitat – thus, where the buckwheat species are in decline, it is generally interpreted that so are Smith's blue populations. It has been estimated that more than 50% of the dune habitat in the butterfly's northern region has been either lost to or significantly altered by human activities such as development, sand mining, recreational use including for off-road vehicles, fire suppression, and introduction/invasion by non-native, habitat-altering plant species such as iceplant and European beach grass (for the latter, see *Invasive Species* section below). Ongoing habitat fragmentation diminishes the quality of remaining suitable habitat both directly and indirectly.

Smith's blue butterfly has been officially recorded from throughout its northern region, including on the CEMEX property, as have the buckwheat species it depends upon. Occurrences of animal and habitat tend to be patchy, and are prone to further exacerbation by regional habitat fragmentation. However, conservation and restoration efforts may alleviate pressure on the species' by promoting habitat continuity for buckwheat and thereby, dispersal for Smith's blue populations. Over portions of the CEMEX property, expanses of coast buckwheat habitat have been mapped recently (AECOM 2016; CalAm MPWSP 2017), indicating potential for butterfly occurrences as well as opportunity to facilitate recovery in the northern regional habitat corridor.

FIGURE 4 BANK SWALLOW BURROWS NEAR THE BASE OF THE BLUFF FACE OBSERVED DURING A SITE VISIT TO THE CEMEX PROPERTY. *PHOTO CREDIT: CCC STAFF (18 MARCH 2016).* INSET: A BANK SWALLOW (*RIPARIA RIPARIA*) PERCHED OUTSIDE ITS BURROW AT FALL RIVER MILLS, CALIFORNIA. *PHOTO CREDIT: LARRY JORDAN.*

BANK SWALLOW (*RIPARIA RIPARIA*)

Bank swallows are listed as Threatened by the State of California, ranked as S2 by the California Department of Fish & Wildlife, and considered sensitive by the Bureau of Land Management.

Populations of this small bird occur worldwide and historically, throughout California along inland river banks and coastal bluffs; however, populations and their ranges have been decimated in California over the past century. The species is believed to have been extirpated from southern coastal California and only a few known breeding populations remain elsewhere along the coast (Laymon *et al* 1987). An extant non-breeding population is reported from near the Salinas River mouth, a few miles north of the CEMEX site (CNDDB). Bank swallows have also been reported from south of the CEMEX property at Fort Ord Dunes State Park in recent years (CDPR 2013). Notably, March 2016 photos from a CCC Staff visit documented burrows consistent with bank swallow occupation on the property, suggesting that they have at least previously occupied shoreline bluffs at the site (see **Figure 4**).

As a migratory species, North American bank swallows are generally present in California from late March until mid-September as they move from sub-Arctic regions to the lowlands of South America. Habitat use is dictated by the availability of bluffs and vertical banks made up of friable soils, which allow the birds to create their distinctive burrows. Bank swallows feed predominantly on insects caught while in-flight and thus, they tend to favor areas that support large volumes of insect biomass across wide, open habitat areas such as coastal grassland and coastal scrub adjacent to suitable burrowing areas. The primary threat to bank swallows in California has been identified as the loss of suitable bank features required for the birds to burrow within (Garrison 1998).

INVASIVE SPECIES

Within dune ecosystems, invasive plant species are a major threat to native flora and fauna because they establish dense ground coverage that limits substrate movement and availability to native organisms. Native dunes typically exhibit open vegetation interspersed with sandy areas nearly devoid of plant cover, where wind creates a dynamic physical landscape. As non-native plant species invade dune ecosystems, the substrate available for less native species to recruit becomes increasingly limited. Invasive species can also alter dune morphology to various extents, which in turn alter wind and exposure dynamics for native organisms as well as key shoreline processes. Available images from CCC Staff site visits document a variety of non-native species, several of which are particularly invasive and threatening to dune ecosystems - the most consequential of these are discussed.

EUROPEAN BEACH GRASS (*AMMOPHILA ARENARIA*)

Introduced in the late 1800's to stabilize dunes, European beach grass is an aggressive competitor imposing severe impacts on native ecosystems. It is rated by the California Invasive Plant Council as highly invasive and is problematic throughout central and northern California, where it is has affected more than 50% of California's remaining coastal dunes. Relative to native beach grasses, it grows much more densely and has deep roots that rapidly consume what little water may be available. It also hosts nitrogen-fixing bacteria in its rhizosphere, which allow it to grow rapidly in nitrogen-poor sands and form large monocultures. By contrast, native beach grasses tend to grow as small clumps interspersed with other plant species, promoting a mosaic of biodiversity. Because European beach grass grows so densely, it acts

FIGURE 5 *TOP IMAGE,* INVASIVE PLANTS AT THE CEMEX SITE. ON THE LEFT SIDE, ICEPLANT (*CARPOBROTUS SPP.*) MIXED WITH OTHER SPECIES IN THE DUNES, NOTICEABLY INCREASING THE VEGETATIVE COVER RELATIVE TO MORE NATURAL CONDITIONS AS PICTURED IN THE LOWER IMAGE; ON THE RIGHT, EUROPEAN BEACH GRASS (*AMMOPHILA ARENARIA*) ESTABLISHED WITH EVIDENCE OF ROOTS EXTENDING DOWNWARD INTO THE BLUFF FACE SEEN AS VERTICAL TRAILS DIRECTLY BENEATH. *BOTTOM* IMAGE, INVASIVE EUROPEAN BEACH GRASS ESTABLISHING ON THE RIGHT SIDE, INSHORE OF THE DREDGE SAND ANCHOR. PHOTO *CREDIT: TOP, CCC STAFF (18 MARCH 2016); BOTTOM, CCC STAFF (27 AUGUST 2015).*

as a highly-efficient trap for wind-blown sand, leading to the development of unnaturally steep dune formations along the shoreline. At such steepened foredunes, sand is blocked from reaching and renourishing interior dunes, thereby degrading their forms as well as altering microclimates (Danin *et al* 1998). Resilience to major storm events can also be compromised where European beach grass takes hold – when the steep and unstable foredunes it creates collapse, the remaining now-degraded dunes and inland areas behind them are left vulnerable.

The overarching consequence of European beach grass invasion in dunes has been that native flora and the fauna that depend upon it are compromised or forced out. For example, alteration of the landscape physically displaces the habitat required by nesting and breeding western snowy plovers (Pickart & Sawyer 1998) and reduces dune arthropod diversity (Aptekar 2000). CCC Staff photos from site visits to the CEMEX property indicate the presence of at least two stands of European beach grass (see **Figure 5**). The image pictured in the **upper portion of Figure 5** notably illustrates of the plant's deep roots, which can be seen within the sheared bluff face – the difference between this and the area without it on the left side of the image is readily apparent.

ICEPLANT & SEA FIG (CARPOBROTUS EDULIS AND C. CHILENSIS)

Both iceplant (*Carpobrotus edulis*) and sea fig (*C. chilensis*) are notoriously problematic perennial succulent shrubs throughout California and particularly in dune ecosystems where they were introduced

FIGURE 6 FOREGROUND HIGHLIGHTS DENSE AND EXTENSIVE ESTABLISHMENT OF INVASIVE ICEPLANT RELATIVE TO MORE NATIVE CONDITIONS VISIBLE IN THE BACKGROUND. *PHOTO CREDIT: CCC STAFF (15 SEPTEMBER 2009).*

to stabilize erosion. Iceplant is rated by the California Invasive Plant Council as highly invasive and affected 20-50% of coastal dune ecosystems, sea fig is rated as moderately invasive and has affected more than 50%; both have severe impacts on native ecosystems. These aggressive species form extensive mats that can occupy nearly 100% cover in dune mat and scrub habitats, choking out less competitive native species and limiting the necessary open space for native recruitment. They also interfere by consuming limited water resources, altering soil biochemistry from that the native species are adapted to, and thus facilitate the encroachment of additional non-native species into dune ecosystems.

At the CEMEX property, the assortment of CCC Staff photos through time indicate that extensive mats of iceplant and/or sea fig occur here (for example, see **Figure 6**). These appear to be largely localized around the settling ponds, access road, and mining facilities, presumably planted to help maintain development features. Mats are also evident along foredune and bluff areas. In these latter cases, this has the potential to affect natural dune morphologies and dynamics. Based upon review of Google Earth imagery through time and relative to other nearby areas such as Fort Ord, iceplant mats appear to be still relatively limited here though the threat remains significant. Proactive efforts to eliminate iceplant and sea fig will be incredibly important for protecting sensitive species and habitats.

POTENTIAL IMPACTS TO THE DUNE COMPLEX AND SENSITIVE SPECIES

At the CEMEX property, mining operations appear to extend across the full suite of sensitive habitats including the beach, central foredunes, and central dune scrub. Potential impacts to the Monterey dune complex are both direct and indirect. The extraction of sediment at the dredge pond limits the capacity of local and down-coast systems to naturally maintain their areal coverage and persist through the seasonal pattern of accretion in the spring and summer, and erosion in the fall and winter. Deprived of renourishing substrate material, sensitive beaches and dunes likely erode progressively, experience dynamic shifts, and as a result, alteration of structural morphologies from their natural state. Infrastructure such as unpaved roads, buildings, ponds, parking lots, and stockpile yards also directly limit the space available for habitat, interrupts physical dynamics, and also alters dune morphologies. Activities such as dredge anchoring (*e.g.*, disturbance to surface use and infaunal beach communities), driving (*e.g.*, compaction of substrate), movement of and stockpiling material (*e.g.*, introduction of non-native material, limits to successional processes), and sand sorting (*e.g.*, alteration of beach grain sizes) can impose temporary, persistent, and permanent impacts. And disturbances via lighting (*e.g.*, disruption of nocturnal species activities and increased vulnerability to predators), noise (*e.g.*, flushing of birds), ground vibrations (*e.g.*, stress on ground-dwelling animals), and the introduction of invasive species (*e.g.*, to stabilize developed areas) may impose indirect effects on sensitive flora and fauna. Individually, each of these physical disturbances may impact the sensitive resources at the CEMEX property; cumulatively, such impacts may be further exacerbated.

Given what is understood of the CEMEX operations, several examples of potential impacts to ecological resources can be highlighted. Among these, impacts to the coastal strand over time would result in foraging and nesting for bird species such as the federally-protected western snowy plover (*Charadrius alexandrines nivosus*; see *Fauna* section). Indeed, the USFWS (2007) specifically identifies sand mining in the Monterey Bay as a major threat to the species' recovery within the designated critical habitat because it reduces nesting and foraging habitat for plovers, generates excessive noise, and can lead to physical trampling by heavy equipment. Alteration of foredunes and bluff morphology by invasive non-native plants like European beach grass, iceplant, and sea fig (see *Invasive Species* section) reduce transport of replenishing sand to the inland dune complex and further limit available space for native vegetation, reducing overall ecological diversity (Stenzel *et al* 1981). Bluff stabilization is also widely recognized as the primary threat to bank swallow populations (*Riparia riparia*; see *Fauna* section) statewide (Garrison *et al* 1998) though presumably, sea level rise along bluff-backed beaches (exacerbated by sand supply loss and dune deterioration) will also pose a threat to available habitat. Within central foredune and dune scrub, ongoing habitat loss and degradation will likely affect native plant species such as the federally-threatened Monterey spineflower (*Chorizanthe pungens* var. *pungens*; see *Flora* section), which has critical habitat designated directly north and south of the CEMEX property (USFWS 2008) suggesting that the value of the property for this protected species is likely significant as it would facilitate a continuous dispersal corridor. Where native fauna are dependent upon native vegetation – such as the case of Smith's blue butterfly (*Euphilotes enoptes smithi*; see *Fauna* section) and its host buckwheat plants (*Eriogonum spp.*; see *Flora* section) – the implications of dune habitat loss and fragmentation are profound, particularly in this highly susceptible and isolated northern region of the butterfly's habitat. As a final example, the black legless lizard (*Anniella pulchra nigra*; see *Fauna* section) and its habitat are vulnerable to operations such as the regular movement of stockpile material, including repeated burial with material and injury or mortality from heavy equipment use.

ESHA Discussion

The Coastal Act defines environmentally sensitive [habitat] areas, or ESHA, in §30107.5, where it reads:

> *"Environmentally sensitive area" means any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.*

Section 30240 of the coastal requires protection of ESHA as follows:

> *(a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.*
>
> *(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.*

The determination of rare habitats and species are made by the California Department of Fish and Wildlife, the US Department of Fish and Wildlife, and other expert groups (*e.g.*, California Native Plant Society). The Coastal Commission is tasked with protecting ESHA. The California Natural Diversity Database is a state depository of lists of rare plant and animal species, and rare natural communities (*e.g.*, habitats, vegetation communities), generated by an array of regional, state, national and international sources, that are vetted, maintained and continually updated by the Biogeographic Branch of the California Department of Fish and Wildlife. The Commission has a subscription to the CNDDB and Commission staff routinely use this resource to determine the rarity status of habitats and species that have been identified on potential project sites.

As described above, many acres of central foredunes and central dune scrub habitat occur on the CEMEX property. Central foredunes and central dune scrub are rare habitats assigned global and state rankings of G1 S1.2 and G2 S2.2, respectively. Because they are rare and can be easily disturbed or degraded by human activities and developments, I conclude that central foredune and central dune scrub habitats at this location rise to the level of ESHA. It should be noted that given the rarity of dune habitats across the state and the ease with which they are degraded by human activities, the Commission has considered coastal dunes, even those that are significantly degraded, to meet the definition of ESHA[2,3].

Eight plant species that are known to occur or likely to occur on the CEMEX property have been described previously as possessing a California Rare Plant Rank of either 1B.1 or 1B.2, indicating that they are rare. Notably, three of these are federally-protected species. Because they are rare and can be easily disturbed or degraded by human activities and developments, I conclude that the areas occupied or likely to be occupied by the following plant species rise to the level of ESHA: sandmat manzanita (*Arctostaphylos pumila* – 1B.2); Monterey spineflower (*Chorizanthe pungens* var. *pungens* – federally-threatened/1B.2); sand-loving wallflower (*Erysimum ammophilum*

[2] City of Oxnard LCP Amendment 1-05 (Oxnard Shores)

[3] City of Malibu LCP Amendment 1-07 (Malibu Bay Company)

– 1B.2); Menzies' wallflower (*E. menziesii* – federally-endangered/1B.1); Monterey gilia (*Gilia tenuiflora* ssp. *arenaria* – federally-endangered/1B.2); Seaside bird's beak (*Cordylanthus rigidus* ssp. *littoralis* – 1B.1); Kellog's horkelia (*Horkelia cuneata* var. *sericea* – 1B.1); and, Point Reyes horkelia (*Horkelia marinensis* – 1B.2).

Two additional plant species, coast buckwheat (*Eriogonum latifolium*) and seaside buckwheat (*E. parvifolium*), have been previously described as uniquely supporting the federally-endangered Smith's blue butterfly through their role as host plants necessary for the butterfly's life cycle. Because they provide especially valuable habitat and can be easily disturbed or degraded by human activities and developments, and the northern region of the Smith's blue butterfly's distribution is considered to be its most threatened, I conclude that the areas occupied or likely to be occupied by both species of buckwheat, *E. latifolium* and *E. parvifolium*, rise to the level of ESHA here.

Four animal species that are known to occur or likely to occur on the CEMEX property have been described previously. Each of these is ranked by the California Department of Fish and Wildlife as S1 or S2, indicating that they are rare. Because they are rare and can be easily disturbed or degraded by human activities and developments, I conclude that the areas of habitat occupied or likely to be occupied by the following animal species rise to the level of ESHA: black legless lizard (*Anniella pulchra nigra* – S2); western snowy plover (*Charadrius alexandrines nivosus* - federally-threatened/S2); Smith's blue butterfly (*Euphilotes enoptes smithi* – federally-endangered/S1); and, bank swallow (*Riparia riparia* – S2).

In conclusion, I find that two habitats and the areas occupied or likely to be occupied by the fourteen species either occurring or likely occurring on the CEMEX property constitute ESHA, demonstrating the ecological significance of this site.

Cited Literature

Aptekar R. 2000. *Ammophila arenaria*. Pp 42-46. *In:* CC Bossard, JM Randall, MC Hoshovsky. 2000. Invasive Plants of California's Wildlands. University of California Press. Berkeley.

Arnold RA. 1986. Ecological studies of the endangered Smith's blue butterfly at Marina State Beach in 1986. Final Report for an Interagency Agreement between the California Department of Parks and Recreation and the University of California's University Research Expeditions Program. Entomological Consulting Services, Inc. Pleasant Hill, California. 24pp.

Arnold RA. 1991. Status surveys and habitat assessment for the endangered Smith's blue butterfly at the Garland Ranch Regional Park in Carmel Valley, California. Prepared for the Monterey Peninsula Regional Park District. Entomological Consulting Services, Inc. Pleasant Hill, California. 28pp.

Barbour MG, TM De Jong, AF Johnson. 1975. Additions and corrections to a review of North American Pacific coast beach vegetation. Madroño 23: 130-134.

Bluestone V. 1981. Strand and dune vegetation at Salinas River State Beach, California. Madroño 28: 49-60.

California Department of Fish and Wildlife – Biogeographic Data Branch. 2010. List of Vegetation Alliances and Associations. Vegetation Classification and Mapping Program, California Department of Fish and Game. Sacramento, CA. https://www.wildlife.ca.gov/Data/VegCAMP/Natural-Communities/List, accessed: 16 June 2017.

California Department of Parks and Recreation – Monterey District. 2013. Final Initial Study/Mitigated Negative Declaration for the Fort Ord Dunes State Park Campground Project. Prepared by Denise Duffy & Associates, Monterey. 104 pp.

Cooper WS. 1967. Coastal Dunes of California. The Geological Society of America, Memoir 104. 147pp.

Danin A, S Rai, M Barbour, N Jurjavcic, P Connors, E Uhlinger. 1998. Early primary succession on dunes at Bodega Head, California. Madroño 45: 101-109.

Garrison BA. 1998. Bank swallow (*Riparia riparia*). *In*: The Riparian Bird Conservation Plan: a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/htmldocs/riparian_v-2.html.

Holland VL, D Keil, LD Oyler. 1995. Nipomo Dunes Preserve surveys conducted between March 1990 and December 1992. Unpublished report, The Nature Conservancy, San Luis Obispo, CA.

Laymon SA, BA Garrison, JM Humphrey. 1987. Historic and Current Status of the Bank Swallow in California. State of California, The Resources Agency, Department of Fish and Game - Wildlife Management Division, Administrative Report 88-2. 47pp.

Page GW, LE Stenzel. 1981. The breeding status of snowy plover in California. Western Birds 12: 1-40.

Papenfuss TJ, JF Parham. 2013. Four New Species of California Legless Lizards (Anniella). Breviora 536: 1-17.

Pickart AJ, MG Barbour. 2007. Beach and Dune. Pp. 155-179. *In*: Terrestrial Vegetation of California (Third Edition). MG Barbour, T Keeler-Wolf, AA Schoenherr, Eds. University of California Press. Berkeley.

Pickart AJ, JO Sawyer. 1998. Ecology and Restoration of Northern California Coastal Dunes. The California Native

Plant Society. Sacramento, California. 152 pp.

Stenzel LE, SC Peaslee, GW Page. 1981. The breeding status of the snowy plover in California. II. Mainland Coast. Western Birds 12: 6-16.

US Fish And Wildlife Service. 2003. Status Review for the Smith's Blue Butterfly (*Euphilotes enoptes smithi*), Los Padres National Forest, Monterey Ranger District. Report to the US Forest Service under cooperative agreement number 03-IA-11050700-024. 42pp.

US Fish and Wildlife Service. 2006. Smith's Blue Butterfly (*Euphilotes enoptes smithi*) 5-Year Review: Summary and Evaluation. 28pp.

US Fish and Wildlife Service. 2007. Recovery Plan for the Pacific Coast Population of Western Snowy Plover (*Charadrius alexandrines nivosus*). In 2 volumes. Sacramento, California. xiv+751 pp.

US Fish and Wildlife Service. 2008. Designation of critical habitat for the Monterey spineflower (*Chorizanthe pungens* var. *pungens*). Federal Register January 9, pp. 1525-1554.

US Fish and Wildlife Service. 2012. Revised designation of critical habitat for the Pacific Coast population of the Western snowy plover; Final Rule. Federal Register June 19, pp. 36727-36869.

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VIA REGULAR AND CERTIFIED MAIL

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Subject:	Notification of Intent to Commence Cease and Desist Order and Restoration Order Proceedings and Administrative Civil Penalties Proceedings
Violation File Number:	V-3-14-0151
Property Location:	Lapis Sand Plant, Lapis Road, City of Marina, Monterey County Assessor's Parcel Number 203-011-019-000
Alleged Violation:	Unpermitted Development, including, but not necessarily limited to: Dredging and extraction of sand, including resulting in the creation of ponds; placement of floating dredges and development associated with the dredges, such as placement and installation of anchors and mooring cables, pipes, a pump station(s), and other facilities; grading; and changes in the intensity of use of the property.

Dear Mr. Wittman:

I would first like to thank Cemex and their representatives for meeting multiple times with Coastal Commission staff over the last several months to discuss the issues related to the above-referenced matter. We have spent a great deal of time reviewing the materials that Cemex has provided to us and have done our own, additional, independent research into the issues discussed below. As Commission staff has discussed in numerous meetings with Cemex and counsel for Cemex, we feel there are significant resource, policy and legal issues related to the activities that are occurring at the above-referenced site, as I will discuss in more detail below. With that said, we remain open to further discussions with Cemex to resolve this matter. As discussed with your representatives, Bonnie Neely and Geoff Etnire, in a meeting on December 17, 2015, and in subsequent conversations between Ms. Neely and Commission staff, this letter is a step in the formal administrative process intended to remedy the Coastal Act violations that Commission staff believes exist on the property. We are encouraged by Cemex's willingness so far to discuss the issues related to the sand mining operation on the site, and we hope to continue working with Cemex to determine the appropriate path forward for this matter.

Therefore, the purpose of this letter is to notify you of my intent, as the Acting Executive Director of the California Coastal Commission, to commence proceedings for issuance of a Cease and Desist Order and a Restoration Order ("the Orders") and for the imposition of administrative civil penalties, to resolve the violations of the California Coastal Act resulting from unpermitted development that has occurred and continues to occur on property owned by you at Lapis Road, as described above ("the Property"). The unpermitted development at issue on the Property includes, but is not necessarily limited to: dredging and extraction of sand, including such activities that have resulted in the creation of ponds; placement of floating dredges and development associated with the dredges, such as the placement or installation of anchors and mooring cables, pipes, a pump station(s), and other facilities; grading; and changes in the intensity of use of the Property.

As discussed with your agents Bonnie Neely and Geoff Etnire in a meeting on December 17, 2015 this letter does not preclude our ability to continue to work together to resolve this matter. As stated previously, this letter is a standard step in the ongoing administrative process that will legally resolve the Coastal Act violations through an enforcement hearing. If we cannot resolve this matter through consent orders, we plan to bring regular cease and desist and restoration orders and administrative penalty proceedings to the Commission unilaterally in the near future.

<u>Background</u>

As you may know, the California Coastal Act[1] was enacted in 1976 to provide long-term protection of California's 1,100-mile coastline through implementation of a comprehensive planning and regulatory program that would manage conservation and development of coastal resources. The California Coastal Commission ("Commission") is the state agency created by, and charged with, administering the Coastal Act. In making its permit, enforcement, and land use planning decisions, the Commission carries out Coastal Act policies, which, amongst other goals, were designed to protect and restore sensitive habitats (such as dunes and wetland habitats), protect natural landforms, protect scenic landscapes and views of coastal areas, and provide maximum public access to the coastal zone. The Commission, in coordination with local governments, plans and regulates development and natural resource use in the coastal zone in keeping with the requirements of the Coastal Act.

Although Commission staff has been aware of the sand mining operation at the Property for years, in 2010, in response to allegations from the public that the property owner was using bulldozers to push sand into the dredge pond, Commission staff began a more detailed investigation regarding the status of the operation. In April 2014, Commission staff began a series of discussions with representatives of the property owner to discuss the status of the sand mining operation on the Property. Since that time, Commission staff has continued to investigate this matter and discuss the unpermitted development with the representatives of the property owner, through a number of meetings, phone calls, and visits to the Property by Commission staff.

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[1] The California Coastal Act of 1976 ("Coastal Act") is codified in Division 20 of the Public Resources Code (sections 30000 to 30900).

Cease and Desist and Restoration Orders

As stated above, this letter provides notice of my intent to commence proceedings for issuance of a Cease and Desist Order and a Restoration Order. The purpose of these proceedings is to resolve outstanding issues associated with unpermitted development activities that violate the Coastal Act. Collectively, the Orders will direct you to cease and desist from performing any unpermitted development, will compel the removal of unpermitted development, and order the restoration of the areas impacted by the unpermitted development[2].

Cease and Desist Order

The Commission is authorized to issue an order to cease and desist pursuant to Section 30810 of the Coastal Act. Section 30810(a) of the Coastal Act states, in part:

> *If the commission, after public hearing, determines that any person or governmental agency has undertaken, or is threatening to undertake, any activity that (1) requires a permit from the commission without securing the permit or (2) is inconsistent with any permit previously issued by the commission, the commission may issue an order directing that person or governmental agency to cease and desist. The order may also be issued to enforce any requirements of a certified local coastal program or port master plan, or any requirements of this division which are subject to the jurisdiction of the certified program or plan, under any of the following circumstances:*
>
> *(1) The local government or port governing body requests the commission to assist with, or assume primary responsibility for, issuing a cease and desist order.*

Pursuant to the Coastal Act (Public Resources Code Section 30600(a))[3] and the Implementation Plan portion of the City of Marina's Local Coastal Program ("LCP"), any person wishing to perform or undertake development in the Coastal Zone must obtain a Coastal Development Permit ("CDP"), in addition to any other permit required by law. Development is defined by Section 30106, as follows:

> *"Development" means, on land, in or under water, the placement or erection of any solid material or structure; discharge or disposal of any dredged material or any gaseous, liquid, solid, or thermal waste; grading, removing, dredging, mining, or extraction of any materials; change in the density or intensity of the use of land...change in the intensity of water, or of access thereto; construction, reconstruction, demolition, or alteration of the size of any structure, including any facility of any private, public, or municipal utility; and the removal or harvest of major vegetation....*

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[2] Although violations that consist of unpermitted development can sometimes be resolved through the issuance of an after-the-fact coastal development permit, the Commission's Central Coast office permitting staff have indicated that the operation would likely not be consistent with the applicable standard of review under the Coastal Act and City of Marina LCP, and likely advise against submitting a CDP application. Moreover, although Commission staff asked Cemex representatives during the above-referenced December meeting if they planned to submit a coastal development permit application, Cemex representatives then indicated a reluctance to do so and of course Cemex has not moved to seek a permit in the intervening months.

[3] Unless otherwise specified, all section references herein (including references to "Coastal Act" sections or sections "of the Coastal Act") are technically to sections of the Public Resources Code (and thus, to the Coastal Act).

Development is defined in the City of Marina Implementation Plan as follows:

> *Development: Shall mean, on land, in or under water, the placement or erection of any solid material or structure; discharge or disposal of any dredge materials or waste; grading, removing, dredging, mining or extraction of any materials; change in the density or intensity or use of land including subdivision and any other division of land except where division occurs as a result of purchase by a public agency for public recreational use; change in the intensity of use of water, or access thereto; construction, reconstruction, demolition, or alteration of the size of any structure; and the removal or harvesting of major vegetation other than for agricultural purposes or kelp harvesting.*

As confirmed by Commission staff, development has occurred and continues to occur without a CDP on your property at Lapis Road, Monterey County Assessor's Parcel Number 203-011-019-000 (the "Property"). The activities that constitute unpermitted development in this case include, but are not necessarily limited to: dredging and extraction of sand, including resulting in the creation of ponds; placement of floating dredges and development associated with the dredges, such as placement and installation of anchors and mooring cables, pipes, a pump station(s), and other facilities; grading; and changes in the intensity of use of the property. Changes in intensity of use of the property include a significant increase in the volume of sand extraction. These are all activities that constitute development as defined in Section 30106 of the Coastal Act and the City of Marina certified Implementation Plan, occurred without any coastal development permit, and occurred on the Property, which is within the Coastal Zone.

No exemptions from the Coastal Act's and the LCP's permit requirements apply for the development. The one type of exemption that we have discussed is the potential for an exemption based on vested rights and Coastal Act section 30608; however, neither the property owner nor its predecessors in interest to the Property have filed, or received confirmation of, a vested rights claim pursuant to Section 30608 of the Coastal Act and Sections 13200 to 13202 of Title 14 of the California Code of Regulations. Notwithstanding the fact that no such formal claim has been made, your representatives have provided information, such as the March 31, 2014 letter to Commission staff. We have reviewed these materials as well as done independent research to assess the possibility that such rights might exist. Although we recognize that review is not based on a formal application and is therefore not a formal determination on an application for vested rights, based on that review, in addition to the issue noted above with regard to an increase in the volume of sand extraction, it appears that a vested rights claim could not be granted for the unpermitted development, as the development listed above did not receive all necessary authorizations as of the relevant date under Proposition 20 (November 8, 1972) or the Coastal Act (January 1, 1977). One example of such a missing authorization is the failure to secure the issuance of a Use Permit from Monterey County prior to the creation and commencement of use of the main dredge pond in 1965. Similarly, once the City of Marina ("City") incorporated, there was no attempt to rectify that permitting problem by securing an after-the-fact permit from the City. Finally, though this is not necessarily the only other permit that was lacking, there is the failure to have obtained a CDP from the Coastal Zone Conservation Commission prior to 1977. Additionally, vested rights law provides that other factors, such as changes to or cessation of an activity, including such factors as an increase in the volume extracted, may also result in a new requirement for authorization of an activity. Therefore, the development required a CDP and none was obtained, and, as such, undertaking this development constitutes a violation of the Coastal Act and the LCP.

The activities described in this letter clearly constitute "development" as that term is defined in both the Coastal Act (Section 30106) and the LCP and are not otherwise exempt from Coastal Act and LCP permitting requirements. No CDP was issued to authorize the subject unpermitted development. Therefore, development occurred that required a permit from the Commission without one having been obtained and that violated the City's LCP, satisfying both of the criteria of Section 30810(a) of the Coastal Act.

Because the City has a certified Local Coastal Program, the City has the option to enforce its own LCP. However, some of the development at issue began before the City's LCP was certified, and some of the development at issue may be occurring in the area of the Commission's retained jurisdiction pursuant to section 30519(b) of the Coastal Act. All such development required a permit from the Commission, so the Commission has jurisdiction to enforce the failure to obtain such a permit before commencing development, pursuant to the first sentence of Section 30810(a). In addition, for the development that required a permit from the City, the Commission has jurisdiction over enforcement of that unpermitted development based on the second sentence of Section 30810(a), and in particular, Section 30810(a)(1), which enables the Commission to take enforcement action to enforce the requirements of a certified Local Coastal Program when the local government requests that the Commission assist with or take primary responsibility for enforcement. In this case, the City requested that the Commission assume primary enforcement responsibility regarding this violation via a resolution passed by the City on March 15 and confirmed via phone call on March 16, 2016.

Section 30810(b) of the Coastal Act also states that a Cease and Desist Order may be subject to such terms and conditions as the Commission may determine are necessary to ensure compliance with the Coastal Act, including removal of any unpermitted development or material. The proposed Order will therefore direct the property owner and others subject to their control and/or in a legal relationship with the property owner to come into compliance with the Coastal Act and LCP by, among other potential actions: 1) cease and desist from maintaining any development on the Property not authorized pursuant to the Coastal Act and the City's LCP; 2) cease and desist from engaging in any further development on the Property unless authorized pursuant to the Coastal Act; 3) remove the physical elements of unpermitted development, and 4) take all steps, as identified, necessary to comply with the Coastal Act.

For these reasons, I am issuing this Notice of Intent to Commence Cease and Desist Order proceedings. The procedures for the issuance of these Cease and Desist Orders are described in Sections 13180 through 13188 of the Commission's regulations, which are codified in Title 14 of the California Code of Regulations.

Restoration Order

Section 30811 of the Coastal Act provides the Coastal Commission the authority to issue a restoration order to address violations at the Property. Coastal Act section 30811 gives the Commission the authority to issue a Restoration Order when three criteria are satisfied: 1) development has occurred without the requisite CDP, 2) the development is inconsistent with the Coastal Act, and 3) the development is causing continuing resource damage.

The first of those three criteria was discussed in the prior section. However, along with being unpermitted, the above-referenced activities on the Property also raise significant substantive issues in that they have continuing natural resource impacts that are inconsistent with Chapter 3 of the Coastal Act, including impacts to the shoreline sand supply, to environmentally sensitive habitat areas ("ESHA"), and to public access.

The unpermitted development has resulted in the removal of sand from the littoral system and its transport inland for commercial sale, with associated impacts on the sand supply of the area. Sand is a mobile resource that is moved by wave and wind action. The unpermitted development has altered and continues to alter the natural shoreline processes at this location. The vast majority of the sand that is removed as a result of the unpermitted development comes from the littoral system. As a result of the unpermitted development, sand that would under natural conditions remain a part of the littoral system is instead captured in the dredge pond and extracted for commercial sale. That sand is removed from the littoral system, and is not able to build or accrete to beaches, dunes, or offshore areas along the Monterey Bay. This is inconsistent with Coastal Act Sections 30233, 30235, and 30253, and Policies 8 and 22 of the Land Use Plan portion of the City's LCP (the "LUP"), which prohibits further degradation of the beach environment. The unpermitted development therefore decreases the amount of sand on the Monterey Bay shoreline, and narrows beaches within the Monterey Bay, inconsistent with Coastal Act Section 30210 and 30211. Existing development, including a wastewater treatment plant and the highway are located just downcoast near the edge of the dunes. Narrower beaches lead existing development to have greater susceptibility to erosion by wave action, potentially impacting the stability of existing development on the Monterey Bay shoreline, inconsistent with Coastal Act Section 30253 and Policy 38 of the LUP. The unpermitted development also results in impacts to public access, as a reduction in the width of the beach reduces the area of the sandy beach available to the public with additional potential impacts to lateral access. Especially critical here is that, as sea levels continue to rise, the impacts to public access will become even more significant. Given this, among the other issues stated herein, the unpermitted development is also inconsistent with the public access policies of the Coastal Act and Policy 1 of the LUP.

Coastal dunes, which are located on the Property, are important habitat for many species of native plants that are adapted to the shifting dune sands, including special status plants that have been observed on the site, including the federally threatened Monterey spineflower, which has designated critical habitat on the property, the state and federally endangered Yadon's wallflower, and the CNPS listed coast wallflower[4]. Native dune plants also provide important habitat for many native animal species, including the federally threatened Smith's blue butterfly which has suitable habitat on the Property and provides foraging and nesting grounds for shore bird species such as the federally threatened Western snowy plover, which is present and has designated critical habitat on the Property[5]. However, the presence of unpermitted extraction of sand on the beach and the physical elements of unpermitted development have eliminated the beach and dune habitat used by sensitive species in this location. Instead of the unique dune system that is located adjacent and throughout this area, there is an artificial dredge pond. Use of mechanized equipment, including the floating dredge, causes noise and disturbance that further impacts ESHA here and in the dunes surrounding the dredge pond, which are also ESHA, inconsistent with Section 30240 and Policy 25 of the LUP. The unpermitted development at issue is located in and adjacent to the dune habitat, and is also not consistent with Section 30240(b), which requires that development in areas adjacent to ESHA be "sited and designed to prevent impacts which would significantly degrade those areas," and be "compatible with the continuance of those habitat and recreation areas," and Policy 26 of the LUP, which has similar requirements.

Coastal Act section 30811 gives the Commission the authority to issue a Restoration Order when three criteria are satisfied: 1) development has occurred without the requisite CDP, 2) the development is inconsistent with the Coastal Act, and 3) the development is causing continuing resource damage. The third and final criterion for issuance of a restoration order, as explained above, is that the development at issue is causing continuing resource damage. That phrase is defined by Section 13190 of the Commission's regulations as: "any degradation or other reduction in quality, abundance, or other quantitative or qualitative characteristic of the resource as compared to the condition the resource was in

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[4]SWCA (2014) Draft Initial Study and Mitigated Negative Declaration for the California American Water Slant Test Well Project.
[5] Ibid.

before it was disturbed by unpermitted development." The unpermitted development at issue here continues to exist, and therefore, the Coastal Act resources remain degraded and reduced compared to their condition before the unpermitted development occurred.

In sum, pursuant to Section 13191 of the Commission's regulations, I have determined that the activities specified in this letter meet the criteria of Section 30811 of the Coastal Act, based on the following:

1) Unpermitted development has occurred, including but not necessarily limited to: dredging and extraction of sand, including resulting in the creation of ponds; placement of floating dredges and development associated with the dredges, such as placement and installation of anchors and mooring cables, pipes, a pump station(s), and other facilities; grading; and changes in the intensity of use of the property. Such unpermitted activity is "development" as that term is defined by section 30106 of the Coastal Act, and it has occurred without a CDP from the Commission.

2) This unpermitted development is inconsistent with several of the resource protection policies of the Coastal Act and the applicable City of Marina LUP policies, including, but not necessarily limited to:
   a. Coastal Act Section 30210 and 30211 and LUP Policy 1(access)
   b. Coastal Act Section 30233 and LUP Policy 22 (dredging)
   c. Coastal Act Section 30235 (shoreline processes)
   d. Coastal Act Section 30240 and LUP Policies 25 and 26 (protection of environmentally sensitive habitat areas);
   e. Coastal Act Section 30253 and LUP Policy 38 (minimization of adverse impacts).

3) The unpermitted development remains in place and therefore continues to cause continuing resource damage.

For the reasons stated above, I am therefore issuing this notice of intent to commence proceedings for a Restoration Order before the Commission in order to compel the restoration of the Property. The procedures for the issuance of Restoration Orders are described in Sections 13190 through 13197 of the Commission's regulations, which are codified in Title 14 of the California Code of Regulations.

Administrative Civil Penalties, Civil Liability, and Exemplary Damages

Under Section 30821 of the Coastal Act, in cases involving violations of the public access provisions of the Coastal Act, the Commission is authorized to impose administrative civil penalties by a majority vote of the Commissioners present at a public hearing. In this case, as described above, the unpermitted development impacts the public access provisions of the Coastal Act; and therefore the criteria triggering Section 30821 have been satisfied. The penalties imposed may be an amount up to $11,250, for each violation, for each day the violation has persisted, or is persisting, for up to five (5) years. Under Section 30821(h), a violator may avoid administrative penalties by correcting the violation within 30 days of receiving written notice of the violation, if that violation can be corrected without undertaking development that requires a CDP. If a person fails to pay an administrative civil penalty imposed by the Commission, under Section 30821(e) the Commission may record a lien on that person's property in the amount of the assessed penalty. This lien shall be equal in force, effect, and priority to a judgment lien.

Response Procedure

In accordance with Sections 13181(a) and 13191(a) of the Commission's Regulations, you have the opportunity to respond to the Commission staff's allegations as set forth in this notice of intent to commence Cease and Desist Order and Restoration Order and Administrative Penalty proceedings by completing the enclosed Statement of Defense (SOD) form. The completed SOD form, including identification of issues and materials for Commission consideration, and documents and issues that you would like the Commission to consider, must be returned to the Commission's San Francisco office, directed to the attention of John Del Arroz, no later than April 6, 2016.

Civil Liability, Exemplary Damages, and Fines

As you may know, the Coastal Act provides a number of provisions to address civil liabilities. Section 30820(a) provides for civil liability to be imposed on any person who performs or undertakes development without a CDP and/or that is inconsistent with any CDP previously issued by the Commission, in an amount that shall not exceed $30,000 and shall not be less than $500 for each violation. Section 30820(b) provides that additional civil liability may be imposed on any person who performs or undertakes development without a CDP and/or that is inconsistent with any CDP previously issued by the Commission, when the person intentionally and knowingly performs or undertakes such development, in an amount not less than $1,000 and not more than $15,000 per day for each day in which each violation persists. Section 30821.6 also provides that a violation of an Order issued by the Commission can result in civil liabilities of up to $6,000 for each day in which each violation persists, and Section 30822 provides for additional exemplary damages for intentional and knowing violations of the Coastal Act or a Commission Cease and Desist Order. Additionally, as noted above, a person who undertakes unpermitted development that is in violation of the public access provisions of the Coastal Act may also be assessed administrative civil penalties pursuant to Section 30821 in the amount of up to $11,250 a day for each day in which the violation persists.

Potential for Recordation of a Notice of Violation of the Coastal Act

Finally, I would like to notify you that Section 30812 of the Coastal Act allows for the recordation of a notice of the existence of a Coastal Act violation on the property after providing notice and the opportunity for a public hearing. Notice may also be recorded when a property owner agrees to stipulate to the recordation of a Notice of Violation while working with the Commission to resolve the violations through mutual agreement. If we pursue recordation of a Notice of Violation, you will first be given separate notice of the Executive Director's intent to record such a notice, and will have the opportunity to object to such recordation and to provide evidence to the Commission at a public hearing as to why such a notice should not be recorded.

Resolution

We remain encouraged by the cooperation of Cemex to date to provide information regarding details and history of the operation on the Property. We remain open to working with you to resolve the violations of the Coastal Act on the Property, and we remain committed to working with you to achieve that end.

Please contact John Del Arroz, Statewide Enforcement Analyst at (415) 904-5220 by April 6, 2016 to discuss options to resolve this case.

Sincerely,

LHaage for

John Ainsworth
Acting Executive Director

cc: Bonnie Neely, Nossaman LLP, Certified Mail No. 7015 1730 0002 1801 6802
Geoff Etnire, Venable LLP, Certified Mail No. 7015 1730 0002 1801 6796
Layne Long, City Manager, City of Marina
Mike Novo, Planning Director, Monterey County
Lisa Haage, Chief of Enforcement
Aaron McLendon, Deputy Chief of Enforcement
Alex Helperin, Senior Staff Counsel
John Del Arroz, Statewide Enforcement Analyst
Dan Carl, Deputy Director, North Central and Central Coast Districts

Encl. Statement of Defense Form for Cease and Desist Order and Restoration Order and Administrative Penalty Proceeding

CITY OF MARINA
211 Hillcrest Avenue
Marina, CA 93933
831-884-1278; FAX 831-384-9148
www.ci.marina.ca.us

December 8, 2015

California Coastal Commission
Mr. Dan Carl
Deputy Director
Central Coast/North Coast District
VIA EMAIL TO: Dan.Carl@coastal.ca.gov

Re: Cemex Pacific Lapis Sand Mining Plant, Marina California

Dear Mr. Carl:

The City Council of the City of Marina at a regular council meeting date of December 1, 2015 voted unanimously to request the California Coastal Commission to complete its investigation on the CEMEX Sandmining Plant in Marina, California.

Sand is a precious resource, vital to our coast and CEMEX's operations are suspected to be a primary cause of beach and dune erosion in southern Monterey Bay. According to a 2012 study by the Monterey Bay Sanctuary Foundation and the Southern Monterey Bay Coastal Erosion Working Group, the plant's production has expanded by about 250 percent, from 80,000 cubic yards per year to 200,000 cubic yards per year since 1972 when the commission was formed.

The Sierra Club wrote to the commission in 2009 requesting that a permit be required for all sand mining in excess of 80,000 cubic yards per year. This request has been under "jurisdictional review" since then.

On November 22, 2015, the San Francisco Examiner reported that a California appeals court has ruled that sand in the San Francisco Bay must be considered a public trust resource, potentially challenging the practice of mining for sand in the Bay. It was further reported that Wednesday's ruling in the lawsuit between San Francisco Baykeeper and the California State Lands Commission in the California 1st District Court of Appeal is considered a major victory by environmental advocates who have argued sand mining contributes to erosion at Ocean Beach and threatens the Bay's ecosystem.

With the aforementioned information regarding the Cemex plant and the recent successful challenges in the San Francisco Bay, the Marina City Council respectfully requests that the California Coastal Commission complete the 2009 its investigation surrounding the CEMEX san mining plant in Marina, California and issue a report of the Commission's findings. The completion of this investigation is vital the public interests.

Sincerely,

Layne Long
City Manager
City of Marina

STATE OF CALIFORNIA—NATURAL RESOURCES AGENCY
EDMUND G. BROWN, JR., *GOVERNOR*

CALIFORNIA COASTAL COMMISSION
45 FREMONT STREET, SUITE 2000
SAN FRANCISCO, CA 94105-2219
VOICE (415) 904-5200
FAX (415) 904-5400
TDD (415) 597-5885

VIA REGULAR U.S. AND ELECTRONIC MAIL

March 16, 2016

Mr. Layne Long
City Manager
211 Hillcrest Avenue
Marina, CA 93933

llong@ci.marina.ca.us

Subject: CCC Violation File No. V-3-14-0151; Sand mining operation at Lapis Road, Marina; Monterey County Assessor's Parcel Number 203-011-019-000

Dear Mr. Long,

This letter is intended to confirm our March 16, 2016 telephone conversation regarding enforcement of the Coastal Act and the City of Marina's Local Coastal Program ("LCP") as they pertain to the sand mining operation on Lapis Road (hereinafter referred to as the "Property") , in the City of Marina. During that conversation, you requested that the Coastal Commission ("Commission") assume primary responsibility for issuing a cease and desist order and/or taking any other appropriate enforcement action with regard to the unpermitted sand mining and processing operations at the Property, and stated that you had been authorized to make that request pursuant to a March 15, 2016 resolution by the Marina City Council. Thus, the Commission will contact the property owner shortly to discuss alleged Coastal Act and LCP violations and to pursue formal enforcement action, including the potential issuance of a cease and desist and restoration order to resolve the alleged violations on the Property.

Thank you for taking the time to work with us and for your collaboration in this matter. Commission staff will continue to coordinate with the City and welcomes your ongoing thoughts about this case. Please call me if this does not accurately reflect your understanding of our discussion and the City's position. If you have any questions or concerns regarding this letter or the pending enforcement action, or if we can provide any assistance to the City, please do not hesitate to contact me at 415-904-5220.

Sincerely,

John Del Arroz
Statewide Enforcement Analyst

Cc: Mayor Bruce Delgado

MONTEREY COUNTY
RESOURCE MANAGEMENT AGENCY
Carl P. Holm, AICP, Director
John Guertin, Acting Deputy Director

Daniel Dobrilovic, Acting Building Official
Michael Novo, AICP, Director of Planning
Robert K. Murdoch, P.E., Director of Public Works

168 W. Alisal Street, 2nd Floor
Salinas, CA 93901
http://www.co.monterey.ca.us/rma

January 14, 2016

John Del Arroz, Statewide Enforcement Analyst
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105

RE: CEMEX PROPERTY APN 203-011-019-000

Dear Mr. Del Arroz:

Thank you for your inquiry regarding the above-mentioned property. From the information you provided, the dredge pond on the property was created in 1965. In 1972, the voters passed an initiative creating the predecessor to the California Coastal Commission and giving it permit authority over lands within 1,000 yards of the mean high tide line, prior to the adoption of California Coastal Act of 1976. Below, you will find a summary of the Zoning Designations on the property and the Uses Allowed under the applicable Zoning Regulations for these timeframes.

Zoning

The area where the dredge pond is located was first zoned in March 1967, when it was zoned as Transitional (T-B-5). At the time, the uses allowed would have been the same as what was, at the time, zoned "F" or agricultural zoning. Prior to March, 1967, there was no zoning on the property so the regulations for Unclassified areas would have applied. In May 1967, the area of the dredge pond was zoned "M-P" or Industrial ("M") with a Parking ("P") combining district. From the maps available, the area remained under that zoning until 1983.

Zoning Regulations

As noted above, the property was unzoned in 1965 so the regulations for Unclassified areas would have applied. Attached you will find a copy of the relevant pages of our Zoning Ordinance (No. 911) in place in 1965 (1955 version). According to Section 12, regulations for Unclassified areas were also subject to the provisions of Section 30a (General Provisions and Exceptions). Section 30 a.(3) states that the removal of minerals or natural materials, including building and construction materials to be used for commercial purposes, shall be allowed in any district but not unless or until a Use Permit is first secured in each case. These same regulations were in place as far back as the 1955 Zoning Ordinance. According to our records, no Use Permit was obtained. Therefore, when the dredge was created and put into operation in 1965, it lacked the necessary authorization. From these facts, they could not be considered legal nonconforming, either. To be considered legal, non-conforming, the use would have needed to have been legally established prior to the effective date of a zoning district that required a Use Permit. In other words, they would have needed whatever permit was required at the time the use was established, even if the rules later required a different permit type. Since a Use Permit would have been required for this site for use of a dredge pond, from 1955 on, and one was never obtained, it cannot be considered legal, non-conforming.

In 1972, the area where the dredge pond is located was zoned "M-P" or Industrial with a Parking combining district. Section 23 b. (2) (a) of the Zoning Ordinance No. 911 in place in 1972 (1967 version) states that commercial excavation of stone or earth materials was allowed subject to first securing a Use Permit. These regulations were the same in the zoning ordinance updated in 1973. According to our records, no Use Permit was obtained so the dredge operation lacked the necessary authorization.

If you have any questions regarding this matter, please do not hesitate to contact me at (831) 755-5192 or novom@co.monterey.ca.us.

Sincerely,

Mike Novo
Director of RMA-Planning

Attachments:
Cemex Area Zoning Map August 1962
Cemex Area Zoning Map March 1967
Cemex Area Zoning Map May 1967
Cemex Area Zoning Map December 1972
Zoning Designations Summary
Zoning Ordinance No. 911 – 1955
Zoning Ordinance No. 911 – 1967

WELLINGTON
LAW OFFICES

857 CASS STREET, SUITE D
MONTEREY, CALIFORNIA 93940
TELEPHONE (831) 373-8733
FACSIMILE (831) 373-7106
attys@wellingtonlaw.com

DEBORAH MALL
ROBERT W. RATHIE
GEORGE C. THACHER
ROBERT R. WELLINGTON

January 9, 2017

Mr. John Del Arroz
Statewide Enforcement Analyst
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, California 94105

Re: CEMEX Dredge Pond Operation, Lapis Site, Your Violation No. V-3-14-0151

Dear Mr. Del Arroz:

With respect to the referenced Coastal Commission proceeding, you have requested the City of Marina to provide to Commission staff the City's permitting history of the dredge pond operation on the Lapis site in the City.

The City of Marina was incorporated in 1975. Prior to incorporation, the Lapis site was subject to County of Monterey land use regulation. At all times since incorporation, City land use regulations have included a discretionary permit requirement for the sort of dredge pond operation ongoing at the Lapis site. From 1975 to 1982 the county regulations adopted upon incorporation by City as its own required such a permit, and since 1982 superseding zoning regulations adopted by the City have included a similar provision. There has been no break in the permit requirement since incorporation in 1975

From incorporation to date the City has received no applications from the owner or operator of the Lapis site for a permit to allow the ongoing dredge pond operation, and the City consequently has never issued such a permit.

In the years since incorporation the City on occasion has made both affirmative and implied representations that the owner of the dredge pond operation site does enjoy an entitlement to continue without need for permit. Those representations appear in connection with, for example: a statement on page 40 (first sentence of third full paragraph) of City's 1982 certified Local Coastal Program, Land Use

Plan ("LUP")[1]; coastal development permits in 1989 for a wet plant; 1992 review of a reclamation plan for the site; and 2013 and 2014 matters, the last one involving approval of bore hole drilling by California-American Water Company based on a finding that such activity is within the scope of an existing entitlement.

In no case have these approval processes included consideration of an application for a permit calling for the City to make an independent, discretionary determination regarding whether in fact the Lapis site had approvals necessary to allow the ongoing dredge pond operations. The LUP references, for example, are not permit-contextual, rather are policy statement based on assumed conditions. Moreover, LUP's cannot under any circumstances create a vested right or any other form of entitlement that does not already exist, nor can they function independently to provide any other form of exemption or authorization for an operation. So, the LUP has no bearing on the legal status of the Lapis operation.

Our conjecture is that because the Lapis site operation was ongoing at the time of incorporation, and because at that point there was likely little if any focus on the scope or legality of the operation, it was and continued to be incorrectly assumed that necessary county-issued entitlements were in place and continued by operation of law through and beyond incorporation.

It is the City's position that if, as has been confirmed by Monterey County officials, the Lapis site was not approved and/or otherwise entitled by the County for the dredge pond operation as of the time of incorporation, then it follows, given the absence of City permits as discussed above, that there are not now in place permits lawfully required for the dredge pond operation.

Very truly yours,

Robert R. Wellington

Robert R. Wellington
Marina City Attorney

1 Note that the LUP, pages 23-24, refers to "surf zone mining," whereas the Lapis operation takes sand from a dredge pond landward of the surf zone, thus the reference is inapplicable to the Lapis operation.

STATE OF CALIFORNIA
EDMUND G. BROWN JR., *Governor*

CALIFORNIA STATE LANDS COMMISSION

EXECUTIVE OFFICE
100 Howe Avenue, Suite 100-South
Sacramento, CA 95825-8202

JENNIFER LUCCHESI, *Executive Officer*
(916) 574-1800 *Fax* **(916) 574-1810**
California Relay Service TDD Phone 1-800-735-2929
Voice Phone 1-800-735-2922

Established in 1938

May 16, 2017

Sent Via Electronic Mail and Regular U.S. Mail

Eric Wittmann
Regional President, West Region
CEMEX
929 Gessner Road, Suite 1900
Houston, Texas 77024

Mike Egan
Executive Vice President and General Counsel
CEMEX
10100 Katy Freeway, Suite 300
Houston, Texas 77043

Subject: Activities of concern at CEMEX Lapis Plant, Marina, California

Dear Mr. Wittmann and Mr. Egan:

The California State Lands Commission (Commission) is continuing to evaluate the relationship between CEMEX's Lapis Plant and the state's Public Trust interests along the coast. As you are likely aware, CEMEX's predecessors at the Lapis plant, Pacific Cement and Aggregates, Inc., paid royalties to the Commission under a 5-year lease issued August 18, 1964 (Lease No. PRC 3183.1). Subsequently, the plant changed its method of sand removal from a dragline to the current dredge pond. Historical photos and Commission surveys indicate that the pond's dimensions, its location on the beach, and its relationship to the mean high tide line continue to vary over time.

Conversion of State Minerals

Scientific research in the past decade has clarified that sand mined at the Lapis plant comes from offshore and that the dredge pond takes advantage of area wave patterns and beach topography to function as a vacuum, siphoning sand from below the mean high tideline, and trapping it in the dredge pond.[1] In other words, the dredge

[1] E.g., Thornton et. al., *Temporal and Spatial Variations in Sand Budgets with Application to Southern Monterey Bay,* California (2016) 382 Marine Geology 56, 64; Philip Williams & Associates, Ltd., et al., Coastal Regional Sediment Management Plan for Southern Monterey Bay (November 2008), p. 43, 86-87.

pond performs the same function as the prior dragline operation, removing a mineral resource from sovereign land subject to the Public Trust. Currently CEMEX, like prior operators, then processes and sells these mineral resources for private commercial gain. However, unlike the dragline operation, a lease was not obtained by prior operators or CEMEX for these sovereign lands nor was a royalty paid for the use of this Public Trust resource since the expiration of the lease in 1969.

The commercial exploitation of a Public Trust resource without compensation to the State constitutes an expropriation of public property that is prohibited by the California Constitution (Cal. Const., art. XVI, § 6). Conversion of state minerals, including sand, is subject to civil liability and treble damages (Cal. Pub. Resources Code, § 6224.2).

Nuisance

In addition to the financial and resource loss to the State, the intensity of sand extraction at the Lapis operation causes environmental damage, public and private property damage, and loss of economic benefit through beach erosion, as indicated in recent studies (e.g., Thornton, *supra*, at p. 64). Longstanding California Supreme Court mining case law holds that, when the customary and previously legitimate activities of a business develop into a condition that threatens public and private rights, such a customary activity is no longer reasonable and may be found to be a nuisance. (*People v. Gold Run Ditch and Mining Company* (1884) 66 Cal. 138, 150-151. See also *Pacific Gas & Electric Co. v. Scott* (1938) 10 Cal. 2d 581, 585.) The California Supreme Court has also concluded that the State's ongoing Public Trust oversight power "precludes anyone from acquiring a vested right to harm the public trust." (*National Audubon Society v. Superior Court* (1983) 33 Cal.3d 419, 436, 452.) Moreover, as with any resource located on or extracted from sovereign lands, the State Lands Commission has an affirmative obligation to consider and protect the Public Trust on behalf of the State and its citizens. The Lapis operation has been identified in several studies as the primary contributor to beach erosion in the littoral cell in which it is located.[2] This impacts Public Trust resources downcoast that the Commission is charged with protecting.

The statements in this letter are made without prejudice to any future assertion of State ownership or public rights, should circumstances change, or should additional information come to our attention. This letter is not intended, nor should it be construed as, a waiver of any right, title, or interest by the State of California in any lands or resources under its jurisdiction.

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[2] E.g., Thornton, *supra*, at pp. 64-66; Philip Williams & Associates, Ltd., et al., *supra*, at p. 87; Hapke, Cheryl J., David Reid, et al., *National Assessment of Shoreline Change Part 3: Historical Shoreline Change and Associated Coastal Land Loss Along Sandy Shorelines of the California Coast*, U.S. Geological Survey, Open File Report 2006-1219, pp. 45, 47, 49-50, and 67.

In consideration of the state resources being converted by CEMEX's operation, CEMEX must immediately submit a lease application to the Commission for its consideration or CEMEX must cease dredge pond operations at the Lapis plant. The Commission may require environmental review pursuant to the California Environmental Quality Act as part of the lease application review and analysis and, as with all applications for the use of state Public Trust lands and resources, will consider whether any proposed lease is consistent with the common law Public Trust Doctrine and in the best interest of the State of California. Please contact me at (916) 574-1800 if you have any questions.

Sincerely,

JENNIFER LUCCHESI
Executive Officer

cc: John Ainsworth, Executive Director, California Coastal Commission
Andrew Vogel, Deputy Attorney General

RESOLUTION NO. 5196
MONTEREY COUNTY PLANNING COMMISSION
STATE OF CALIFORNIA

Granting Use
Permit #1118

WHEREAS: The Planning Commission of the County of Monterey, State of California, has considered the application of Pacific Cement & Aggregates, Inc. for Use Permit No. 1118, in accordance with Section 32 of Ordinance No. 911, the Zoning Ordinance of the County of Monterey, and,

WHEREAS: The said Planning Commission finds that the establishment or maintenance of the use for which application is made will not be injurious to property or improvements or detrimental to the health, safety, morals, comfort, convenience, or general welfare of persons residing or working in the neighborhood of such use, now therefore, be it

RESOLVED: That said Planning Commission hereby grants said Use Permit, thereby allowing the removal of natural materials from the tideland area in the Lapis area,

as shown on the attached sketch.

DO NOT REMOVE

Regularly passed and adopted by the Planning Commission of the County of Monterey, State of California, on the 29th day of October, 19 63, by the following vote:

Ayes: Commissioners Cailotto, Gordon, Krishuo, Marcucci, Wilber

Noes: None

Absent: Commissioners Evans, Grigory, Mansfield, Moore

ATTEST:

E. W. DE MARS, SECRETARY

EDWARD P. MARCUCCI, VICE CHAIRMAN

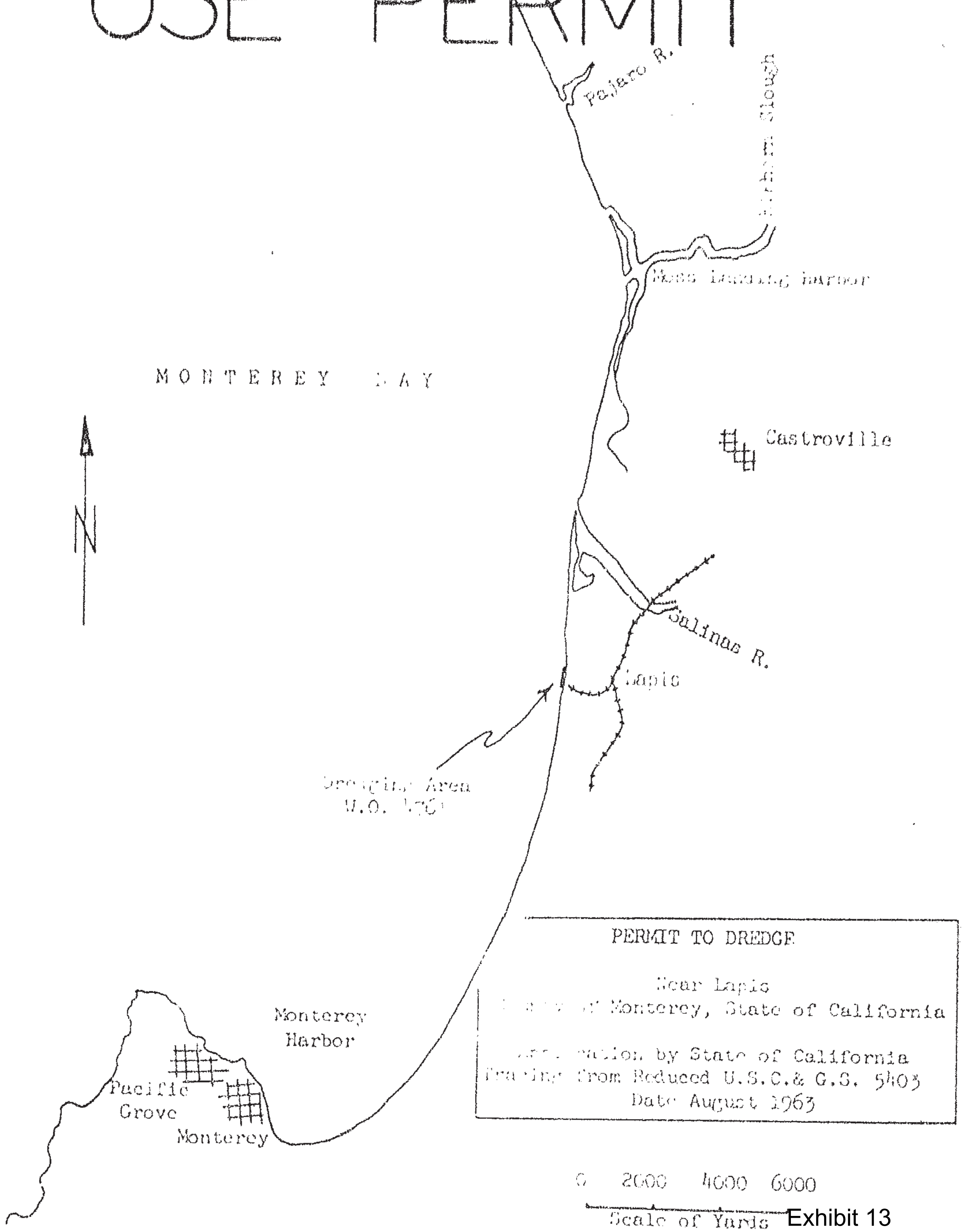
Copy of this decision was mailed to the applicant on November 4, 1963

Exhibit 13
CCC-17-CD-02
Page 1 of 4

RESOLUTION NO. 5/96

ATTACHMENT

USE PERMIT



RESOLUTION NO. 5691
MONTEREY COUNTY PLANNING COMMISSION
STATE OF CALIFORNIA

Granting Use Permit #1272

WHEREAS: The Planning Commission of the County of Monterey, State of California, has considered the application of Pacific Cement & Aggregates, Inc. for Use Permit No. 1272, in accordance with Section 32 of Ordinance No. 911, the Zoning Ordinance of the County of Monterey, and,

WHEREAS: The said Planning Commission finds that the establishment or maintenance of the use for which application is made will not be injurious to property or improvements or detrimental to the health, safety, morals, comfort, convenience, or general welfare of persons residing or working in the neighborhood of such use, now therefore, be it

RESOLVED: That said Planning Commission hereby grants said Use Permit, thereby allowing the removal of natural materials from the tideland area in the Lapis area,

as shown on the attached sketch.

FILE COPY
DO NOT REMOVE

Regularly passed and adopted by the Planning Commission of the County of Monterey, State of California, on the 27th day of October, 1964, by the following vote:

Ayes: Commissioners Evans, Henderson, Krishun, Mansfield, Wilbur

Noes: None

Absent: Commissioners Branson, Grigory, Marcucci, Callotto

ATTEST:

R. SLIMMON, JR., ACTING SECRETARY

KEITH B. EVANS, CHAIRMAN

Copy of this decision was mailed to the applicant on October 30, 1964

11005 RP-1

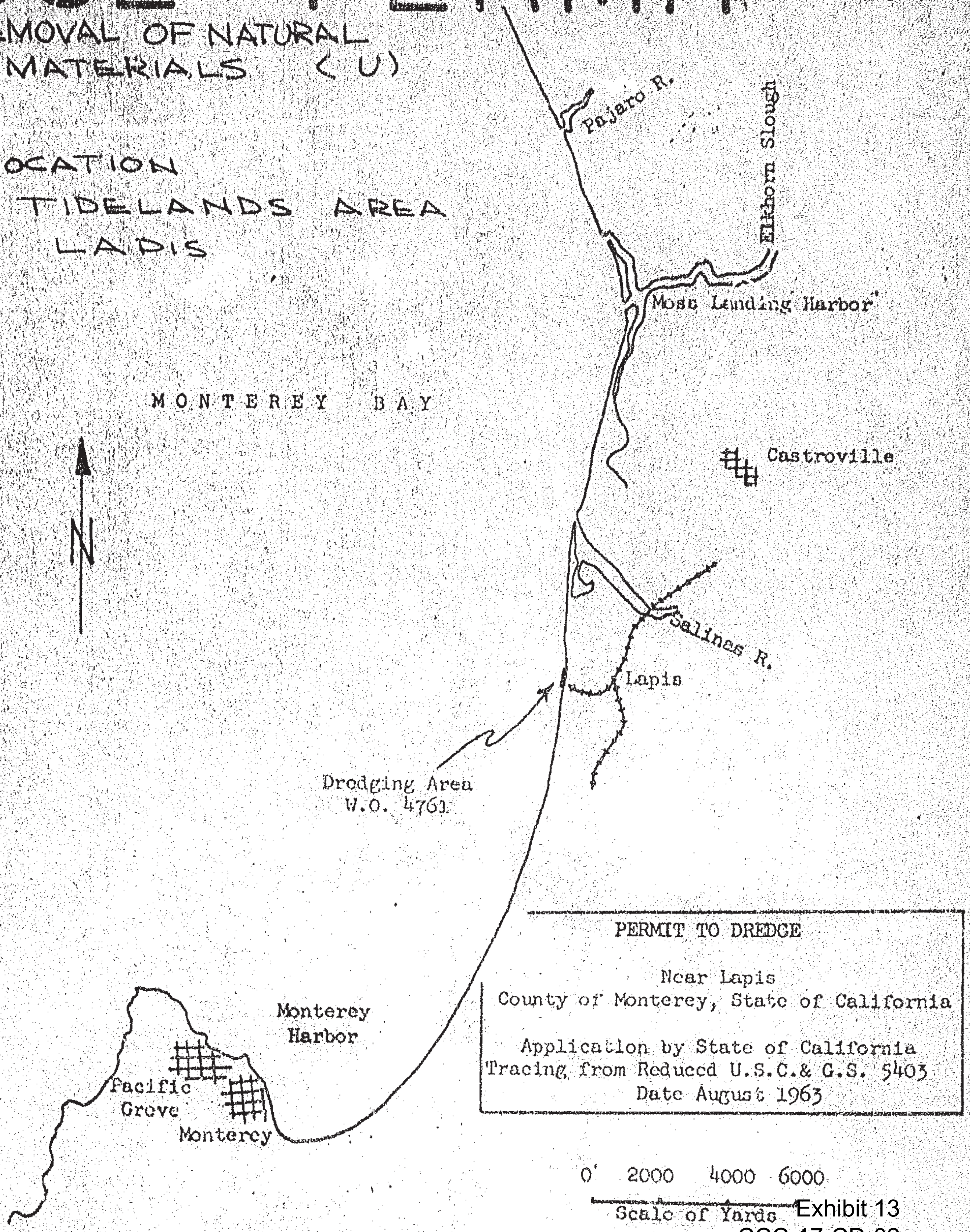
RESOLUTION NO. 5641

ATTACHMENT

USE PERMIT

RE-MOVAL OF NATURAL MATERIALS (U)

LOCATION
TIDELANDS AREA
LAPIS



MINUTE ITEM

23. PROPOSED MINERAL EXTRACTION LEASE, MONTEREY BAY, MONTEREY COUNTY; PACIFIC CEMENT & AGGREGATES, INC. - W.O. 4761, P.R.C. 3183.1.

After consideration of Calendar Item 24 attached, and upon motion duly made and unanimously carried, the following resolution was adopted:

IN ACCORDANCE WITH THE PROVISIONS OF DIVISION 6 OF THE PUBLIC RESOURCES CODE, THE COMMISSION AUTHORIZES THE EXECUTIVE OFFICER TO ISSUE TO PACIFIC CEMENT & AGGREGATES, INC., THE ONLY BIDDER, A MINERAL EXTRACTION LEASE FOR 10 ACRES MORE OR LESS OF TIDE AND SUBMERGED LANDS LYING IN MONTEREY BAY, MONTEREY COUNTY, AS DETAILED IN EXHIBIT "A" ATTACHED, SUBJECT TO PAYMENT OF A ROYALTY IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

FOR ALL MATERIAL EXTRACTED:

$$R = 0.06 + 0.06 (0)$$

WHERE R = ROYALTY IN DOLLARS AND CENTS PER CUBIC YARD OF MATERIAL EXTRACTED

THE ROYALTY RATE UNDER THE ABOVE SCHEDULE SHALL BE INCREASED AUTOMATICALLY AFTER THE FIRST YEAR OF THE LEASE AT THE RATE OF FIVE PERCENT (5%) PER YEAR FOR EACH OF THE NEXT FOUR YEARS TO THE END OF THE LEASE TERM. FOR EACH SUCCESSIVE LEASE RENEWAL, THE ROYALTY RATE AND THE RATE OF INCREASE PER YEAR (IF ANY), SHALL BE SUBJECT TO REDETERMINATION BY THE STATE AT THE TIME OF THE RENEWAL.

A PERFORMANCE BOND IN THE PENAL SUM OF $10,000 IS TO BE DEPOSITED BY THE LESSEE TO GUARANTEE THE FAITHFUL PERFORMANCE AND OBSERVANCE OF ALL OF THE TERMS AND CONDITIONS OF THE LEASE.

Attachment
Calendar Item 24 (2 pages)

Exhibit 14
CCC-17-CD-02
Page 1 of 5

A 34
S 25

CALENDAR ITEM

24.

PROPOSED MINERAL EXTRACTION LEASE, MONTEREY BAY, MONTEREY COUNTY; PACIFIC CEMENT & AGGREGATES, INC. - W.O. 4761.

On July 21, 1964, one bid was received in response to a published Notice of Intention of the State Lands Commission to enter into a lease for the extraction of sand from 10 acres more or less of tide and submerged land in Monterey Bay, Monterey County.

The bid, submitted by Pacific Cement & Aggregates, Inc., offered $0.06 per cubic yard for all material extracted.

The office of the Attorney General has advised that, with respect to its substantive content, the bid submitted by Pacific Cement & Aggregates, Inc. conforms with:

1. Bid requirements as specified in the proposal of the State Lands Commission to enter into the aforesaid sand extraction lease;

2. Applicable provisions of law;

3. Rules and regulations of the State Lands Commission.

IT IS RECOMMENDED THAT, IN ACCORDANCE WITH THE PROVISIONS OF DIVISION 6 OF THE PUBLIC RESOURCES CODE, THE COMMISSION AUTHORIZE THE EXECUTIVE OFFICER TO ISSUE TO PACIFIC CEMENT & AGGREGATES, INC., THE ONLY BIDDER, A MINERAL EXTRACTION LEASE FOR 10 ACRES MORE OR LESS OF TIDE AND SUBMERGED LANDS LYING IN MONTEREY BAY, MONTEREY COUNTY, AS DETAILED IN EXHIBIT "A" ATTACHED, SUBJECT TO PAYMENT OF A ROYALTY IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

FOR ALL MATERIAL EXTRACTED:

$$R = 0.06 + 0.06\ (0)$$

WHERE R = ROYALTY IN DOLLARS AND CENTS PER CUBIC YARD OF MATERIAL EXTRACTED

THE ROYALTY RATE UNDER THE ABOVE SCHEDULE SHALL BE INCREASED AUTOMATICALLY AFTER THE FIRST YEAR OF THE LEASE AT THE RATE OF FIVE PERCENT (5%) PER YEAR FOR EACH OF THE NEXT FOUR YEARS TO THE END OF THE LEASE TERM. FOR EACH SUCCESSIVE LEASE RENEWAL, THE ROYALTY RATE AND THE RATE OF INCREASE PER YEAR (IF ANY), SHALL BE SUBJECT TO REDETERMINATION BY THE STATE AT THE TIME OF THE RENEWAL.

A PERFORMANCE BOND IN THE PENAL SUM OF $10,000 IS TO BE DEPOSITED BY THE LESSEE TO GUARANTEE THE FAITHFUL PERFORMANCE AND OBSERVANCE OF ALL OF THE TERMS AND CONDITIONS OF THE LEASE.

Attachment
Exhibit "A"

W.O. 4761

EXHIBIT "A"

THAT PORTION OF STATE LANDS LYING WEST OF THE WESTERLY LINE OF PACIFIC CEMENT AND AGGREGATES, INC., PROPERTY AT LAPIS, MONTEREY COUNTY, CALIFORNIA, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE COMMON CORNER OF THE RANCHO RINCON DE LAS SALINAS AND THE MONTEREY CITY LANDS TRACT NO. 1 ON THE SHORE OF MONTEREY BAY, FROM WHICH AN OLD FOUR INCH BY FOUR INCH POST MARKED "R S 3 WIT" STANDING ON RANCHO BOUNDARY BEARS S. 63° 20' E., 844.14 FEET DISTANT; THENCE FOLLOWING THE SHORELINE OF BAY S. 1° 05' W., 3960.00 FEET TO THE TRUE POINT OF BEGINNING; THENCE S. 5° 40' W., 2178.00 FEET, THENCE LEAVING THE SHORE OF MONTEREY BAY N. 84° 20' W., 200.00 FEET; THENCE N. 5° 40' E., 2178.00 FEET; THENCE S. 84° 20' E., 200 FEET TO THE TRUE POINT OF BEGINNING, CONTAINING 10.00 ACRES MORE OR LESS.

MINUTE ITEM 8/28/69

26. EXTENSION OF MINERAL EXTRACTION LEASE P.R.C. 3183.1 AND ASSIGNMENT OF MINERAL EXTRACTION LEASES P.R.C. 3183.1 AND P.R.C. 2615.1 FROM PACIFIC CEMENT & AGGREGATES TO PACIFIC CEMENT & AGGREGATES, A DIVISION OF LONE STAR CEMENT CORPORATION, MONTEREY BAY, MONTEREY COUNTY - W-9003.

After consideration of Calendar Item 46 attached, and upon motion duly made and carried, the following resolution was adopted:

THE COMMISSION AUTHORIZES A FIVE-YEAR EXTENSION OF P.R.C. 3183.1 THROUGH AUGUST 18, 1974, AND THE ASSIGNMENT OF P.R.C.'S 3183.1 AND 2615.1 FROM PACIFIC CEMENT AND AGGREGATES, ASSIGNOR, TO PACIFIC CEMENT AND AGGREGATES, A DIVISION OF LONE STAR CEMENT CORPORATION, ASSIGNEE, WITH THE ASSIGNEE TO BE BOUND BY THE TERMS AND CONDITIONS OF THE LEASES TO THE SAME EXTENT AS THE ORIGINAL LESSEE, WITH MINERAL EXTRACTION UNDER THE TERMS OF P.R.C. 3183.1 TO BE CONDITIONAL UPON A VALID DEPARTMENT OF THE ARMY PERMIT BEING IN EFFECT, WITH MINIMUM ANNUAL EXTRACTION REQUIREMENTS FOR EACH LEASE TO BE INCREASED FROM 25,000 CUBIC YARDS TO 50,000 CUBIC YARDS, WITH ROYALTY SCHEDULE UNDER EACH LEASE (MINIMUM OF $0.06 PER CUBIC YARD) TO REMAIN UNCHANGED.

Attachment
Calendar Item 46 (1 page)

A 34
S 17

CALENDAR ITEM

46.

EXTENSION P.R.C. 3183.1
AND ASSIGNMENT P.R.C. 3183.1 AND P.R.C. 2615.1

ASSIGNOR: Pacific Cement & Aggregates.

ASSIGNEE: Pacific Cement & Aggregates, a Division of Lone Star Cement Corporation.

LOCATION: Monterey Bay - P.R.C. 3183.1 at Lapis.
P.R.C. 2615.1 at Prattco.

ACREAGE: P.R.C. 3183.1 - 10 acres.
P.R.C. 2615.1 - 7 acres.

TYPE OF LAND: Tide and submerged.

PREREQUISITE ITEMS:

1. Assignment forms, properly executed, have been received.

2. Bond requirements have been met.

3. Monies and production statements due the State have been received.

OTHER PERTINENT INFORMATION:

1. Assignee is fully qualified to hold State leases.

2. Minimum annual extraction under terms of the leases to be increased on each lease from 25,000 to 50,000 cubic yards, with royalty schedule under each lease (minimum of $0.06 per cubic yard) to remain unchanged.

3. Under P.R.C. 3183.1, the U. S. Army Corps of Engineers permit under which lessee operates expired 12-31-67, and no renewal has been issued to date. Operations under the lease are to be subject to a Corps of Engineers permit being in effect.

IT IS RECOMMENDED THAT THE COMMISSION AUTHORIZE A FIVE-YEAR EXTENSION OF P.R.C. 3183.1 THROUGH AUGUST 18, 1974, AND THE ASSIGNMENT OF P.R.C.'S 3183.1 AND 2615.1 FROM PACIFIC CEMENT AND AGGREGATES, ASSIGNOR, TO PACIFIC CEMENT AND AGGREGATES, A DIVISION OF LONE STAR CEMENT CORPORATION, ASSIGNEE, WITH THE ASSIGNEE TO BE BOUND BY THE TERMS AND CONDITIONS OF THE LEASES TO THE SAME EXTENT AS THE ORIGINAL LESSEE, WITH MINERAL EXTRACTION UNDER THE TERMS OF P.R.C. 3183.1 TO BE CONDITIONAL UPON A VALID DEPARTMENT OF THE ARMY PERMIT BEING IN EFFECT, WITH MINIMUM ANNUAL EXTRACTION REQUIREMENTS FOR EACH LEASE TO BE INCREASED FROM 25,000 CUBIC YARDS TO 50,000 CUBIC YARDS, WITH ROYALTY SCHEDULE UNDER EACH LEASE (MINIMUM OF $0.06 PER CUBIC YARD) TO REMAIN UNCHANGED.

A 34
S 17

City of Marina

211 HILLCREST AVENUE
MARINA, CA 93933
TELEPHONE (408) 384-3715

Rec'd 8/17/88

CC BAG ✓ 8/18/88
DUKE

I [redacted]

COASTAL DEVELOPMENT PERMIT CERTIFICATE LONE STAR

THIS IS TO CERTIFY THAT the Marina Planning Commission at a regular meeting thereof held on the 8th day of August, 1988, did grant a COASTAL DEVELOPMENT PERMIT to RMC Lone Star for the removal and relocation of several existing structures at the Lone Star sand plant at the end of Lapis Road (A.P.N. 203-01-19) including the reduction in height of the existing dewatering structure and its relocation 250 feet in a westerly direction from its current location. In association therewith, the dewatering control structure and the fuel pump building will be relocated on the site to reduce potential interference with the relocated dewatering structure. The approval was subject to the following Conditions of Approval:

COASTAL DEVELOPMENT PERMIT CONDITIONS

1. That the proposed wet plant and minor accessory structures to be relocated shall comply with the Uniform Building Code and also demonstrate compliance with California and/or federal occupational safety and health acts as applicable to the satisfaction of the Director of Building.

2. That at the time plans are submitted for plan check, the site plan shall show written dimensions between the new fuel pump building and the existing office building to the satisfaction of the Director of Building.

3. That structural calculations in accordance with seismic zone 4 requirements shall accompany a complete set of plans at the time of application for building plan check to the satisfaction of the Director of Building.

4. That the location and construction of the new gasoline fuel pump building shall comply with table 5A of the Uniform Building Code and Chapter 9 of the Uniform Fire Code to the satisfaction of the Director of Building.

5. The relocation of gasoline storage tanks shall comply with current codes to the satisfaction of the Monterey County Health Department.

6. That prior to final Building Permit inspection clearance of the relocated wet plant, the applicant shall have submitted, and if approved by the City Council, executed an Agreement which will provide for a report which will demonstrate that interim dune mining shall be conducted in compliance with the Endangered Species Act to the satisfaction of the Director of Planning. Any such agreement shall state that anything else notwithstanding, applicant is not giving up any of its property rights nor its right to assert the same.

As justification of the Coastal Development Permit the Planning Commission adopted the following findings:

COASTAL DEVELOPMENT PERMIT FINDINGS

The proposed project will:

1. Not impair major view corridors towards the sea from Highway 1 parallel to the sea, including the Planning Guidelines listed in the LCLUP.

Comment:

The project will reduce by one third the height of the existing wet plant and replace it in a location where it will be largely screened by existing adjacent structures and trees in order to create an overall reduction in any visual impact of the existing wet plant.

2. Continue to require major development projects to be subject to approval of the Site and Architectural Design Review Board, including the Planning Guidelines listed in the LCLUP.

Comment:

This project was reviewed by the Design Review Board and approved as submitted.

3. Be adequately set back from the shore line to withstand erosion to the extent that the reasonable economic life of the use would be guaranteed without need for shore line protection structures.

Comment:

The relocated wet plant will be well inland of the 50 year erosion setback established in the L.C.P

4. Protect least disturbed dune habitat areas, primary habitat areas and provide protection measures for secondary habitat areas consistent with the LCLUP and LCIP.

Comment:

The project will be carried out exclusively in developed areas which have been previously severely disturbed by sand mining and which are not adjacent to habitat areas.

5. Be consistent with beach parking standards, as established in the LCLUP Access Component.

Comment:

Not applicable.

6. Not interfere with public access along the beach.

Comment:

The project will be conducted well to the east of the beach.

7. Will comply with the access, shore line structure and habitat protection standards included in the Local Coastal Land Use and Implementation Plan.

Comment:

See items 3, 4 and 6.

8. Comply with the Housing Element and housing recommendations of the Local Coastal Land Use and Implementation Plans.

Comment:

Not Applicable.

9. Will Comply with all Coastal access and Public recreation policies of Chapter 3 of the Coastal Act.

10. Will be consistent with all of the policies in Chapter 6 of the State Coastal Act.

11. Will be consistent with all of the policies in Marina's certified LCLUP.

This certificate is to notify the applicant and the Coastal Commission that the project listed above was approved by the Planning Commission. Should any aggrieved party wish to appeal to the City Council, the decision or any of the conditions listed in this certificate, a written appeal must be filed with the City Clerk within seven (7) calender days of the Planning Commission Action. Such an appeal must set forth specifically the points at issue, the reasons for the appeal, and describe why the person appealing the decision believes there was an error or abuse of discretion by the Planning Commission. Should no appeal be filed within that time this certificate shall be valid as written and shall serve as the notice of final local action. However, if an appeal is filed within the specified time frame, the City Council will be responsible for taking final local action on the project. Since this project is located in an appealable area, any action of the Council is appealable to the Coastal Commission within ten (10) calendar days of the Coastal Commission receiving notice of the final Council action. It is of note that the process for appeal to the Coastal Commission is not available unless all local appeals have been exhausted.

Jeffrey P. Dack

Dated: AUGUST 10, 1988
Marina, California
a:lonstar.cer

JEFFREY P. DACK, AICP
DIRECTOR OF PLANNING

City of Marina

211 HILLCREST AVENUE
MARINA, CA 93933
TELEPHONE (408) 384-3715
FAX (408) 384-0425

RECEIVED
JUL 24 1997
CALIFORNIA
COASTAL COMMISSION
CENTRAL COAST AREA

Marina 1975

COASTAL DEVELOPMENT PERMIT/
DESIGN REVIEW APPROVAL CERTIFICATE

FINAL LOCAL ACTION NOTICE
REFERENCE # 3-MAR-97-001
APPEAL PERIOD 7/25-8/7/97

RMC LONESTAR
SCALE HOUSE EXPANSION PROJECT
LAPIS ROAD

oOo

THIS IS TO CERTIFY THAT the Marina Planning Commission at a regular meeting thereof held on the 14th day of July, 1997, considered the following request and after holding a public hearing took the following action:

REQUEST:

On June 2, 1997, Architect Jim Vocelka on behalf of RMC Lonestar filed an application for a Coastal Development Permit to allow a 186 square foot single story addition to the existing scale house at the Lapis Sand Plant (APN 203-011-019) located at the west end of Lapis Road in an area which lies within the Coastal Zone. This project is exempt from environmental review by virtue of Section 15301 of the California Environmental Quality Act (CEQA) which exempts small additions to existing structures.

PLANNING COMMISSION ACTION:

The Planning Commission adopted the following findings in justification of granting a Coastal Development Permit and Design Review Approval for this request and granted said entitlements, **all subject to the following conditions of approval which begin on page 3**.

FINDINGS:

COASTAL DEVELOPMENT PERMIT FINDINGS:

The proposed project will:

1. Not impair major view corridors towards the sea from Highway 1 parallel to the sea, including the Planning Guidelines listed in the Local Coastal Land Use Plan (LCLUP).

Comment: The project proposed includes a very small single story addition (less than 200 square feet) to the existing scale house. As a result of the location of the existing structures, the small size of the proposed addition, and the existing topography, there will be no impact upon existing coastal views in any way. (See page 25 of the LCLUP).

2. Be subject to approval of the Site and Architectural Design Review Board, including the Planning Guidelines listed in the LCLUP.

Comment: At their meeting on June 5, 1997, the Design Review Board (DRB) approved the project subject to minor project revisions. These revisions will be incorporated into the project as a condition of project approval.

3. Be adequately set back from the shoreline to withstand erosion to the extent that the reasonable economic life of the use would be guaranteed without need for shoreline protection structures.

Comment: It should be several hundreds of years before this addition is threaten by coastal erosion based upon the various estimates of the rate of coastal erosion. Long before such threat is a reality the proposed addition will be removed and the site will be redeveloped.

4. Protect least disturbed dune habitat areas, primary habitat areas and provide protection measures for secondary habitat areas consistent with the LCLUP and LCIP.

Comment: The site proposed for the scale house addition and the location of activities associated with the construction of said addition will be in an area which is presently developed as part of the scale house approach and parking lot for the Lapis operation.

5. Be consistent with beach parking standards, as established in the LCLUP Access Component.

6. Not interfere with public access along the beach.

7. Comply with the access, shoreline structure and habitat protection standards included in the Local Coastal Land Use and Implementation Plan.

Comment: At no time will the addition or any activities associated with its construction or operation have any impacts on the availability of beach parking, access to the beach or wildlife habitat. No shoreline structures or activities are part of this proposal.

8. Comply with the Housing Element and housing recommendations of the Local Coastal Land Use and Implementation Plans.

9. Comply with all Coastal access and Public recreation policies of Chapter 3 of the Coastal Act.

Comment: Not Applicable.

10. Be consistent with all of the policies in Chapter 6 of the State Coastal Act.

11. Be consistent with all of the policies in Marina's certified LCLUP.

Comment: Such consistency is maintained.

DESIGN REVIEW APPROVAL FINDING

1. That the project, if constructed in accordance with the Design Review Approval conditions, will not create any adverse impacts in the vicinity, nor will it hamper orderly development in and about the subject property.

CONDITIONS OF APPROVAL:

Note that unless otherwise noted all conditions of approval are "standard conditions" required by ordinance or other authority and the imposition of these requirements is independent of their inclusion within any action by the Planning Commission. These "conditions" are presented primarily to help define how the City and other agencies' rules and regulations will apply to this project. This is intended to improve understanding on the part of the project proponent and improve communication between the City and agency staff and the proponent. Other conditions which have been identified as "special conditions" are conditions which might not be accomplished under existing authority and are being imposed as a condition of granting the requested development entitlements.

COASTAL DEVELOPMENT PERMIT
AND DESIGN REVIEW APPROVAL CONDITIONS:

1. That proper permits, licenses and approvals shall be obtained and compliance shall be maintained with all such permits and approvals and all applicable local, state and federal laws and regulations, including but not limited to applicable building, fire, health, handicapped accessibility and zoning regulations, and building security standards to the satisfaction of the appropriate permitting or jurisdictional authority.

2. That prior to any building construction, remodeling or alteration, proper signed plans shall be submitted and Building Permits shall be obtained following standard procedures established by the Building Division.

3. That prior to occupancy or final project approval, all improvements shall be completed to the satisfaction of applicable departments/agencies following standard procedures established by the Building Division.

4. That the building and its operation shall be maintained in accordance with the plans and other submission materials received and dated by the Planning Department on May 30, 1997, except as the project might be modified by the Conditions of Approval contained herein and any subsequent plans submitted to and approved by the City.

Fire Division:

5. That requirements may be imposed upon review of subsequent plans pursuant to the authority of the Fire Chief.

6. That the applicant shall contact the Fire Division for an inspection at the close of construction.

Public Works Department:

7. That all new utility connections shall be underground.

Planning Department/Design Review Board:

8. That the slope of the roof shall be reversed so as to carry roof top rainwater runoff to the north and away from the scale side of the addition.

9. That downspouts shall be added to the rain gutters.

10. That building materials and colors shall match the existing scale house.

City Attorney:

12. That the applicant shall agree as a Condition of Approval of this project to defend, at their sole expense, indemnify and hold harmless from any liability and reimburse the City for any expenses incurred resulting from or in connection with the approval of this project including any appeal, claim, suit or legal proceeding. The City may, at its sole discretion, participate in the defense of any such action, but such participation shall not relieve the applicant of its obligations under this condition. (Special condition)

THIS CERTIFICATE IS TO NOTIFY the applicant, the Coastal Commission and any person who had submitted a written request for such notice (no such requests were submitted) that the Coastal Development Permit for the project described in this certificate was approved by the Planning Commission.

In accordance with the Marina Local Coastal Program Implementation Plan any action of the Planning Commission on the Coastal Development Permit or any of the conditions listed in this certificate may be appealed with no fee by members of the public to the City Council. Such an appeal must be in writing and filed with the City Clerk within seven (7) calendar days of the Planning Commission's action, no later than 5:00 p.m., Monday, July 21, 1997. The appeal must set forth specifically the points at issue, the reasons for the appeal, and describe why the person appealing the decision believes there was an error or abuse of discretion by the Planning Commission. Should no appeal be filed within that time this certificate shall be valid as written and it shall serve as the Notice of Final Local Action on the Coastal Development Permit.

Further, in accordance with the Marina Local Coastal Program Implementation Plan, because this project is located in the "Coastal Permit Appeal Zone", any action of the City Council on the Coastal Development Permit, may be appealed by members of the public to the California Coastal Commission within twenty-one (21) calendar days of final action of the City Council. Any appeal to the Coastal Commission must be made in writing on proper forms which may be obtained by contacting the Central Coast Office of the Commission at (408) 479-3511, 725 Front Street, Suite #300, Santa Cruz, CA 95060. There are no fees required to submit an appeal of a Coastal Development Permit action to the California Coastal Commission. However, the Coastal Commission can not accept an appeal from the public unless the Planning Commission's action on the Coastal Development Permit has first been appealed to the City Council and an action has been taken by the Council.

Written notice of action on the Coastal Development Permit by the Planning Commission or City Council will be sent to any person who has, prior to the action, submitted a written request for such notice. If anyone challenges the nature of the proposed actions in court, they may be limited to challenging only those issues which have been raised at public meeting(s) regarding the project, be it either by written correspondence submitted to or at the meeting(s) or public testimony at the meeting(s). Any action for judicial review of this decision must be brought within the time limits specified in the Code of Civil Procedure Section 1094.6.

Jeffrey P. Dack

Dated: JULY 23, 1997
Marina, California

JEFFREY P. DACK, AICP
DIRECTOR OF PLANNING

DISTRIBUTION OF CERTIFICATE:

Original to: James Vocelka, AIA, Ability Ventures, 295 Hillcrest Ave., Marina, CA 93933
Copies to: RMC Lonestar, P.O. Box 337, Marina, CA 93933
Joy Chase, California Coastal Commission
Public Safety Department, c/o Fire Division
Public Works Department
Building Division
Planning Department

lapis.cer

[redacted]

On July 9, 1980, by a vote of 8 to 0, the California Coastal Commission granted to Monterey Regional Water Pollution Control Agency Permit A- 80-80, subject to the conditions set forth below, for development consisting of **construction of a regional sewage treatment system, including plant (outside of coastal zone)**; pumping station, transmission pipelines, and land and ocean outfall, more specifically described in the application file in the Commission offices.

The development is within the coastal zone in Monterey County at: treatment plant in Marina; transmission lines connecting cities of Monterey, Seaside, Fort Ord, Castroville and Salinas; outfall through dunes south of the Salinas River.

After public hearing held on June 4, 1980, the Commission found that, as conditioned, the proposed development is in conformity with the provisions of Chapter 3 of the California Coastal Act of 1976; will not prejudice the ability of the local government having jurisdiction over the area to prepare a Local Coastal Program that is in conformity with the provisions of Chapter 3 of the California Coastal Act of 1976; if between the sea and the public road nearest the sea, is in conformity with the public access and public recreation policies of Chapter 3 of the California Coastal Act of 1976; and either (1) will not have any significant adverse impact on the environment, or (2) there are no feasible alternatives or feasible mitigation measures available that would substantially lessen any significant adverse impact that the development as approved may have on the environment.

Issued on behalf of the California Coastal Commission on JUL 25 1980.

MICHAEL L. FISCHER
Executive Director

By Martha H. ...

The undersigned permittee acknowledges receipt of the California Coastal Commission Permit A- 80-80, and fully understands its contents, including all conditions imposed.

Date	Permittee

Permit A- 80-80 , is subject to the following conditions:

A. Standard Conditions.

1. Assignment of Permit. This permit may not be assigned to another person except as provided in the California Administrative Code, Title 14, Section 13170.

2. Notice of Receipt and Acknowledgment. Construction authorized by this permit shall not commence until a copy of this permit, signed by the permittee or authorized agent, acknowledging receipt of the permit and acceptance of its contents, is returned to the Commission.

3. Expiration. If construction has not commenced, this permit will expire two (2) years from the date on which the Commission voted on the application. Application for extension of this permit must be made prior to the expiration date.

4. Construction. All construction must occur in accord with the proposal as set forth in the application for permit, subject to any special conditions set forth below. Any deviations from the approved plans must be reviewed by the Commission pursuant to California Administrative Code, Title 14, Sections 13164-13168.

5. Interpretation. Interpretation or revisions of the terms or conditions of this permit must be reviewed by the State Coastal Commission or its Executive Director. All questions regarding this permit should be addressed to the State Commission office in San Francisco unless a condition expressly authorizes review by the Regional Commission or its staff.

B. Special Conditions.

1. Limit of Approval. This permit is subject to the 21 listed conditions. The conditions are separated into two general categories: Overall Project Conditio[illegible] and Specific Project Segment Conditions. While the approval of this permit authori[illegible] the overall Monterey Regional Wastewater Project concept as described and modified in the findings and conditions, actual construction of the specific segments of the project shall not commence until the listed conditions are met as certified in writ[illegible] by the Executive Director. In some instances, Commission action will be needed for the determination of compliance with conditions. In all cases where Executive Dire[illegible] sign-off is required, a thirty (30) day review period shall be set. Where Commissi[illegible] review and approval is required, the timing shall be as with a normal permit application under the Commission's Regulations (Section 13056-13096).

OVERALL PROJECT CONDITIONS

2. Service Area.

a. The service area of the authorized project within the coastal zone sha[illegible] be limited to that shown on Exhibit 1. Additions to this service area within the coastal zone shall require an amendment to this permit, a separate Coastal Permit, [illegible] a federal consistency determination, as appropriate.

b. Except as provided for in (a), the applicant, Monterey Regional Water Pollution Control Agency (MRWPCA), shall not cause any property located outside its current district boundary within the coastal zone to be "assessed for benefits received" from the approved project; nor shall any future payment be accepted by MRWPCA or its member agencies in exchange for a promise to serve, to issue sewer connection permits to, or to annex any such property. "To serve" shall not be con[illegible] to limit the geographic area to which MRWPCA may supply reclaimed wastewater.

3. Financing. Any revisions to the general financing system (i.e. local fundin through revenue bond approach) specified in the August 15, 1979, letter from Bartle-Wells to MRWPCA and changes in the rate structures (not schedules or user, connec or annexation fees) based on other than existing land uses (e.g. charge proportionate to development allowed under zoning, charge to vacant parcels) shall be subject to Executive Director review and approval to determine their impact on development patte and coastal resources and to determine if the changes result in the need for a permit amendment. (See Ca. Adm. Code 13652)

4. Scenic Resources. This permit authorizes the demolition of the Seaside Treatment Plant. After demolition, the parcel(s) currently containing the Seaside Treatment Plant shall remain free of structural development (excepting the approved pump station and workshop) visible from Highway 1 or any public use areas. This condition shall be implemented by a scenic easement or comparable alternative measure, subject to Executive Director review and approval.

5. Disposal of Construction Spoils. Off-site disposal of excavated spoils withi the coastal zone shall be subject to prior review and approval by the Executive Direc

6. Future Modifications. Other than normal repair and maintenance as defined in Section 30610(d) of the Coastal Act, any modifications to any approved project components within the coastal zone shall require an amendment to this permit.

7. Construction. Prior to any demolition work to abandon any of the existing outfall lines, permittee shall submit a description of the work for Executive Director review and approval.

8. Access.

a. MRWPCA shall agree to allow public access over any portions of its easements or land within the coastal zone, excluding federal property, so designated for public access in the applicable Local Coastal Programs. This agreement is subject to MRWPCA granting only such rights as it may have and it is understood that MRWPCA will not obstruct any other party's establishment of public accessways in the project vicinity. The appropriateness of public access in any given area (especially agri-cultural lands) shall be examined through the LCP planning process. Public use shall be regulated consistent with the provisions of Sections 30212 and 30214 of the Coastal Act. MRWPCA may delegate public access management responsibilities to another public agency. Any surface easements associated with this project, running from the first public road to or along the shoreline, which are acquired by MRWPCA prior to certifi-cation of the applicable Local Coastal Program shall include provisions which would allow public access over the subject area.

b. MRWPCA shall, by accepting the terms and conditions of the permit, agree that permit issuance and completion of the authorized development shall not prejudice any subsequent assertion of public rights, e.g. prescriptive rights, public trust, etc

9. Liability Disclaimer. In accepting this permit, permittee acknowledges that portions of the permittee structure lies within an apparent high hazard area; and fur acknowledges that the State of California assumes no liability for loss of life or property which may result from the placement of structures on this site.

10. Archaeology.

a. The SWRCB grant condition regarding archaeology and any additional mitigation measures recommended by the State Historic Preservation Officer (by May 1, 1980) shall be conditions of this Coastal Permit as well.

b. For any final pipeline routes or staging areas within the coastal zone not previously surveyed by the consultant: unless permittee presents verification by a recognized professional archaeologist or the State Historic Preservation Officer that the site has no apparent prehistoric scientific values warranting further mitiga permittee shall provide an evaluation of the significance of the archaeologic values of the site, prior to any disturbance of the surface area of subject property. Such evaluation shall be prepared by a professional archaeologist or by other person(s) qualified in accordance with the standards of the State Historic Preservation Office, and shall be submitted for approval by the Executive Director.

c. If the archaeologic resources are found to be significant, permittee shall then submit a plan of mitigation, prepared by a qualified professional archaeologist and using accepted scientific techniques, prior to any (additional) disturbance of the surface area of the property. Such plan shall be submitted for review by the State Historic Preservation Office and the approval of the Executive Director. The plan shall provide for reasonable mitigation of archaeologic impacts resulting from the development of the site, and shall be fully implemented. A report verifying compliance with this condition shall be submitted upon completion of excavation, for review and approval by the Executive Director.

11. Odor Control. MRWPCA shall prepare and implement a detailed program employing highest "state of the art" methods to prevent project odors. The program shall cover the periods when the system transports treated effluent, and raw sewage is transported, and shall include an implementation time table. Prior to commencement of construction of any project components the design unit of the Division of Water Quality - State Water Resources Control Board shall certify in writing to the Commissi that the project designs meet the above-mentioned objective for odor control.

12. Retaining Reclamation Opportunity. [illegible] proposed project does not authorize demolition of any existing [illegible] plant in the coastal zone, except the Seaside facility. A separate [illegible] Development Permit (or a feder consistency determination, where applicable) [illegible] required prior to any demolitio

13. Reclamation Progress.

a. MRWPCA shall submit an annual report to the Coastal Commission and/or its successor agency(ies) detailing its progress toward reclamation, including a priority list of potentially viable reclamation projects with expected demand and required start-up time for each. The first report is due January 1981.

b. To ensure that Coastal Act priorities are incorporated in MRWPCA's reclamation planning, it shall establish and sponsor a Wastewater Reclamation Advisory Committee consisting of a wide range of representation, including that of the Coastal Commission and/or its successor agencies (i.e. local coastal governments).

14. Energy Consumption. The final pipeline alignment (except as otherwise provided herein) shall be the least energy consumptive. Energy saving and alternative energy components shall be incorporated to the maximum extent feasible. A revised total energy use projection, using the latest acceptable energy cost projections, shall be submitted for State Water Resources Control Board staff verification and then to the Commission for the review and approval of the Executive Director.

SPECIFIC PROJECT SEGMENT CONDITIONS

15. Monterey Pump Station. This permit authorizes construction of the Monterey Pump Station as depicted in the drawings of 1/29/80. Prior to the award of the bid and commencement of construction, MRWPCA shall submit for the review and approval of the Executive Director of the Commission:

a. Certified odor control plan pursuant to condition 11.

16. Monterey-Seaside Interceptor. This permit authorizes a selection from two alternative locations of the 27" force to 30" gravity interceptor line between the Monterey and Seaside Treatment Plants (Exhibit 5). Prior to bid award and commencement construction, MRWPCA shall submit final plans of its selected alternative for Commis review and approval pursuant to Condition #1. Plans submitted for final approval sh include detailed engineering drawings and contract specifications that clearly demon that all conditions listed for the chosen alternative are met.

ALTERNATIVE A

The interceptor alignment shall avoid sand and dunes areas and shall be located along existing paved roadways or along improved rights-of-way (Alternative alignment 2B of 2/19/80 submission). Final plans for this alternative shall include the follo provisions and submissions:

a) avoidance of and protection of any adjacent wetland areas;

b) staging area plnas (including location - outside of any dune area, size, any fencing);

c) construction and staging area restoration plans;

d) archaeological clearance pursuant to Condition 10b and c.;

e) certified odor control plans pursuant to Condition 11;

f) applicable local approvals;

g) U.S. Army Corps of Engineers approval

-- OR --

ALTERNATIVE B

The interceptor alignment shall be through the dunes as proposed by the MRWPCA. (Alternative alignment #2A of 2/19/80 submission). Final plans shall include the following provisions and specifications:

a) staging area plans (including location outside of any dune area, size, fencing) designed to minimize viewshed, access, and vegetation impacts;

b) a dune restoration plans showing restoration and revegetation of the dunes from the construction zone to the high tide line with native dune vegetation to the maximum extent feasible to provide for permanent coverage of the pipeline. The restoration plans shall be developed in consultation with the California Department of Parks and Recreation. Aspects of the plan shall include but not be limited to: 1) designation of precise restoration boundaries; 2) list of native plant species which will be utilized; 3) topographic map showing final dune features and indication of source of dune material; 4) maintenance and management objectives and methods; and 5) upon completion of construction and prior to the operation of the approve facility, MRWPCA shall begin the dune restoration and stabilization plan;

c) archaeologic clearance pursuant to Condition 10b and c.;

d) certified odor control plans pursuant to Condition 11;

e) applicable local approvals;

f) permission from State Parks and Recreation to cross its land;

g) written determination from the State Lands Commission that:

- No State lands under State Lands Commission jurisdiction are involved in the development; or
- State Lands are involved in the development and all permits required by the State Lands Commission have been obtained; or
- State Lands may be involved in the development, but pending a final determination, an agreement has been made with the State Lands Commission for the project to proceed without prejudice to that determination;

h) U.S. Army Corps of Engineers approval;

i) easements from private property owners;

j) availability of MRWPCA's easement through the dunes to other existing utilities;

k) evidence of legal authority sufficient to implement the dune restoration plan and provide permanent preservation of the dune area between the transmission line and the sea (e.g. deed restriction, fee simple acquisition or easement). MRWPCA may transfer this interest to an appropriate public or conservation agency that agrees to permanently manage the dunes.

17. Seaside Pump Station. This permit authorizes a new pump station at the Seaside Treatment Plant site. Prior to the award of the bid and commencement of construction, MRWPCA shall submit for Executive Director review and approval or certification:

a) revised building plans, including landscaping compatible in design and materials with the surrounding dune area. These plans (including elevations and adequate renderings and perspectives) shall be adequate to allow determination of the visual impact of the proposed new building and retained existing buildings and their relationship to total site development;

b) certified odor control plan pursuant to condition #11;

c) proof of local approval.

18. Seaside to Ft. Ord Interceptor. This permit authorizes the 36" interceptc from the Seaside to Ft. Ord treatment plants at the location and elevations specifie in the 6/7/79 plans as modified by MRWPCA letter of 12/11/79 and subject to the 7/79 specifications. Prior to the award of the bid and commencement of construction, MRW shall submit for Executive Director review and approval or certification:

a) detailed engineering drawings of revised routing specified in 12/11/79 letter;

b) staging area plans (including location - outside of stabilized dune areas, size, any fencing) designed to minimize viewshed, access, and habitat impacts;

c) construction and staging area restoration plans including removal of all construction debris, recontouring of land and revegetation;

d) archaeological clearance of revised route pursuant to Condition 10b. and c;

e) certified odor control plan pursuant to Condition 11.

f) necessary easement.

19. Ft. Ord Pump Station & Interceptor. This permit authorizes the Ft. Ord pump station (1/21/80 plans) and the 48" gravity interceptor line from Ft. Ord thr the portions of Marina within the coastal zone at the location and elevations spec in the 8/7/79 plans, subject to the 7/79 specifications. Prior to the award of th bid and commencement of construction, the applicant shall submit the following for the review and approval of the Executive Director of the Commission:

a) staging area plans (including location - outside of stabilized dune areas, size, any fencing) designed to minimize viewshed, access and habitat impacts;

b) construction and staging area restoration plans including removal of all construction debris, recontouring of land and revegetation;

c) CALTRANS approval.

20. Realignment of the Land and Ocean Outfall. Prior to the award of the bid commencement of construction MRWPCA shall submit final plans to the Commission show an alternative alignment of the land and ocean outfall. The outfall alignment shal be located to avoid all vegetated and stabilized dunes from the Salinas River Refug to the Lone Star Sand Plant. This would be accomplished by relocating the land out pipeline along the SPRR right-of-way and through the disturbed portion of the dunes and relocating the outfall directly offshore from the sand plant to a point outside the Zone of Prohibition (Attachment A, Exhibit 6). Plans submitted for final appro shall include detailed engineering drawings and contract specifications which clear demonstrate that all conditions listed can be met. Final plans for the outfall sha include the following stipulations:

a) the pipeline shall be located at a depth that will be covered at all times;

b) the pipeline and junction box shall be located outside the stabilized dunes and in an area that will minimize the disruption of the existing operation of the Lone Star Plant, but in no case interfere with the ability of the Lone Star Sand Plant to design and carry out reclamation pursuant to the State Mining and Reclamation Act;

c) the junction box-drop structure shall be located far enough inland to avoid the need for future installation of shoreline protection devices due to shoreline erosion during an estimated 100-year project lifetime.

The beginning of the ocean outfall pipeline (which runs from the junction box through the surf zone) shall be designed to take into account the probably shoreline erosion that will occur within the 100-year project lifetime. The design shall be prepared so that no future shoreline protective works will be needed and the outfall line will not be exposed forming groin or other impediment to natural sand transport. This design shall be supported by the analysis of a coastal engineer, licensed to practice civil engineering in the State of California, which describes coastal processes in the portion of the littoral zone and sand dunes. The report shall include (but not be limited to) the theoretical line of scour, and the retreat of the dune scarp, assuming two-foot and four-foot annual erosion rates for the project lifetime.

d) MRWPCA, in consultation with its selected contractor, shall submit detailed maps and plans showing all necessary construction staging areas and access roads within the coastal zone for the Alternative A land and ocean outfall alignment located out of, and which minimize impacts on, environmentally sensitive habitat areas and agricultural fields. These plans shall specify the type of equipment, length of time area is needed, and any special secur provisions. Staging area plan shall include detailed restoration and revegetation plans for all disturbed sites.

e) final archaeological clearance pursuant to condition 10b and c;

f) certified odor control plan pursuant to condition 11;

g) State Lands Commission approval;

h) U.S. Army Corps of Engineers approval;

i) all necessary local approvals;

j) easements.

As a part of the Commission's review the final land and ocean outfall plans will be analyzed by the State Commission geotechnical staff and the California Divi of Mines and Geology.

21. Salinas River Mitigation Program.

a. The SWRCB Step III Clean Water Grant Condition shall be in full force effect for the subject permit(Exhibit 3). The condition requires as follows:

> The Grantee shall conduct a study of the resultant effects of the removal of the City of Salinas Wastewater discharges on the lower reaches of the Salinas River between the existing City of Salinas discharge point to, and including, the downstream Lagoon. The Study shall be coordinated with representatives from the California Department of Fish and Game, Coastal Commission, State and local Department of Health, U.S. Fish and Wildlife Service, Environmental Protection Agency, Regional Water Quality Control Board and the State Water Resources Control Board (i.e., study coordination group), and shall be completed no later than January, 1981. Wastewater discharges from the City of Salinas shall not be diverted to the Grantee's regional treatment and/or disposal system until the study has been completed and necessary mitigation of significant adverse impacts to the lower Salinas River and Lagoon areas is agreed upon. Following completion of the study, all members of the study coordination group will be officially requested by the Grantee to participate in the development of an appropriate mitigation agreement. The members of the study coordination group shall have 60 days to review the final study. Within the 60-day review period, members of the study coordination group will prepare written comments. A written response from each member of the study coordination group is required. Following the review period, the Grantee shall conduct a public workshop on the Salinas River Study to present preliminary mitigation recommendations and obtain additional public input. Following this workshop, the Grantee in cooperation with the study coordination group shall adopt a final mitigation agreement which will provide optimum protection of the environmentally sensitive habitat of the lower Salinas River and Lagoon, consistent with the Coastal Act, water quality and public health statutes. Should the study coordination group fail to arrive on a mitigation agreement by September, 1981, the State Water Resources Control Board will have the option to intervene and take whatever action required to ensure that an appropriate mitigation agreement is developed.

The agreement including a schedule for completion of the mitigation program must be reviewed and approved by the State Water Resources Control Board. Following this approval, the Grantee shall initiate implementation of the agreed upon mitigation measures.

b. The applicant shall submit a mitigation program adequate for the protec and maintenance of the functional capacity of the Salinas River and Lagoon habitat values within the coastal zone for the review and approval of the Commission prior t diversion of the treated effluent discharge currently contributing to the Salinas Ri flow, to the proposed ocean outfall. The program shall include a timetable and evid of funding for implementation of the mitigation program. The Commission's review sh include a public hearing and Commission action to approve a mitigation program with any changes necessary to protect the environmentally sensitive haibtat area of the lower Salinas River consistent with water quality and public health policies of the Coastal Act. Determination of appropriate mitigation measure(s) shall be accomplish by completion of the study and review process required by the State Water Resources Control Board through its Clean Water Grant Special Condition No. 12 (See Condition

DEPARTMENT OF THE ARMY

NOTE.—It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining *State assent* to the work authorized. IT MERELY EXPRESSES THE ASSENT OF THE FEDERAL GOVERNMENT SO FAR AS CONCERNS THE PUBLIC RIGHTS OF NAVIGATION. (See *Cummings* v. *Chicago*, 188 U. S., 410.)

16—13168-2

SPNHN
PN 64-18

PERMIT

US Army Engineer District, San Francisco
Corps of Engineers
~~180 New Montgomery St~~
100 McAllister ~~Corps of Engineers~~
San Francisco, California 94102
10 April, 1964.

0231

State of California
Department of Finance
State Lands Division
305 State Building
Los Angeles 12, California

Gentlemen:

Referring to written request dated August 1, 1963 for a Department of the Army permit,

I have to inform you that, upon the recommendation of the Chief of Engineers, and under the provisions of Section 10 of the Act of Congress approved March 3, 1899, entitled "An act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes," you are hereby authorized by the Secretary of the Army.

to extract a maximum limit of 100,000 tons of sand per year from a 2,200 foot long area along the shoreline extending not further than 200 feet seaward of the ordinary high water mark
(Here describe the proposed structure or work.)

in Monterey Bay,
(Here to be named the river, harbor, or waterway concerned.)

at near Lapis, Monterey County, California,
(Here to be named the nearest well-known locality—preferably a town or city—and the distance in miles and tenths from some definite point in the same, stating whether above or below or giving direction by points of compass.)

in accordance with the plans shown on the drawing attached hereto and titled: "Permit to Dredge near Lapis, County of Monterey, State of California, Application by: State of California, Tracing from Reduced USC&GS 5403, Date August 1963"
(Or drawings; give file number or other definite identification marks.)

subject to the following conditions:

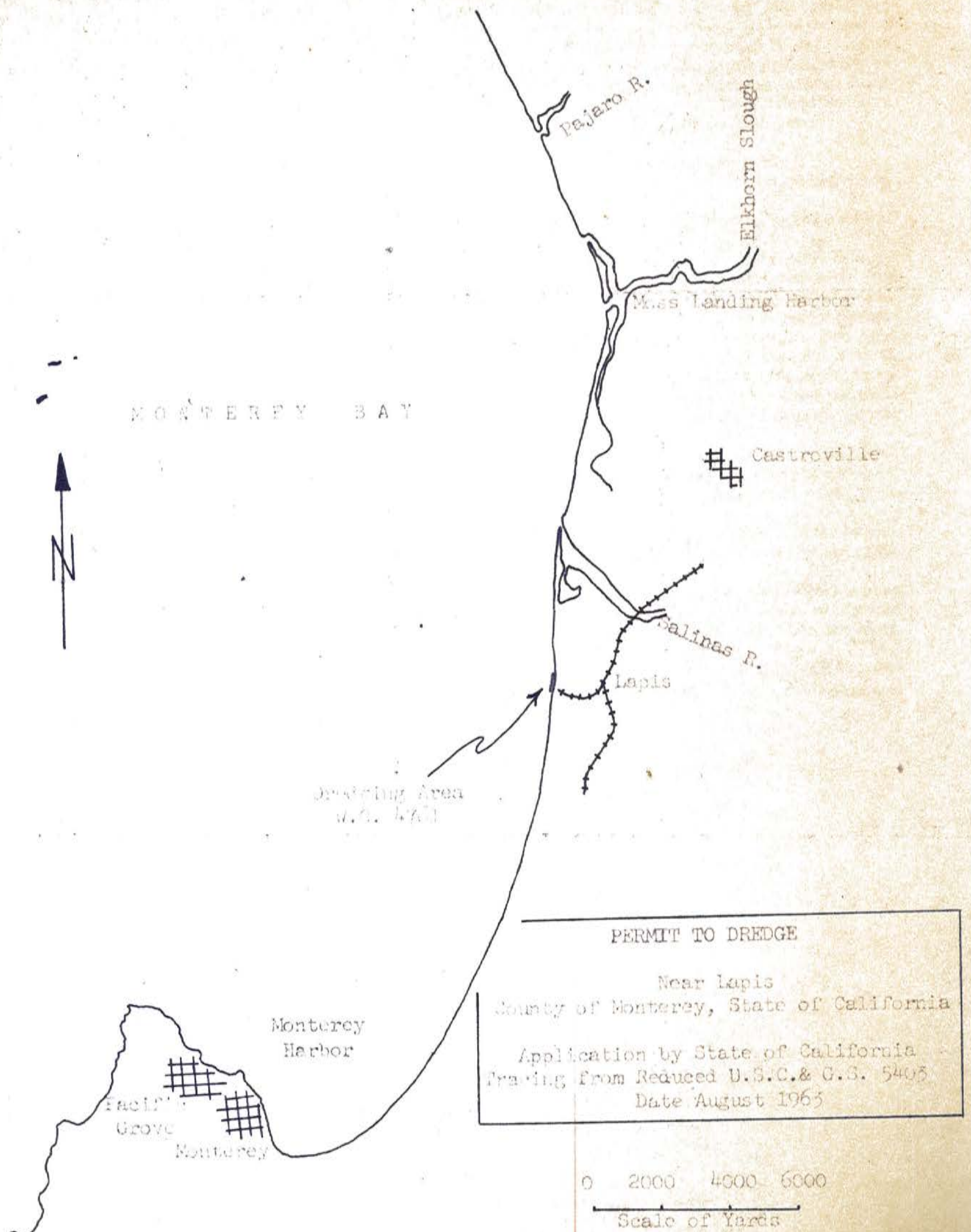


Exhibit 18
CCC-17-CD-02

...all be subject to the supervision and approval of the District Engineer, Corps of Engineers, in charge of the locality, who may temporarily suspend the work at any time, if in his judgment the interests of navigation so require.

(*b*) That any material dredged in the prosecution of the work herein authorized shall be removed evenly and no large refuse piles, ridges across the bed of the waterway, or deep holes that may have a tendency to cause injury to navigable channels or to the banks of the waterway shall be left. If any pipe, wire, or cable hereby authorized is laid in a trench, the formation of permanent ridges across the bed of the waterway shall be avoided and the back filling shall be so done as not to increase the cost of future dredging for navigation. Any material to be deposited or dumped under this authorization, either in the waterway or on shore above high-water mark, shall be deposited or dumped at the locality shown on the drawing hereto attached, and, if so prescribed thereon, within or behind a good and substantial bulkhead or bulkheads, such as will prevent escape of the material in the waterway. If the material is to be deposited in the harbor of New York, or in its adjacent or tributary waters, or in Long Island Sound, a permit therefor must be previously obtained from the Supervisor of New York Harbor, New York City.

(*c*) That there shall be no unreasonable interference with navigation by the work herein authorized.

(*d*) That if inspections or any other operations by the United States are necessary in the interest of navigation, all expenses connected therewith shall be borne by the permittee.

(*e*) That no attempt shall be made by the permittee or the owner to forbid the full and free use by the public of all navigable waters at or adjacent to the work or structure.

(*f*) That if future operations by the United States require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army, it shall cause unreasonable obstruction to the free navigation of said water, the owner will be required upon due notice from the Secretary of the Army, to remove or alter the structural work or obstructions caused thereby without expense to the United States, so as to render navigation reasonably free, easy, and unobstructed; and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners shall, without expense to the United States, and to such extent and in such time and manner as the Secretary of the Army may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable capacity of the watercourse. No claim shall be made against the United States on account of any such removal or alteration.

(*g*) That the United States shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the Government for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

(*h*) That if the display of lights and signals on any work hereby authorized is not otherwise provided for by law, such lights and signals as may be prescribed by the U. S. Coast Guard, shall be installed and maintained by and at the expense of the owner.

(*i*) That the permittee shall notify the said district engineer at what time the work will be commenced, and as far in advance of the time of commencement as the said district engineer may specify, and shall also notify him promptly, in writing, of the commencement of work, suspension of work, if for a period of more than one week, resumption of work, and its completion.

(*j*) That if the structure or work herein authorized is not completed on or before the thirty-first (31st) day of December, 19 67, this permit, if not previously revoked or specifically extended, shall cease and be null and void.

By authority of the Secretary of the Army:

Robert H. Allan

ROBERT H. ALLAN
Lt. Colonel, CE
District Engineer

ENG FORM 1 SEP 48 1721 (Civil) This form supersedes ED Form 96, dated 1 Apr 48, which may be used until exhausted.

EM 1145-2-303

U. S. GOVERNMENT PRINTING OFFICE 16—13168-5

SPNCO-OR
PN 70-4

27 February 1973

Mr. George W. Ginn
State Lands Division
100 Oceangate, Suite 300
Long Beach, CA 90802

Dear Mr. Ginn:

Reference is made to your letter dated 6 August 1969, file number W-9003, P.R.C. 3183.1, requesting an extension to Department of the Army Permit No. 64-18.

Processing of the request has been held in abeyance because of several objections. Most significant of the objections was an objection filed by the Association of Monterey Bay Area Governments opposing the extension of the permit. They also requested that no new permits be granted for sand removal in the Monterey Bay area until more is known regarding the movement and rate of replacement of sand in the area.

Since over three years has elapsed with no further progress on your request, this office has determined a new request would be necessary if it is decided to pursue the proposed work in the future. The file regarding the request for the extension will be "retired." Any questions regarding this matter should be referred to Mr. Evan Hong, Permit Section, telephone 415-556-5178 or 5489.

Sincerely yours,

James C. Wolfe

JAMES C. WOLFE, Chief
Construction-Operations Division

AGREEMENT BETWEEN THE CITY OF MARINA AND RMC LONESTAR REGARDING CONTINUED DUNE MINING

THIS AGREEMENT is made and entered into on April 11th, 1989, by and between the CITY OF MARINA and RMC LONESTAR as follows:

RMC LONESTAR has been working as a member of the Coastal Zone Planning Task Force of Marina to plan habitat preservation and restoration areas, as well as, areas for potential development in the coastal dunes in Marina. RMC LONESTAR does not believe that mining the areas marked "A" and "B" in the attached Exhibit 1 has or will violate the Endangered Species Act, 16 USC 1530 et seq. (Act). However, in keeping with our cooperative effort with the City, park agencies and environmental groups on the Task Force, RMC LONESTAR agrees to the following:

1) RMC LONESTAR will not hereafter mine area "A" on the attached map (Exhibit 1) unless or until:
   a) A habitat conservation plan which involves the Marina property of RMC LONESTAR (Lapis), is approved; or
   b) The U. S. Fish and Wildlife Service and/or agent thereof accepts mining in such area; or
   c) RMC LONESTAR submits to the City, a report by a biologist as to area "A" of the type set forth in 2) a) i) below.

2) a) i) No later than May 1, 1989, RMC LONESTAR will submit to the City a map of proposed interim mining within area "B". Accompanying such map will be a report prepared by a biologist who shall be reasonably approved by the Director of Planning and the City of Marina. The report will reflect whether mining in area "B" or portions thereof, will result in a taking of endangered species, protected by the Act. A taking shall include significant habitat modification or degradation which would actually kill or injure endangered species as set forth by the Act or regulations promulgated pursuant to the Act. Said map shall plot areas in which endangered species have been found and habitats thereof which are protected by the Act, if any.
      ii) Mining shall not continue in those portions of area "B" where such mining will result in the taking of such endangered species protected by the Act, unless or until any of the actions specified in Section 2) b) have been completed.
   b) Mining in area "B" may continue without the above said report in the event:
      i) A habitat conservation plan which involves the Marina property of RMC LONESTAR (Lapis), is approved; or
      ii) The U. S. Fish and Wildlife Service and/or agent thereof accepts, mining in such area.

3) The parties to this agreement acknowledge that this agreement does not limit nor preclude any obligations of RMC LONESTAR

under the California Public Resources Code, especially Section 2770.

4) Anything else notwithstanding, RMC LONESTAR is not giving up any of its property rights nor its rights to assert the same.

The parties hereto, by their duly authorized representative, have executed this agreement on the date first written above.

RMC LONESTAR

By [signature]
Title V. P. PRES. ENVIRONMENT AND RESOURCES.

CITY OF MARINA

By [signature]
Title Mayor

agrermcls


D
A
B
B

STATE OF CALIFORNIA - THE RESOURCES AGENCY PETE WILSON, Governor

DEPARTMENT OF CONSERVATION

09-05

.ATE MINING AND GEOLOGY BOARD

801 K Street

Sacramento, CA 95814-3500

Telephone: (916) 322-1082

TDD Line: (916) 324-2555

RESOLUTION #92-12

Reclamation Plan for RMC Lonestar's - Lapis Sand Plant

WHEREAS, RMC Lonestar (hereinafter referred to as Lapis), filed a Notice of Intent to Appeal with the State Mining and Geology Board on June 27, 1990, pursuant to the reclamation plan appeal provisions of Section 2770(e) of the Surface Mining and Reclamation Act (SMARA) for its Lapis Sand Plant;

WHEREAS, the appeal was accepted by the Board by letter dated July 12, 1990, based on RMC Lonestar's initial prima facie showing that the City of Marina failed to act on the reclamation plan application within a reasonable period of time;

WHEREAS, environmental documentation was prepared and approved by the Board pursuant to the requirements of the California Environmental Quality Act (CEQA), and the administrative record is now deemed complete according to the Board's own regulations (California Code of Regulations, Sections 3650 - 3659);

WHEREAS, a Committee of the full Board held a public hearing in the City of Marina on April 27, 1992, for purposes of receiving testimony on the adequacy of the reclamation plan;

WHEREAS, the Committee recommended to the full Board that the reclamation plan be approved;

WHEREAS, the members of the Board have reviewed the administrative record, the transcripts of the public hearing and the recommendation of the Committee;

WHEREAS, the Board finds that the reclamation plan with the identified mitigation and monitoring program substantially meets the requirements of SMARA Sections 2772 and 2773, Board regulations and the local surface mining and reclamation ordinance, and the requirements of CEQA;

THEREFORE, BE IT RESOLVED, that the State Mining and Geology Board approves RMC Lonestar's Lapis Sand Plant reclamation plan.

James A. Anderson

James A. Anderson
Chairman

Adopted: June 15, 1992

RECLAMATION PLAN

LAPIS PLANT
City of Marina
County of Monterey

RMC LONESTAR
P.O. Box 5252
Pleasanton, CA 94566
(415) 426-8787

August 1989
Revised Oct. 11, 1989
(Items [illegible], 27, & 29)
April [illegible], 1991
(Items 20, 22, 27 & 28)

TABLE OF CONTENTS

SECTION

RMC Lonestar owns and operates a sand-mining and processing plant in the City of Marina, County of Monterey, California. The plant has been in operation since 1906. The State Surface Mining and Reclamation Act of 1975 (SMARA), Section 2776, provides as follows:

> *"A person who has obtained a vested right to conduct surface mining operations prior to January 1, 1976, shall submit to the lead agency and receive, within a reasonable period of time, approval of a reclamation plan for operations to be conducted after January 1, 1976, unless a reclamation plan was approved by the lead agency prior to January 1, 1976, and the person submitting the plan has accepted responsibility for reclaiming the mined lands in accordance with the reclamation plan. Nothing in this chapter shall be construed as requiring the filing of a reclamation plan for, or the reclamation of, mined lands on which surface mining operations were conducted prior to January 1, 1976."*

As a practical approach, this reclamation plan is for the portion of the site which is currently being mined. This area includes sites mined before and after the January 1, 1976 cutoff date. Other lands to the north which are not currently being mined, will be addressed in a future reclamation plan.

SUGGESTED MODEL RECLAMATION PLAN

As a guide to Counties and Cities for Compliance with
Section 2772, Surface Mining and Reclamation Act of 1975

OWNER, OPERATOR, AND AGENT:

1. *Applicant*

Name	RMC Lonestar Industries, Inc.
Address	P.O. Box 5252 Pleasanton, CA 94566
Telephone	(415) 426-8787

2. Name (if any) of Mineral Property: Lapis Plant

3. *Property Owners,* or owners of surface rights (List all owners).

Name	
Address	Same as Applicant
Telephone	

4. *Owners of Mineral rights.*

Name	
Address	Same as Applicant
Telephone	

5. *Lessee.*

Name	
Address	Same as Applicant
Telephone	

6. *Operator.*

Name	
Address	Same as Applicant
Telephone	

7. *Agent of Process.* (Person designated by operator as his agent for the service process).

Name	Ralph Mitchell RMC Lonestar Industries, Inc.
Address	P.O. Box 5252 Pleasanton, CA 94566
Telephone	(415) 426-8787

LOCATION:

8. Brief description, including legal, of the extent of the minded lands (to be) involved by this operation, including total acreage.

   Portion of Assessor's Parcel No. 23-011-01 as shown on the attached map.

   Section(s)__________________, Township __________________, Range __________________,

   ________________________ Meridian.

---

9. Describe the access route to the operation site.

   The Lapis Plant is located on the western end of Lapis Road. Lapis Road is reached from Del Monte Avenue and passes under Highway 1.

---

10. Attach Location and Vicinity Map

    See attached maps.

DESCRIPTION:

11. Mineral commodity (to be) mined: Silica Sand

---

12. Geologic description, including brief general geologic setting, more detailed geologic description of the mineral deposit (to be) mined, and principal minerals or rock types present.

    The site is a sand deposit adjacent to the Pacific Ocean. Silica sand, consisting primarily of quartz and feldspar, is mined from the on-shore deposit. The eolian deposited sand is referred to as Flandrian complex with older, Pre-Flandrian dunes lying underneath.

---

13. Brief description of environmental setting of the site and the surrounding areas. Describe existing area land use, soil, vegetation, ground water elevation and surface water characteristics, average annual rainfall and/or other factors pertaining to environmental impacts and their mitigation and reclamation.

    Land uses to the south and east include Highway 1, agriculture, sand-mining and processing and residential. The site has been actively mined since 1906, and the site has been disturbed by off-road vehicles. A regional sewage outfall line crosses the site to an ocean discharge location.

PROPOSED (EXISTING) SURFACE MINING OPERATION:

14. Proposed starting date of operation Mining is on-going

    Estimated Life of Operation 50 years or more.

    Duration of First Phase Undefined

---

15. Operation will be (is): Continuous ___X___, Seasonal ______

Developed,
not yet in operation ______, Temporarily deactivated ______,
Stockpile in Mine ______

---

16. Operations will be (is):
- Under 5,000 tons cu. yds./yr. ______
- 5,000 - 50,000 tons cu. yds./yr. ______
- 50,000 - 250,000 tons cu. yds./yr. ______
- 250,000 - 1,000,000 tons cu. yds./yr. ___X___
- Over 1,000,000 tons cu. yds./yr. ______

---

17. *Total anticipated production*

Mineral commodities to be removed - tons (cu. yds.) >5,000,000 yds
Waste retained on the site - tons (cu. yds.)______
Waste disposed off site- tons (cu. yds.)______
Maximum anticipated depth Final Grade ~ 20 NGVD ft.

---

18. *Mining Method:* (Check all applicable)

Open Pit	______	Gravel/Sand Pit	___X___
Single Bench	______	Drill and Blast	______
Quarry:			
Hill Top	______	Clay Pit	______
Multibench	______	Truck to processing	
Side Hill	______	plant (To RR)	______
Dragline	______	Borrow Pit	______
Low Level	______	Tailings Pond	______
Shovel	______	Slurry Pump	______
Underground	______	Waste dump	______
Gravel bar skimming	______	Rail	______
Other	______	Other	___X___

Speciality sand is removed from the dredge pond, pumped to the dewatering tower, and kiln dried.

19a. If processing of the ores or mineral mined is planned to be conducted at or adjacent to the site, briefly describe the nature of the processing and explain disposal method of the tailings or waste from processing.

Sand is dried, screened and blended at a processing plant on the site. No tailings are generated. Small quantities of waste from washing or from air pollution control equipment are stockpiled and sold.

19b. Estimate quantity (gallons per day) and quality of water required by the proposed operation, specifying proposed sources of this water, of method of its conveyance to this property and the quantity and quality and method of disposal of used and/or surplus water.

Sand is washed with water from a well on-site. Waste water is discharged to a percolation pit on-site. Average daily use is approximately 504,000 gallons per day.

20. If the nature of the deposit and the mining method used will permit, describe and show the steps or phases of the mining operation that allow concurrent reclamation and include a proposed time schedule for such concurrent activities.

This reclamation plan pertains to the current mining area which is continuously involved in mining and the inactive mining area to the south as labeled on the mapping. Reclamation and revegetation is proposed for the southern slopes and the inactive mining area as described on the mapping.

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21. Attach a map of the mined land and/or suitable aerial photograph showing:

(a) Boundaries and topographic details of the site;
(b) Location of all streams, roads, railroads, water wells, and utility facilities within 500 feet of the site;
(c) Location of all currently proposed access roads to be constructed in conducting the surface mining operation(s);
(d) Location of areas (to be) mined, and of waste dumps and tailings ponds.
(e) By use of overlay symbol or color, depiction of separate mining phases if applicable. (See Item 20).
(f) The source of map base, orientation (North arrow), and scale (e.g., 1" = 500', etc.) of the map.

RECLAMATION PLAN:

22. Indicate on an overlay of map of Item 21, or by color or symbol on map those areas to be covered by reclamation plan.

Acreage ~104

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23. Describe the ultimate physical condition of the site and specify proposed use(s), or potential uses, of the mined lands as reclaimed.

After sufficient sand mining, the parcel will be available for other coastal dependent or visitor serving uses as allowed by the Marina Coastal Zone Land Use Plan. Most of the site will have gentle slope to the ocean at elevations of +20' to +25'. Dune ridges will remain at lateral boundaries.

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24. Describe relationship of the interim uses other than mining and the ultimate physical condition to:

(a) Zoning regulations. Marina Local Coastal Plan, Coastal Conservation and Development/ Coastal Development Permit Combining District
(b) General plan and plan elements. Consistent with above.

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25. Provide evidence that all owners of a possessory interest the land have been notified of the proposed use(s) or potential uses identified in Item 22. (Attach copy of notarized statement of acknowledgement, etc.)

Statement of acknowledgement is attached in Appendix.

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26. Describe soil conditions and proposed soil salvage plan.

Parcel entirely overlies sand deposits, no topsoil exists.

27. Describe the methods, their sequence and timing, to be used in bringing the reclamation of the land to its end state. Indicate on map (Item 21-22) or on diagrams as necessary. Include discussion of the pertinent items listed below.

(a) Backfilling and grading.
(b) Stabilization of slopes.
(c) Stabilization of permanent waste dumps, tailings, etc.
(d) Rehabilitation of pre-mining drainage.
(e) Removal, disposal, or utilization of residual equipment, structures, refuse, etc.
(f) Control of contaminants, especially with regard to surface runoff and ground water.
(g) Treatment of streambeds and streambanks to control erosion and sedimentation.
(h) removal or minimization of residual hazards.
(i) Resoiling, revegetation with evidence that selected plants can survive given the site's topography, soil and climate.

See attached topography map.

At the conclusion of mining and in conjunction with the development of the permitted secondary land use, a detailed grading plan will be developed to establish the final contour of the reclaimed lands. A revegetation plan has been prepared by LSA Associates dated April 1990, and is a part of this reclamation plan. Slopes will be stabilized to prevent erosion and blow-outs. All residual equipment, structures, refuse, etc. from the operation will be removed from the site. There are no known contaminant that will affect surface runoff and ground water. Surface water run-off will be treated in a manner so as to prevent erosion.

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28. If applicant has selected a short term phasing of his reclamation, describe in detail the specific reclamation to be accomplished during first phase.

"Phase One Revegetation" has been identified on the mapping which includes reconstruction of the southerly slopes as shown on the "Reclamation Plan". Revegetation will be in conformance with the Revegetation Plan prepared by LSA Associates dated April 1990, subject to Fish & Wildlife approval and contingent on approval of this reclamation plan.

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29. Describe how reclamation of this site in this manner may affect future mining at this site and in the surrounding area.

Reclamation of the site will be consistent with potential second uses of the site. The selected second use will determine how future mining at this site may be affected. This reclamation plan is for the current mining area and does not address the sand deposits to the north.
Future mining is not anticipated to the south and east; future mining to the north will not be affected by the implementation of this plan.

DISCUSSION OF REQUIREMENTS OF MARINA ORDINANCE 82-14

The City of Marina's Ordinance 82-14 became effective on December 17, 1982. The Ordinance includes an Exhibit "D" which is "An Ordinance Relating to Surface Mining and Reclamation Standards and Requiring Mining Operators Within The City of Marina to Prepare and Execute Reclamation Plans." Section 4.5 of the ordinance defines certain Reclamation Plan Requirements. Most of these requirements are addressed in the preceding "Suggested Model Reclamation Plan" prepared by the California Division of Mines & Geology. Additional requirements are addressed in the following material.

Section 7 of the ordinance provides that Reclamation Plans are public records, except for information identified as proprietary by the City. Some of the following information is already a part of the public record as it pertains to a neighboring sand-mining operation.

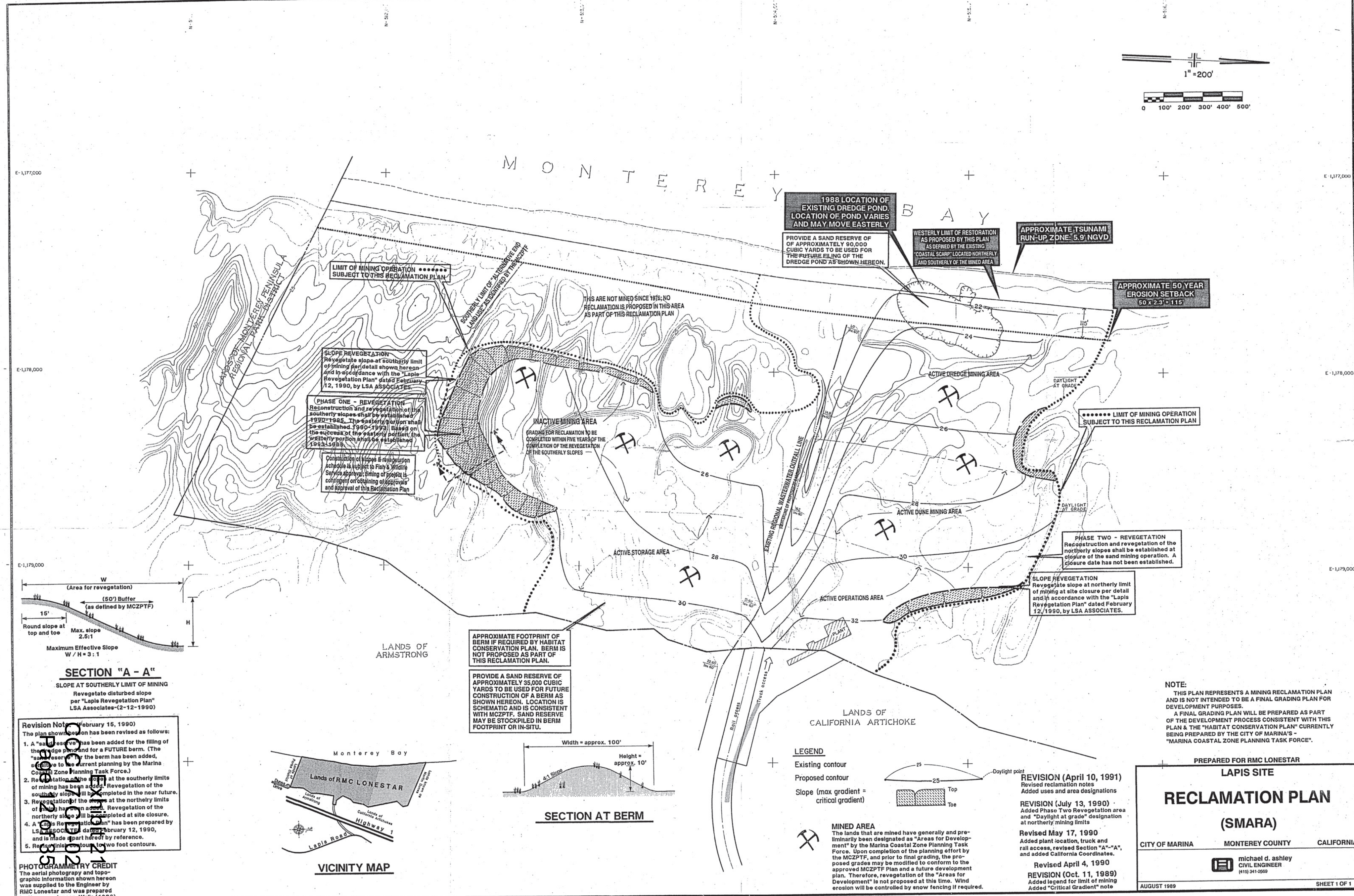
Ordinance Sections 4.5e and 4.5h (3) require the identification of a line indicating the tsunami run-up line and a description of the manner in which the tsunami run-up zone will be preserved to protect the public safety of the community This issue was addressed in a report titled "Tsunami Run-Up and Coast Erosion Elements of the Surface Mining and Reclamation Ordinance Relating to Surf Zone Sand Mining in the City of Marina," which was prepared for a neighboring sand-mining operation by Dr. Warren C. Thompson, Consultant in Oceanography and Registered Geologist No. 2722 and is dated August 28, 1984. This report has been submitted to and has been approved by the City of Marina and is a matter of public record. The report states that the U.S. Army Corps of Engineers has determined a predicted 100-year tsunami run-up for the City of Marina coast of 5.9 feet above the standard surveying datum NGVD (National Geodetic Vertical Datum). The predicted 500 year run-up is 11.6 feet above NGVD. The 100-year run-up line is shown on the map in the Appendix. The report states that from observations of the major tsunamis of 1960 and 1964 in Monterey Bay, a large tsunami may be expected to have the appearance of a quiet tide-like rise and fall of the water level oscillations lasting for several hours. The report states that the combination of low run-up, tide-like character, and rare occurrence of tsunami should require no special measures to protect public safety on any part of Marina's beach.

With regard to coastal erosion, the report states that the southern sector of Monterey Bay has experienced landward erosion of the coastal bluff over the past approximately 15,000 years and that the long-term erosion rate in Marina has been determined by Cleary Consultants, Inc. to average 2.2 feet per year for the 45-year period from October 1937 to February, 1983. The report states that the question of whether surf-zone sand mining in Marina is contributing significantly to the permanent coast erosion has not been resolved. An opinion is offered that natural erosion remains the dominant factor on the Marina coast today, and that sand-mining from the surf and beach represents a secondary contribution and the fractional contribution made by commercial mining would appear to be low.

Biological Assessment — Ordinance Section 4.5k requires a biological assessment. The United States Department of the Interior, Fish and Wildlife Service transmitted a draft of the Smith's Blue Butterfly Recovery Plan on March 13, 1[illegible]. The draft cited findings of the smith's blue butterfly (*Euphilotes enoptes Smithi*) in the coastal dunes of the central coast in Monterey County. The butterfly is dependent on its larval buckwheat host plants (*Eriogonum*). the butterfly and host buckwheat host plants were identified during the environmental assessment review for the proposed Gullwing Inn Project which is immediately to the south of RMC Lonestar's Property.

The City of Marina has met with representatives of the State Department of Fish and Game and Federal Fish and Wildlife to identify additional study needs. As a result the City adopted Resolution No. 84048 on November 13, 1984: "A Resolution Establishing a Policy for the City of Marina with Respect to the Protection of the Smith's Blue Butterfly and Agreement to Co-operate in the Participation of a Habitat Conservation Plan for the Smith's Blue Butterfly." This plan was intended to define the habitat requirements more thoroughly and will impact future land uses in the City. Subsequent work has been commissioned by RMC Lonestar and was conducted by LSA during 1985, and by TRA in 1989. Their reports are enclosed.

Geological Assessment — Ordinance Section 4.5k requires a geological assessment. The site consists primarily of eolian deposited sand, referred to as the Flandrian and Pre-Flandrian dune complexes, and also sand deposited by ocean wave action. The Flandrian dunes tend to be finer grained sand, while the ocean-generated sands are coarser. Groundwater at a location near the processing plant is typically in the range of 3 to 4 feet NGVD. There are no significant geologic hazards to the site with the exception of seismic activity. A recent geological reconnaissance of the area is a matter of public record (J.A. Benfer-Terratech, Inc., report of 9/4/84). this report identifies known active faults as the Palo Colorado-San Gregorio fault zone, located approximately 12 miles to the southwest, and the San Andreas fault zone located approximately 12 miles to the northeast. Additionally, the active Monterey Bay fault zone is located immediately off-shore in Monterey Bay. The concealed trace of the potentially active King City fault is located approximately 1 mile southwest of the site.



SECTION "A - A"

SLOPE AT SOUTHERLY LIMIT OF MINING

Revegetate disturbed slope per "Lapis Revegetation Plan" LSA Associates-(2-12-1990)

Revision Notes (February 15, 1990)

The plan shown hereon has been revised as follows:

1. A "sand reserve" has been added for the filling of the dredge pond and for a FUTURE berm. (The "sand reserve" for the berm has been added, sensitive to the current planning by the Marina Coastal Zone Planning Task Force.)
2. Revegetation of the slopes at the southerly limits of mining has been added. Revegetation of the southerly slope will be completed in the near future.
3. Revegetation of the slopes at the northerly limits of mining has been added. Revegetation of the northerly slope will be completed at site closure.
4. A "Lapis Revegetation Plan" has been prepared by LSA ASSOCIATES dated February 12, 1990, and is made a part hereof by reference.
5. Revise finish contours to two foot contours.

PHOTOGRAMMETRY CREDIT

The aerial photograpy and topographic information shown hereon was supplied to the Engineer by RMC Lonestar and was prepared by Hammon-Jenson-Wallin (1986)

VICINITY MAP

SECTION AT BERM

LEGEND

Existing contour

Proposed contour

Slope (max gradient = critical gradient)

Top

Toe

Daylight point

MINED AREA

The lands that are mined have generally and preliminarily been designated as "Areas for Development" by the Marina Coastal Zone Planning Task Force. Upon completion of the planning effort by the MCZPTF, and prior to final grading, the proposed grades may be modified to conform to the approved MCZPTF Plan and a future development plan. Therefore, revegetation of the "Areas for Development" is not proposed at this time. Wind erosion will be controlled by snow fencing if required.

REVISION (April 10, 1991)
Revised reclamation notes
Added uses and area designations

REVISION (July 13, 1990)
Added Phase Two Revegetation area and "Daylight at grade" designation at northerly mining limits

Revised May 17, 1990
Added plant location, truck and rail access, revised Section "A"-"A", and added California Coordinates.

Revised April 4, 1990

REVISION (Oct. 11, 1989)
Added legend for limit of mining
Added "Critical Gradient" note

NOTE:

THIS PLAN REPRESENTS A MINING RECLAMATION PLAN AND IS NOT INTENDED TO BE A FINAL GRADING PLAN FOR DEVELOPMENT PURPOSES.

A FINAL GRADING PLAN WILL BE PREPARED AS PART OF THE DEVELOPMENT PROCESS CONSISTENT WITH THIS PLAN & THE "HABITAT CONSERVATION PLAN" CURRENTLY BEING PREPARED BY THE CITY OF MARINA'S - "MARINA COASTAL ZONE PLANNING TASK FORCE".

PREPARED FOR RMC LONESTAR

LAPIS SITE

RECLAMATION PLAN

(SMARA)

CITY OF MARINA | MONTEREY COUNTY | CALIFORNIA

michael d. ashley
CIVIL ENGINEER
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AUGUST 1989 SHEET 1 OF 1

lsa

LAPIS REVEGETATION PLAN

PREPARED FOR

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PLEASANTON, CA 94566

PREPARED BY

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LSA PROJECT #LSI001

April 19, 1990

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INTRODUCTION

SITE LOCATION

The Lapis Sand Pit is located at the end of Lapis Road at the northern portion of the limits of the City of Marina. It is bounded by Monterey Bay on the west, agricultural fields on the east, the Martin Dunes to the north and a former sand mine to the south. The dunes of the Southern Monterey Bay are known as the Monterey Dunes (Cooper, 1967) and the Lapis Sand Pit is located within a subset of the Monterey Dunes called the Marina Dunes.

OBJECTIVE

This report provides a conceptual revegetation plan for the Lapis Sand Pit. This plan proposes to revegetate mined areas at the Lapis site to stable, self-sustaining native scrub vegetation.

PLANT COMMUNITIES

Eight different plant communities have been identified by Zoger and Pavlik (1987) as occurring within the Marina Dunes. These communities are Strand, Recent Dune Scrub, Recent Bluff Scrub, Flandrian Dune Scrub, Mesic Swale Scrub, Pre-Flandrian Oak Woodland, Disturbed Dune, and Bare Sand.

The predominant natural vegetation types in the area of the proposed revegetation are Flandrian Dune Scrub and Mesic Swale Scrub. These two types and Disturbed Dune vegetation are discussed below.

Flandrian Dune Scrub

Flandrian Dune Scrub consists of sparse scrub vegetation growing on Flandrian Dunes (Zoger and Pavlik 1987). Flandrian dunes were formed between 18,000 and 4,000 years ago during the latter portion of the Wisconsin glaciation.

Flandrian Dune Scrub consists of fore-dune and mid-dune types. The fore-dune type is a low vegetation which results from the effects of wind. In addition, the fore-dunes are more prone to blow-outs from strong on-shore winds than mid-dunes. As a result of this disturbance, colonizing species are present in fore-dunes as dominants or sub-dominants. These species include sea rocket (*Cakile maritima*), beach bur (*Franseria chamissonis*), beach evening primrose (*Camissonia cheiranthifolia*), beach morning glory (*Convolvulus soldanella*), yellow sand verbena (*Abronia latifolia*), and purple sand verbena (*Abronia umbellata*). Other species present in the fore-dunes as dominants or sub-dominants include coast buckwheat (*Eriogonum latifolium*), beach sagewort

(Artemesia pycnocephala), Chilean iceplant (Carpobrotus chilense), and salt bush (Atriplex sp.).

The mid-dune scrub is a taller vegetation than the fore-dune scrub because it receives more protection from the wind. Dominant and sub-dominant plants of this vegetation type are dune aster (Corethrogyne leucophylla), live forever (Dudleya farinosa), coast buckwheat, beach sagewort, deerweed (Lotus scoparius), and Monterey Bay spineflower (Chorizanthe pungens var. pungens). Other species present include California poppy (Eschscholtzia californica var. maritima), dune knotweed (Polygonum paronychia), cardionema (Cardionema ramosissimum), dune bluegrass (Poa douglasii), Indian paintbrush (Castilleja latifolia), and coast wallflower (Erysimum ammophilum).

Mesic Swale Scrub

Mesic Swale Scrub occurs in depressions in the Flandrian dunes. The mesic nature of the vegetation may be a result of protection from wind. In addition, water may also tend to flow to the bottom of the swale prior to percolating into the sand substrate.

Dominant species of the Mesic Swale Scrub consist of beach mock heather (Haplopappus ericoides), lizardtail (Eriophyllum stachaedifolium), and live forever. Other species present include silver beach lupine (Lupinus chamissonis), coyote brush (Baccharis pilularis), and coast buckwheat.

Disturbed Dune

A type of vegetation grows in disturbed areas including areas of stabilized blowouts, and mined areas. Plant cover is typically low in these areas. Dominant species of the Disturbed Dune vegetation type are beach evening primrose and beach bur. Other species present include sea rocket, yellow and purple sand verbena, Monterey Bay spineflower, and beach morning glory. These species are adapted to colonizing bare areas and providing cover prior to the establishment of Flandrian Dune Scrub.

REVEGETATION

PLANTING CONCEPT

This plan proposes the use of native species that occur within the Marina Dunes for revegetation. Those species that occur within the Flandrian Dune Scrub, Mesic Swale, and Disturbed Dune vegetation types will be used in the revegetation. Non-native plants will not be used in the revegetation with the exception of sea rocket, which occurs on beaches and sand dunes along large sections of California's coast. Sea rocket has adapted to colonizing bare areas and can assist in stabilizing disturbed dunes.

Dune plants that grow in disturbed areas are included in the revegetation plan because of their ability to stabilize disturbed sites and to act as a nurse crop for the other species until they become well established. Revegetation in this manner will help to establish a diverse assemblage of plants.

PLANT MATERIALS

Seed Source

Seed from commercial sources collected within the same climatic zone as the Lapis Sand Pit will be used. If such seed is unavailable from commercial sources, seed will be collected from native plants at the Lapis site.

Containerized Planting

The use of seed, as opposed to planting potted plants, is the most efficient manner to revegetate bare slopes. For this reason, container grown plants will only be used where severe erosion requires quick establishment of larger plants. Species that can be used for containerized planting include beach sagewort, lizardtail, and beach lupine.

Seed Mix

While the number of species found within the Marina Dunes is extensive, a survey of those communities within the Lapis area by LSA in 1985 showed that 12 species, two of which are non-native, are dominant. Table 1 presents the findings of that survey. LSA's survey results and the vegetation type descriptions by Zoger and Pavlik were used to develop the basic seed mixes presented on Table 2. The Flandrian Dune seed mix will be applied on slopes steeper than 20 percent and ridges while the Mesic Scrub seed mix will be applied on slopes less than 20 percent and swales. These mixes retain a certain amount

TABLE 1

1985 VEGETATIVE SURVEY OF THE LAPIS AREA

SPECIES	NORTHERN AREA % COVER	SOUTHERN AREA % COVER
Beach bur (*Franseria chamissonis*)	0.00	0.08
Deerweed (*Lotus scoparius*)	0.74	1.42
Sand verbena (*Abronia latifolia* and *umbellata*)	0.00	0.32
Beach sagewort (*Artemisia pycnocephala*)	7.12	4.45
Dune aster (*Corethrogyne leucophylla*)	3.40	1.79
Coast buckwheat (*Eriogonum latifolium*)	3.21	2.49
Lizardtail (*Eriophyllum stachaedifolium*)	2.33	0.00
Mock heather (*Haplopappus ericoides*)	2.05	2.80
Evening primrose (*Camissonia cheiranthifolia*)	0.00	0.14
Sea rocket (*Cakile maritima*)	0.00	0.30
Hottentot fig (*Carpobrotus edule*)	0.10	0.00
Ice plant (*Carpobrotus chilense*)	1.21	0.00
Total Vegetative	25.45	25.73
Litter	19.88	17.17
Bare	52.29	57.10

TABLE 2

BASIC SEEDING MIXES OF THE LAPIS SAND PIT

FLANDRIAN DUNE SCRUB

The Flandrian Dune Scrub seed mix will be composed of the following species. Because the weights of seed for the various species are not all known, the proportions are presented as the number of seeds to be planted per square foot. This seeding rate equals 35 seeds per square foot and is considered to be the minimum acceptable application rate.

Group A: Each species listed below will be included at 5 seeds per square foot.

Beach sagewort (*Artemisia pycnocephala*)
Coast buckwheat (*Eriogonum latifolium*)
Dune aster (*Corethrogyne leucophylla*)
Deerweed (*Lotus scoparius*)

Group B: Three of the following species will be included at 3 seeds per square foot.

Beach bur (*Franseria chamissonis*)
Sea rocket (*Cakile maritima*)
Monterey Bay spineflower (*Chorizanthe pungens var. pungens*)
Evening primrose (*Camissonia cheiranthifolia*)
Yellow sand verbena (*Abronia latifolia*)
Purple sand verbena (*Abronia umbellata*)

Group C: Three of the following species will be included at 2 seeds per square foot.

Live forever (*Dudleya farinosa*)
Coast wallflower (*Erysimum ammophilum*)
California poppy (*Eschscholtzia californica var. maritima*)
Indian paintbrush (*Castilleja latifolia*)
Dune bluegrass (*Poa douglasia*)

MESIC SWALE SCRUB

The Mesic Swale Scrub seed mix will be composed of the following species. Because the weights of seed for the various species are not all known, the proportions are presented as the number of seeds to be planted per square foot.

This seeding rate equals 35 seeds per square foot and is considered to be the minimum acceptable application rate.

Group A: All species listed below will be included at 10 seeds per square foot.

Mock heather (*Haplopappus ericoides*)
Lizardtail (*Eriophyllum stachaedifolium*)

Group B: Three of the species listed below will be included at 3 seeds per square foot.

Live forever (*Dudleya farinosa*)
Yarrow (*Achillea borealis*)
Silver beach lupine (*Lupinus chamissonis*)
Evening primrose (*Camissonia cheiranthifolia*)

Group C: Three of the following species will be included at 2 seeds per square foot.

Beach bur (*Franseria chamissonis*)
Sea rocket (*Cakile maritima*)
Yellow sand verbena (*Abronia latifolia*)
Purple sand verbena (*Abronia umbellata*)
Monterey Bay spineflower (*Chorizanthe pungens var. pungens*)

of flexibility to accommodate annual variations in seed availability and site-specific opportunities.

TIMING

Because the best time for revegetation for the Lapis area is the period between October and March, site preparation will be timed so that the area is left bare for the minimum amount of time prior to seeding. Seeding and planting activities will be scheduled to take advantage of winter moisture and cooler temperatures.

SITE PREPARATION

Following mining, the slopes will be graded to a complex form having a convex shape at the top and a concave shape at the bottom. Based on analysis of stable and unstable natural slopes in the Lapis area (see Figure 1), no slope will be steeper than 40 percent (2.5:1). As Figure 1 shows, slope height does not appear to affect erosion of the slopes, perhaps due to the highly permeable nature of the sand.

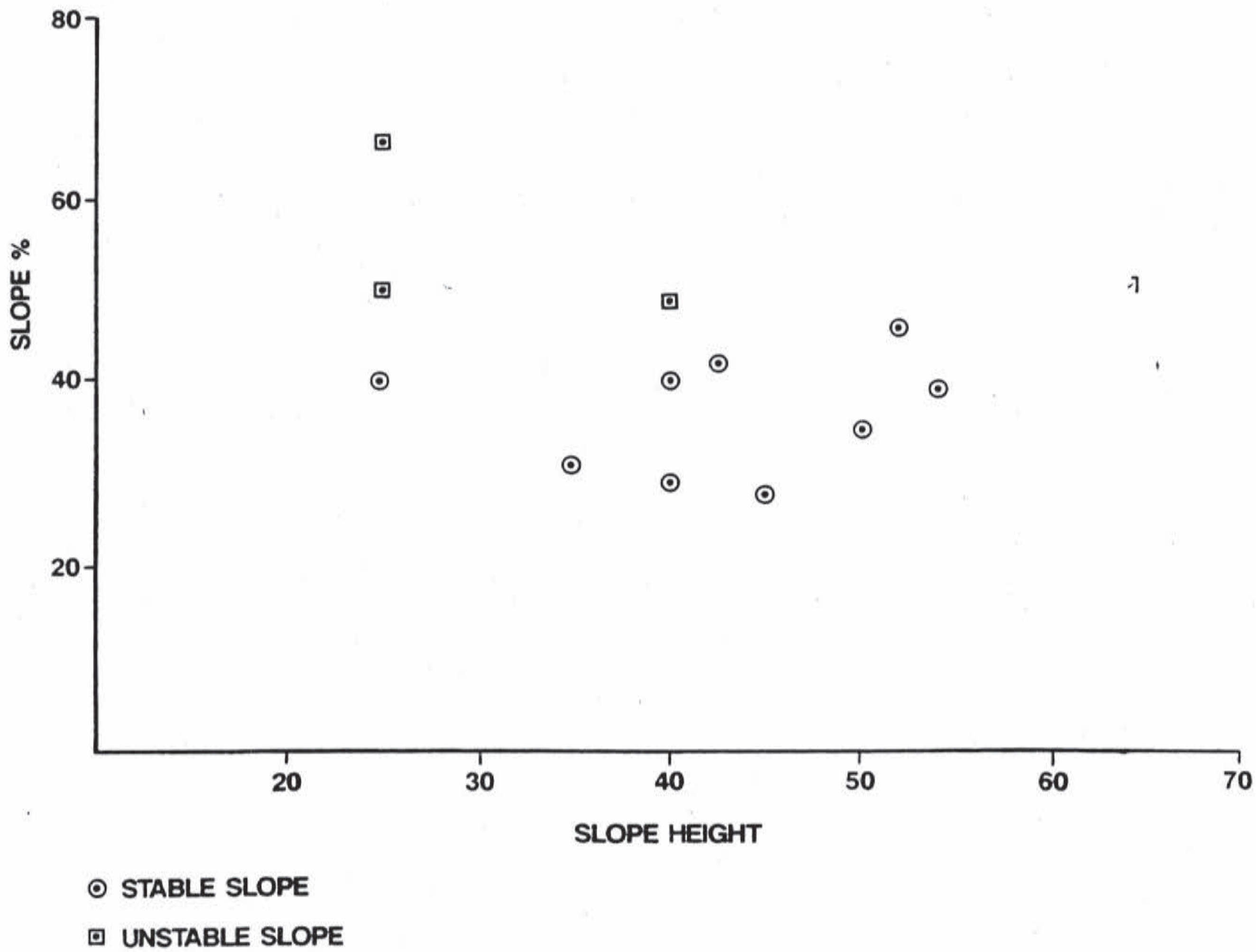
Because topsoils were not salvaged when mining first began at the Lapis site, little topsoil is available for respreading over graded slopes. While topsoil can be an excellent source of native plant seed, organic matter, microorganisms, and fertility, it can also have high concentrations of weed seed. Further, soils developed from sand dune materials are generally low in organic matter, microorganisms, and fertility when compared with soils developed from other parent material types. For these reasons the lack of topsoil at the Lapis site is not considered to be a major deterrent for revegetation. This reclamation plan has included measures to increase the fertility and organic matter content of the residual dune materials remaining following mining to ensure reclamation success.

Available topsoil will be spread on the convex portion of slopes and upon ridgetops. Because topsoil availability is restricted, topsoil spreading will be performed with the objective of covering the largest possible area. In this way the largest possible area will be inoculated with microorganisms.

INVASIVE EXOTIC PLANT ERADICATION

Hottentot fig, or ice plant (Carpobrotus edule), an exotic species, grows in large patches in some areas of the Marina Dunes. This plant out-competes the native vegetation and results in a degradation of the floristic and faunistic quality of the dunes. While Hottentot fig is not likely to occur on any recently mined areas it may invade such areas. Hottentot fig found within 10 feet of

Figure 1. Relationship of slope height and steepness to slope stability at the Marina Dunes



revegetation areas will be treated with an application of roundup (glyphosate) or removed by hand prior to planting.

PLANTING

Three planting prescriptions may be used as necessary to produce optimal revegetation results. Evaluation of these separate approaches in the 3rd and 4th years will provide valuable direction for future revegetation efforts. The most successful prescription or a new prescription based on the previous efforts will be used in later revegetation efforts.

The first prescription entails hydroseeding with native seed and mulch. The second prescription consists of hand-seeding with native seed followed by the application of straw followed by the installation of jute netting on slopes steeper than 20 percent and on ridges. The last prescription entails hydroseeding a sterile wheatgrass cultivar 'Escort' with a mulch the first year followed by hand-seeding with native seed the second year. The seed mix is discussed earlier and listed on Table 2. The seed mix is the same for each of the three prescriptions.

Hydroseed Prescription

Hydroseeding would entail placing the seed in a truck-mounted tank containing mulch. The seed and mulch mixture is applied through a high pressure nozzle mounted on the truck. Advantages of this method include ease and uniformity of application. Disadvantages include timing of the application should be shortly before rain to facilitate establishment and a high percentage of the seed does not become established because it lies at the top of the mulch and desiccates. In addition, the tops of some of the slopes would not be accessible to the hydromulch equipment and would have to be hand-seeded.

Hand-Seeding Prescription

Hand-seeding entails walking across the slope spreading seed over its surface. Advantages of hand-seeding are more control regarding the locations of seeds of particular species in the area that is being revegetated and the whole slope is accessible. In addition, small areas are more efficiently seeded by hand than with hydroseeding equipment. Disadvantages of hand-seeding are that no mulch accompanies the seeding and that the seed is not spread uniformly on the slopes.

This prescription includes the application of straw over the entire area that is hand-seeded. In addition, jute netting will be placed on slopes greater than 20 percent.

Wheatgrass Nurse-crop Prescription

A wheatgrass cultivar 'Escort' may be used in certain situations as a first year nurse-crop. Escort will be hydroseeded at a rate of 40 lbs live seed per acre. The top of some of the slopes may be seeded by hand because they are too high and the application of hydromulch will not reach the top of the slope. Escort is currently available in batches of 93% pure live seed which would entail 43 pounds of seed mix per acre to account for 40 pounds of live seed per acre.

Escort is a male "sterile" perennial wheatgrass that has been developed for seeding harsh, erodible areas where the establishment of native vegetation is desired. Escort will dominate the site the first year but will quickly decline until the third year when it should disappear. This will provide a stable site for the seeding of native seed the second year.

FERTILIZATION

Fertilizer will be added to the hydroseed mixture and applied with the seed and mulch mixture. Granular fertilizer will be applied to any hand-seeded areas at the same time that seeding occurs. The rate and type of fertilizer that is applied will be determined following analysis of soil samples, however, based on previous revegetation experience, fertilization with 200 lbs/acre ammonium-phosphate (16-20-0) should be adequate.

EROSION CONTROL

Following recontouring, the area will be susceptible to erosion by wind and water. Erosion control will be effected by use of hydromulch, use of straw, and use of jute or another type of erosion control netting.

Hydromulch

Hydroseeded areas will include a wood fiber mulch at a rate of 2500 lbs/acre and an appropriate tackifier. This treatment should provide sufficient control of erosion prior to the establishment of the plants. Plant species to accompany the hydromulch are those in Table 2 or the wheatgrass cultivar, escort. Seed can accompany the hydromulch mixture or be applied by hand before hydromulching. The hydromulch treatment can be used on all the slopes. Nevertheless, on slopes over 20 percent, hydromulch should be used in conjunction with straw and erosion control netting.

Straw

Straw can be applied to hand-seeded areas or hydroseeded areas, on gently or steeply sloping areas, and can be applied by hand or with a [illegible]lch applicator. In swales and slopes less than 20 percent, straw will be applied at a rate of 6000 lbs/acre. In areas greater than 20 percent and ridge tops or other exposed locations, straw will be applied at 3000 lbs/acre in conjunction with erosion control netting.

Straw applied to these areas should have an average stem length longer than 6 inches. The straw will be crimped into the sand with either a straw roller or by hand. If a straw roller is used, it will be equipped with straight studs made of approximately 7/8 inch steel plate, approximately 6 inches long, and spaced approximately 8 inches apart.

Jute or Erosion Control Netting

Jute, or another type of erosion control netting, will be applied to slopes greater than 20 percent and to rilled areas, if appropriate. The erosion control netting provides stability to slopes, lessens the force of water as it flows down hill, lessens the impact of rain drops, and lessens the ability of wind to blow sand from the surface. Netting, in conjunction with straw, should be sufficient to lessen erosion on steep or other susceptible slopes.

Rilling

Following seeding, blowouts or rilling deeper than 9 inches will be repaired by constructing snow fences across the area, installing straw bale check dams, or installing jute netting. The area will then be seeded or planted at the first opportunity. As previously stated, selected species grown in containers may be used in these areas to facilitate the stabilization and revegetation of such areas. In such cases, one-gallon size plants, that have well established root systems, will be used.

MAINTENANCE AND MONITORING

To ensure that revegetation efforts are successful and unanticipated events are expeditiously managed, revegetation areas will be monitored for three years following planting. During that time period measures required for erosion control, reseeding or replanting, and weed control will be implemented as necessary.

Additionally, the plantings will be monitored for species establishment and cover. The criteria that will determine the success of the plantings include plant cover and species composition/diversity. Based upon the 1985 LSA survey of the Lapis site, 25 percent appears to be the average vegetative cover existing on the undisturbed sites within the area. This same survey showed the data to have an 80 percent confidence interval. Twenty-five percent vegetative cover by native species and sea rocket with an 80 percent confidence interval will be used as the cover standard for success.

Species presence/diversity will be considered adequate if the species listed in the seeding mixes under Group A are all present and each species provides at least one percent cover.

ANNUAL REPORT

An annual report will be prepared that describes the methods used to revegetate the sand pit and the success of the revegetation effort. The first annual report will list the species and amount of seed used in the revegetation, rate of seed application, location of seeded areas, seeding methods, and date of seeding. It will also discuss the type of erosion control measures implemented on-site.

Subsequent annual reports will discuss the results of vegetative monitoring, erosion, and any other subjects impinging on the success of the revegetation.

REVEGETATION PHASING

Revegetation of the Lapis Sand Pit has been divided into two phases. The first phase encompasses the southern area where operations will soon end. This area is subdivided into an eastern and a western portion. The eastern portion will be revegetated between 1990 and 1993 while the western portion be revegetated between 1993 and 1995. Phasing in this manner will allow for the refinement of techniques necessary for the successful establishment of natural vegetation. In this manner, the revegetation efforts on the western portion of this phase of revegetation can benefit from the results of revegetation efforts on the eastern portion.

The second phase of revegetation will consist of the revegetation of areas to the north and will be performed following the completion of mining operations in those areas.

LITERATURE CITED

Cooper, W.S. 1967. Coastal Dunes of California. Mem. Geological Society of America 104:1-124.

Zoger, A. and B. Pavlik. 1987. Marine Dunes Rate Plant Survey. Prepared for the Marina Dunes Coastal Zone Task Force, City of Marine, Monterey County, California. 27 pp.

Representative species of the different vegetation types found on Lonestar property:

VEGETATION TYPE	REPRESENTATIVE SPECIES
strand	Abronia latifolia, Ambrosia chamissonis, Cakile maritima, Calystegia soldanella, Camissonia cheiranthifolia, Carpobrotus spp.
recent dune scrub	Corethrogyne leucophylla, Ericameria ericoides, Eriogonum latifolium, Eriophyllum staechadifolium, Lupinus chamissonis.
recent bluff scrub	Abronia latifolia, Agoseris apargioides, Ambrosia chamissonis, Calystegia soldanella, Camissonia cheiranthifolia, Carpobrotus spp., Poa douglasii.
Flandrian dune scrub	Artemisia pycnocephala, Cardionema ramosissimum, Corethrogyne leucophylla, Dudleya farinosa, Eriogonum latifolium, Eschscholzia californica, Lotus scoparius, Polygonum paronychia,
mesic swale scrub	Corethrogyne leucophylla, Dudleya farinosa, Ericameria ericoides, Eriogonum latifolium, Lupinus chamissonis.
disturbed vegetation	Brassica spp., Bromus diandrus, Carpobrotus spp., Erodium cicutarium, Eucalyptus spp., Plantago spp.
bare sand	Abronia latifolia, Cakile maritima, Poa douglasii. (negligible cover.)

IV. MITIGATION AND MONITORING

Recent legislation by the State of California, Public Resource Code 21081.6 (AB3180) addresses the problem of unenforced mitigation of project impacts. The legislation requires that local agencies adopt a mitigation monitoring plan at the time of project approval for projects with EIR's or Negative Declarations.

As the agency responsible for implementing the RMC Lonestar Reclamation Plan, the City of Marina must provide the documentation necessary to demonstrate that the mitigating measures required as a condition of project approval have been implemented. Where mitigation is required by another agency, the City can request that agency to specify and even carry out specialized monitoring. The funding for the monitoring plan would be provided by RMC Lonestar as a condition of project approval.

A summary of all the mitigation provided in the Environmental Assessment chapter is presented below along with the monitoring method recommended for each of the measures.

A. GEOLOGY

Impact: The central mining area is not proposed for revegetation in anticipation of future development uses. The barren sand could be subject to erosion if left unattended for a long period of time.

Measure: RMC Lonestar shall submit an end use application to the City of Marina 5 years before mining is completed to ensure that the area is not left unvegetated for a long period of time. If an application is not submitted prior to mining closure, RMC Lonestar shall submit a revegetation plan to stabilize sand and establish native vegetation in the central mining area.

Monitoring: Field inspection by the City of Marina or HCP Administrator. Review of the revegetation/erosion control plan by the City of Marina and the HCP Administrator.

Impact: The 40 percent cut slopes proposed at the southern periphery of the reclamation area could cause 20 feet of slope retreat during strong ground shaking. Most of the retreat would be at the expense of the rounded head of slope and could cause an adverse impact on the protected adjacent habitat.

Measure: The cut slopes should have a maximum gradient of 30% in order to be relatively stable during strong ground motion.

Monitoring: Field inspection by the City of Marina or HCP Administrator.

Impact: The 50-year setback line shown on the RMC Lonestar Reclamation Plan map is inconsistent with the more conservative setback line identified by the Marina Dunes HCP.

Measure: The RMC Lonestar Reclamation Plan should identify a setback line of 210 feet, which is consistent with the 4.2 feet per year erosion rate used in the Marina Dunes HCP.

Monitoring: Review of future development plans by the City of Marina and the HCP Administrator.

B. BIOLOGY

Impact: The implementation of the reclamation plan would result in the take of the endangered Smith's blue butterfly. The black legless lizard would also be adversely affected.

Measure 1: In compliance with the federal Endangered Species Act, reclamation activities within the Smith's blue butterfly habitat areas shall be prohibited until RMC Lonestar secures a Section 10(a) permit from the U.S. Fish and Wildlife Service. RMC Lonestar shall continue to participate in the Marina Dunes HCP process and become a signatory to the HCP Agreement. If the HCP is not approved, RMC Lonestar must secure a permit as an individual applicant.
Monitoring: Field inspection by the City of Marina and/or the HCP Administrator and the U.S. Fish and Wildlife Service.

Measure 2: Reclamation of non-habitat areas may be allowed prior to obtaining a Section 10(a) permit provided that the habitat areas are protected by fencing as described in Measures 5 and 6 below.
Monitoring: Field inspection by the City of Marina or the HCP Administrator.

Measure 3: RMC Lonestar shall comply with policies identified in the Marina Dunes HCP to mitigate the loss of the Smith's blue butterfly and black legless lizard. The implementation timing of these measures shall be as specified in the Marina Dunes HCP. These measures include but are not limited to:

a. Repair of blowouts on property and revegetation with native dune plant species.
b. Removal of exotic species, such as ice plant, in habitat areas on the property.
c. Salvage and relocation of rare plants where possible.
d. Revegetate disturbed areas with habitat species.

Monitoring: Inspections as provided by monitoring for the Marina Dunes Habitat Conservation Plan.

Measure 4: RMC Lonestar shall provide a habitat corridor between 50 feet to 100 feet in width along the eastern edge of the Reclamation Plan boundary as specified in the Marina Dunes LCP. This corridor shall link the undeveloped dunes north and south of the current mining area. A sand reserve shall be retained on the mining site to construct a berm within the habitat corridor as part of the mining reclamation. This berm shall be revegetated with native plant species to provide habitat for the Smith's blue butterfly and black legless lizard.
Monitoring: Field inspection by the City of Marina or the HCP Administrator.

Measure 5: RMC Lonestar shall construct a snow fence around the perimeter of the reclamation plan area to ensure that grading does not occur in protected areas. The reclamation site should be surveyed to determine placement of the fence. The fence shall be maintained by RMC Lonestar, and removal or displacement of the fence should be monitored by the City of Marina.
Monitoring: Field inspection by the City of Marina or the HCP Administrator.

Measure 6: The snow fence should be posted with signs warning against damage or displacement and identifying the Federal penalties for violation of the Endangered Species Act ($50,000 fine/imprisonment for 1 year). If rights to this fence are granted to the City of Marina, damage or displacement of the fence could be prosecutable under City ordinance.

Monitoring: Field inspection by the City of Marina or the HCP Administrator.

Impact: The use of a commercial seed mix as proposed by the Lapis Revegetation Plan has the potential to impact the dune habitat through introduction of non-native plants. The effectiveness of the proposed plan could be enhanced.

Measure 7:

a. Use a straw punch treatment, rather than wheatgrass nurse-crop, to avoid introduction of non-native plants.

b. To prevent accidental contamination of the native seed mixtures, the hydroseed contractor should rinse the machines and hoses a minimum of three times at an off-site location, under the supervision of the monitoring biologist.

c. Use jute netting with a wide mesh to avoid smothering seedlings. Jute netting should first be tested on a small scale prior to full-scale employment. The operator should conduct test trials comparing the stabilizing effect of jute-netting to straw punching, and the resulting growth of native dune species.

d. Collect seeds from on-site, native plants whenever possible to reduce sowing of weed seed and ensure genetic purity. Commercial seed from the Monterey Peninsula climatic zone should be used. Seeds should be tested for viability prior to planting.

e. The seeding rate should be based on pounds of pure live seed per acre. Appropriate rates of seeding should be based on current literature.

f. Mesic swale scrub is largely confined to mesic swales and depressions, and the use of this seed mix should be limited to these areas. The inclusion of Coyote brush (*Baccharis pilularis*) and coast buckwheat (*Eriogonum latifolium*) may be helpful in the Mesic swale seed mix.

g. Fertilizer should be applied at a rate no greater than 100 pounds/acre to avoid favoring the weedy species over the desired native dune species. The fertilizer should be a balanced, slow-release formula (such as Osmocote 13-13-13).

h. For denuded areas awaiting revegetation, windward slopes should be no steeper than 3:1 (horizontal to vertical).

i. Propagation of beach bluegrass from seed has not been adequately demonstrated and should be reintroduced onto the site by use of vegetative divisions. Beach bluegrass should be added to the list of containerized plants used in the revegetation program.

j. Sea rocket, a non-native species, should be used only at low rates in the revegetation design.

k. Revegetate as early in the winter as possible to take full advantage of winter moisture and cooler temperatures.

l. Inoculate greenhouse plants with vesicular-arbuscular mycorrhizae to increase nutrient uptake and drought tolerance.

m. Establish an allowable density of exotic invasives to allow the City to determine whether remedial action is needed.

n. Develop a contingency plan to allow for unanticipated events which may delay success beyond the three-year period. Monitoring should continue until success criteria are met provided that during the last two years of monitoring, there has been no human intervention, including, for example, irrigation, fertilization or weeding.

o The success criteria ~~of 25% vegetative cover should also include an average cover of 18% litter.~~ *should be based on the standards set forth in the Marina Dunes HCP. These standards shall included but not be limited to the following:*

- o *Native plant cover is self-perpetuating (seedlings are evident).*
- o *Native plant composition is representative of the natural plan community and is comprised of at least 70 percent of the species characteristic of the specific habitat type.*
- o *Native plant density averages 1 plant per 4 square feet and 40 percent coverage.*
- o *Stated sensitive species density goals identified in the project's restoration plan are 80 percent achieved.*
- o *Targeted non-indigenous plant species are declining, generally not in evidence and no where dominant.*

p. Monitoring success criteria should be documented by submitting annual reports, which fully detail sampling methods and results, to the City of Marina and the Division of Mines and Geology. Success rates of initial revegetation efforts should be documented, and the results should be used as a guideline for future revegetation plans.

Monitoring: Annual reports detailing the progress of the revegetation efforts shall be submitted by RMC Lonestar to the City of Marina and/or the HCP Administrator for review.

Impact: The central mining area is not proposed for revegetation due to secondary use of the site.

Measure: RMC Lonestar shall submit an end use application to the City of Marina 5 years before mining is completed to ensure that the area is not left unvegetated for a long period of time. If an application is not submitted prior to mining closure, RMC Lonestar shall submit a revegetation plan to stabilize sand and establish native vegetation in the central mining area.

Monitoring: Field inspection by the City of Marina or the HCP Administrator. Review of the revegetation/erosion control plan by the City of Marina and the HCP Administrator.

Impact: RMC Lonestar is responsible for the successful implementation of the reclamation plan.

Measure: SMARA Section 2773,1 requires financial assurances of all surface mining operations. RMC Lonestar will post a bond, or other form of assurance specified by the State Mining and Geology Board, with the City of Marina and the State of California to ensure the successful implementation of the proposed reclamation plan.

Monitoring: The City of Marina shall receive financial assurances upon approval of the reclamation plan in accordance with SMARA Sections 2770(c) and 2770(d).

C. VISUAL QUALITY

Impact: Grading the central mining area to a level grade sharply contrasts with the surrounding landform. Views from the beach are opened up to Highway 1.

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Measure: A berm should be placed along the eastern boundary of the property to provide a backdrop to views from the beach and continuation of coastal dune view from Highway 1 masking the graded area. *The perimeter berm should be designed to conform with the surrounding dune morphology.*

Monitoring: Field inspection by the City of Marina or the HCP Administrator.

D. CULTURAL RESOURCES

Impact: Site grading may uncover historical or cultural resources.

Measure: If any subsurface deposits, artifacts, or features of an archaeological nature, such as those described above, are encountered during reclamation activities, work in the immediate area should be halted and the work effort transferred to another area. A qualified archaeologist should be contacted to evaluate the finds before work resumes at the site of discovery.

Monitoring: The grading operator shall submit a letter to the City of Marina identifying whether cultural resources were recovered on the project site.

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V. ALTERNATIVES

The California Environmental Quality Act (CEQA) requires an EIR to "Describe a range of reasonable alternatives to the project, or to the location of the project, which could feasibly attain the basic objectives of the project and evaluate the comparative merits of the alternatives." CEQA further states that, "The discussion of alternatives shall focus on alternatives capable of eliminating any significant adverse environmental effect or reducing them to a level of insignificance, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly."

The purpose of proposing alternatives is to reduce or eliminate the significant adverse impacts associated with a project. The RMC Lonestar reclamation plan has the potential to create significant biological and visual impacts. The biological impacts can be reduced through mitigation measures. The visual impact as it relates to landform and end use development is unavoidable.

A. NO PROJECT

The No Project Alternative means no reclamation. Since the existing mining operations at the Lapis Sand Plant are vested, the No Project Alternative would not cause the cessation of mining.

B. ALTER RECLAMATION BOUNDARY TO AVOID TAKE

One alternative would eliminate impacts to the endangered Smith's blue butterfly as described in Chapter III.B. The reclamation boundary shown on the Reclamation Plan map in Figure 3 would be redrawn to avoid all areas containing the host plant, Eriogonum latifolium and E. parvifolium, delineated on the vegetation map shown in Figure 12. This amended plan would avoid the need for a Section 10 (a) Permit from the U.S. Fish and Wildlife Service.

If the Reclamation Plan avoids a take, it does not need to be included in the HCP. However, it is in the interest of the City to keep the Lonestar property in the HCP in order to provide areas of permanent protection.

The gain may be considered small since the impact to the Smith's blue can be adequately mitigated by the habitat enhancement and preservation measures provided in the terms and conditions of a Section 10(a) permit.

The size of the reclamation area would be slightly reduced. The restriction this places on potential second uses is negligible. Slopes could still be constructed as designed with the top of the new slope moved forward into the reclamation plan area.

C. NATURALIZED TOPOGRAPHY

The proposed reclamation plan calls for reclamation to create a large flat site suitable for future development. Alternatively, a naturalized topography could be created with the remaining sand resource.

Causes of Beach Erosion in Southern Monterey Bay

By

Dr. Stephen P. Leatherman

Background and Expertise of Dr. Stephen P. Leatherman

I received my undergraduate degree in Geosciences from North Carolina State University and a Ph.D. in Environmental (Coastal) Sciences from the University of Virginia wherein Dr. John S. Fisher (Ph.D. in coastal engineering from MIT) was my major professor. My 60-page curriculum vitae (see Appendix A) demonstrates my considerable experience and expertise in coastal science, especially involving coastal erosion, sea level rise and coastal storm impacts. I have authored or edited 20 books and National Academy of Science peer-reviewed reports and 148 refereed journal articles (including articles in both *Science* and *Nature*) and book chapters. In addition, I was chair of the committee that produced the 252-page report by the Heinz Center entitled "Evaluation of Erosion Hazards" for the Federal Emergency Management Agency as mandated by the U.S. Congress.

Overview of Causes of Beach Erosion/Retreat in Southern Monterey Bay

I have reviewed reports and newspaper articles, including an October 2016 article authored by Dr. Ed Thornton and published in *Marine Geology* entitled *"Temporal and spatial variations in sand budgets with application to southern Monterey Bay, California,"* which state that the Lapis Plant is largely responsible for beach erosion along Southern Monterey Bay—this statement is patently incorrect as explained below.

In truth, the beaches along the undeveloped shore of Southern Monterey Bay (including at the Lapis Plant) are not being eroded away. Instead, beaches are migrating landward and maintaining their width. Further, without quantitative data for the major factors affecting shoreline change and the net rate of longshore sediment transport (e.g., there is disagreement in the scientific literature on even the direction, much less the magnitude, at present), it is not possible to make definitive statements regarding the precise shoreline changes in Monterey Bay, other than to state that closing the Lapis Plant will not solve the perceived erosion problem. Closing the Lapis Plant will not stop coastal retreat, as several major factors discussed below that promote retreat will continue unabated. In other words, the trend of landward migration of the beach will continue with or without the Lapis Plant.

There are 14 factors that affect shoreline change (Table 2-1; Managing Coastal Erosion, 1990, National Academy Press).

First among these factors is sediment supply (sources and sinks). Sand along Southern Monterey Bay was historically transported to the coast by the Salinas River. Unfortunately, this major sand source have been significantly cut off. Construction of dams on the Salinas River has greatly reduced the supply of sand to the Southern Monterey Bay shore and is one of the largest factors in causing beach retreat. In addition, a long jetty is shunting all the sand moving southward from Northern Monterey Bay into the Monterey Submarine Canyon.[1] [2] This Submarine Canyon has been shown by measurements to be a huge sink, amounting to the loss of 650,000 cubic yards of beach sand per year according to the Sanctuary Integrated Monitoring Network. A December 31, 2016 California Coastal Commission report confirmed that "[d]ue to its geology, Monterey County has one of the highest erosion and sand loss rates in the state," thus confirming that erosion and sand loss are due to the region's geology, rather than to sand mining (California Coastal Commission, 2016, California Coastal Commission Statewide Sea Level Rise Vulnerability Synthesis, Appendix A).

The second major factor is that El Nino and associated major coastal storms are responsible for quantum step losses of beach and dune sand. For example, the 1997-1998 El Nino resulted in the erosion of 3,371,000 cubic yards of sand in Southern Monterey Bay in one winter as documented by Thornton et al. (2006), which dwarfs other documented losses such as the Lapis plant operation, and were not included in the final analysis of the October 2016 article. The 1982-1983 El Nino is considered the strongest and most destructive of the century by Woods Hole Oceanographic Institution scientists prior to the advent of the 2015-2016 event (http://www.whoi.edu/science/B/people/kamaral/1982-1983ElNino.html). In fact, the 2015-2016 El Nino triggered unprecedented erosion along the California coast with the amount of erosion being 76% higher than normal and 27% higher than any other recorded winter storm (Barnard, P. L. et al., 2017, Extreme oceanographic forcing and coastal response due to the 2015–2016 El Niño. *Nature Communications* 8, 14365 doi: 10.1038/ncomms14365). In spite of these highly erosive events, as noted above, the beaches along the undeveloped shore of Southern Monterey Bay are not being eroded away, but instead are migrating landward and maintaining their width.

The third significant and long-standing factor is sea level rise. The December 31, 2016 report by the California Coastal Commission similarly emphasized the tremendous impact of sea level rise on beaches, dunes and wetlands in the coming decades. It is possible that sea level could rise as much as 167 centimeters (66 inches) by 2100, which would be devastating to many urbanized beach communities, which does not include the majority of Southern Monterey Bay (California Coastal Commission, 2016, California Coastal Commission Statewide Sea Level Rise Vulnerability Synthesis, Appendix A). Dr. Bob Guza of Scripps Institute of Oceanography is quoted in an August 24, 2016 LA Times newspaper article as stating that "[i]f we do nothing, absolutely nothing, I'd say in 50 years we're going to have very few beaches left" in California because of sea level rise. Southern Monterey Bay, however, is an exception because the beach is backed by large sand dunes with very little hard stabilization; therefore, the beach will

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1 The approach to retain the sand by bypassing the littoral drift (e.g., longshore sediment transport) at a harbor inlet and therefore nourish the southern beaches has been very successful at Port Huenema in California.

2 The other three major reasons for coastal retreat in Southern Monterey Bay are El-Nino-coastal storms, sea level rise, and rip currents, but there is no way to arrest these significant offshore losses.

migrate landward and not disappear. Other factors that contribute to a lesser degree to sand budgets in Southern Monterey Bay are rip currents, which dominate this shore, overwash into the pond at the Lapis Plant, and aeolian sand transport (i.e., windblown sand) resulting in landward dune migration as evident at Sand City and other areas from Google Earth imagery.

Given the cumulative effect of the factors discussed in this report, the only way to meaningfully affect the littoral processes at work in Southern Monterey Bay is to address dam removal and sand bypassing of the jetty.[3] Put simply, shuttering the Lapis Plant will not alter these trends. **Closing the Lapis Plant will not stop coastal retreat as there are at least five other major factors promoting beach retreat that will continue unabated. The trend of landward migration of the beach will continue with or without the Lapis Plant.**

Detailed Comments on Marine Geology 2016 Article

A theoretical construct based on many assumptions was formulated to derive a hypothetical sand budget for Southern Monterey Bay in an October 2016 article authored by Dr. Ed Thornton and published in *Marine Geology* entitled "Temporal and spatial variations in sand budgets with application to southern Monterey Bay, California." This report identifies the limitations of Dr. Thornton's October 2016 theoretical analysis, which does not reliably identify the causes of beach erosion in Southern Monterey County.

Specific factors of Dr. Thornton's article that highlight its theoretical nature and limited practical application are described below.

The October 2016 Article Relies on Theoretical Assumptions and Imprecise Data Sets
Recognized sand budgets typically involve the usage of data sets that include shoreline change maps that extend as much as 100 years and include multiple points of time in order to discern any trend changes. Paramount to such an analysis is the quantification of longshore sediment transport, which is the major means of sand movement on the beach. Southern Monterey Bay is 96% natural, not having been nourished, which distinguishes Monterey Bay from most developed shorelines.[4] Therefore, there is a paucity of data in this location, including a lack of measured longshore sediment transport rates (such as those rates which are volumetrically determined by the build-up of sand at jetties). These data regarding longshore sediment transport are necessary for a robust sand budget. Morang et al. (1993) presented a flow chart to illustrate the information required to obtain a sand budget (see Appendix B).

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3 By way of example, efforts are underway to remove the Matilija Dam in Ventura County and the Rindge Dam near Malibu, and dam removal is under consideration elsewhere in California. The second initiative to retain beach sand would be to by-pass sediment around Moss Landing where a long jetty is shunting all the sand moving southward from Northern Monterey Bay into the Monterey Submarine Canyon.

4 Many beaches in California have been developed and beach nourishment projects have been undertaken at these other locations to arrest beach erosion. In contrast to those areas, there has been no stabilization of the Southern Monterey Bay coastline except for two short seawalls to protect buildings on the beach while sea level has risen significantly in the past 100 years.

Perhaps because of this paucity of actual data, the words "assume, assumption, hypothesize and simplify" are used 20 times in the October 2016 article, which is an exceptionally high number. This highlights that the October 2016 analysis is largely speculative without proven real-world application because of the lack of actual measurements available to the author. There is a fundamental problem of using so many assumptions to determine a sand budget for Southern Monterey Bay.

Consistent data sets collected during summer months need to be taken. Instead, the data used in the October 2016 article (shown on Figure 2 of that article) was collected by various investigators from 1966 to 1982, a 16 year period.[5] Therefore, this is not a reliable data set and is not useful. Additionally, it is unclear why a polynomial regression was used when it appears that a straight line, sloping slightly downward from south to north, might accurately reflect the data set. In any case, a new, consistent data set should be gathered and analyzed to determine if any trend exists. Without a reliable and consistent data set, the conclusions of the article are not fully supported.

In another example of debatable assumptions, three sub-cells in Southern Monterey Bay are delineated on page 59 of the 2016 article based on inferential information, not actual studies of longshore transport directions. In the absence of shore-perpendicular coastal engineering structures, particularly long groins or jetties to measure littoral drift by sediment entrapment, field observations of longshore currents could be made with fluorescent tracer dye thrown into the surf every day with the direction and rate of movement measured over a period of several years.[6] This was not done in connection with nor to support the October 2016 analysis.

Similarly, Figure 7 is used to illustrate dune erosion rates. But, this figure is simply a conceptual diagram and what is needed are real numbers and justification, including closure depth. This information would be useful in an analysis if it consisted of actual beach profiles at various locations along Southern Monterey Bay rather than theoretical constructs.

Finally, in addition to the lack of actual data for many of his key assumptions, only medium to coarse sand (grain size larger than 0.25 mm) were considered in the October 2016 article in order to "simplify" the sand budget (see page 56). A sand sample acquired from the mid-tide beach at the Lapis Plant site during the summer (i.e., Labor Day 2016) showed that about 35% of sand was 0.25 millimeters or smaller grain size (Appendix C). It does not seem reasonable to omit such a large quantity of beach sand from consideration of the sand budget, and this omission undermines the conclusion of the October 2016 article.

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[5] It is assumed, but not stated, that all the beach sand was collected at the mid-tide level, but there is no indication regarding time of year. The best approach is to acquire all the sand samples along the beach at the same time, which could be easily done by driving an ATV along the beach—this would likely reduce the large scatter in the plot and more accurately reveal any alongshore trend.

[6] Fluorescent dye has been shown by the U.S. Environmental Protection Agency to be safe in the marine environment and is NSF approved (see Material Safety Data Sheet for fluorescein, disodium salt).

Despite Assuming That the Lapis Plant Is the Major Contributor to the Perceived Erosion Problem in Southern Monterey Bay, the October 2016 Article Does Not Explain Why the Areas of Highest Retreat Are Far Removed from the Lapis Plant Site

The October 2016 article on page 57 notes that the highest recession rate is 6.5 feet per year at Fort Ord. But, there is no direct relationship to this area of high recession and the Lapis Plant, which is located about 4.6 miles north of Fort Ord.

Indeed, it is stated on page 58 of the article that the waves approach at near normal incidence all along the shoreline, which would indicate minimal longshore sediment transport. It is further stated on page 59 that there is a large variation in estimates, but the only numbers presented are calculated (but not measured) to be 130,000 cubic yards per year at Marina and 65,000 cubic yards per year at Fort Ord. There are no other estimates provided of longshore sediment transport for the larger area of Southern Monterey Bay, including the Lapis site.[7] If there is little to no net transport, as the October 2016 article states, then any sand removed from the beach by the Lapis operation should be localized (i.e., not affecting beaches to the north or south).

Alternatively, Figure 2 indicates that coarse sand dominates the central part of the bay, fining northward. This might imply a northerly longshore sediment transport so that the Lapis Plant would have little to no impact on Southern Monterey Bay because the sand in this area would eventually be lost into the Monterey Bay Submarine Canyon.

Finally, although Figure 9 is a difficult graph to interpret because it is too small to discern the detail, it appears that the red line, showing the long-term shoreline recession from 1954 to 1998, as calculated by Hapke et al. (2006). Reviewing Hapke's original figure (Appendix D), it can be seen that the Lapis Plant is located in the area of highest accretion during the time period of 1954 to 1998 and that the location of highest recession during the shorter time period of 1970 to 1998 is at Seaside about 7.4 miles to the south. This is another indication that the highest recession rates are not seen at the Lapis Plant and that there are many factors that influence recession and accretion rates (National Research Council, 1990, Appendix E), which cannot be differentiated by the analysis in the October 2016 article.

The October 2016 Article Omitted Significant Factors That Should Be Considered When Constructing Reliable Sand Budgets

There are 14 different factors that affect shoreline change and erosion rates as documented by a National Research Council report, "Managing Coastal Erosion" (Appendix E), yet the October 2016 article only considered sand mining in evaluating the principal cause of sand loss to the beach along Southern Monterey Bay. Without considering all these factors, it is unrealistic to attempt construction of a sand budget for Southern Monterey Bay, let alone to determine with any degree of scientific certainty that sand mining is a significant cause of the overall trajectory of the shoreline in Southern Monterey Bay.

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7 Furthermore, even the direction of longshore transport can be in question if the wave approach is near normal, which raises questions about the transport directions as indicated on Figure 1.

First, it is well established that the major means of sediment transport on most oceanic beaches is via longshore sediment transport (Komar, 1976). Chapter 9 of Komar's 1976 book on Beach Processes and Sedimentation is devoted to beach sand budget (pages 227-248).[8] The October 2016 article did not contain rates of longshore sediment transfer in this area. Instead, as noted above, the October 2016 article relied on assumptions in lieu of actual data for key parts of the analysis. Without established rates of longshore sediment transport in terms of direction and net amount, it is impossible to construct a sand budget. Therefore, conclusions regarding the relative causes of beach retreat cannot be confirmed.

Second, other factors that can lead to shoreline change were not considered in the October 2016 article. Instead, only sand mining was presented as a loss of sand to the beach (see page 63).

Omitted factors include (but are not limited to) the following:

- The October 2016 article did not evaluate sea level rise, which has been shown to be a major driver of shorelines (e.g., causing erosion) in many studies worldwide. The average landward migration rate along Southern Monterey Bay is 2.6 feet per year (see page 57 in the October 2016 article). Research by Leatherman, Zhang and Douglas (2000) showed that there was a two order of magnitude relationship between sea level rise and coastal erosion and that sea level rise was the underlying driver of beach erosion, which has averaged about 2 feet per year along the well-studied U.S. East Coast (Heinz Center report, 2000). The San Francisco tide gauge, which can be used to infer relative sea level rise for Monterey (PWA, 2008), indicates a rise rate of 2.13 millimeters per year, which can contribute significantly to the overall rate of beach erosion according to the Bruun rule (Zhang, Douglas and Leatherman, 2003). In fact, Dr. Bob Guza at Scripps Institute of Oceanography is quoted in an August 24, 2016 article in the LA Times newspaper by Steve Lopez as stating that "[i]f we do nothing, absolutely nothing, I'd say in 50 years we're going to have very few beaches left" because of sea level rise. A significant cause of beach erosion should not have been excluded from the analysis, and this omission among others undermines the conclusion that the Lapis Plant is the cause of the perceived erosion problem. Griggs et al. (2005), in a summary statement in their book on the California coast regarding Southern Monterey Bay, stated that "all indications for the future point to a continuing rise in sea level, resulting in continuing erosion of the coastline."

- The October 2016 article did not consider in the final analysis that the construction of dams on the Salinas River, which has the third largest watershed in California, has deprived the beaches of Southern Monterey County of considerable sand supplies. In fact, shoreline change analysis from 1854 to 1998 by the United States Geological Survey showed that the area where the Salinas River exits and the Lapis Plant is located experienced accretion over the long term (Hapke, et al., 2006). Studies by the California Division of Mines and Geology

8 The 1998 second edition of Dr. Komar's book discusses this same issue on pages 66-72.

(1972) indicated that completion of the Nacimiento Dam in 1958 on the Salinas River resulted in more than 90 percent reduction in sand delivery to the beach.

- Detailed studies by the Sanctuary Integrated Monitoring Network also showed that approximately 650,000 cubic yards of beach sand descend into the Monterey Submarine Canyon yearly (http://sanctuarysimon.org/monterey/sections/submarineCanyons/overview.php?sec). Contributing to the loss of sand into the Monterey Submarine Canyon, the north jetty at Moss Landing was built in 1946; this 954-foot long structure is a total littoral barrier to the enormous quantity of sand, some of which could have moved into Southern Monterey Bay in earlier times.

- The October 2016 article also did not consider the large-scale, powerful rip currents that dominate the beach face and can transport significant quantities of sand offshore. Rip currents are considered an important mechanism for offshore sediment transport among many other factors (National Research Council, 1990, see Table in Appendix E). Southern Monterey Bay is a high-energy coast, and rip currents dominate this coast, as shown on air photos (Appendix F). Interestingly, Thornton et al. (2006) noted the alongshore erosion pattern is correlated with the occurrence of rip currents in Southern Monterey Bay, thereby indicating their importance in offshore sediment transport, and yet they have not been considered in the final analysis of erosion causes in the October 2016 article.

- It is stated on page 63 that there is negligible onshore transport of dune sand, but frontal dune blowouts exist, including a major area of sand migration onshore at Sand City (Appendix G). This source of sand loss to the beach was not included in the final analysis.

- The occurrence of El Nino greatly complicates the analysis of shoreline changes in terms of determining rates of erosion during certain periods of time as has been attempted in the October 2016 article (see page 65). The El Nino events of 1982-1983 and 1997-1998 were the largest ones in recent history during the time frame of this analysis, but there have been a large number of El Ninos of differing intensity and hence impact on shore erosion via coastal storms during the past 100 years. As stated earlier, Thornton et al. (2006) determined that the El Nino winter of 1997-1998 resulted in a sand loss of 3,371,000 cubic yards in one year in Southern Monterey Bay, and the 2015-2016 El Nino has been shown to be even more devastating (Barnard et al, 2017). These complicating factors make parsing the shoreline data set difficult to interpret in terms of recession rate changes.[9]

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[9] Table 2 does not include the entire active beach profile, which extends to closure depth. Recession rates in Table 2 do not contain any error bars, and the error bar for the period 1989-2011 can be fairly large for short periods of time (Crowell, Leatherman and Buckley, 1991), thus causing the data to be less reliable. The recession rate also depends significantly upon the timing of El Ninos and storminess, and there were five El Ninos during this 22-year time period, which can easily account for the higher erosion rate during this time interval. Thornton et al (2006) calculated a loss of 3,371,000 cubic yards for one year during the 1997-1998 El Nino winter storms, which dwarfs all other losses.

The Limited Data Used in the October 2016 Article is Internally Contradictory and Challenged by Other Recognized Sources

Because of the theoretical nature of the October 2016 article, the assumptions contained in the article are often contradictory. Such contradictions would have to be resolved to create a reliable sand budget.

First, and perhaps most significantly, a primary component of any sand budget is preferably quantitative measurements of littoral drift or reliable calculations of longshore sediment transport. But, the October 2016 article contains conflicting information on this foundational issue (see Figure 1 in Appendix H-1): The October 2016 article states on page 58 that the larger storm waves generally arrive from the west or southwest, which indicates that the net longshore sediment transport should be north along Southern Monterey Bay. This is also consistent with the map by the Monterey Bay Aquarium Research Institute (Appendix H-2). But, the 2008 PWA report (Appendix H-3) indicates that the net longshore sediment transport is southward from the Salinas River to Sand City.

Second, it is stated on page 60 that finer sand tends to move offshore where wave energy is less and thus the article omitted it from the sand budget. And yet, the sample taken at Lapis beach was 35% fine-grained sand, so this component of the beach cannot be properly dismissed from the sand budget calculation (Appendix C). Relatedly, the dune sand is stated to be comprised of fine to coarse size fractions on page 60 of the October 2016 article. This information would be useful in an analysis if it consisted of representative histograms of sand size distribution and calculation of mean size including the finer sands (i.e., 0.25 millimeter in diameter and smaller). However, these were omitted from the sand budget and such histograms were not included in the October 2016 article.

Third, it is noted that dune heights are highly variable along the shoreline with a maximum of 128 feet at Fort Ord. Figure 5a shows the alongshore variation of dune heights, but no confidence intervals are presented in terms of volumetric calculations, which could reveal fairly large error bars. Such large error bars would call into question the article's assumption of dune heights and, therefore, its estimated dune erosion rates. Table 4 also indicates that the dune erosion rate has decreased greatly from 1940-1989 to 1989-2011, yet there is no explanation. It seems that there is little agreement on the direction of longshore sediment transport (e.g., comparing this article, the 2008 PWA report and Monterey Bay Aquarium Research Institute research, Appendix H-2), let alone the rate of longshore sediment transport. This is perhaps because longshore (i.e., littoral) sediment transport rates are assumed because there are no actual measurements. Thus, the sand budget presented in Table 4 is largely theoretical because the major means of sediment transport on beaches is due to the along-the-shore (e.g., longshore) movement of sand.

Fourth, Table 3 indicates that the Salinas River discharge from 1910 to 1945 was 485,000 cubic yards per year. In contrast, the California Division of Mines and Geology (1972) report stated that the Salinas River from 1905 to 1958 deposited as much as 1,000,000 cubic yards annually at the coast. The 1972 report further stated that, in 1958, the Nacimiento Dam was completed so that the average annual sand yield is estimated to be 40,000 cubic yards or less. Thus, the dam could have resulted in more than a 90% reduction in sand yield. In addition, McGrath (1987) argued that the "Salinas River no longer contributes substantial beach-size sand to the littoral cell because the river gradient has greatly decreased with the rise in sea level, reducing the flow rate" (page 30 of 2008 PWA report). These conflicting data points call into question the sand budget presented in Table 2 in terms of river input.

Conclusions

In conclusion, the October 2016 article is not a useful or reliable analysis from which we can draw scientific conclusions about causes of beach retreat in Southern Monterey Bay. A true sand budget requires reliable data on the magnitude of longshore transport of sand and even the direction is in question for Southern Monterey Bay. Given the observations above, it is not possible to make definitive statements regarding the precise shoreline changes in Monterey Bay other than to state that closing the Lapis Plant will not stop coastal retreat given that several major factors promoting shoreline change will continue unabated. In other words, the trend of landward migration of the beach will continue with or without the Lapis Plant.

Further, it is stated on page 66 of the October 2016 article that the Lapis dredge-pond operation appears to intercept most all the beach-size sand transported south from the Salinas River. This is not plausible. The sand pit on the beach backshore that is more than 100 feet landward of the active beach face receives sand during major storms events via overwash (Leatherman, et al., 1977). In addition, the Lapis Plant in no way acts as a littoral barrier like a jetty, and the portion of sand that is moved to the dredge pond relative to the longshore sediment transport is totally unknown and may be a small amount based on overwash studies elsewhere (Leatherman, et al., 1977).

Finally, as noted above, it is not clear if the net longshore sediment transport in this area is northward or southward. If it is northward, as indicated by reliable sources such as the Monterey Bay Aquarium Research Institute (see Appendix H-2), then all sand from this area would be lost into the Monterey Bay Submarine Canyon and any sand lost due to the Lapis Plant would be of little to no effect on shoreline stability.

Submitted by:

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References

California Division of Mines and Geology, 1972, The Southern Monterey Bay Littoral and Coastal Environment and the Impact of Sand Mining, Sacramento, CA, 43p.

California Coastal Commission, 2016, California Coastal Commission Statewide Sea Level Rise Vulnerability Synthesis.

Crowell, M., Leatherman, S.P. and Buckley, M.K., 1991, Historical Shoreline Change: Error Analysis and Mapping Accuracy, *Journal of Coastal Research*, V. 7, p. 839-852.

Griggs, G. Patsch, K. and Savoy, L., 2005, Living with the Changing California Coast, University of California Press, Berkeley, CA, 540p.

Hapke, C., Reid, D., Richmond, B.M., Ruggiero, P. and List, J., 2006, National Assessment of Shoreline Change Part 3: Historical Shoreline Change and Associated Coastal Land Loss Along Sandy Shorelines of the California Coast, USGS Open File Report 2006-1219, 70p.

Heinz Center, 2000, Evaluation of Erosion Hazards, Report for the Federal Emergency Management Agency, Washington, DC, 252p.

Komar, P.D., 1976, Beach Processes and Sedimentation, Prentice-Hall, Englewood Cliffs, NJ, 429p.

Leatherman, S.P., Williams, A.T. and Fisher, J.S., 1977, Overwash Sedimentation Associated with a Large-Scale Northeaster, *Marine Geology*, V. 24, p. 109-121.

Leatherman, S.P., 2013, Rip Currents in Coastal Hazards, C. Finkl, editor, Springer, New York, p. 811-831.

Leatherman, S.P., Zhang, K. and Douglas, B.C., 2000, Sea level Rise Show to Drive Coastal Erosion, *EOS* Transactions in American Geophysical Union, V. 81, p. 55-57.

McGrath, J., 1987, Sand Mining and Erosion in Monterey Bay, Proceedings of Coastal Zone 87, Seattle, WA, V. 5, p. 5786-5811.

Morang, A., Mossa, J. and Larson, R., 1993, Technologies for Assessing the Geologic and Geomorphic History of Coasts, US Army Corps of Engineers Technical Report CERC 93-5, 140p.

National Research Council, 1990, Managing Coastal Erosion, National Academy Press, Washington, DC, 182p.

PWA, 2008, Coastal Regional Sediment Management Plan for Southern Monterey Bay, San Francisco, CA, 218p.

Thornton, E., et al, 2006, Sand Mining Impacts on Long-Term Dune Erosion in Southern Monterey Bay, *Marine Geology*, V. 229, p. 45-58.

Thornton, E., 2016, Temporal and Spatial Variations in Sand Budgets with Application to Southern Monterey Bay, California, *Marine Geology*, V. 382, p. 56-67.

Zhang, K., Douglas, B.C. and Leatherman, S.P., 2003, Global Warming and Long-Term Sandy Beach Erosion, *Climatic Change*, V. 64, p. 41-56.

Appendices

A. Stephen P. Leatherman Curriculum Vitae

B. Flow Chart for Coastal Studies (Morang et al, 1993)

C. Lapis Sand Sample Histogram (acquired September 5, 2016 by Leatherman)

D. Shoreline Change Map from Hapke et al (2006)

E. Table from National Research Council (1990)

F. Air Photo of Rip Currents at Lapis Plant (October 5, 1976)

G. Photo of Onshore Sand Migration at Sand City (September 5, 2016 by Leatherman)

H-1. Figure 1 from Thornton (2016)

H-2. Map from MBARI (2000)

H-3. Map from PWA (2008, p. 22)

Appendix A

Stephen P. Leatherman Curriculum Vitae

CURRICULUM VITAE

STEPHEN P. LEATHERMAN
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Florida International University
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EDUCATION

1972-1975 University of Virginia, Charlottesville, Virginia, Ph.D. in Environmental (Coastal) Science, May 16, 1976.

1966-1970 North Carolina State University, Raleigh, North Carolina, B.S. in Geosciences with Honors, May 30, 1970.

PROFESSIONAL EXPERIENCE

Professor
Department of Earth & Environment
August 1997- present
Director
Laboratory for Coastal Research
August 1997-2014

We Will Rebuild Chair Professor
December 2001 - 2010
Director
International Hurricane Research Center
August 1997 - August 2009
Florida International University
Miami, FL 33199

Director
Laboratory for Coastal Research
May 1985 - August 1997
Professor
August 1991 - August 1997
Associate Professor

August 1983 – 1991
Assistant Professor
August 1981 - August 1983
Department of Geography & Marine Science
University of Maryland
College Park, MD 20742

Director
National Park Service Research Unit
University of Massachusetts
Amherst, MA 01003
August 1976 - August 1981

Assistant Professor
Department of Geology
Boston University
Boston, MA 02215
September 1975 - August 1977

PROFESSIONAL ACTIVITIES

Member, Select Panel for Post Super Storm Sandy Recommendations for Coastal Erosion and Breach Closure at Fire Island, New York Governor's Office, New York City, June 3, 2013.

Organizer and Chair, Florida Hurricane Alliance Research Program Workshop, Florida International University, Miami, FL, March 18-20, 2010.

Organizer and Co-Chair, 1st International Rip Current Symposium, Florida International University, Miami, FL, February 17-19, 2010.

Member, Heinz Center Coastal Vision Committee, Washington, DC, 2007-2009.

Expert Testimony to House Committee on Science & Technology, Washington, DC, June 26, 2008.

Co-Chair, Science Committee on Climate Change, Miami-Dade County, 2007-2008.

Organizer and Chair, NSF-Sponsored Workshop on Full-Scale Wind Testing with WoW Hurricane Simulator, Florida International University, Miami, FL, March 8, 2007.

Presenter to Florida Governor and Cabinet, Climate Change, Sea Level Rise and Hurricanes, Tallahassee, FL, April 19, 2007.

Review Coordinator, $19.7 Million IPET Report on New Orleans Flood Disaster, National Academy of Sciences and Engineering, 2006.

Organizer, Florida Hurricane Alliance of eight public universities, 2004-present.

Drafter of Legislation, National Windstorm Impact Reduction Act, signed into law by President Bush on October 25, 2004.

Chair, Committee on Sustainable Oceans, Coasts and Waterways, Heinz Center, Washington, DC, 2004-2007.

Editorial Board, Journal of Coastal Research, 1995-present.

Editorial Board, Natural Hazards, 1995-2008.

Editorial Board, Shore & Beach, 1989-2005.

Member, Board of Directors, Marjory Stoneman Douglas Biscayne Nature Center, Key Biscayne, FL, 2000-2003.

Member, Roundtable on Natural Disasters, National Research Council, National Academy of Sciences, Washington, DC, 2000-2003.

Board Member, The Climate Institute, Washington, DC, 1987-Present. Chairman of the Board, 1987-1990; Co-Chairman with Sir Crispin Tickell, 1990-2001.

Member, Committee on Global Change Research, National Research Council, National Academy of Sciences, Washington, DC, 1999-2002.

Nominator for Fellowship, Pew Fellows Program in Marine Conservation, New England Aquarium, Boston, MA, 2000-2001.

Chair, National Panel to Evaluate Coastal Erosion Hazards for the Federal Emergency Management Agency as mandated by the U.S. Congress, H. John Heinz III Center, Washington, DC, 1998-2000.

Member, Technical Advisory Committee, Insurance Friends of the National Hurricane Center, 1997 – 2002.

Leader, U.S. Congressional Staffers (Natural Hazards) Field Trip to the Chesapeake Bay, December 3, 1996.

Expert Testimony, U.S. Senate Committee on Environment and Public Works, November 20, 1996.

Member, Advisory Board, Cove Point Environmental Trust, Maryland, 1995-1997.

Expert Testimony to President's Council on Sustainable Development, Washington, DC, April 19, 1994.

Expert Testimony to the U.S. Senate Committee on Banking and Insurance, Washington, DC, April 14, 1994.

Elected Secretary, Sigma Xi, University of Maryland Chapter, 1992; Vice President, 1993; President, 1994.

Expert Testimony to U.S. House of Representatives Committee on Banking, Finance, and Urban Affairs, Washington, DC, June 24, 1993.

Expert Testimony to U.S. Senate Committee on Housing and Urban Affairs, Washington, DC, July 27, 1992.

On-screen host and co-producer, "Vanishing Lands" documentary film, 1991.

Field Team Member of Committee on Natural Disasters, National Academy of Sciences, National Research Council, Washington, DC, 1984-1991.

Expert Testimony, U.S. House of Representatives, Subcommittee on Policy Research and Insurance, Washington, DC, July 13, 1990.

Member, National Commission on Research and Resource Management Policy in the National Park System, National Parks and Conservation Association Report to the U.S. Congress, 1988-1989.

Expert Testimony to U.S. Senate Committee on Insular Affairs, Washington, DC, October 1989.

Visiting Professor, Peking University, Beijing, China, May-June, 1989.

Member, Water Science and Technology Board Committee on Coastal Erosion Zone Management, National Research Council, National Academy of Sciences, Washington, DC, 1988-1990.

Presenter, Climate Science Award to Roger Revelle, The Climate Institute, Washington, DC, December 1988.

Expert Testimony to U.S. Senate Committee on Commerce, Science and Transportation, U.S. Senate, Washington, DC, July 13, 1988.

Elected Member, Nominating Committee for Electorate E, American Association for the Advancement of Science, 1986-Present; Chairman, 1989-1990.

Expert Testimony to U.S. Senate Committee on Public Works and Environmental Affairs, U.S. Senate, Washington, DC, June 10, 1986.

Chairman, Coastal Geomorphology Specialty Group, Assateague Island Erosion Workshop, National Park Service, Berlin, MD, March 1986.

Editorial Board, CERF Bulletin, Ft. Lauderdale, Florida, 1985-1988.

Distinguished Lectureship Tour, Partners of Americas, Rio de Janerio, Brazil and Mar del Plata, Argentina, November, 1985.

Advisor, Glamorgan Heritage Coast Project, United Kingdom, 1985-1990.

Corresponding Member, International Geologic Correlation Program, UNESCO, 1985-1989.

Member, Marine Board Committee on Engineering Implications of Changes in Relative Sea Level, National Research Council, National Academy of Sciences and Engineering, Washington, DC, 1984-1987.

Invited Participant, National Assessment of Effects of Accelerated Carbon Dioxide Loading in the Atmosphere, U.S. Environmental Protection Agency, Washington, DC, 1983.

Panelist, Task Force on Barrier Islands, Department of the Interior, Washington, D.C. 1980-1981 (Preparation of technical information for U.S. Coastal Barrier Resources Act of 1983).

Member, Expert Panel for Selection of Criteria for Coastal Biospheres (MAB), UNESCO, University of Virginia, August 1980.

Invited Participant, "Corps of Engineers' Nationwide Assessment of Barrier Island Dynamics and Development Practices," Coastal Engineering Research Center, Fort Belvoir, VA, November 1979.

Scientific Adviser, Earthwatch Scientific Expeditions, 1976-1979.

Elected Office, Society of Sedimentary Geologists
Vice-President, SEPM-Eastern Section (1978-1979)
President, SEPM-Eastern Section (1979-1980).

MEMBERSHIP IN PROFESSIONAL SOCIETIES

American Association for Advancement of Science (Fellow)
Geological Society of America (Fellow)
Scientific Society of Sigma Xi

GRANTS AND CONTRACTS (Principal Investigator)

Coastal Processes Research, Andrew W. Mellon Foundation, 1994-2015, $1,500,000.

STORM Project, Thomas & Barbara Gale Foundation, 2012-2014, $25,000.

1st International Rip Current Symposium, Florida Sea Grant, 2009-2010, $10,000.

Center of Excellence for Hurricane Damage Mitigation & Product Development, Florida Board of Governors, 2008-2012, $7.5 million.

Florida Hurricane Alliance, NOAA National Weather Service, 2004-2010, $5.5 million.

Residential Construction Mitigation Program, Florida Division of Emergency Management, 2004-2009, $2.1 million.

Hurricane Storm Surge Modeling and Animation Project, Federal Emergency Management Agency, 2001-2004, $2.5 million.

Development of a Public Model for Hurricane Catastrophic Losses, Co-PI, Florida Department of Insurance, 2000-2004.

Hurricane Impact Initiative, Phase II, Insurance Friends of the National Hurricane Center, 2000-2002.

Florida Coastal Monitoring Program, Florida Department of Community Affairs (DCA) Emergency Management, 1999-2000.

Mapping Using Airborne Laser Altimetry, Florida Department of Community Affairs (DCA) Emergency Management, 1998-1999.

Hurricane Impact Initiative, Insurance Friends of the National Hurricane Center, 1998-1999.

High Resolution Hurricane Vulnerability Data Set, Florida Department of Community Affairs (DCA) Emergency Management, Co-PI, 1998-1999.

Climate Change Workshop, NOAA-Office of Global Programs, 1998-1999.

Comprehensive Hurricane Forecast and Impact Analysis, Quality Improvement Program, Florida International University, 1997-2000.

Vanishing Lands Teachers Guidebook, Chesapeake Bay Trust, 1995-1996.

Coastal Sector Impacts of Climate Change on Island States, U.S. Country Studies Program, Washington, DC, 1994-1997.

Impact of Sea Level Rise on U.S. Coastal Areas: Economic and Land Use Implications, U.S. Environmental Protection Agency, 1994-1997.

Utilization of Computer Technology in Coastal Geomorphology, UMD Improvement in Teaching Award, 1994-1995.

Vanishing Lands: An Assessment of Coastal Land Loss on Human Settlements, National Geographic Society, 1992-1994.

Vanishing Lands Project, William Bingham Foundation, Marpat Foundation, National Fish and Wildlife Foundation, U.S. Fish and Wildlife Service, 1992-1995.

Implications of Sea-Level Rise for West Ocean City, MD, Maryland Department of Natural Resources, 1992-1993.

Development of Coastal Geographic Information System, Naval Facilities Engineering Facility, Washington, DC, 1991-1997.

Coastal Erosion Mapping and Analysis, Federal Emergency Management Agency, 1990-1997.

An Assessment of Sea Level Trends and Implications, W. Alton Jones Foundation, 1990-1994.

Impact of Sea Level Rise on Developing Countries, U.S. Environmental Protection Agency, 1989-1994.

Research Equipment for the Laboratory for Coastal Research, UMD Designated Research Funds, 1986-1988.

Sea Level Rise Curve for the Chesapeake Bay: Marsh Development and Bay-wide Implications, Maryland Sea Grant (with Mike Kearney), 1986-1987.

National Shoreline Movement Studies: Development of Microcomputer Mapping Routines and Geographic Information Systems, NOAA-National Ocean Service, 1985-1986.

Development of Laboratory Manual for Remote Sensing, UMD Improvement of Teaching Award, 1985.

Geomorphic Effects of Projected Sea Level Rise on Coastal Areas, U.S. Environmental Protection Agency, Washington, DC, 1984-1988.

Sediment Budget and Transport Patterns, Maryland Chesapeake Bay, University of Maryland Graduate School Summer Research Award, 1984.

Historical and Projected Shoreline Changes, Ocean City, Maryland, Water Resources Research Center, 1983-1984.

Effects of Projected Sea-Level Rise on Galveston Island and Bay, Texas, U.S. Environmental Protection Agency, Washington, DC, 1982-1983.

Remote Sensing Applications: East and Gulf Coast Barrier Islands, NASA, Washington, DC, 1981-1982.

Metric Mapping: Fire Island Inlet to Montauk Point, U.S. Army Corps of Engineers, New York District, 1980-1982.

Geomorphic Analysis of South Shore of Long Island, N.Y., Phases II-IV, U.S. Army Corps of Engineers, New York District, 1980-1985.

Geological Evolution of Outer Cape Cod for Archeological Interpretations, National Park Service, Boston, MA, 1979-1981.

Development and Utilization of Metric Mapping Techniques, National Park Service, Boston, MA, 1980-1981.

Province Lands Dune Migration and Resource Management, National Park Service, Cape Cod National Seashore, Wellfleet, MA, 1979-1981.

Outer Cape Cod Shoreline Analysis, National Park Service, Boston, MA, 1979-1981.

Geomorphic Analysis of South Shore of Long Island, N.Y., Phase I, U.S. Army Corps of Engineers, New York District, 1979-1980.

Effects of Off-Road Vehicles on Beaches and Dunes, Fire Island National Seashore, National Park Service, Boston, MA, 1977-1980.

Recreational Impacts on Assateague Island, Maryland-Virginia, National Park Service Denver Service Center, 1978-1979.

Beach Dynamics of Fire Island, N.Y., Earthwatch, Inc., Belmont, MA, 1978.

Overwash Processes and Foredune Ecology, U.S. Army Corps of Engineers, Coastal Engineering Research Center, Fort Belvoir, VA, 1977-1981.

Impact of Off-Road Vehicles on Nauset Spit, Cape Cod, National Park Service, Boston, MA, 1977-1979.

Coastal Environments of Province Lands, Cape Cod, Earthwatch, Inc, Belmont, MA, 1977.

Environmental Effects of Off-Road Vehicles on Coastal Ecosystems in Cape Cod National Seashore, National Park Service, Boston, MA, 1976-1979.

Coastal Environments: Past and Present, Nauset Spit, Cape Cod, Massachusetts, Earthwatch, Inc., Belmont, MA, 1976.

Hydraulics of an Overwash Event, Research Award, Boston University Graduate School, 1975.

PUBLICATIONS

Books and National Academy Reports

1. THE 3RD INTERNATIONAL RIP CURRENT SYMPOSIUM (with Jung Lyul Lee and Jooyong Lee), Journal of Coastal Research Special Issue 72, 2014, 195 p.

2. FIELD GUIDE TO THE WATER'S EDGE (with Jack Williams), National Geographic Society, Washington, DC, 2012, 335 p (subscriber's edition).

3. RIP CURRENTS: BEACH SAFETY, PHYSICAL OCEANOGRAPHY AND WAVE MODELING (with John Fletemeyer, editors), CRC Press International, 2011, 277 pp.

4. HURRICANES, World Life Library, London, England (with Jack Williams), 2008, 72pp.

5. Dr. BEACH'S SURVIVAL GUIDE: WHAT YOU NEED TO KNOW ABOUT SHARKS, RIP CURRENTS, & MORE BEFORE GOING IN THE WATER, Yale University Press, New Haven, CT, 2003, 106 pp.

6. BEACH VACATION TRAVEL JOURNAL, 2002, AAA National Office, Heathrow, FL, 80 pp.

7. SEA LEVEL RISE: HISTORY AND CONSEQUENCES, Academic Press, New York (with B. Douglas and M. Kearney, editors), 2001, 228 pp.

8. COASTAL EROSION MAPPING AND MANAGEMENT, Journal of Coastal Research, Special Issue No. 28 (with M. Crowell, editors), 1999, 196 pp.

9. AMERICA'S BEST BEACHES, Laboratory for Coastal Research, Florida International University, Miami, FL, 1998, 112 pp. (Distributed by University Press of Florida).

10. ISLAND STATES AT RISK: GLOBAL CLIMATE CHANGE, POPULATION AND DEVELOPMENT, Journal of Coastal Research, Special Issue No. 24, editor, 1997, 242 pp.

11. POTENTIAL IMPACTS OF ACCELERATED SEA-LEVEL RISE ON DEVELOPING COUNTRIES, Journal of Coastal Research, Special Issue No. 14 (with R. Nicholls, editors), 1995, 323 pp.

12. MANAGING COASTAL EROSION, National Academy Press, Washington, D.C. (with others), 1990, 182 pp.

13. CAPE COD: FROM GLACIERS TO BEACHES, Laboratory for Coastal Research, University of Maryland, College Park, MD, 1988, 132 pp.

14. RESPONDING TO CHANGES IN SEA LEVEL: ENGINEERING IMPLICATIONS, National Academy Press, Washington, D.C. (with others), 1987, 148 pp.

15. REMOTE SENSING LABORATORY MANUAL, Kendall-Hunt Publishing Co., Dubuque, Iowa, 1986 (with S. Goward), 116 pp.

16. BARRIER ISLANDS, Special Issue, Marine Geology, V. 63, (with G. Oertel, editors), Elsevier Publishing Co., Amsterdam, The Netherlands, 1985, 419 pp.

17. OVERWASH PROCESSES, Benchmark Papers in Geology, Hutchinson and Ross Publishing Co., Stroudsburg, PA, editor, 1981, 376 pp.

18. ENVIRONMENTAL GEOLOGIC GUIDE TO CAPE COD NATIONAL SEASHORE, Society of Economic Paleontologists and Mineralogists, Eastern Section, editor, 1979, 249 pp.

19. BARRIER ISLAND HANDBOOK, Laboratory for Coastal Research, University of Maryland, College Park, MD, editor, 1979, 101 pp., reprinted 1980; revised and reprinted 1982; revised and reprinted, 1988.

20. BARRIER ISLANDS: FROM GULF OF ST. LAWRENCE TO GULF OF MEXICO, Academic Press, New York, editor, 1979, 325 pp.

<u>Refereed Journal Articles and Book Chapters</u>

1. Leatherman, S.P. and S.B. Leatherman, 2017, Sea Level Change, in the International Encyclopedia of Geography, People, the Earth, Environment and Technology, Wiley-Blackwell Publishers, in press

2. Leatherman, S.P., 2015, Miami Beach at 100: Where Would It Be Without a Beach?, SHORE & BEACH, V. 83, p. 48.

3. Leatherman, S.P., 2014, Rip Current: Science and Threat Communication, Journal of Coastal Research Special Issue 72, p. 93-95.

4. Leatherman, S.B., S.P. Leatherman, and B.K. Haus, 2013, Bar Height and Rip Current Presence and Strength, SHORE & BEACH, V. 81, p. 1-4.

5. Leatherman, S.P., 2013, Rip Currents, in Coastal Hazards, C. Finkl, editor, Springer, New York, p. 811-831.

6. Leatherman, S.P., 2012, Rip Currents: Types and Identification, SHORE & BEACH, V. 80, p. 5-10.

7. Leatherman, S.P., 2012, Undertow, Rip Current and Riptide, JOURNAL OF COASTAL RESEARCH, V. 28, p. 3-5.

8. Ariza, E. and S.P. Leatherman, 2012, No-Smoking Policies and Their Outcomes on U.S. Beaches, JOURNAL OF COASTAL RESEARCH, V. 28, p. 143-147.

9. Leatherman, S.P., 2012, Bluff Stabilization at Robins Island in Peconic Bay, Long Island, New York, SHORE & BEACH, V. 80, p. 2-8.

10. Leatherman, S.P., 2011, Hurricane Wind Damage Mitigation: Research and Outreach, NATURAL HAZARDS, V. 12, p. 202-206.

11. Zhang, K. and S.P. Leatherman, 2011, Barrier Island Population along the U.S. Atlantic and Gulf Coasts, JOURNAL OF COASTAL RESEARCH, V. 27, p. 356-363.

12. Leatherman, S.P., 2010, Rip Currents: Terminology and Pro-Active Beach Safety in Rip Currents: Beach Safety, Physical Oceanography and Wave Modeling, S.P. Leatherman and J. Fletemeyer, eds, CRC Press International, p. 259-271.

13. Fletemeyer, J. and S.P. Leatherman, 2010, Rip Currents and Public Education, JOURNAL OF COASTAL RESEARCH, v. 26, p. 1-3.

14. Gan Chowdhury, A., Simiu, E., Leatherman, S.P., 2009, Destructive Testing under Simulated Hurricane Effects to Promote Hazard Mitigation. NATURAL HAZARDS REVIEW, Vol. 10, p. 1-10.

15. Leatherman, S.P., 2007. The Most Vulnerable U.S. Hurricane Places, CATASTROPHE RISK MANAGEMENT, p. 8-10.

16. Leatherman, S.P., K. Zhang, and C. Xiao, 2007. Lake Okeechobee, Florida: The Next Hurricane Disaster?, WATER RESOURCES IMPACT, V.9, p. 5-7.

17. Douglas, B.C., and S.P. Leatherman, 2007. Increasing the Resilience of Our Coasts: Coastal Collision Course of Rising Sea Level, Storms, Coastal Erosion and Development in Sudden and Disruptive Climate Change: Its Likelihood, Character and Avoidance, M. MacCracken, J. Topping, Jr. and F. Moore, eds., Earthscan Publications, p. 143-152.

18. Gan Chowdhury, A.G. and Stephen P. Leatherman, 2007. Innovative Testing Facility to Mitigate Hurricane-Induced Losses, EOS TRANSACTION OF THE AMERICAN GEOPHYSICAL UNION, Vol. 88, p. 262.

19. Leatherman, S.P., A.G. Chowdhury, and C.J. Robertson, 2007. Wall of Wind Full-Scale Destructive Testing of Coastal Houses and Hurricane Damage Mitigation, JOURNAL OF COASTAL RESEARCH, V.23, p.1211-1217.

20. Kates, R.W., C.E. Colton, S. Laska, and S.P. Leatherman, 2006. Reconstruction of New Orleans Following Hurricane Katrina: A Research Perspective, PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, V. 103, pp. 14653-14660.

21. Leatherman, S.P., 2006. Hurricane Katrina: Implications for Building and Living in Harm's Way, WATER RESOURCES IMPACT, Vol. 8, pp. 6-10.

22. Leatherman, S.P., 2006. The WoW Factor in Hurricane Damage Mitigation, CATASTROPHE RISK MANAGEMENT, pp. 24-25.

23. Crowell, M., S. P. Leatherman, and B.C. Douglas, 2005. Erosion: Historical Shoreline Analysis and Forecasting, ENCYCLOPEDIA OF COASTAL SCIENCE, M. Schwartz, ed., Kluwer Academic Publishers, pp. 428-432.

24. Galgano, F. and S.P. Leatherman, 2005. Modes and Patterns of Shoreline Change, in ENCYCLOPEDIA OF COASTAL SCIENCE, M. Schwartz, ed., Kluwer Academic Publishers, pp. 651-656.

25. Leatherman, S.P., 2005. Rating Beaches, ENCYCLOPEDIA OF COASTAL SCIENCE, M. Schwartz, ed., Kluwer Academic Publishers, pp. 785-790.

26. Leatherman, S.P., D. Whitman, and K. Zhang, 2005. Coastal Erosion Hazard Mapping Using LIDAR (Airborne Laser Altimetry Technology), in ENCYCLOPEDIA OF COASTAL SCIENCE, M. Schwartz, ed., Kluwer Academic Publishers, pp. 21-24.

27. Robertson, W., K. Zhang, D. Whitman, and S.P. Leatherman, 2005. Shoreline and Beach Volume Change Before and After the 2004 Hurricane Season, Palm Beach County, Florida, SHORE & BEACH, Vol. 73, pp. 79-84.

28. Zhang, K., D. Whitman, S.P. Leatherman, and W. Robertson, 2005. Quantification of Beach Changes Caused by Hurricane Floyd Along Florida's Atlantic Coast Using Airborne Laser Surveys, JOURNAL OF COASTAL RESEARCH, Vol. 21, pp. 123-134.

29. Leatherman, S.P. and K. Zhang, 2004. Coastal Hazards and Barrier Beach Development, in WorldMinds: Geographic Solutions on 100 Problems, AAG Centennial Celebration, B. Warf, D. Janelle, and K. Hansen, eds., pp. 455-460.

30. Robertson, W., D. Whitman, K. Zhang and S.P. Leatherman, 2004. Mapping Shoreline Position Using Airborne Laser Altimetry, JOURNAL OF COASTAL RESEARCH, Vol. 20, pp. 884-892.

31. Zhang, K., D. Whitman, Leatherman, S.P. and Robertson, W., 2004. Quantification of changes caused by Hurricane Floyd along Florida's Atlantic Coast using airborne LIDAR survey. JOURNAL OF COASTAL RESEARCH, V. 21, pp. 123-134.

32. Whitman, D., K. Zhang, S. Leatherman, and W. Robertson, 2003. Airborne Laser Topographic Mapping: Application to Hurricane Storm Surge Hazards, in: Earth Sciences in the Cities, G. Heiken, R. Fakundiny, and J. Sutter, editors, AMERICAN GEOPHYSICAL UNION, pp. 363-378.

33. Leatherman, S.P., 2003. Shoreline Change Mapping and Management along the U.S. East Coast, JOURNAL OF COASTAL RESEARCH, Special Issue No. 38, pp. 5-13.

34. Leatherman, S.P., Douglas, B.C., and LaBrecque, J. L., 2003. Sea Level Rise and Coastal Erosion Require Large-Scale Monitoring. EOS, V.84, p. 13.

35. Whitman, D., Zhang, K., Leatherman, S.P., and Robertson, W., 2003. Airborne Laser Topographic Mapping: Applications to Hurricane Storm Hazards, AGU MONOGRAPH, EARTH SCIENCE IN THE CITY, pp. 363-376.

36. Zhang, K., Douglas, B.C. and Leatherman, S.P. 2003. Global Warming and Long-Term Sandy Beach Erosion, CLIMATIC CHANGE, V. 64, pp. 41-58.

37. Leatherman, S.P., and Burkett, V.R., 2002. Sea-Level Rise and Coastal Disasters: Lessons from the East Coast and New Orleans: NATURAL HAZARDS OBSERVER, v. 26, no. 4, pp. 10-11.

38. Pajak, M.J. and Leatherman, S.P., 2002. The High Water Line as Shoreline Indicator, JOURNAL OF COASTAL RESEARCH, Vol. 18, pp. 329-337.

39. Zhang, K., B.C. Douglas and S.P. Leatherman, 2002. Beach Erosion Potential for Severe Nor'easters, JOURNAL OF COASTAL RESEARCH, Vol. 17, pp. 309-321.

40. Zhang K., B.C. Douglas, and S.P. Leatherman, 2002. Do Storms Cause Long-Term Beach Erosion along the U.S. East Barrier Coast? JOURNAL OF GEOLOGY, V. 110, pp. 493-502.

41. Zhang, K., W. Huang, B.C. Douglas and S.P. Leatherman, 2002. Shoreline Position Variability and Long-Term Trend Analysis, SHORE & BEACH, V. 70, pp. 31-35.

42. Leatherman, S.P., 2001. Social and Economic Costs of Sea Level Rise, in Sea Level Rise: History and Consequences, Douglas, B., et al., eds., ACADEMIC PRESS, New York, pp. 181-223.

43. Leatherman, S.P., W.J. Merrell, Jr. and R.M. Friedman, 2001. Coastal Erosion and Its Impact on the National Flood Insurance Program: The Heinz Center Report, SHORE & BEACH, V. 69, pp. 23-27.

44. Zhang, K., Douglas, B.C., and Leatherman, S.P., 2001. Beach Erosion Potential for Severe Nor'easters, JOURNAL OF COASTAL RESEARCH, V. 17, pp. 309-321.

45. Leatherman, S.P., K. Zhang, and B.C. Douglas, 2000. Sea Level Rise Shown to Drive Coastal Erosion: A Reply, EOS Transactions in American Geophysical Union, V. 81, pp. 437-441.

46. Leatherman, S.P., K. Zhang, and B.C. Douglas, 2000. Sea Level Rise Shown to Drive Coastal Erosion, EOS Transactions in American Geophysical Union, V. 81, pp. 55-57.

47. Smith, J. and S.P. Leatherman, 2000. Erosion Anomaly on Eastern Jones Beach Island, NY: Genesis and Management Implications, SHORE & BEACH, V. 68, pp. 29-32.

48. Zhang, K., B.C. Douglas, and S.P. Leatherman, 2000. Twentieth-Century Storm Activity along the U.S. East Coast, JOURNAL OF CLIMATE, V. 13, pp. 1748-1761.

49. Galgano, F.A. and S.P. Leatherman, 1999. Beach Erosion, Tidal Inlets and Politics: The Fire Island Story, SHORE & BEACH, V. 67, pp. 26-32.

50. Leatherman, S.P. and Anders, F.J., 1999. Mapping and Managing Coastal Erosion Hazards in New York, JOURNAL OF COASTAL RESEARCH, Special Issue 28, pp. 34-42.

51. Leatherman, S.P. and Eskandary, L.S., 1999. Evaluation of Coastal Erosion Hazards along Delaware's Atlantic Coast, JOURNAL OF COASTAL RESEARCH, Special Issue 28, pp. 43-49.

52. O'Connell, J.F. and Leatherman, S.P., 1999. Coastal Erosion Hazards and Mapping along the Massachusetts Shore, JOURNAL OF COASTAL RESEARCH, Special Issue 28, pp. 27-33.

53. Douglas, B. C., Crowell, M., and Leatherman, S.P., 1998. Considerations for Shoreline Position Prediction, JOURNAL OF COASTAL RESEARCH, V. 14, pp. 1025-1033.

54. Galgano, F., Douglas, B.C., and Leatherman, S.P., 1998. Trends and Variability of Shoreline Position, JOURNAL OF COASTAL RESEARCH, Special Issue 26, pp. 282-291.

55. Crowell, M., Douglas, B.C, and Leatherman, S.P., 1997. On Forecasting Future U.S. Shoreline Positions: A Test of Algorithms, JOURNAL OF COASTAL RESEARCH, V.13, pp. 1245-1255.

56. Leatherman, S.P., 1997. Beach Ratings: A Methodological Approach, JOURNAL OF COASTAL RESEARCH, V. 13, pp. 253-258.

57. Leatherman, S.P. and Beller-Simms, N., 1997. Sea Level Rise and Small Island States: An Overview, JOURNAL OF COASTAL RESEARCH, Special Issue 24, pp. 1-16.

58. Leatherman, S.P., Crowell, M., and Douglas, B.C., 1997. U.S. Sea-Level Trends: Implications for Long-Term Erosion, JOURNAL OF COASTAL RESEARCH, Editorial, V. 13, 2 pp.

59. Leatherman, S.P., Dean, R., Kana, T. and Anders, F., 1997. Goldsmith Inlet and Adjacent Areas, North Shore of Long Island, New York: Erosion Problems and Suggested Modifications, SHORE & BEACH, V. 65, pp. 13-16.

60. Turner, I. and Leatherman, S.P., 1997. Beach Dewatering As a Soft Engineering Solution to Coastal Erosion: A History and Critical Review, JOURNAL OF COASTAL RESEARCH, V. 13, pp. 1050-1063.

61. Zhang, K., Douglas, B.C., and Leatherman, S.P., 1997. East Coast Storm Surges Provide Unique Climate Record, EOS TRANSACTIONS, American Geophysical Union, V. 78, pp. 395-397.

62. Jallow, B.P., Malang, K.A. and S.P. Leatherman, 1996. Assessment of the Vulnerability of the Coastal Zone of the Gambia to Sea Level Rise and Development of Response Strategies and Adaptation Options, CLIMATIC RESEARCH, V. 6, pp. 165-177.

63. Leatherman, S.P., 1996. Shoreline Stabilization Approaches In Response to Sea Level Rise: U.S. Experiences and Implications for Pacific Islands and Asian Nations, JOURNAL OF WATER, AIR AND SOIL POLLUTION, V. 92, pp. 149-157.

64. Nicholls, R.J. and Leatherman, S.P., 1996. Adapting to Sea Level Rise: Relative Sea-Level Trends to 2100 for the United States, COASTAL MANAGEMENT, V. 24, pp. 301-324.

65. Deering, A. and Leatherman, S.P., 1995. Are Insurers on a Collision Course with Nature?, BEST'S REVIEWS, pp. 66-69.

66. Leatherman, S. P., Nicholls, R. J., and Dennis, K. C., 1995. Aerial Videotape- Assisted Vulnerability Analysis: A Cost-Effective Approach to Assess Sea-Level Rise Impacts, JOURNAL OF COASTAL RESEARCH, Special Issue 14, pp. 15-25.

67. Leatherman, S.P. and Nicholls, R.J., 1995. Accelerated Sea-Level Rise and Developing Countries: An Overview, JOURNAL OF COASTAL RESEARCH, Special Issue 14, pp. 1-14.

68. Lee, G., Nicholls, R.J., Birkemeier, W.A., and Leatherman, S.P., 1995. A Conceptual Fairweather - Storm Model of Beach Nearshore Profile Evolution at Duck, North Carolina, JOURNAL OF COASTAL RESEARCH, V. 11, pp. 1157-1166.

69. Nicholls, R.J. and S.P. Leatherman, 1995. Sea-Level Rise and Coastal Management, in Geomorphology and Land Management in a Changing Environment, D. McGregor and D. Thompson, eds., John Wiley, pp. 229-244.

70. Nicholls, R.J. and S.P. Leatherman, 1995. Sea Level Rise, in As Climate Changes: Impacts and Implications, CAMBRIDGE UNIVERSITY PRESS, pp. 92-123.

71. Nicholls, R.J. and Leatherman, S.P., 1995. The Implications of Accelerated Sea-Level Rise for Developing Countries: A Discussion, JOURNAL OF COASTAL RESEARCH, Special Issue 14, pp. 303-323.

72. Nicholls, R.J., S.P. Leatherman, K.C. Dennis, and C.R. Volonte, 1995. Impacts and Response to Sea-Level Rise: Qualitative and Quantitative Assessments, JOURNAL OF COASTAL RESEARCH, Special Issue 14, pp. 26-43.

73. Wray, R.D., Leatherman, S.P., and Nicholls, R.J., 1995. Historic and Projected Land Loss for Upland and Marsh Islands in the Chesapeake Bay, Maryland, JOURNAL OF COASTAL RESEARCH, V. 11, pp. 1195-1203.

74. Downs, L.L., Nicholls, R.J., Leatherman, S.P., and Hautzenroder, J., 1994. Historic Evolution of a Marsh Island, Bloodsworth Island, Maryland, JOURNAL OF COASTAL RESEARCH, V. 10, pp. 1031-1044.

75. Leatherman, S.P., 1994. Rising Sea Level and Small Island States, ECODECISION, V. 11, pp. 53-54.

76. Crowell, M., Leatherman, S.P., and M.K. Buckley, 1993. Shoreline Change Rate Analysis: Long Term versus Short Term Data, SHORE & BEACH, V. 61, pp. 13-20.

77. Leatherman, S.P., 1993. Coastal Change, in Atlas of Satellite Observations Related to Global Change, R.J. Gurney et al., eds., CAMBRIDGE UNIVERSITY PRESS, pp. 327-339.

78. Williams, A.T. and Leatherman, S.P., 1993. Process Form Relationships on U.S. East Coast Barrier Islands, ZEIT FUR GEOMORPHOLOGY, V. 37, pp. 179-197.

79. Davison, A.T., R.J. Nicholls, and S.P. Leatherman, 1992. Beach Nourishment as a Coastal Management Tool: An Annotated Bibliography

on Development Associated with the Artificial Nourishment of Beaches, JOURNAL OF COASTAL RESEARCH, V.8, pp. 984-1022.

80. Leatherman, S.P., 1992. Hurricane Hugo's Impact on the South Carolina Coast, in Natural and Technological Disasters: Causes, Effects and Preventive Measures, S.K. Majumdar, et al., eds., Pennsylvania Academy of Sciences, pp. 138-149.

81. Leatherman, S.P. 1992. Coastal Land Loss in the Chesapeake Bay Region: An Historical Analogy Approach to Global Climate Analysis and Response, in the Regions and Global Warming: Impacts and Response Strategies, J. Schmandt, ed., OXFORD UNIVERSITY PRESS, pp.17-27.

82. Leatherman, S.P., 1992. Sea Level Rise: Implications and Responses, in Global Climate Change: Implications, Challenges, and Mitigation, S.K. Majumdar, et al., eds., Pennsylvania Academy of Sciences, pp. 256-263.

83. Titus, J., R. Park, S. Leatherman, J. Weggle, M. Greene, S. Brown, C. Gaunt, M. Trehan, and G. Yohe, 1992. Greenhouse effect and sea level rise: the cost of holding back the sea. COASTAL MANAGEMENT, V. 19, pp. 219-233.

84. Crowell, M., Leatherman, S.P., and Buckley, M.K., 1991. Historical Shoreline Change: Error Analysis and Mapping Accuracy, JOURNAL OF COASTAL RESEARCH, V. 7, pp. 839-852.

85. Leatherman, S.P., 1991. Coasts and Beaches, in Heritage of Engineering Geology: The First Hundred Years, Geological Society of America, Centennial Special Volume 3, pp. 183-200.

86. Galgano, F.A. and S. P. Leatherman, 1991, Shoreline Change Analysis Case Study: The Bethany Beach Groin Field, Coastal Sediments, p. 1043-1953.

87. Leatherman, S.P., 1991. Impact of Climate-Induced Sea-Level Rise on Coastal Resources, in Global Climate Change and Life on Earth, R.L. Wyman, ed., Chapman and Hall, New York, pp. 170-179.

88. Leatherman, S.P., 1991. Modeling Shore Response to Sea-Level Rise on Sedimentary Coasts, PROGRESS IN PHYSICAL GEOGRAPHY, V. 14, pp. 447-464.

89. Leatherman, S.P., and Dean, R.G., 1991. Coastal Erosion Zone Management, EOS TRANSACTIONS, American Geophysical Union, V. 72, pp. 9-10.

90. Leatherman, S.P., 1990. Environmental Implications of Shore Protection Strategies Along Open Coasts (With a Focus on the United States), Changing Climate and the Coasts, J.G. Titus, ed., United Nations Environment Program, pp. 197-207.

91. Leatherman, S.P. and J.J. Moller, 1990. Hurricane Hugo's Impact on the South Carolina Beaches, JOURNAL OF COASTAL RESEARCH, Skagen Symposium Special Volume, pp. 332-357.

92. Leatherman, S.P. and J.J. Moller, 1990. Morris Island Lighthouse: A "Survivor" of Hurricane Hugo, SHORE & BEACH, v. 59, pp. 11-15.

93. Leatherman, S.P., 1989. Impact of Accelerated Sea-Level Rise on Beaches and Coastal Wetlands, J.C. White, editor, Global Climate Change Linkages, pp. 43-57.

94. Leatherman, S.P., 1989. Response of Sandy Beaches to Sea-Level Rise in Late Quaternary Sea-Level Correlations and Applications: Walter S. Newman Memorial Volume, D.B. Scott, et al., eds., Kluwer Academic Publishers, Boston, MA, pp. 57-69.

95. Leatherman, S.P., 1989. Role of Inlets in Geomorphic Evolution of the South Shore Barriers of Long Island, New York, ENVIRONMENTAL MANAGEMENT, V. 13, pp. 109-115.

96. Oertel, G.F., Kearney, M.S., Leatherman, S.P., and Woo, H.J., 1989. Anatomy of a Barrier Platform: Outer Barrier Lagoon, Southern Delmarva Peninsula, Virginia, MARINE GEOLOGY, V. 88, pp. 303-318.

97. Vellinga, P. and Leatherman, S.P., 1989. Sea Level Rise, Consequences and Policies, CLIMATIC CHANGE, V. 15, pp. 175-189.

98. Leatherman, S.P., 1988. Beach and Shoreface Response to Sea Level Rise, PROGRESS IN OCEANOGRAPHY, v. 18, pp. 139-149.

99. Leatherman, S.P., 1988. Implications of Sea-Level Rise on the South Shore of Long Island, New York, NORTHEASTERN ENVIRONMENTAL SCIENCE, V. 7, pp. 83-90.

100. Leatherman, S.P. and McDonough, J.J., 1988. America's Eroding Beaches: NOS Data May Hold the Key, MILITARY ENGINEER, V. 520, pp. 143-144.

101. Leatherman, S.P. and Panageotou, W., 1988. Barrier Evolution during Sea Level Rise: South Shore of Long Island, New York, NORTHEASTERN ENVIRONMENTAL SCIENCE, V. 6, pp. 76-81.

102. Anders, F.J. and Leatherman, S.P., 1987. Disturbance of Beach Sediment by Off-Road Vehicles, ENVIRONMENTAL GEOLOGY AND WATER SCIENCE, V. 9, pp. 183-189.

103. Anders, F.J. and Leatherman, S.P., 1987. Effects of Off-Road Vehicles on Coastal Foredunes at Fire Island, New York, ENVIRONMENTAL MANAGEMENT, V.11, pp. 45-52.

104. Fisher, J.J. and Leatherman, S.P., 1987. Glacial and Coastal Geology, Cape Cod National Seashore, Massachusetts, in Decade of North American Geology, Geological Society of America, Centennial Field Guide, pp. 213-220.

105. Leatherman, S.P., 1987. Annotated Chronological Bibliography of Barrier Island Migration, JOURNAL OF COASTAL RESEARCH, V. 3, pp. 1-14.

106. Leatherman, S.P., 1987. Coastal Geomorphological Applications of Ground-Penetrating Radar, JOURNAL OF COASTAL RESEARCH, V. 3, pp. 397-399.

107. Leatherman, S.P., 1987. Field Measurement of Micro-topography, JOURNAL OF COASTAL RESEARCH, V. 3, pp. 233-235.

108. Leatherman, S.P., 1987. Reworking of Glacial Sediments along Outer Cape Cod: Development of Provincetown Spit, in Treatise on Glaciated Coasts, D.M. Fitzgerald and P.S. Rosen, eds., Academic Press, pp. 307-325.

109. Leatherman, S.P., 1987. Time Frames for Barrier Island Migration, O'Brien Symposium Edition, SHORE & BEACH, V. 55, pp. 82-86.

110. Leatherman, S.P. and Zaremba, R.E., 1987. Overwash and Aeolian Processes on a U.S. Northeast Coast Barrier, SEDIMENTARY GEOLOGY, V. 52, pp. 183- 206.

111. Leatherman, S.P., 1986. Cliff Stability along Western Chesapeake Bay, Maryland, MARINE TECHNOLOGY SOCIETY JOURNAL, V. 20, pp. 28-36.

112. Leatherman, S.P., and Zaremba, R.E., 1986. Dynamics of a Northern Barrier Beach: Nauset Spit, Cape Cod, Massachusetts, BULLETIN GEOLOGICAL SOCIETY OF AMERICA, V. 97, pp. 116-124.

113. Panageotou, W., and Leatherman, S.P., 1986. Holocene-Pleistocene Stratigraphy of the Inner Shelf off Fire Island, New York: Implications for Barrier Island Migration, JOURNAL OF SEDIMENTARY PETROLOGY, V. 56, pp. 528-537.

114. Zaremba, R.E., and Leatherman, S.P., 1986. Vegetative-Physiographic Analysis of a Northern Barrier Beach, ENVIRONMENTAL GEOLOGY AND WATER SCIENCE, V. 8, pp. 193-207.

115. Demarest, J.M., and Leatherman, S.P., 1985. Mainland Influence on Coastal Transgression: Delmarva Peninsula, MARINE GEOLOGY, V. 63, pp. 19-33.

116. Leatherman, S.P., 1985. Geomorphic and Sedimentary Analysis of Fire Island, New York, MARINE GEOLOGY V. 63, pp. 173-195.

117. Orson, R.A., Panageotou, W., and Leatherman, S.P., 1985. Response of Tidal Salt Marshes of the U.S. Atlantic and Gulf Coasts to Rising Sea Levels, JOURNAL OF COASTAL RESEARCH, V. 1, pp. 29-37.

118. Williams, A.T., Evans, N.H., and Leatherman, S.P., 1985. Genesis of Fire Island Foredunes, New York, SEDIMENTARY GEOLOGY, V. 42, pp. 201-216.

119. Leatherman, S.P., 1985. Approaches to Coastal Hazard Analysis: Ocean City, Maryland, in R. Platt, ed., Cities on the Beach, University of Chicago Press, pp. 143-154.

120. Leatherman, S.P., 1984. Geomorphic Responses to Coastal Landforms to Projected Sea Level Rise, in Barth, M. and J. Titus, ed., Greenhouse Effect and Sea Level Rise, Van Nostrand Reinhold, New York, pp. 151-178.

121. Ashmore, S., and Leatherman, S.P., 1984. Holocene Sedimentation in Port Royal Bay, Bermuda, MARINE GEOLOGY, V. 56, pp. 289-298.

122. Leatherman, S.P., 1984. Geomorphic Responses of Coastal Landforms to Projected Sea Level Rise, in Barth, M. and J. Titus, ed., Greenhouse Effect and Sea Level Rise, Van Nostrand Reinhold, New York, pp. 151-178.

123. Leatherman, S.P., 1984. Shoreline Evolution of North Assateague Island, Maryland, SHORE & BEACH, V. 52, pp. 3-10.

124. Leatherman, S.P., 1983. Barrier Dynamics and Landward Migration with Holocene Sea-Level Rise, NATURE, V. 301, pp. 415-418

125. Leatherman, S.P., 1983. Barrier Evolution in Response to Sea Level Rise, JOURNAL OF SEDIMENTARY PETROLOGY, V. 53, pp. 1026-1033.

126. Leatherman, S.P., 1983. Coastal Marine Processes, in Geological Applications in Remote Sensing, R.S. Williams, ed., Manual of Remote Sensing, American Society of Photogrammetry, Falls Church, VA, pp. 1880-1882.

127. Leatherman, S.P., 1983. Shoreline Mapping: A Comparison of Techniques, SHORE & BEACH, V. 51, pp. 28-33.

128. Leatherman, S.P. and Clow, B., 1983. UMD Shoreline Mapping Project, IEEE Geoscience and Remote Sensing, V. 22, pp. 5-8.

129. Leatherman, S.P. and Williams, A.T., 1983. Vertical Sedimentation Units in a Barrier Island Washover Fan, EARTH SURFACE PROCESSES AND LANDFORMS, V. 8, pp. 141-150.

130. Rice, T.E. and Leatherman, S.P., 1983. Barrier Island Dynamics: The Eastern Shore of Virginia, SOUTHEAST GEOLOGY, V. 24, pp. 125-137.

131. Anders, F.J. and Leatherman, S.P., 1982. Mapping Techniques and Historical Shoreline Analysis, Nauset Spit, Massachusetts, in Geotechnology in Massachusetts, O.C. Farquhar, ed., Amherst, MA, pp. 501-509.

132. Leatherman, S.P., Rice, T.E., and Goldsmith, V., 1982. Virginia Barrier Island Configuration: A Reappraisal, SCIENCE, V. 215, pp. 285-287.

133. Leatherman, S.P., 1981. Barrier Beach Development: A Perspective on the Problem, SHORE & BEACH, V. 49, pp. 2-9.

134. Steiner, A.J. and Leatherman, S.P., 1981. Recreational Impacts on the Distribution of Ghost Crabs. *Ocyode Quadrate Fab.*, BIOLOGICAL CONSERVATION, V. 20, pp. 111-122.

135. Godfrey, P.J., Leatherman, S.P., and Buckley, P.A., 1980. ORVs and Beach Degradation, PARKS, V. 5, pp. 5-11.

136. Godfrey, P.J., Leatherman, S.P., and R.E. Zaremba, 1979. A Geobotanical Approach to Classification of Barrier Beach Systems, Leatherman, S.P., ed., Barrier Islands, Academic Press, Inc., New York, pp. 99-125.

137. Leatherman, S.P., 1979. An Inexpensive Suspended Sediment Sampler. ESTUARIES V. 2, pp. 135-136.

138. Leatherman, S.P., 1979. Barrier Dune Systems: A Reassessment. SEDIMENTARY GEOLOGY, V. 24, pp. 1-16.

139. Leatherman, S.P., 1979. Beach and Dune Interactions During Storm Conditions. QUARTERLY JOURNAL OF ENGINEERING GEOLOGY, V. 12, pp. 281-290.

140. Leatherman, S.P., 1979. Migration of Assateague Island, Maryland, by Inlet and Overwash Processes, GEOLOGY, V. 7, pp. 104-107.

141. Leatherman, S.P., 1978. A New Aeolian Sand Trap Design. SEDIMENTOLOGY, V. 25, pp. 303-306.

142. Leatherman, S.P., 1978. Anthropical Structures in Coastal Sediments. MARITIME SEDIMENTS, V. 14, pp. 69-72.

143. Leatherman, S.P. and Williams, A.T., 1978. Lamination Sampling Technique for Unconsolidated Sediments. MARITIME SEDIMENTS, V. 14, pp. 15-16.

144. Leatherman, S.P. and Williams, A.T., 1977. Lateral Textural Grading in Overwash Sediments. EARTH SURFACE PROCESSES, V. 2, pp. 333-341.

145. Leatherman, S.P., Williams, A.T., and Fisher, J.S., 1977. Overwash Sedimentation Associated with a Large-Scale Northeaster. MARINE GEOLOGY, V. 24, pp. 109-121.

146. Williams, A.T., Grant, C.J., and Leatherman, S.P., 1977. Sedimentation Patterns in Repulse Bay, Hong Kong. PROCEEDINGS OF THE GEOLOGISTS' ASSOCIATION, V. 88, pp. 183-200.

147. Leatherman, S.P. and Williams, A.T., 1976. Sedimentation in a Barrier Island Overwash Fan. JOURNAL OF THE GEOLOGICAL SOCIETY OF LONDON, V. 132, pp. 707-708.

148. Williams, A.T., Leatherman, S.P., and Fisher, J.S., 1976. Particle Size-Velocity Relationship for Swash Transport at Cape Hatteras, North Carolina. SOUTHEASTERN GEOLOGY, V. 17, pp. 231-242.

Technical Reports, Proceedings and Other Articles

1. Leatherman, S.P., 2015, Sea Level Rise: Scientific Basis, Trends and Coastal Impacts, in Climate Change and Public Health, Levy, B.S. and J.A. Patz, editors, Oxford University Press, p. 39-40.

2. Leatherman, S.P., 2014, Review of book "The Human Shore," JOURNAL OF COASTAL RESEARCH, V. 30, p. 68-71.

3. Leatherman, S.P. and S.B. Leatherman, 2011, Rip Currents: A Major Coastal Hazard and Public Safety Challenge, Proceedings of the International Conference on Solutions to Coastal Disasters, American Society of Civil Engineers (ASCE), Washington, DC, p. 131-136.

4. Leatherman, S.P., 2011, Obituary for John R. Clark: Father of American Coastal Management, JOURNAL OF COASTAL RESEARCH, V. 27.

5. Leatherman, S.P., 2011, Rip Currents, Rip Tides and Undertow, ELICCA, Southampton, NY, 4pp.

6. Leatherman, S.P., 2010, Review of "Coming Climate Crisis: Consider the Past, Beware of the Big Fix, Claire Parkinson, Rowman & Littlefield Publishing Group, 256pp.

7. Leatherman, S.P., 2010, Rip Currents and Beach Safety, ELICCA, Southampton, NY, 4pp.

8. Leatherman, S.P., 2009, Rip Currents and Long Island, New York, ELICCA, Southampton, NY, 4pp.

9. Fletemeyer, J., Leatherman, S. P., and Brander, R., 2009, Rip Current Danger, AQUATICS INTERNATIONAL, V. 21, p. 14-15.

10. Leatherman, S.P., 2008, Program Document for International Hurricane Research Building, Florida International University, 55pp.

11. Leatherman, S.P., 2008, 1938 Hurricane: 70 Years Ago, ELICCA, Southampton, NY, 4pp.

12. Gan Chowdhury, A., E. Simiu, J. Lin, and S.P. Leatherman, 2007, Wall of Wind at FIU, The Wind Engineer: Newsletter of American Association of Wind Engineers, P. 1-6.

13. Leatherman, S.P., 2007. Taking Hurricane Research to the Next Level, Natural Hazards Observer, V. 32, p. 1-2.

14. Leatherman, S.P., 2007. Coastal Collision Course: Sea Level, Hurricanes and Development, Guest Commentary for Carbon Disclosure Project, New York, NY, 2 pp.

15. Leatherman, S.P., 2007. The 2006 Hurricanes That Never Hit: What Happened?, Hurricanes and Long Island, ELICCA, Southampton, NY, 4 pp.

16. Leatherman, S.P., 2006. Katrina's Impact and Hurricane Season of 2005, ELICCA, Southampton, NY, 4 pp.

17. Leatherman, S.P. and G. White, 2005. The Coastal Collision Course, NATIONAL HAZARDS OBSERVER, Vol. 30, pp. 5-6.

18. Leatherman, S.P., 2005. Florida's Fearsome Foursome, ELICCA, Southampton, NY, 4 pp.

19. Leatherman, S.P., 2004. FEMA Windstorm Simulation and Modeling Project: Executive Summary, International Hurricane Research Center, Miami, FL, 12 pp.

20. Leatherman, S.P., 2004. Isabel: A Cape Verde Hurricane, ELICCA, Southampton, NY, 4 pp.

21. Leatherman, S.P., 2004. Statement on Bill to Establish a National Windstorm Impact Reduction Program, U.S. House Science Committee, 9 pp.

22. Leatherman, S.P., 2004. William Morris Davis: AAG Founder and First Coastal Geomorphologist, AAG Newsletter.

23. Leatherman, S.P., 2003. Hurricanes and the Hamptons: Applications of Airborne LIDAR for Storm Surge Mapping, ELICCA, Southampton, NY. 4 pp.

24. Leatherman, S.P., 2002. Beach Erosion Studies on Tropical Islands, Proceedings International Conference on Carbonate Shorelines, ASCE, pp. 229-235.

25. Leatherman, S.P. and K. Zhang, 2002. Hurricane Impact Mapping, Solutions to Coastal Disasters, Proceedings, ASCE, pp. 576-581.

26. Leatherman, S.P., 2002. Hamptons' Hurricane Tracking Map, Eastern Long Island Coastal Conservation Alliance, Southampton, N.Y., 4 pp.

27. Leatherman, S.P. and Burkett, V., 2002. Sea Level Rise and Coastal Disasters, Natural Hazards Observer, p. 10-11.

28. Leatherman, S.P. and Zhang, K., 2002. Hurricane Impact Mapping, Proceedings of Coastal Disasters '02 Conference, San Diego, CA, pp. 576-581.

29. Whitman, D., K. Zhang, S.P Leatherman, W. Robertson, T. Bernier, C. Anderson, 2002. Application of Airborne LIDAR Topographic Mapping to Coastal Flooding and Erosion Hazards, Southeast Florida, Proceedings of the Seventh Annual International Conference on Remote Sensing for Marine and Coastal Environments, Miami, FL, pp. 20-22.

30. Leatherman, S.P. and Kershaw, P.J., 2002. Sea Level Rise and Coastal Disaster, National Academy Press, Washington, DC, 20 pp.

31. Leatherman, S.P., and 16 others, 2001. The Science of Regional and Global Change: Putting Knowledge to Work, Report to the Presidential Transition Team, National Academy Press, Washington, DC, 19 pp.

32. Leatherman, S.P., Walker, C. and Garvey, P.G., 2001. The Hamptons' Life-Saving Stations: Historical Landmarks as Shore Change Indicators, Eastern Long Island Coastal Conservation Alliance (ELICCA), Southampton, NY, 20 pp.

33. Leatherman, S.P., 2001. Beaches and Dunes of Developed Coasts, Book Review, Professional Geographer, V. 53, pp. 442-443.

34. Leatherman, S.P., 2000. Hurricanes of the North Atlantic, Book Review, Bulletin of the American Meteorological Society, V. 81, pp. 594-596.

35. Leatherman, S.P., 2000. Beach Basics: A Reference Guide to Coastal Terminology, Eastern Long Island Coastal Conservation Alliance (ELICCA), Southampton, NY, 14 pp.

36. Leatherman, S.P., 2000. National Hurricane Hazards Reduction Act, Modified version of legislation introduced into U.S. House of Representatives, 10 pp.

37. Leatherman, S.P., 2000. Proceedings of the Roundtable on Rainfall Index, Florida International University, Miami, FL, 40 pp.

38. Leatherman, S.P. and others, 2000. Evaluation of Erosion Hazards, The H. John Heinz III Center for Science, Economics and the Environment, Washington, DC, 203 pp.

39. Leatherman, S.P., 1999. Sand Rights: A Case Study of the Hamptons' Beaches, Proceedings of Sand Rights Conference, ASCE, Ventura, CA, pp. 245-253.

40. Leatherman, S.P., Shumway, S.E. and Christel, D.W., 1999. The Hamptons' South Shore: A History of Beach Changes and Storm Impacts, Eastern Long Island Coastal Conservation Alliance (ELICCA), Southampton, N.Y., 26 pp.

41. Carter, W. E., R. L. Shrestha, and S.P. Leatherman, 1998. Airborne Laser Swath Mapping: Applications to Shoreline Mapping, Proceedings of the INS MAP 98 Conference, Melbourne, Australia.

42. Leatherman, S.P., 1996. Flood Insurance Availability in Coastal Areas: The Role It Plays in Encouraging Development Decisions, FEMA Technical Report, Washington, DC.

43. Beller-Simms, N. and S.P. Leatherman, 1996. Vanishing Lands Teachers Guidebook, Chesapeake Bay Trust, Annapolis, MD, 41 pp.

44. Leatherman, S.P., 1996. Impact of Rising Sea Level: The Chesapeake Bay Region, U.S. Senate Testimony, Washington, DC, 5 pp.

45. Leatherman, S.P., 1996. U.S. Cities Subject to Sea Level Rise, Aquapolis, Venice, Italy, pp. 58-65.

46. Leatherman, S.P. and others, 1995. Vanishing Lands: Sea Level, Society, and the Chesapeake Bay, U.S. Fish & Wildlife Service, Annapolis, MD, 47 pp.

47. Leatherman, S.P., 1994. Vanishing Lands: An Analysis of Coastal Land Loss, Final Report to the National Geographic Society, 126 pp.

48. Leatherman, S.P., and 13 others, 1994. Hurricane Hugo: Puerto Rico, the U.S. Virgin Islands, and South Carolina, National Academy Press, Washington, D.C., 276 pp.

49. Leatherman, S.P., 1994. Coastal Geomorphology, in Environmental Science in the Coastal Zone: Issues for Further Research, National Academy Press, Washington, DC, pp. 44-48.

50. Leatherman, S.P., 1994. Rising Sea Level and Coastal Vulnerability, U.S. Senate Testimony, Washington, DC, 8 pp.

51. Leatherman, S.P., 1993. Modes of Shoreline Behavior: Erosion Rate Analysis Using Geomorphic Principles, Proceedings of the International Coastal Symposium, Hilton Head Island, S.C., pp. 218-223.

52. Leatherman, S.P., 1993. Reform of the National Flood Insurance Program, Statement to the U.S. House of Representatives Committee on Banking, Finance, and Urban Affairs, Washington, DC, 4 pp.

53. Leatherman, S.P., 1993. Sea Level Rise Atlas for the U.S. Coast, Technical Report, W. Alton Jones Foundation, 60 pp.

54. Leatherman, S.P., 1992. Coastal Erosion Zone Delineation and Management Implications, Proceedings of the National Conference on Beach Preservation Technology, St. Petersburg, FL, pp. 442-458.

55. Leatherman, S.P., French, G., and Crowell, M., 1992. Historical Shoreline Mapping: Procedure and Accuracy Assessment, FEMA Technical Report, Washington, DC, 42 pp.

56. Leatherman, S.P., 1992. Sea Level and Society, Proceedings of International Conference of Climatic Impacts on the Environment and Society, Tsukuba, Japan, pp. 39-43.

57. Leatherman, S.P., 1992. The National Flood Insurance Reform Act of 1992, S.2907, Statement to U.S. Senate Committee on Housing and Urban Affairs, Washington, DC, 5 pp.

58. Leatherman, S.P., 1992. The Rising Tide: Global Warming and World Sea Levels, Book Review in Environment, V. 34, No. 9.

59. Galgano, F.A., and Leatherman, S.P., 1991. Shoreline Change Analysis: A Case Study, Proceedings of Coastal Sediments 91, ASCE, pp. 1043-1053.

60. Leatherman, S.P., and Nicholls, R.J., 1991. Difficulties in Measuring and Predicting Sea-Level Rise, Proceedings of the International Conference on Oceans, Climate, and Man, San Paolo Foundation, Turin, Italy.

61. Crowell, M., Leatherman, S.P., and Buckley, M., 1990. Accuracy of Historical Shoreline Change Maps, Proceedings of the Association of State Floodplain Managers, 14th Annual Conference, pp. 182-185.

62. Leatherman, S.P., 1990. Implications of Climate Change, Proceedings of South Carolina Sea Grant Program Annual Meeting, Columbia, S.C., pp. 5-7.

63. Leatherman, S.P., 1990. U.S. Cities Subject to Sea-Level Rise, Proceedings of the Cities on the Water Conference, R. Frassetto, ed., Venice, Italy, pp. 104-108.

64. Leatherman, S.P. and Weigel, R.L., 1990. Global Warming and Sea-Level Rise: Implications for Harbors and Ports, Proceedings of Sixth Terminal Operations Conference, Amsterdam, The Netherlands, pp. 13-17.

65. Gehrels, W.R. and Leatherman, S.P., 1989. Sea-Level Rise: Animator and Terminator of Coastal Marshes, Vance Bibliographies, Monticello, IL, 39 pp.

66. Maurmeyer, E. and Leatherman, S.P., 1989. Geomorphology and Shore Processes along the Maryland and Delaware Coasts, International Geological Congress Field Trip Guide, Washington, DC, 20 pp.

67. Leatherman, S.P., 1989. Beach Response Strategies to Accelerated Sea Level Rise, Proceedings of the Second North American Conference on Preparing for Climate Change, The Climate Institute, Washington, DC, pp. 353-358.

68. Leatherman, S.P., 1989. Impact of Accelerated Sea-Level Rise on Coastal Environments, Proceedings of the International Conference on Climate and Man, Turin, Italy.

69. Leatherman, S.P. and Gaunt, C.H., 1989. National Assessment of Beach Nourishment Requirements Associated with Accelerated Sea-Level Rise, Proceedings of Coastal Zone 89, ASCE, Charleston, S.C., pp. 1978-1993.

70. Leatherman, S.P., 1988. Impact of Climate-Induced Sea Level Rise on Coastal Areas, U.S. Senate Publication, Washington, D.C., 4 pp.

71. Leatherman, S.P. and Steiner, A.J., 1987. An Annotated Bibliography of the Effects of Off-Road Vehicle and Pedestrian Traffic on Coastal Ecosystems, Vance Bibliographies, Monticello, IL, 70 pp.

72. Oertel, G.F. and Leatherman, S.P., 1987. Barrier Island Processes and Environments of the Eastern Shore of Virginia, in Geological Society of American Guidebook, Southeastern Section, Norfolk, VA, pp. 179-188.

73. Leatherman, S.P., Dean, R.G., Everts, C.E., and Fulford, E., 1987. Shoreline and Sediment Budget Analysis of North Assateague Island, Maryland, Proceedings of Coastal Sediments 87, ASCE, pp. 1460-1471.

74. Leatherman, S.P. and Allen, J.R., 1986. Geomorphic Analysis of the South Shore of Long Island, New York, NPS Scientific Monograph, 350 pp.

75. Leatherman, S.P., 1986. Coastal Geomorphic Impacts of Sea-Level Rise on Coasts of South America, Proceedings of United Nations Environmental Programme Conference, Washington, DC, pp. 73-82.

76. Leatherman, S.P., 1986. Effect of Accelerated Sea-Level Rise on Coastal Ecosystems, U.S. Senate Publication S HRG. 99-723, Washington, DC, pp. 141-153.

77. Leatherman, S.P., 1986. Shoreline Response to Sea-Level Rise: Ocean City, MD, Proceedings of Icelandic Conference on Coasts and Rivers, Reykjavik, Iceland, pp. 267-276.

78. Leatherman, S.P. and others, 1986. Hurricane Diana, North Carolina, Sept. 10-14, 1984, Committee on Natural Disasters, National Academy Press, Washington, DC, 108 pp.

79. Leatherman, S.P., 1985. Barrier Island Migration: An Annotated Bibliography, Vance Bibliographies, Monticello, IL, 54 pp.

80. Leatherman, S.P., 1985. Coastal Geomorphic Responses to Accelerated Sea Level Rise: Ocean City, Maryland, U.S. Environmental Protection Agency Report, Washington, DC, 23 pp.

81. Clow, B. and Leatherman, S.P., 1984. Metric Mapping: An Automated Technique of Shoreline Mapping, Proceedings of American Society of Photogrammetry, Washington, DC, pp. 309-318.

82. Leatherman, S.P. and Dubois, R., 1984. Coastal Environments of Maryland and Delaware, Association of American Geographers, Annual Field Trip Guidebook, Washington, DC, pp. 22-35.

83. Bresee, S. and Leatherman, S.P., 1984. An Analysis of Shoreface Morpho-dynamics: Ocean City, MD, Report to U.S. Environmental Protection Agency, Washington, DC, 29 pp.

84. Zaremba, R.E. and Leatherman, S.P., 1984. Overwash Processes and Foredune Ecology, Nauset Spit, Massachusetts, U.S. Army Waterway Experiment Station Coastal Engineering Research Center, Misc. Paper EL-84-8, 232 pp.

85. Kearney, M.S., Leatherman, S.P., and Wong, G.J.F., 1983. Recent Vertical Marsh Accretion Rates at Blackwater Wildlife Refuge, Maryland Water Resources Research Center Report No. 78, College Park, MD, 43 pp.

86. Leatherman, S.P., 1983. Historical and Projected Shoreline Changes, Ocean City and North Assateague Island, Maryland, Maryland Water Resources Research Center Report No. 79, College Park, MD, 39 pp.

87. Leatherman, S.P., Kearney, M.S., and Clow, B., 1983. Assessment of Coastal Responses to Projected Sea Level Rise: Galveston Island and Bay, Texas, Final Report to U.S. Environmental Protection Agency, Washington, DC, 116 pp.

88. Leatherman, S.P., 1983. Coastal Hazards Mapping on Barrier Islands, Proceedings of National Symposium on Preventing Coastal Flood Disasters, Natural Hazards Res. & Appl. Spec. Publ. #7, Boulder, CO, pp. 165-175.

89. Leatherman, S.P., 1983. Geomorphic Effects of Projected Sea Level Rise: A Case Study of Galveston Bay, Texas. Proceedings of Coastal Zone 83, ASCE, San Diego, CA, pp. 2890-2901.

90. Leatherman, S.P., 1983. Historical and Projected Shoreline Mapping. Proceedings of Coastal Zone 83, ASCE, San Diego, CA, pp. 2902-2910.

91. Leatherman, S.P., 1982. Non-Structural Approach to Coastal Problems, Proceedings of Barrier Island Forum and Workshop, National Park Service, Provincetown, MA, pp. 139-147.

92. Leatherman, S.P., 1982. Pedestrian Impacts: Assateague Island, Proceedings of Barrier Island Forum and Workshop, National Park Service, Provincetown, MA, pp. 83-88.

93. Anders, F.J. and Leatherman, S.P., 1981. Effects of Off-Road Vehicles on the Beaches and Dunes of Fire Island National Seashore, NPSCRU Final Report, University of Massachusetts-Amherst, 176 pp.

94. Leatherman, S.P., 1981. Prehistoric Environmental Characteristics of Pamet River Valley and Nauset Marsh, NPSCRU Report No. 51, University of Massachusetts-Amherst, 21 pp.

95. Leatherman, S.P. and others, 1981. Identification and Selection of Coastal Biosphere Reserves, United States Man and Biosphere Program, Washington, DC, 30 pp.

96. Leatherman, S.P., Giese, G., and O'Donnell, P., 1981. Historical Cliff Erosion of Outer Cape Cod, NPSCRU Report No. 53, University of Massachusetts-Amherst, 50 pp.

97. Madore, C. and Leatherman, S.P., 1981. Dune Stabilization of the Province Lands, Cape Cod National Seashore, NPSCRU Report No. 52, University of Massachusetts-Amherst, 59 pp.

98. Leatherman, S.P. and Joneja, D., 1980. Geomorphic Analysis of South Shore of Long Island Barriers, Phase I. NPSCRU Report No. 47, University of Massachusetts-Amherst, 161 pp.

99. O'Donnell, P. and Leatherman, S.P., 1980. Generalized Maps and Geomorphic Reconstruction of Outer Cape Cod Between 12,000 BP and 500 BP, NPSCRU Report No. 49, University of Massachusetts-Amherst, 57 pp.

100. Leatherman, S.P., 1980. Barrier Island Management. Proceedings of Coastal Zone 80, ASCE, Miami, FL, pp. 1470-1480.

101. Leatherman, S.P., 1980. Scientific Input for Barrier Island Management, Coastal Society Proceedings, Washington, DC, pp. 9-11.

102. Leatherman, S.P. and Godfrey, P.J., 1979. The Impact of Off-Road Vehicles on Coastal Ecosystems in Cape Cod National Seashore: An Overview. NPSCRU Report No. 34, University of Massachusetts-Amherst, 34 pp.

103. Palmer, J.F. and Leatherman, S.P., 1979. Off-Road Vehicle Usage on Federally Managed Coastal Parklands. NPSCRU Report No. 46, University of Massachusetts-Amherst, 59 pp.

104. Steiner, A.J. and Leatherman, S.P., 1979. Environmental Effects of Recreational Usage on Dune and Beach Ecosystems of Assateague Island, NPSCRU Report No. 44, University of Massachusetts-Amherst, 101 pp.

105. Godfrey, P.J., Leatherman, S.P. and Buckley, P.A., 1978. Impact of Off-Road Vehicles on Coastal Ecosystems, Proceedings of Coastal Zone 78 Symposium, ASCE, San Francisco, CA, pp. 581-600.

106. Leatherman, S.P., Godfrey, P.J. and Buckley, P.A., 1978. Management Strategies for National Seashores. Proceedings of Coastal Zone 78 Symposium, ASCE, San Francisco, CA, pp. 322-337.

107. Benedict, M.A. and Leatherman, S.P., 1978. Investigation of the Geobotanical Evolution of Provincetown Peninsula. NPSCRU Report No. 38, University of Massachusetts-Amherst, 56 pp.

108. Leatherman, S.P. and others, 1978. Summary of Recommendations for Ocean Beach, San Francisco, CA, National Park Service Report, 11 pp.

109. Zaremba, R.E., Godfrey, P.J., and Leatherman, S.P., 1978. The Ecological Effects on Off-Road Vehicles on the Beach/Backshore Drift Line Zone in Cape Cod National Seashore, Massachusetts. NPSCRU Report No. 29, University of Massachusetts-Amherst, 79 pp.

110. Leatherman, S.P., 1977. Assateague Island: A Case Study of Barrier Island Dynamics. Proceedings of the First Conference on Scientific Research in the National Parks, New Orleans, LA, pp. 769-775.

111. Leatherman, S.P., 1977. Overwash Hydraulics and Sediment Transport. Proceedings of Coastal Sediments 77 Symposium, ASCE, Charleston, S.C., pp. 135-148.

112. Leatherman, S.P., 1977. The Effects of Off-Road Vehicles on the Geomorphology of Dunes in Cape Cod National Seashore, Proceedings of the First Conference on Scientific Research in the National Parks, New Orleans, LA, pp. 1119-1124.

113. Leatherman, S.P., 1977. Physiography of Fire Island National Seashore in Natural Resource Management Plans, National Park Service Report, Boston, MA, 45 pp.

114. Leatherman, S.P., 1976. Barrier Island Dynamics: Overwash Processes and Aeolian Transport. Proceedings of the 15th International Coastal Engineering Conference, Honolulu, Hawaii, pp. 1958-1974.

115. Leonard, J.E., Fisher, J.S., Leatherman, S.P. and Godfrey, P.J., 1976. Coastal Geology and Geomorphology of Cape Cod, in Cameron, B. (ed.), Geology of Southeastern New England, New England Inter-Collegiate Geological Conference Proceedings, Boston, MA, pp. 224-264.

116. Fisher, J.S., Leatherman, S.P. and Perry, F.C., 1974. Overwash Processes on Assateague Island, Proceedings of the 14th International Coastal Engineering Conference, Copenhagen, Denmark, pp. 1194-1212.

Professional Papers Presented

1. "Rip Currents and Beach Safety," Costa Rica Workshop on Rip Currents, Jaco Beach, Costa Rica, July 14, 2014.

2. "Science and Threat Communication," 3rd International Rip Current Symposium, Haeundae Beach, South Korea, June 23, 2014.

3. "Hurricane Impacts," MIT Global Change Forum, Biltmore Hotel, Coral Gables, Florida, January 30, 2014.

4. "Living with Coastal Hazards," SEAS Ocean Life Series, Key Largo, Florida, July 19, 2013.

5. "Beach Quality and Ratings," National Conference on Clean Beaches, Acapulco, Mexico, June 20, 2013.

6. "Our Changing Shorelines," The Southampton Association Public Policy Forum, Southampton, New York, May 4, 2013.

7. "United States Beach Quality and Ratings," VIII Encurentro Nacional Playas Limpias, Ensenada, Baja California, Mexico, October 5, 2012.

8. "Keynote Address on Rip Currents," 2nd International Rip Current Symposium, Sydney, Australia, October 30, 2012.

9. "Not All Rip Currents Are Alike," National Drowning Prevention Association Annual Symposium, Ft. Lauderdale, Florida, March 15, 2012.

10. "Implications of Sea Level Rise for Low-Lying Coastal Areas," Climate Change Conference, Veracruz, Mexico, September 21, 2011.

11. "Rip Currents: A Major Coastal Hazard and Public Safety Challenge," International Conference on Solutions to Coastal Disasters, American Society of Civil Engineers, Anchorage, Alaska, June 29, 2011.

12. "Rip Currents: Research and Outreach," Coastal Sediments 2011, Miami, Florida, May 5, 2011

13. "Oil Spills and Hurricanes," Environmental Summit, Florida Coastal School of Law and Jacksonville University, Jacksonville, Florida, November 4, 2010.

14. "Weather Safety, Water-Based Recreational Activity and Rip Currents," International Boating & Water Safety Summit, Daytona Beach, Florida, March 30, 2010.

15. "Beach Ratings and Rip Currents," Florida Sea Grant Sponsored Mini-Workshop on Beach Safety, Panama City Beach, Florida, February 22, 2010.

16. "Rip Currents: Terminology and Pro-Active Management," 1st International Rip Current Symposium, Miami, Florida, February 18, 2010.

17. "What Makes A Great Beach," Western Australia Coastal Conference, Perth, Australia, October 8, 2009.

18. "Beach Quality Evaluations and Ratings," Great Lakes Coastal Conference, Milwaukee, Wisconsin, September 30, 2009.

19. "Coastal Water and Beach Quality," US EPA National Beach Conference, Huntington Beach, California, April 21, 2009.

20. "Killer Currents and Public Policy," National Drowning Prevention Association, Miami Beach, Florida, February 24, 2009.

21. "Wall of Wind Full Scale Destructive Testing of Coastal Houses and Hurricane Damage Mitigation," Coastal Cities Summit, University of South Florida, St. Petersburg Beach, FL, November 18,2008.

22. "Changing Climate and Possible Impacts," Coastal Storms Workshop, Stony Brook University, Stony Brook, New York, November 14, 2008.

23. "Sea Level Rise and Coastal Demographics Keynote Address," Impacts of Climate Changes on the North Carolina Coast, University of North Carolina, Chapel Hill, NC, October 17,2008.

24. "The National Hurricane Research Initiative Act," U.S. Congressional Committee, Washington, DC, June 26, 2008.

25. "Solutions to Coastal Disasters Conference," American Society of Civil Engineers (ASCE) Coastal Hazards Conference, Honolulu, HI, April 14, 2008.

26. "2008 AIR Catastrophe Modeling Conference," AIR World Wide Corporation, Coronado, San Diego, CA, April 6, 2008.

27. "Sea Level Rise Impacts," Climate Change: State of Sciences and Adapting to the Inevitable, New York Academy of Science, New York, NY, January 29, 2008.

28. "IHRC: The Coastal Agenda," Florida Coastal Ocean Observing System Consortium F-I-U, Miami, FL, November 27, 2007.

29. "The Hurricane Simulator," Annual Founders' Day Workshop, Old Dominion University, Norfolk, VA, November 10,2007

30. "Wall of Wind: Hurricane Research and Insurance," American Society of Civil Engineers (ASCE), 137 Annual Conference, Orlando, FL, November 1, 2007.

31. "New Technologies and Emerging Mitigation Solutions," Annual Meeting of the Federal Alliance for Safe Homes, Atlanta, GA, October 30, 2007.

32. "Hurricane Impact Forecasting and Mitigation," Seminar Series, Federal Emergency Management Agency, Washington, DC, October 24, 2007.

33. "Wall of Wind: Technical Session on Full-Scale Testing," Natural Hazards Workshop, Boulder, CO, July 9, 2007.

34. "RenaissanceRe Wall of Wind Full-Scale Destructive Testing," Insurance Industry Executives, Florida International University, Miami, FL, June 27, 2007.

35. "Wall of Wind Initiative," Chinese Delegation of Emergency Management Executives, Florida International University, Miami, FL, May 28, 2007.

36. "Wall of Wind Testing Results and Findings," RCMP Governor Advisory Board/Florida Division of Emergency Management Meeting, Gainesville, FL, May 23, 2007.

37. "Wall of Wind: New Technology for Hurricane Damage Mitigation," Biltmore Hotel, Coral Gables, FL, May 19, 2007.

38. "Wall of Wind: The Hurricane Simulator," Stony Brook University, Southampton, NY, May 10, 2007.

39. "WoW: Wall of Wind Impact Test Facility," Bahamas Weather Conference, Nassau, Bahamas, April 19, 2007.

40. "Wall of Wind: Research Applications," Roofing Contractors Association of South Florida, Pembroke Pines, FL, March 21, 2007.

41. "Windstorm Mitigation Study Committee, Building a Stronger Tomorrow Mitigation Research, Wall of Wind Full-Scale Testing and New Technologies," State of Florida Windstorm Committee, Tallahassee, FL, February 15, 2007.

42. "Hurricane Research at the IHRC," Texas Tech University, Lubbock, TX, November 16, 2006.

43. "Increasing the Resilience of Our Coasts," Climate Institute Symposium, Washington, D.C., September 19, 2006.

44. "Wall of Wind Testing," RCMP Governor Advisory Board/ Florida Division of Emergency Management Meeting, Tallahassee, FL, July 30, 2006.

45. "New Technology for Building Better: The Wall of Wind," Kiwanis Club, Homestead, FL, May 10, 2006.

46. "Building a Stronger Tomorrow," Greater Miami Society for Human Resource Management, Miami, FL, April18, 2006.

47. "Hurricane Impact Forecast," Coudert Institute, Palm Beach, FL, March 31, 2006.

48. "Hurricane Katrina: Analysis of a Disaster," Association of American Geographers Annual Meeting, Chicago, IL, March 10, 2006.

49. "Wall of Wind and Hurricane Damage Mitigation, " Business Continuity Planning Forum, Greater Miami Chamber of Commerce, Miami, FL, February 2, 2006.

50. "Florida's Foursome Fearsome," Natural Hazards Workshop, Boulder, CO, July 12, 2005.

51. "Hurricane Prediction, Impacts and Mitigation," Emergency Management Conference on Natural Disasters, Hauppage, NY, June 1, 2005.

52. "Research Projects at the International Hurricane Research Center," Governor's Hurricane Conference, Tampa, FL, May 13, 2005.

53. "Hurricanes and Economic Impacts," Florida Council of 100 Top CEOs, Ponte Vedra Beach, FL, May 6, 2005.

54. "Lessons Learned from Hurricane Swarm of 2004," Roundtable on Natural Disasters, National Academy of Sciences, Washington, DC, March 8, 2005.

55. "Beaches: Past, Present and Future," 4th Annual Environmental Ethics Conference, Ft. Lauderdale, FL, February 11, 2005.

56. "Hurricane Isabel Storm Surge Modeling and Prediction," Hurricane Isabel in Perspective Workshop, Linthicum Heights, MD, November 16, 2004.

57. "Land-falling Hurricanes and Grand Challenges," Roundtable on Natural Hazards, National Academy of Sciences, Washington, DC, October 28, 2004.

58. "The Hurricane that Missed the Hamptons," Rogers Memorial Library, Southampton, NY, July 7, 2004.

59. "Beach Erosion and Hurricane Storm Surges," 8th Annual Weather Conference, Grand Bahamas, April 2, 2004.

60. "Airborne LIDAR Applied to Coastal Geomorphology," Annual Meeting of Association of American Geographers, Philadelphia, PA, March 18, 2004.

61. "Coastal Hazard Management," Annual Meeting of Association of American Geographers, Philadelphia, PA, March 17, 2004.

62. "Airborne LIDAR and Hurricane Storm Surge Modeling," International Remote Sensing Conference, Honolulu, HI, November 12, 2003.

63. "Healthy Beaches: Ratings and Certifications," American Shore and Beach Preservation Association Annual Meeting, Wilmington, NC, September 26, 2003.

64. "Hurricane Storm Surge Modeling and Computer Animation, "Natural Hazards Workshop, Boulder, CO, July 10, 2003.

65. "Drivers of Coastal Erosion," Coastal Sediments '03 Conference, Clearwater, FL, May 23, 2003.

66. "Global Change and Sea Level Rise Impacts, "Washington College, Chestertown, MD, April 25, 2003.

67. "Hurricane Impact Mapping," Annual Meeting of Association of American Geographers, New Orleans, LA, March 6, 2003.

68. "Beach Quality, Columbus Dispatch Charities Show, Columbus, OH, February 15, 2003.

69. "Hurricane Impact Modeling and Mitigation," Briefing for Florida Congressional Delegation, Washington, DC, January 15, 2003.

70. "Shoreline Monitoring and Modeling," Puerto Rico Sea Grant Workshop, San Juan, Puerto Rico, November 6, 2002.

71. "Beach Processes and Geomorphology," Biscayne Bay Center, Crandon Park, FL, November 1, 2002.

72. "Application of Airborne Laser Mapping to Hurricane Storm Surge Analysis," Natural Hazards Workshop, Boulder, CO, July 15, 2002.

73. "Applications of Airborne Laser Technology to Hurricane Storm Surge Mapping and Coastal Evacuation," Briefing for Governor and Emergency Management Director, Columbia, SC, July 1, 2002.

74. "A National Hurricane Hazards Reduction Act: U.S. Congressional Initiatives," Hurricane Andrew 10-Year Anniversary Summit, Miami, FL, May 31, 2002.

75. "Hurricane Impact Modeling and Mitigation," Briefing for Florida Congressional Delegation, Washington, DC, May 15, 2002.

76. "Shoreline Change Mapping and Management along the U.S. East Coast," NOAA Shoreline Change Conference, Charleston, SC, May 7, 2002.

77. "Hurricane Impact Mapping," Coastal Disasters Conference, San Diego, CA, February 25, 2002.

78. "Sea Level Rise and Coastal Disasters," Natural Hazards Roundtable, National Academy of Sciences, Washington, DC, October 25, 2002.

79. "Rising Sea Level and Coastal Impacts," Annual Meeting Soil and Water Conservation Society, Myrtle Beach, SC, August 6, 2002.

80. "Advances in Airborne Laser Mapping," National Science Foundation Workshop on Remote Sensing Technological Advancements, University of Florida, Gainesville, FL, July 24, 2002.

81. "Airborne Laser Applications to Hurricane Storm Surge Mapping in South Florida," Natural Hazards Workshop, Boulder, CO, July 15, 2002.

82. "National Hurricane Hazard Reduction Act," Florida Congressional Briefing, Rayburn House Office Building, Washington, DC, June 13, 2001.

83. "Hurricane Hazards for Long Island, New York," June 9, 2001, New York State Marine Education Association, Southampton, NY, June 9, 2001.

84. "Hurricane Mitigation Research," The Weather Channel Forum on Hurricane Preparedness and Response, Washington, DC, June 6, 2001.

85. "Coastal Management and Restoration," Marine Sciences Seminar Series, Chulalongkorn University, Bangkok, Thailand, April 30, 2001.

86. "Scientific Criteria for Rating Beaches," International Oil Spill Conference, Tampa, FL, March 29, 2001.

87. "Coastal Erosion Hazards Report to the U.S. Congress," American Association for the Advancement of Science, Annual Meeting, San Francisco, CA, February 16, 2001.

88. "Airborne Laser Technology Applied to Hurricane Storm Surge Mapping," Florida Emergency Preparedness Association, Panama City Beach, FL, January 17, 2001.

89. "Research Initiatives at the International Hurricane Center," Reinsurance Association of America, Annual Meeting, New York, NY, January 9, 2001.

90. "Beach Erosion Studies on Tropical Islands," International Conference on Carbonate Shorelines, Key Largo, FL, December 7, 2000.

91. "Technological Advances in Coastal Research," National Science Foundation.

92. Coastal Processes Forum, Rice University, Houston, TX, November 2, 2000.

93. "Future of America's Coasts," October 12, 2000, VIP Dinner Presentation at Joanne Woodward and Paul Newman's Home, New York City, NY.

94. "Coastal Erosion Hazards: Report to the U.S. Congress," National Beach Preservation Conference, Maui, HI, August 8, 2000.

95. "LIDAR Applications to Hurricane Research and Mitigation," American Meteorological Society, National Hurricane Center, Miami, FL, July 20, 2000.

96. "Evaluation of Erosion Hazards: Report to the U.S. Congress," Natural Hazards Workshop, Boulder, CO, July 11, 2000.

97. "Multi-disciplinary Research at the International Hurricane Center," Natural Hazards Workshop, Boulder, CO, July 10, 2000.

98. "Application of Airborne Laser Technology to Hurricane Storm Surge Mapping," South Florida Hurricane Conference, Ft. Lauderdale, FL, May 24, 2000.

99. "Proposed Rainfall Index for Tropical Storms," Roundtable on Rainfall Index, Florida International University, Miami, Florida, May 10, 2000.

100. "Hurricanes and Beach Erosion: A Historical Perspective," Bridgehampton National Bank Roundtable, Bridgehampton, NY, May 8, 2000.

101. "National Hurricane Hazard Reduction Act," U.S. Hurricane Researchers Workshop, Florida International University, Miami, FL, February 25, 2000.

102. "Hurricane Storm Surge Mapping Using Advanced Technology," Hurricane Researchers Workshop, Florida International University, Miami, FL, November 30, 1999.

103. "Sea Level Rise and Society," NASA Goddard Space Flight Center, Greenbelt, MD, June 10, 1999.

104. "Impact of Sea Level Rise on South Florida," EPA Workshop on Climate Change: What Does It Mean for South Florida?, Miami, FL, May 26, 1999.

105. "The International Hurricane Center: Initiatives and Future Directions," U.S. Geological Survey, St. Petersburg, FL, May 24, 1999.

106. "Hurricane Impact Research Initiatives," NOAA Hurricane Research Division, Virginia Key, FL, January 29, 1999.

107. "Coastal Response Module Development for U.S. East and Gulf Coasts," Climate Change Workshop, The Climate Institute, Miami, FL, December 2, 1998.

108. "South Atlantic and Caribbean Island Impacts," U.S. National Assessment of Global Warming Workshop, Albuquerque, NM, October 30, 1998.

109. "Sea Level Rise and Coastal Response," Global Warming and Extreme Events Workshop, NOAA Office of Global Programs, Miami, FL, July 1998.

110. "Coastal Hazards along U.S. East Coast," National Oceans Conference, Monterrey, CA, June 12, 1998.

111. "The International Hurricane Center," International Coastal Symposium, Palm Beach, FL, May 21, 1998.

112. "The High Water Line as a Shoreline Indicator for Coastal Mapping," International Coastal Symposium, Palm Beach, FL, May 20, 1998.

113. "Sea Level Rise and Coastal Impacts for U.S. Northeast Coast," The Climate Institute Forum, Yale University, New Haven, CT, April 3, 1998.

114. "Coastal Hazard Research," NOAA Director's Science Seminar Series, Silver Spring, MD, July 11, 1997.

115. "Coastal Hazard Analysis Using Airborne Laser Technology, "NASA-Goddard Space Flight Center, Greenbelt, MD, June 13, 1997.

116. "Sea Level Rise and Coastal Vulnerability, "American Geophysical Union Annual Meeting, Baltimore, MD, May 27, 1997.

117. "GPS Applications to Coastal Science and Engineering" GPS/GIS '97 Conference, Annapolis, MD, May 15, 1997.

118. "Coastal Erosion Hazard Mapping of Delaware's Atlantic Coast, " FEMA-National Coastal Program Managers Annual Meeting, Pentagon City, VA, April 16, 1997.

119. "America's Best Beaches," International Oil Spill Conference, Ft. Lauderdale, FL, April 10, 1997.

120. "The State of our Coasts," California and World Coastal Conference, San Diego, CA, March 25, 1997.

121. "Vulnerability of Small Island Nations to Sea Level Rise and Hurricane Impact," UNEP Workshop, Antigua, January 6, 1997.

122. "The Loss of Land and Natural Shores as Sea Level Rises, Chesapeake Bay at the Crossroads Workshop, Washington College, Chestertown, MD, October 18, 1996.

123. "How are Coastal Areas of the U.S. and the World Vulnerable to Climate Change and Sea Level Rise?, " Washington Summit on Protection of the World's Climate, The Climate Institute, Washington, DC, September 4, 1996.

124. "Coastal Research Frontiers in Science and Engineering," President's Circle, National Academy of Sciences and National Academy of Engineering, Woods Hole, MA, June 15-16, 1996.

125. "Coastal Hazards: National Policy Issues," NOAA National Coastal Program Managers Annual Meeting, Washington, DC, March 20, 1996.

126. "Coastal Processes Research Along the U.S. East Coast," Annual Meeting of the Association of American Geographers, Charlotte, NC, April 11, 1996.

127. "Sea Level Rise and Small Island Nations," Annual Meeting of the American Association for the Advancement of Science, Baltimore, MD, February 13, 1996.

128. "Impact of Climate Change on Small Island States," International Conference on Developing Countries, Manila, Philippines, January 18, 1996.

129. "Erosion Rate Analysis Applied to the National Flood Insurance Program: A Case Study of Delaware's Atlantic Coast," FEMA National Mitigation Conference, Arlington, VA, December 5, 1995.

130. "Beach Safety: Waves and Currents," Annual Meeting of Mid-Atlantic United States Lifesaving Association, Alexandria, VA, May 5, 1995.

131. "Vulnerability of Coastal Populations to Sea-Level Rise in Developing Countries," Conference on Environmental Refugees, Green College, Oxford University, Oxford, England, February 28, 1995.

132. "Approaches to Coastal Vulnerability Analysis and Integrated Coastal Zone Management," East-West Center, University of Hawaii, Honolulu, HI, February 1, 1995.

133. "Coastal Vulnerability Analysis for Small Island States," U.S. Country Studies Program Workshop, Kosrae Island, Micronesia, January 5, 1995.

134. "Effects of Sea-Level Rise and Antecedent Topography on Vertical and Lateral Migration of Coastal Wetlands," Second Coastal Wetland Ecology and Management Symposium, Key Largo, FL, December 6, 1994.

135. "Impact of Sea Level Rise on Coastal Areas," Annual Meeting of Southeast Division of the Association of American Geographers, Virginia Beach, VA, November 20, 1994.

136. "Global Implications of Sea-Level Rise and Coastal Impacts," Annual Banquet of Association of Meteorologists, College Park, MD, November 18, 1994.

137. "Beach Quality: An Assessment of America's Beaches," Annual Meeting of the American Shore & Beach Preservation Association, Virginia Beach, VA, October 6, 1994.

138. "Integrated Impacts of Global Change in the Coastal Zone," Global Change Institute, University Corporation for Atmospheric Research, Snowmass, CO, July 22, 1994.

139. "Approaches to Coastal Vulnerability Analysis," U.S. Country Studies Program Workshop, San Jose, Costa Rica, May 20, 1994.

140. "The Coastal Collision Course -- Rising Sea Levels and Growing Coastal Populations," Annual Banquet, Sigma Xi University of Maryland Chapter, College Park, MD, April 28, 1994.

141. "Beach Protection and Development: Challenges for the United States into the 21st Century," Florida Sea Grant Seminar Series, University of West Florida, Pensacola, FL, March 11, 1994.

142. "Modes of Shoreline Behavior: Erosion Rate Analysis Using Geomorphic Principles," International Coastal Symposium, Hilton Head Island, SC, June 8, 1993.

143. "Implications of Sea-Level Rise: An International Assessment of Developing Countries," International Geographical Congress, Washington, DC, August 12, 1992.

144. "Coastal Geomorphology: Scientific Progress and Research Directions," National Academy of Sciences, Woods Hole, MA, June 26, 1992.

145. "Impact of Sea Level Rise on South America," Marquarita Island, Venezuela, March 11, 1992.

146. "Impact of Sea Level Rise on Island Nations," Ambassador Seminar on Sea Level Rise and Developing Countries, The United Nations, New York, NY, February 14, 1992.

147. "Sea Level Rise and Coastal Impacts: A National Perspective," Presidential Candidates Forum on Global Warming," Tallahassee, FL, February 2, 1992.

148. "Difficulties in Measuring and Predicting Sea Level Rise," International Conference on Oceans, Climate, and Man, Turin, Italy, May 1991.

149. "Sea Level and Society," International Conference on Climatic Impacts on the Environment and Society, Tsukuba, Japan, February, 1991.

150. "Impacts of Hurricane Hugo on the South Carolina Coast," International Symposium on Coastal Geomorphology and Engineering, Skagen, Denmark, September, 1990.

151. "Managing Coastal Erosion: Implications for the Maryland Coast," Maryland Coastal Resources Advisory Committee, St. Michaels, MD, August 1990.

152. "Sea Level Rise and Temperate Coastal Landforms," Conference on Geomorphology and Global Warming, Royal Geographical Society, London, England, May 1990.

153. "The Greenhouse Effect: Fact and Fiction," Splint Club Seminar Series, University of Maryland Medical School, Baltimore, MD, April 1990.

154. "Global Warming, Sea Level Rise, and Coastal Impacts," Worldwide Port and Terminal Operations Conference, Amsterdam, The Netherlands, April 1990.

155. "The Geomorphic Effects of Hurricane Hugo Impact along the South Carolina Coast," National Science Foundation Special Symposium on Hurricane Hugo, Mayaguez, Puerto Rico, March 1990.

156. "Impacts of Sea Level Rise on Barrier Beaches, American Association for the Advancement of Science Annual Meeting, New Orleans, LA, January 1990.

157. "Implications of Climate Change," South Carolina Sea Grant Program Annual Meeting, Columbia, SC, January 1990.

158. "Global Warming and Sea Level Rise," World Conference on Preparing for Climate Change, Cairo, Egypt, December 1989.

159. "Impacts of Sea-Level Rise on U.S. Coastal Cities," International Conference of Cities on the Water, Venice, Italy, December, 1989.

160. "Sea Level Rise and Environmental Refugees," Our Changing Atmosphere: Sources of Stress and Challenges to Cooperation, American Academy of Arts and Sciences, Cambridge, MA, November 1989.

161. "Global Climate Change and Societal Response: The Coastal Challenge," Sundance Symposium on Greenhouse-Glasnost, Sundance, Utah, August, 1989.

162. "Coastal Implications of Global Warming," American Bar Association Annual Meeting, Honolulu, HI, August 1989.

163. "The Changing Shore," A Vineyard Symposium on Our Coast in Danger, The Nathan Mayhew Seminars, Martha's Vineyard, MA, July 1989.

164. "National Assessment of Beach Nourishment Requirements with Accelerated Sea Level Rise," Coastal Zone 89, ASCE, Charleston, SC, July 1989.

165. "Implications of Climate-Induced Sea Level on the United States Coastline," National Governor's Association Conference, New York, NY, February, 1989.

166. "The Impact of Sea Level Rise," International Conference on Atmosphere, Climate and Man, Turin, Italy, January, 1989.

167. "Consequences of Global Warming: The Sea Level Rise Impact," U.S. Congressional Staff Seminar on Climate Change, World Resources Institute, Washington, DC, January, 1989.

168. "Limitations of Fortifications and Beach Nourishment Strategy," Second North American Conference on Preparing for Climatic Change: A Cooperative Approach, Washington, DC, December 1988.

169. "Likely Sea Level Rise," Keynote Address, Second North American Conference on Preparing for Climate Change: A Cooperative Approach, Washington, DC, December, 1988.

170. "Impacts of Accelerated Sea-Level Rise on Beaches and Coastal Wetlands," Global Climate Change Linkages: Acid Rain, Air Quality and Stratospheric Ozone, Washington, DC, November, 1988.

171. "Global Climate Change and Rising Sea Levels," International Symposium on the Greenhouse Effect, The United Nations, NY, June, 1988.

172. "Sciences and Research in the National Seashores," Protecting and Planning for Parks of the Future, Annual Conference of the National Parks and Conservation Association, Washington, DC, March, 1988.

173. "Implications of Sea-Level Rise on Third World Coastal Projects," Climate Institute Symposium, Washington, DC, March, 1988.

174. "Greenhouse Effect and Its Implications for Coastal Regions," The Population Institute Annual Meeting, Washington, DC, February, 1988.

175. "Global Rise in Sea Level," Marine Technology Society Meeting, Washington, DC, January, 1988.

176. "Responding to Changing Water Levels," Coastal Managers Meeting, National Office of Coastal Zone Management, Nags Head, NC, September, 1987.

177. "Environmental Impacts of Accelerated Sea-Level Rise on Developing Countries," United Nations Environmental Program, Norwich, England, September, 1987.

178. "Shore Responses to Sea Level Rise," International Geological Correlation Programme and NATO Advanced Study Institute, Halifax, Canada, July, 1987.

179. "Shoreline and Sediment Budget Analysis of Ocean City Inlet Area, Maryland," Coastal Sediments 87, ASCE, New Orleans, LA, May, 1987.

180. "Time Frames for Barrier Island Migration," O'Brien Special Symposium, American Shore & Beach Preservation Association, University of California, Berkeley, CA, March, 1987.

181. "Geomorphic Effects of Sea Level Rise on the South Shore Barriers of Long Island, New York," Sea Level Rise Symposium, Hofstra University, Hempstead, NY, March, 1987.

182. "Barrier Evolution in Response to Sea Level Rise," Geological Society of America Southeastern Section Annual Meeting, Norfolk, VA, March, 1987.

183. "Remote Sensing of Coastal Environments," Goddard Scientific Colloquium, NASA-Goddard Space Flight Center, Greenbelt, MD, October 24, 1986.

184. "Coastal Geomorphic Impacts of Sea Level Rise on Coasts of South America," United Nations Environmental Programme Conference, Washington, DC, June, 1986.

185. "Response of Sandy Shores to Sea-Level Rise," American Association for the Advancement of Science, Annual Meeting, Philadelphia, PA, May, 1986.

186. "Accelerated Sea-Level Rise and Coastal Response: Causes and Projections," International Geological Correlation Programme Conference, Cork, Ireland, March, 1986.

187. "Predicting Shore Erosion: Implications for Ocean City, Maryland," International Geological Correlation Programme Conference, Cork, Ireland, March, 1986.

188. "Geomorphic Analysis of Fire Island, New York," Geological Society Annual Meeting, Tandil, Argentina, November 1985.

189. "Storm-Generated Coastal Processes," International Seminar Series, Federal University of Rio de Janeiro, Brazil, November 1985.

190. "Barrier Island Processes and Management," Minerals Management Service Technology Transfer Meeting, New Orleans, LA, October, 1985.

191. "Shoreline Response to Sea-Level Rise: Ocean City, Maryland," Symposium on Coasts and Rivers, Reykjavik, Iceland, September 1985.

192. "Shoreline Evolution, Ocean City Inlet Area, Maryland," Coastal Zone 85, ASCE, Baltimore, MD, August, 1985.

193. "Approaches to Coastal Hazard Analysis," Cities on the Beach Workshop, Virginia Beach, VA, January, 1985.

194. "Role of Overwash Processes in Barrier Island Migration," Barrier Island Workshop, U.S. Army Corps of Engineers National Assessment, Nags Head, NC, November, 1984.

195. "Effects of Ocean City Inlet Jetties on the Adjacent Shorelines," International Geographical Congress, Paris, France, August, 1984.

196. "Geomorphic and Stratigraphic Analysis of South Shore Barriers of Long Island, N.Y.," Association of American Geographers Annual Meeting, Washington, DC, April, 1984.

197. "Shoreline Change and Coastal Environments Mapping: A Comparison of Techniques," American Society of Photogrammetry, Annual Meeting, Washington, DC, March, 1984.

198. "Barrier Island Evolution in Response to Sea Level Rise," Association of American Geographers Annual Meeting, Denver, CO, March, 1983.

199. "New, Automated Technique of Historical Shoreline Mapping," Geological Society of America, Annual Meeting, New Orleans, LA, October, 1982.

200. "Geomorphic and Sedimentary Analysis of Fire Island, New York," Geological Society of America, Northeast-Southeast Meeting, Washington, DC, March, 1982.

201. "Overwash Processes and Barrier Dynamics: Nauset Spit, Cape Cod, Massachusetts," Geological Society of America, Northeast Section Meeting, Philadelphia, PA, March, 1980.

202. "Effects of Storm Processes and Off-Road Vehicles on Barrier Dunes, Nauset Spit, Massachusetts," International Geographic Union, Newport, RI, November, 1979.

203. "Recreational Impacts on Foredunes: Assateague Island National Seashore," NPS 2nd Scientific Conference, San Francisco, CA, November, 1979.

204. "Effects of Eroding Dunes on Swash Processes During Storm Conditions," Geological Society of America, Northeast Section Meeting, Hershey, PA, March, 1979.

205. "Barrier Dune Systems for Coastal Defenses," Coastal Engineering Geology, Annual Meeting, Southampton, England, September, 1978.

206. "Geologic Field Techniques Applied to Coastal Ecology Research," Ecological Society of America, AIBS Annual Meeting, Athens, GA, August, 1978.

207. "Sediment Grading in Overwash Deposits," AAPG-SEPM Annual Convention, Oklahoma City, OK, April, 1978.

208. "Management Strategies for National Seashores," Coastal Zone 78 Symposium, ASCE, San Francisco, CA, March, 1978.

209. "Geomorphic Effects of Off-Road Vehicles on Beaches and Dunes," Geological Society of America, Northeast Section Meeting, Boston, MA, March, 1978.

210. "Overwash Hydraulics and Sediment Transport," Coastal Sediments 77 Symposium, ASCE, Charleston, SC, November, 1977.

211. "Interpretation of Overwash Sedimentary Sequences," Geological Society of America, Northeast Section Meeting, Binghamton, NY, March, 1977.

212. "Assateague Island: A Case Study of Barrier Island Dynamics," First Conference on Scientific Research in the National Parks, New Orleans, LA, November, 1976.

213. "Effects of Off-Road Vehicles on the Geomorphology of Dunes in Cape Cod National Seashore," First Conference on Scientific Research in the National Parks, New Orleans, LA, November, 1976.

214. "Barrier Island Dynamics: Overwash Processes and Eolian Transport," 15th International Coastal Engineering Conference, Honolulu, HI, July, 1976.

215. "Barrier Island Migration: An Assessment of the Overwash Process," Geological Society of America, Northeast-Southeast Meeting, Arlington, VA, March, 1976.

216. "Overwash Sedimentation on Assateague Island," Virginia Academy of Science, Harrisonburg, VA, May, 1975.

Symposia, Workshops and Field Trips

Chair, 1st International Rip Current Symposium, Sponsored by Florida Sea Grant Program, Florida International University, Miami, FL, February 17-19, 2010.

Organizer and Presider, Florida Hurricane Alliance Research Program Annual Workshop, Miami, FL, 2005-2010.

Co-Chair, Florida Coastal Ocean Observing System Consortium, Florida International University, Miami, FL, November 27, 2007.

Presider, Beach Management Conference, Miami, FL, March 2-3, 2005.

Organizing Committee, Hurricane Andrew 10-Year Anniversary Summit, Miami, FL, May 30-31, 2002.

Presider, Shoreline Change Conference: National Meeting of Scientific Experts, NOAA-Coastal Services Center, Charleston, SC, May 7-9, 2002.

Co-Organizer, and Presider, Sea Level Rise and Coastal Disasters, Natural Hazards Roundtable, National Academy of Sciences, Washington, DC, October 25, 2002.

Co-Organizer, Carbonate Beaches Workshop, Key Largo, FL, December, 2000.

Chairman, Roundtable on Tropical Storm Rainfall Index, Florida International University, Miami, FL, May 10, 2000.

Chairman, Hurricane Research Initiatives, Annual Meeting of the Insurance Friends of the National Hurricane Center, Miami, FL, May 6, 2000.

Chairman, Climate Change: What Does It Mean for South Florida?, U.S. Environmental Protection Agency Workshop, Miami, FL, May 26, 1999.

Chairman, Hurricane Studies Initiative for Insurance Friends Workshop, National Hurricane Center, Miami, FL, March 5, 1999.

Chairman, Workshop on Climate Change and Extreme Events, FIU International Hurricane Center, Miami, FL, July 21-23, 1998.

Chairman, Hurricane Impact Initiatives for Insurance Friends Workshop, National Hurricane Center, Miami, FL, March 1, 1998.

Co-Chair, Mapping and Managing Coastal Erosion Hazards Workshop, NOAA National Coastal Managers Annual Meeting, Pentagon City, VA, April 15-16, 1997.

Chairman, Chesapeake Bay at the Crossroads Workshop, U.S. Environmental Protection Agency, Chestertown, MD, October 18-19, 1996.

Chairman, FEMA Coastal Erosion Hazard Mapping Workshop, College Park, MD, June 14, 1996.

Organizer and Session Chair, Mid-Atlantic Coastal Marshes, Second Coastal Wetland Ecology and Management Symposium, Key Largo, FL, December 6, 1994.

Chairman, Technical Session on Coastal Mapping and Analysis, Coastal Sediments 91 Conference, ASCE, Seattle, WA, June 1991.

Field Trip Leader, International Geological Congress, Washington, DC, August 1989.

Organizer and Convener, 14th Annual Assateague Shore and Shelf Workshop, Assateague Island, MD, April, 1987.

Field Trip Leader, Geological Society of America Southeastern Section Annual Meeting, Virginia Barrier Islands, March, 1987.

Chairman, Coastal Geomorphology/Engineering Specialty Group, Assateague Island Erosion Workshop, National Park Service, Berlin, MD, March, 1986.

Field Trip Leader, Association of American Geographers Annual Meeting, Maryland Atlantic Coast, April, 1984.

Co-organizer and Co-convener, Barrier Island Symposium, Geological Society of America, Washington, DC, March, 1982.

Organizer and Co-convener, Symposium on Barrier Island Management, Coastal Zone 80 Conference, ASCE, Hollywood, FL, November, 1980.

Co-organizer and Program Committee Member, Barrier Island Forum and Workshop, National Park Service, Provincetown, MA, May 1980.

Field Trip Leader, Eastern Section, Society of Economic Paleontologists and Mineralogists Annual Field Trip, Cape Cod, Massachusetts, September 1979.

Scientific Expedition Leader, Earthwatch Field Team to Nauset Spit, Cape Cod, MA, July-August, 1979.

Program Committee Member, Panel Chairman and Speaker, Barrier Beach Management Workshop, MIT Sea Grant, Provincetown, MA, May, 1979.

Co-organizer, Ocean Beach Erosion Conference, Golden Gate National Recreational Area, San Francisco, CA, August, 1978.

Organizer and Co-convener, Coastal Research Symposium, Geological Society of America, Boston, MA, March, 1978.

Scientific Expedition Leader, Earthwatch Field Team to Fire Island, NY, August, 1977.

Field Trip Leader, New England Intercollegiate Geological Conference, Cape Cod, MA, April, 1976.

Committees

Major Professor, Ph.D. Dissertation, K. Fallon, in progress.

Committee Member, M.S. Thesis, E. Cook, Barrier Island Response to Sea Level Rise in North Carolina, 2013.

Committee Member, Ph.D. Dissertation, J. Czajkowski, Essays in Environmental Economic Valuation and Decision Making in the Presence of an Environmental Disaster, 2007.

Committee Member, Ph.D. Dissertation, W. Robertson, Analysis of Beach Dynamics Using Airborne LIDAR Technology, 2007.

Committee Member, M.S. Thesis in Civil and Environmental Engineering, C. Anderson, "Rainfall and Flooding Index for Tropical Storms and Hurricanes," 2003.

Committee Member, M.S. Thesis in Geology, W. Robertson, "Applications of Airborne Laser Technology to Coastal Erosion Studies," 2001.

Major Professor, Ph.D. Dissertation, F. Galgano, "Geomorphic Analysis of Shoreline Behavior and the Influence of Tidal Inlets on Coastal Configuration," 1998.

Major Professor, Ph.D Dissertation, K. Zhang, "Twentieth Century Storm Activity and Sea Level Change along U.S. Atlantic Coast and Their Impact on Shoreline Positions," 1998.

Major Professor, M.A. Thesis, J. Smith, "Coastal Erosion Anomaly Area on Jones Beach, New York," 1998.

Major Professor, M.A. Thesis, M. Pajak, "Shoreline Indicators for Coastal Mapping," 1997.

Major Professor, M.A. Thesis, M. Beardslee, "Historic and Geomorphic Evolution of Cove Point, MD," 1997.

Major Professor, M.S. Thesis, G. Lee, "Equilibrium Beach/Nearshore Profiles at Duck, NC," 1993.

Major Professor, M.S. Thesis, L. Downs, "Erosion Rate and Sediment Budget Analysis of a Cliffed Shoreline, Chesapeake Bay, MD," 1993.

Major Professor, M.S. Thesis, R. Donham, "Coastal Evolution and Land Loss in Chesapeake Bay," 1992.

Co-Supervisor, Ph.D. Dissertation, M.C. Thomas, "SEM Analysis of Texture and Shape in Sand Grains," 1992.

Co-Supervisor, Ph.D. Dissertation, P. Morgan, "The Sediment Budget of Fire Island, New York," 1992.

Major Professor, Ph.D. Dissertation, G. Stone, "Geomorphology of Florida Barrier Systems," 1991.

Major Professor, M.S. Thesis, G. French, "Historical Shoreline Change Analysis of Delaware Bay, Delaware" 1990.

Major Professor, M.S. Thesis, F. Galgano, "Dynamics and Processes along the Delaware Coast," 1989.

Major Professor, M.S. Thesis, C. Gaunt, "Historical Shoreline Change Analysis of Cedar Island, Virginia," 1989.

Major Professor, M.S. Thesis, M. Zeigler, "Shoreface and Inner Shelf Stratigraphy of Southern New Jersey," 1987.

Major Professor, M.S. Thesis, K. Lacovara, "Geomorphic Evolution of Little Beach, New Jersey," 1987.

Major Professor, M.S. Thesis, H. Gehring, "Barrier Island Classification Schema," 1986.

Co-Supervisor, M. S. Theses, N. Evans, "Genesis of the Fire Island Foredunes," 1983.

Major Professor, M.S. Thesis, C. Johnson, "Historic and Geomorphic Evidence of Barrier Dynamics, South Shore of Long Island, New York," 1982.

Co-Supervisor, Ph.D. Dissertation, R. Zaremba, "The Role of Overwash Processes and Vegetation in the Landward Retreat of a Northern Barrier Beach," 1981.

Major Professor, M.S. Thesis, D. Joneja, "Dynamics of Fire Island, New York," 1981.

AWARDS AND HONORS

Who's Who in the World, Yearbook, 2015.

Russell Award—AAG Highest Award in Coastal & Marine Research, 2014.

Who's Who in America, 2013.

Who's Who in Science and Engineering, 2011.

Who's Who in America, 2010.

Who's Who in the World, Yearbook, 2009.

Best in Class, Florida International University, Miami, FL, 2008.

Excellence in Faculty Scholarship, Florida International University, Miami, 2008.

Who's Who in America, Yearbook, 2008.

Who's Who in Science and Engineering, Yearbook, 2008.

Environmental Hero Award, The Climate Institute, Washington, DC, 2006.

Golden Chain, Florida International University, Miami, FL, 2002

Research Professor Award, Florida International University, Miami, FL, 2000

40 People to Watch in South Florida, Miami Herald Newspaper, December 12, 1999

Research Professor Award, Florida International University, Miami, FL, 1999

Twenty-Five Outstanding Individuals at FIU, Miami Convention & Visitors Bureau, FL, October 1, 1997

Honored Faculty, Inaugural Alumni Hall of Fame Ball, University of Maryland, College Park, MD, 1995

Presidential Citation for Scholarship, Colonade Society, University of Maryland, College Park, 1993

First Prize for Science, Ekofilm Festival, Czech Republic, for Vanishing Lands documentary film, 1993

Golden Azor for Vanishing Lands documentary film, 1993

Golden Eagle for Vanishing Lands documentary film by CINE, 1992

Finalist, John and Cynthia Mitchell International Prize for Global Change and Sustainability, Woodlands, TX, 1989

American Men and Women of Science, 1989

Dictionary of International Biography, 1987

Who's Who in the World, 1986-1987

Certificate for Outstanding Accomplishments, University of Maryland, College Park, April 10, 1985

Who's Who in Frontiers of Science and Technology, 1985

Men of Achievement, International Biographical Center, Cambridge, England, 1985

Who's Who in the East, 20th Edition, 1984-1985

Outstanding Young Men of America, 1984

Personalities of the South, 1983

Blue Key and Golden Chain Honorary Societies, N.C. State University, 1970

Texaco Scholarship, 1969-1970

DOCUMENTARIES AND VIDEOS

"Vanishing Lands," 1991, S. P. Leatherman, producer and on-screen host, winner of three international award, including the Golden Eagle (30 minute documentary film).

"Beach Rips: Dangerous Currents," 2011, S. P. Leatherman, producer and on-screen host, 5-minute video funded by the National Weather Service, www.ripcurrents.com and YouTube.

UNIVERSITY COURSES TAUGHT AT

University of Virginia
Boston University
University of Massachusetts at Amherst
Yale University
University of Maryland at College Park
Duke University Marine Laboratory
Florida International University

UNIVERSITY SERVICES

Chair, Fundraising and Alumni Committee, Department of Earth & Environment, Florida International University, 2010-present.

Member, Search & Screen Committee, Business Director for Wall of Wind Facility, Florida International University, 2008.

Originator of Document and Chairperson of Committee, International Hurricane Research Building (BT-895), Florida International University, 2008-2009.

Member, Search & Screen Committee, Assistant Professor for Wind Engineering, Florida International University, 2007.

Member, Search & Screen Committee, Assistant Professor for Socioeconomic Research, Florida International University, 2007

Member, Search & Screen Committee, Vice President for Research, Florida International University, 2006.

Member, Search & Screen Committee, Assistant Professor in Wind Engineering, Department of Civil & Environmental Engineering, Florida International University, 2006.

Member, Search & Screen Committee, Chair of the Department of Civil & Environmental Engineering, Florida International University, 2004.

Member, SURA (Southeast Universities Research Association), Coastal Research Committee, 2003-2007.

Member, Latin America and Caribbean Center (LACC), Florida International University, 1997-present.

Ambassador, United Way Campaign for International Hurricane Center, Florida International University, 1997-2005.

Member, University Committee on Environmental Research, Florida International University, 1998-1999.

Member, Professional Advisory Committee, Insurance Friends of the National Hurricane Center, 1997-2002.

Member, College Promotion and Tenure Committee, University of Maryland, 1995-1997.

Member, Graduate Council, University of Maryland, 1993-1995.

Director of Graduate Studies, (1993-1994) and Chair of Graduate Committee, Department of Geography, University of Maryland, 1995-1997.

Member, College Academic Council, University of Maryland, 1991-1993.

Science Director and Co-Founder, Center for Global Change, University of Maryland, 1989-1997.

Member, Review Committee, Marine Sciences Program, University of Maryland, College Park, 1988-1989.

Member, Faculty Search Committees, Department of Geography, University of Maryland, 1985-1996.

Member, Partners of America International Program, University of Maryland, 1985-1990.

Director and Founder, Laboratory for Coastal Research, University of Maryland, 1985-1997.

Alternate Director for University of Maryland, Potomac River Basin Consortium, 1984-1992.

Member, Graduate Admissions Committee, Department of Geography, University of Maryland, 1981-1987.

Member, Marine Station Advisory Committee, The Graduate School, University of Massachusetts, 1979-1981.

Laboratory Director, National Park Service - University of Massachusetts Coastal Laboratory, Truro, Cape Cod, Massachusetts, 1977-1979.

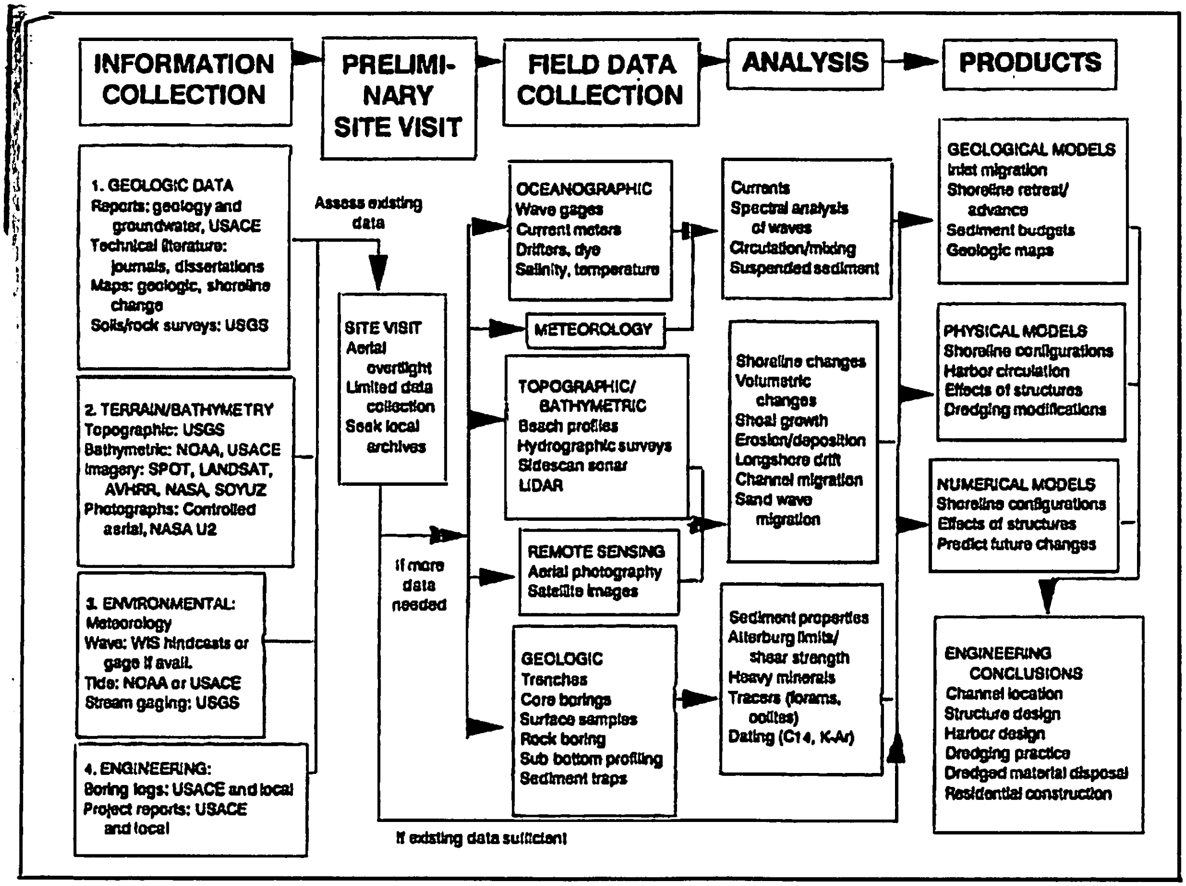
August 2015

Appendix B

Flow Chart for Coastal Studies

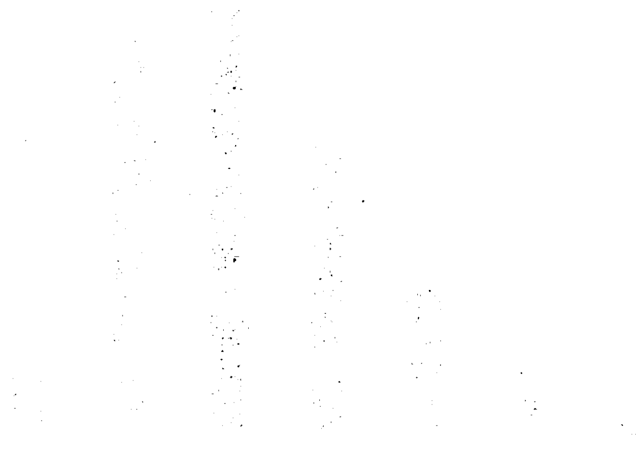
Appendix B

Morang et al, 1993

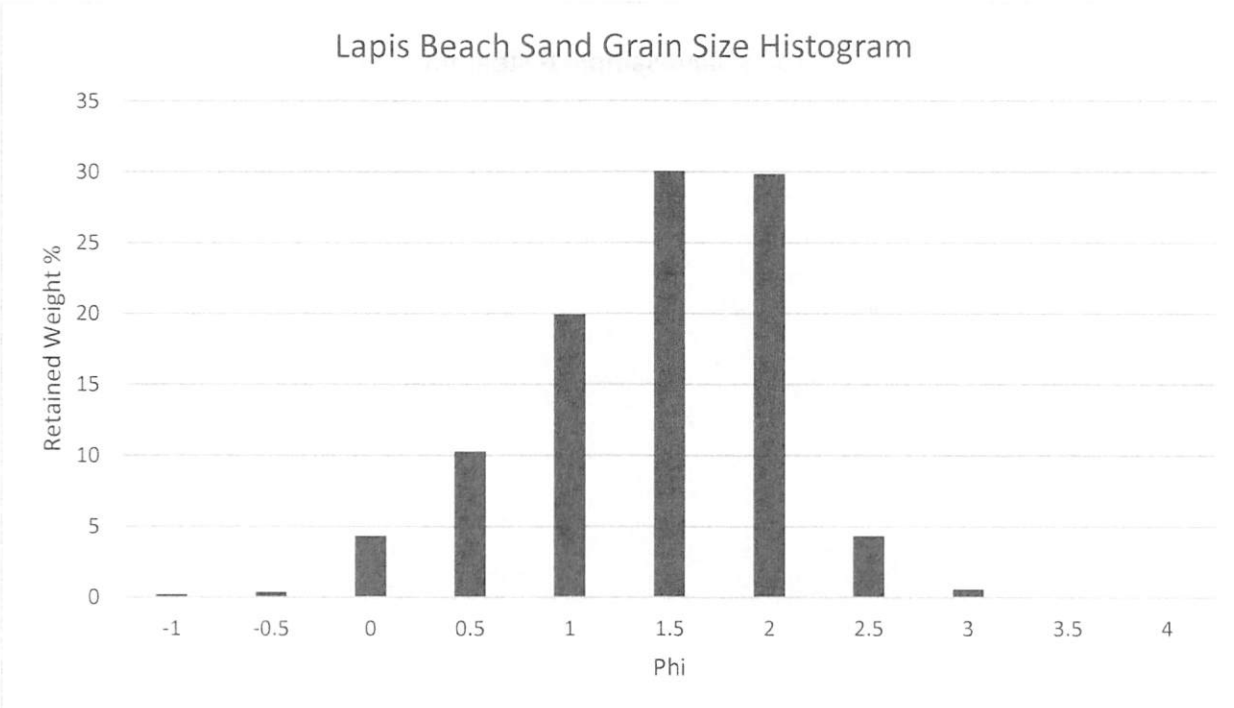


Appendix C

Lapis Sand Sample Histogram



Appendix C



Lapis Beach Sand Grain Size Histogram
Retained Weight %
35
30
25
20
15
10
5
0
-1
-0.5
0
0.5
1
1.5
2
2.5
3
3.5
4
Phi

Appendix D

Shoreline Change Map from Hapke et al (2006)

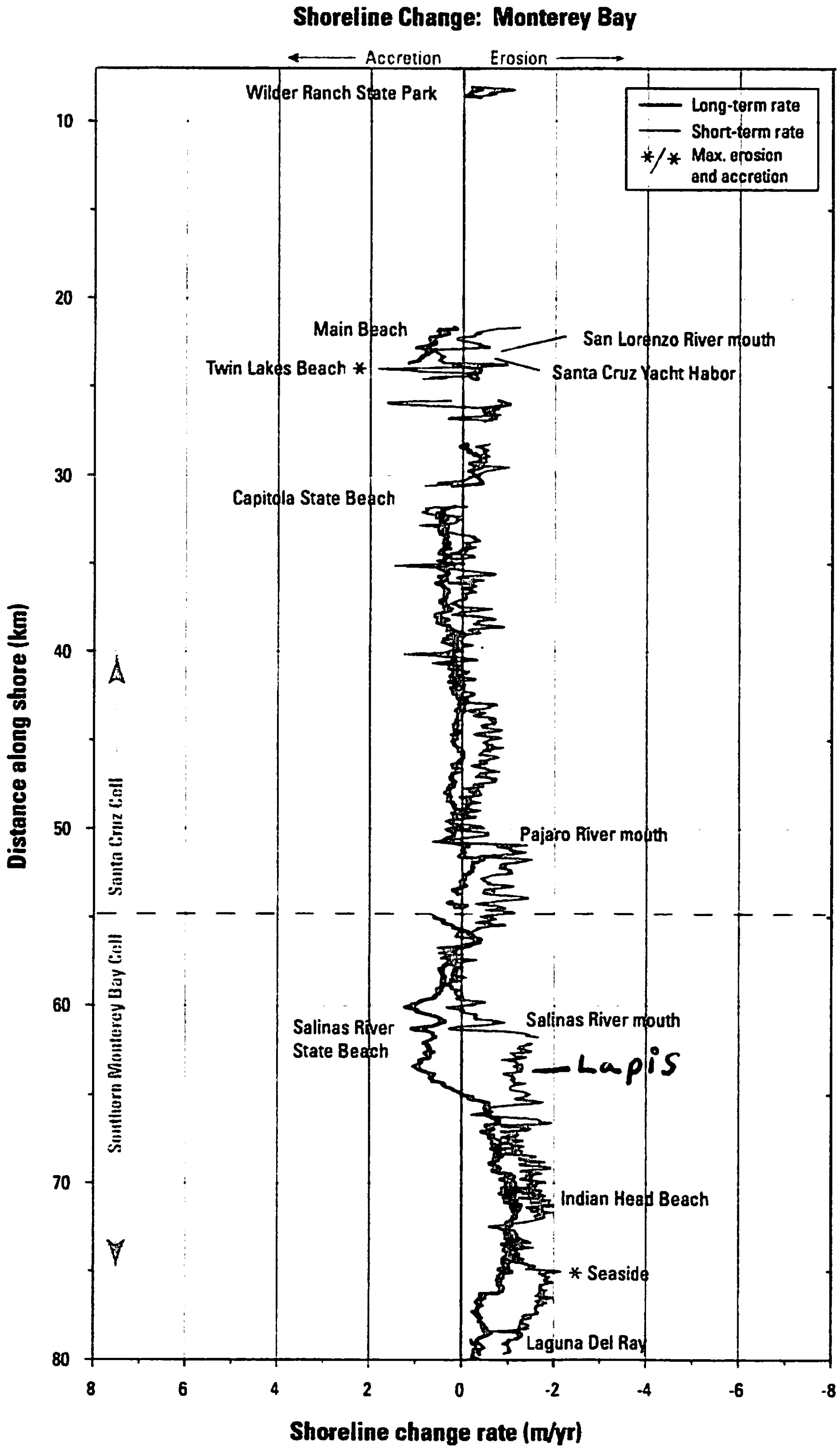


Figure 27. Shoreline change rates for the Monterey Bay region. The maximum long-term erosion rate was -1.3 m/yr on Indian Head Beach near Marina. The maximum short-term erosion rate of –2.4 m/yr was measured near Seaside.

Appendix E

Table from National Research Council (1990)

Appendix E

Managing Coastal Erosion, 1990, National Academy Press

TABLE 2-1 Summary of Natural Factors Affecting Shoreline Change

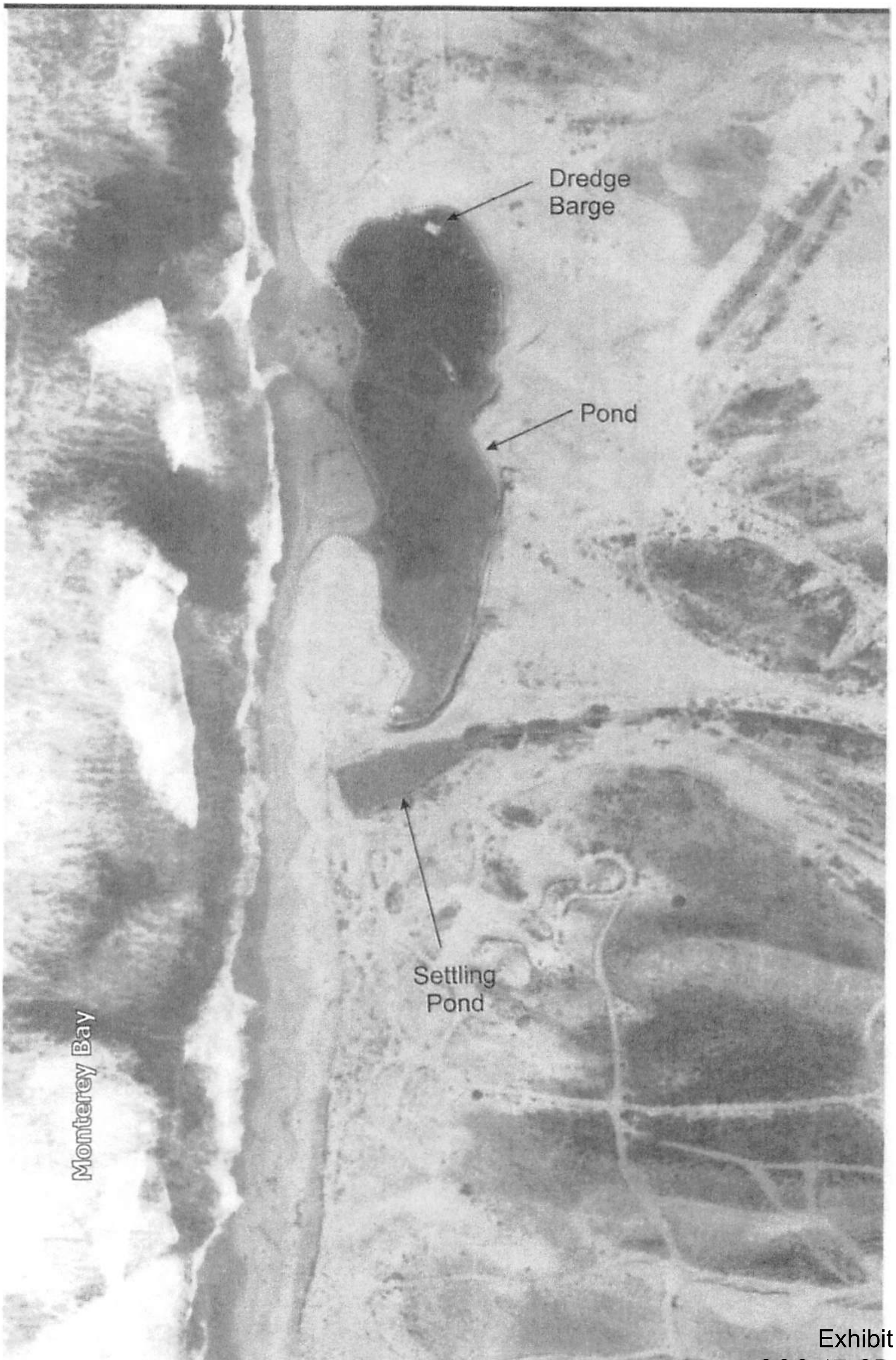
Factor	Effect	Time Scale	Comments
Sediment supply (sources and sinks)	Accretion/ erosion	Decades to millennia	Natural supply from inland (e.g., river floods, cliff erosion) or shoreface and inner shelf sources can contribute to shoreline stability or accretion
Sea level rise	Erosion	Centuries to millennia	Relative sea level rise, including effects of land subsidence, is important
Sea level change	Erosion (for increases in sea level)	Months to years	Causes poorly understood, interannual variations that may exceed 40 years of trend (e.g., El Niño)
Storm surge	Erosion	Hours to days	Very critical to erosion magnitude
Large wave height	Erosion	Hours to months	Individual storms or seasonal effects
Short wave period	Erosion	Hours to months	Individual storms or seasonal effects
Waves of small steepness	Accretion	Hours to months	Summer conditions
Alongshore currents	Accretion, no change, or erosion	Hours to millennia	Discontinuities (updrift ≠ downdrift) and nodal points
Rip currents	Erosion	Hours to months	Narrow seaward-flowing currents that may transport significant quantities of sediment offshore
Underflow	Erosion	Hours to days	Seaward-flowing, near-bottom currents may transport significant quantities of sediment during coastal storms
Inlet presence	Net erosion; high instability	Years to centuries	Inlet-adjacent shorelines tend to be unstable because of fluctuations or migration in inlet position; net effect of inlets is erosional owing to sand storage in tidal shoals
Overwash	Erosional	Hours to days	High tides and waves cause sand transport over barrier beaches
Wind	Erosional	Hours to centuries	Sand blown inland from beach
Subsidence			
Compaction	Erosion	Years to millennia	Natural or human-induced withdrawal of subsurface fluids
Tectonic	Erosion/accretion	Instantaneous	Earthquakes
	Erosion/accretion	Centuries to millennia	Elevation or subsidence of plates

Appendix F

Air Photo of Rip Currents at Lapis Plant (October 5, 1976)

Appendix F

(October 5, 1976)

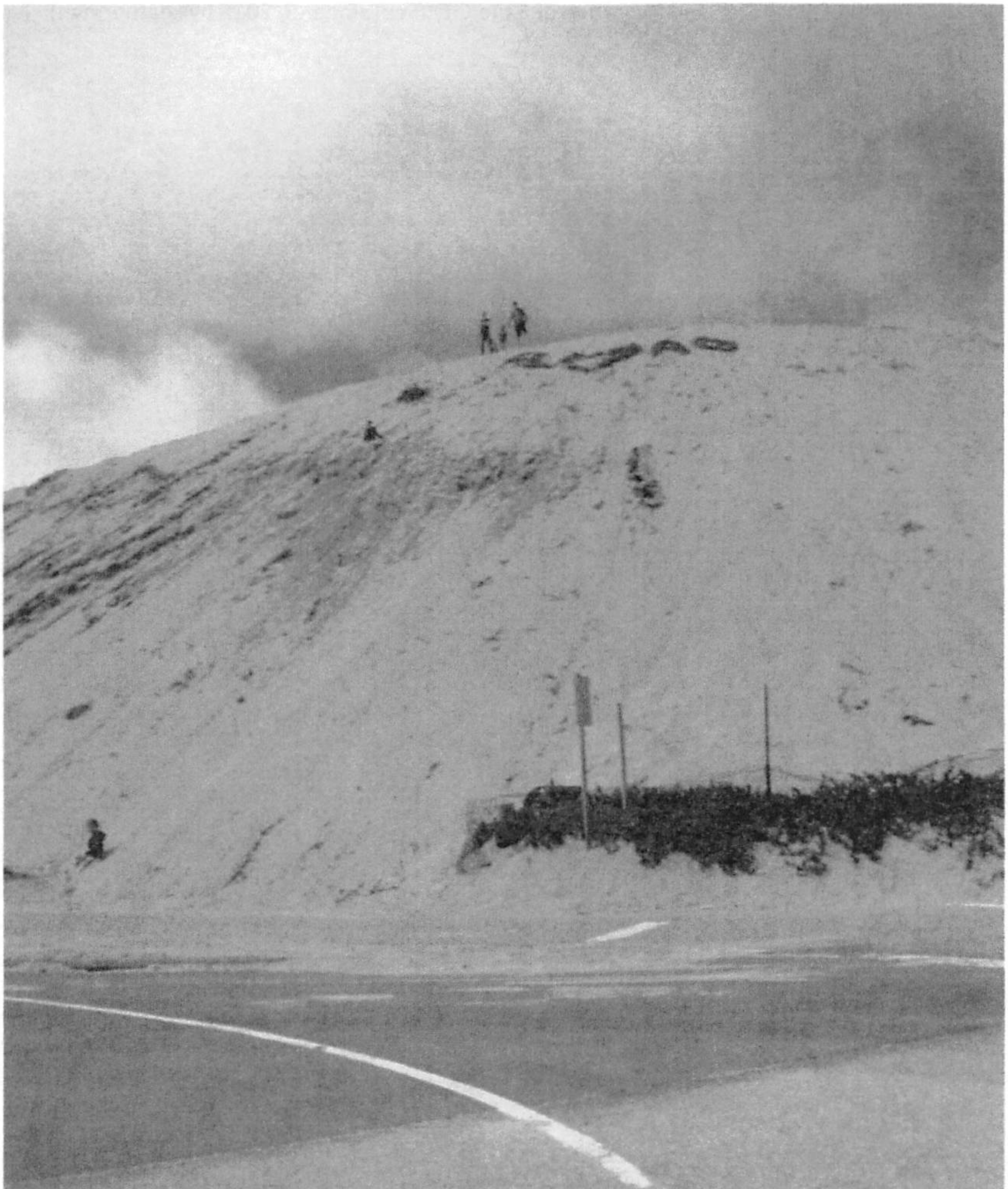


Appendix G

Photo of Onshore Sand Migration at Sand City (September 5, 2016 by Leatherman)

Appendix G

Photo of Onshore Sand Migration at Sand City (September 5, 2016 by Leatherman)

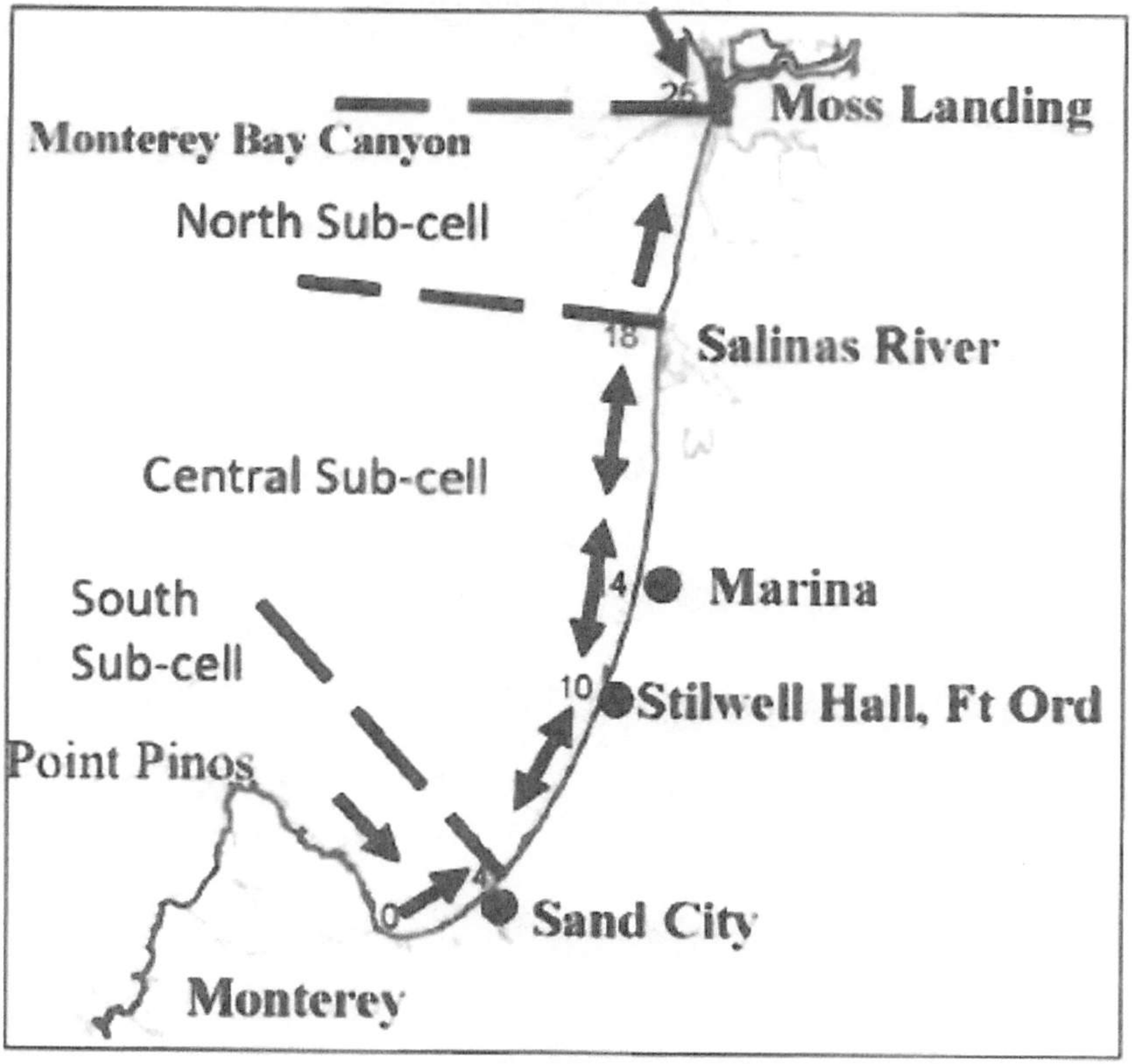


Appendix H-1

Figure 1 from Thornton (2016)

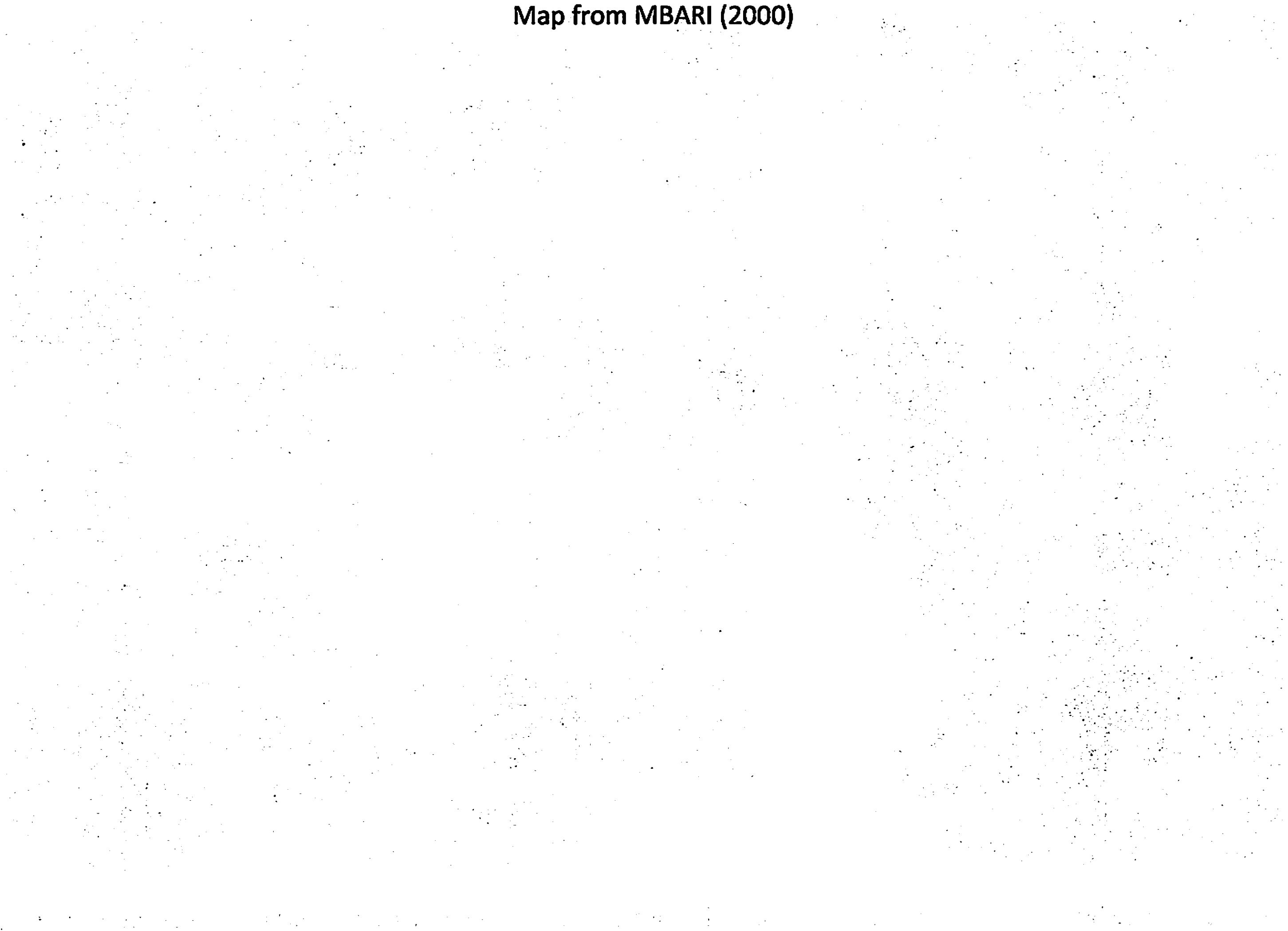
Appendix H-1

Figure 1 from Thornton (2016)



Appendix H-2

Map from MBARI (2000)



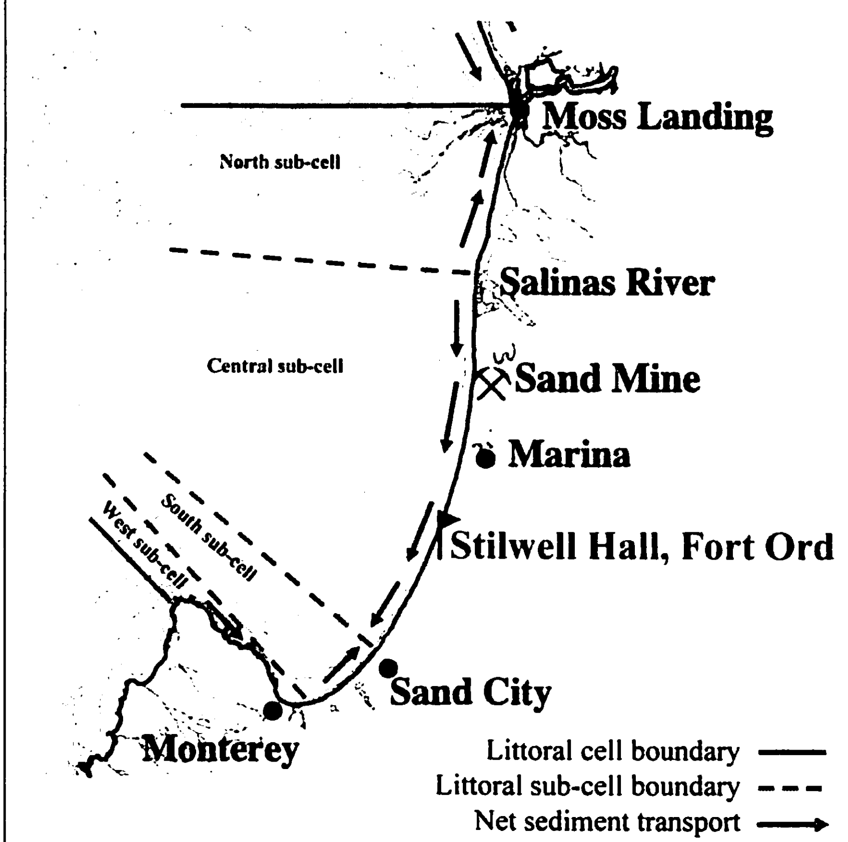
Appendix H-2

Source: Image by David Fierstein, courtesy of and copyright 2000 Monterey Bay Aquarium Research Institute.

Appendix H-3

Map from PWA (2008)

Figure 12. Southern Monterey Bay Littoral Sub-Cells and Net Sediment Transport



Note: Net is defined as southward minus northward transport and is smaller than the gross transport (defined as northward plus southward transport). Gross transport occurs across the net transport convergence at Sand City (across the central and south sub-cell boundary)

May 26, 2017 Item No. ___

Honorable Mayor and Members
of the Marina City Council

City Council Meeting
of June 6, 2016

CONSIDER ADOPTING RESOLUTION NO. 2017-__, FINDING THE CURRENT OPERATION OF THE CEMEX MINE MEETS THE ELEMENTS REQUIRED FOR A PUBLIC NUISANCE DUE TO ITS EROSIVE EFFECTS ON THE SOUTHERN MONTEREY BAY COAST AND FINDING THE CEMEX MINE TO BE IN VIOLATION OF SECTIONS 17.41.260 AND 17.25.030 OF THE MUNICIPAL CODE

RECOMMENDATION:
It is recommended that the City Council:

1. Consider adopting Resolution No. 2017-___;

2. Authorize the City Attorney to pursue the possibility of a civil action against CEMEX to declare and abate the Lapis Mine as a public nuisance under sections 3479 and 3480 of the California Civil Code, pursuant to section 731 of the California Code of Civil Procedure;

3. Authorize the City Attorney to pursue the possibility of commencing action or proceedings for abatement under section 17.60.040 of the Municipal Code due to CEMEX's continued violations of the reporting requirements under section 17.41.260 of the Municipal Code; and

4. Authorize the City Attorney to pursue the possibility of commencing action or proceedings for abatement under section 17.25.030 of the Municipal Code.

5. Direct the City Attorney, at such time as he deems appropriate, to report back to the City Council, in closed session, with regard to which of the above-listed litigation actions he recommends and has decided to pursue on behalf of the City.

EXECUTIVE SUMMARY:
For the past several decades, the CEMEX sand mining operation at Lapis Road in Marina ("Lapis Sand Mine") has been extracting significant volumes of coarse beach sand from the public tidelands through the use of a dredge pond adjacent to the shoreline. Studies show that the Lapis Mine is removing approximately 47 to 63 percent of the available local sand supply "budget" in southern Monterey Bay. Removing this volume from the sand supply budget has contributed significantly to erosion in the southern Monterey Bay, where shoreline erosion rates are the highest in California. Exacerbated erosion from sand mining has come at a high public price: jeopardizing public health and safety by putting coastal infrastructure at risk, impeding

public access and use of beaches, and causing habitat loss and significant property damage throughout the region.
Based on evidence available in the public record and on an independent evaluation of that evidence by Dr. Robert Young, City staff has determined that the CEMEX sand mining operation at Lapis Road is causing significant erosion in the southern Monterey Bay littoral cell, the impacts of which constitute a public nuisance under sections 3479 and 3480 of the California Civil Code. In addition, City staff has determined that CEMEX is currently in violation of two municipal code provisions: (1) the requirement under Municipal Code § 17.25.030 (and the LCP) to obtain a CDP; and (2) the requirement under Municipal Code § 17.41.260 to report annual sand extraction numbers and other data about the site.

For these reasons, City staff recommends that City Council adopt the Resolution and authorize the City Attorney to abate these Code violations and to pursue the possibility of a civil action against CEMEX to declare and abate the Lapis Sand Mine as a public nuisance.

<u>BACKGROUND</u>:

Sand mining history in Southern Monterey Bay

Sand mining commenced in southern Monterey Bay in the early 1900s to provide construction materials for the rebuilding of San Francisco after the 1906 earthquake. Alyssum Pohl & Lisa Johnson, *Lapis Sand Mining: An Economic Analysis of Non-Market Impacts of Lapis Sand Mine in Southern Monterey Bay* 3 (2012) (hereinafter "Pohl")(Attachment A). Early mining operations used shoreline draglines to collect sand directly from the ocean and tidelands. ESA PWA, *Evaluation of Erosion Mitigation Alternatives for Southern Monterey Bay* 107 (2012) (hereinafter "ESA PWA") (Attachment B). By the 1950s, five commercial shoreline sand mines were operating along the Bay: three in Sand City and two in Marina. *Id.* at 107. In 1965, a sixth operation was established: the artificial dredge pond at the Lapis Mine in Marina that is now operated by CEMEX. Philip Williams & Associates, *Coastal Regional Sediment Management Plan for Southern Monterey Bay* 15 (2008) (hereinafter "PWA") (Attachment C). The original operator of the dredge pond was Marina Pacific Concrete and Aggregates, which later sold the operation to Lone Star Industries; CEMEX purchased the facility in 2005. *Id.* at 42.

CEMEX's Lapis Sand Mine

The CEMEX Sand Mine is a 104-acre sand-dredging and -processing operation located between Lapis Road and the Monterey Bay in Marina, California. State Mining & Geology Board, *2012 SMARA Mine Inspection: CEMEX Lapis Sand Plant* 1, 5 (2013) (hereinafter "State Mining & Geology Board") (Attachment D). The CEMEX operation dredges sand from an artificial pond located between the shoreline and dunes. Pohl at 3. The pond acts as a "sand sink," drawing in sand from the nearshore and public tidelands during particular high tides and annual storms. *Id.* A suction dredge in the pond extracts sand from the pond floor and feeds it to a processing plant via a pipe. State Mining & Geology Board at 2. Sand mining at this site began in 1965, and by the time of that CEMEX purchased the facility in 2005, several scientific studies had identified the Lapis Sand Mine extraction operations as a significant contributor to coastal erosion in the southern Monterey Bay. The processed coarse sand product sold by CEMEX—known as "Lapis Lustre"—has a low dust content and unique grain size and is used for water filtration systems, golf courses, sand blasters, construction, and other commercial purposes. CEMEX, *About Lapis*

Lustre Sands, *available at* http://www.cemexusa.com/ProductsServices/LapisSands.aspx (last accessed May 25, 2017).

City of Marina's Interest and Involvement
In response to increasing public concern and the emerging scientific consensus concerning adverse impacts from sand mining, the City Council held a discussion and received public comments on this matter at its December 1, 2015 regular meeting. At the conclusion of that discussion, the City Council voted unanimously to send a letter of support for the California Coastal Commission's completion of an investigation into the environmental impacts of the CEMEX Sand Mine on the City of Marina and the Monterey Peninsula. The City sent this letter to the Coastal Commission on December 8, 2015. See Attachment E.

On March 15, 2016, the City Council adopted a resolution authorizing the City Manager to request that the California Coastal Commission assist and coordinate with the City in any enforcement proceedings pursued relative to possible violations of the California Coastal Act and the Marina Local Coastal Program by the CEMEX Sand Mining operations.

On March 17, 2016, the California Coastal Commission issued a Notice of Intent to Commence Cease and Desist Order and Restoration Proceedings and Administrative Civil Penalties Proceedings against CEMEX for unpermitted development, including sand dredging and extraction and related activities and development. See Attachment F. That investigation remains ongoing.

On February 3, 2017, Mayor Bruce Delgado sent a letter to the State Lands Commission urging that agency to assert its jurisdiction over the lands below the Mean High Tide Line and to require that CEMEX obtain any necessary permitting from the State Lands Commission for any continued sand mining activity. See Attachment G.

On May 16, 2017, the State Lands Commission issued a letter to CEMEX indicating that CEMEX must either immediately submit a lease application to the Commission or cease dredge pond operations because of the financial and resource impacts its operations have on the state. Specifically, the State Lands Commission noted that "the intensity of sand extraction at the Lapis operation causes environmental damage, public and private property damage, and loss of economic benefit through beach erosion." See Attachment H.

Community members and coastal geomorphologists have continued to express concern about the high levels of extraction at the CEMEX Mine. Accordingly, the City commissioned an expert report by Robert S. Young, Ph.D., to review the scientific literature and independently evaluate the impacts of the Lapis Sand Mine on coastal erosion. Dr. Young is the Director for the Program for the Study of Developed Shorelines, a joint venture between Western Carolina University and Duke University, as well as a Professor of Coastal Geology at Western Carolina University. Dr. Young's independent report is included herein as Attachment I (hereinafter "Young Report").

CEMEX's Extraction Activity Causing a Public Nuisance
Section 3479 of the California Civil Code provides: "Anything which is injurious to health, including, but not limited to, the illegal sale of controlled substances, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property, or unlawfully obstructs the free passage or use, in the customary manner, of any navigable lake, or river, bay, stream, canal, or basin, or any public park, square, street, or highway, is a nuisance." Section 3480 of the California Civil Code provides: "A public nuisance is one which affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal." California courts interpret section 3479 broadly and have long protected property owners from unwanted encroachments by neighbors. See *Stoiber v. Honeychuck*, 101 Cal. App. 3d 903, 919 (1980) ("The statutory definition of nuisance appears to be broad enough to encompass almost every conceivable type of interference with the enjoyment or use of land or property."); *Aspen Grove Condo. Ass'n v. CNL Income Northstar LLC*, 231 Cal. App. 4th 53, 64 (2014) ("Defendant may not 'force an invasion of the property rights of one private party to serve the convenience or necessity of another party . . . . [or else] the sacred right of private property . . . would become but a shadowy unsubstantiality'") (quoting *Felsenthal v. Warring*, 40 Cal. App. 119, 131 (1919)).

Based on the available data, studies, and other information, there is scientific consensus that the CEMEX sand mining operation at Lapis Road is causing significant injury to public and private property along the southern Monterey Bay. That injury rises to the level of, and constitutes, a public nuisance under sections 3479 and 3480 of the California Civil Code. First, the scientific evidence shows that CEMEX's operation of the Lapis Sand Mine is "a substantial factor to the harm suffered" by the public and private coastal property owners. *Ileto v. Glock, Inc.*, 349 F.3d 1191, 1212 (9th Cir. 2003). Second, the CEMEX sand mining operations are causing a significant invasion of and interference with the use and enjoyment of public and private property, and the evidence demonstrates that the gravity of the harm caused by the mining operations outweighs the utility of the conduct. *See People ex rel. Gallo v. Acuna*, 14 Cal. 4th 1090, 1105 (1997). As the State Lands Commission's May 16 letter explained: "Longstanding California Supreme Court mining case law holds that, when the customary and previously legitimate activities of a business develop into a condition that threatens public and private rights, such a customary activity is no longer reasonable and may be found to be a nuisance." *People v. Gold Run Ditch and Mining Company*, 66 Cal. 138, 150-151 (1884); *Pacific Gas* & *Electric* Co. *v.* Scott, 10 Cal. 2d 581, 585 (1938).[1]

[1] The City is aware that CEMEX has submitted to the Coastal Commission a vested rights claim under the Coastal Act seeking to continue operating without a coastal development permit, but that claim does not affect the City's analysis here. From the publicly-available evidence, there is considerable doubt that the Lapis Sand Mine can satisfy the requirements to establish a vested right to operate the facility without permits. In any event, the existence of a vested right does not affect or defeat the City's analysis and determination as to whether the facility operations constitute a public nuisance. *See, e.g., Davidson v. Cnty. of San Diego,* 49 Cal. App. 4th 639, 649, 56 Cal. Rptr. 2d 617, 622 (1996) ("vested rights . . . may be impaired or revoked if the use authorized or conducted thereunder constitutes a menace to the public health and safety or a public nuisance.")

Given these facts, City staff recommends that the City Council authorize the City Attorney to pursue the possibility of commencing action or proceedings for abatement of a public nuisance pursuant to section 731 of the California Code of Civil Procedure.

CEMEX's Failure to Comply with Reporting Requirements

Section 17.41.260 of the Municipal Code requires "all operators of existing mining operations" to submit to the planning department (1) a brief statement specifying the approximate annual volume of sand being removed and (2) an accurate cronaflex ortho-topographic map by January 1st of every year, "[i]n order to establish reference base data for the purpose of determining whether or not any particular mining activity constitutes new mining activity and to monitor shoreline erosion." City records indicate, however, that the Lapis Mine has not complied with local requirements to report extraction amounts and other information on operations since last reporting on 1991 extraction amounts in 1992. City staff recommends that the City Council authorize the City Attorney to pursue the possibility of commencing action or proceedings for abatement due to CEMEX's continued violations of the reporting requirements under section 17.41.260.

CEMEX's Failure to Obtain a Coastal Development Permit

The Coastal Act and the City's Local Coastal Program (LCP) Implementation Plan provide that any development in the coastal zone may proceed only after obtaining a coastal development permit. Cal. Pub. Res. Code § 30600(a); City of Marina LCP Implementation Plan at 9, n.2. Development is defined broadly in both the Coastal Act and in Marina's LC P to include such activities as grading, removing, dredging, mining or extracting any materials, disposing of any dredged material, changing the intensity of use of land, or reconstructing or altering the size of any structure. Cal. Pub. Res. Code § 30106; LCP Implementation Plan at 15. The Coastal Commission has confirmed that "development has occurred and continues to occur" at the CEMEX Lapis Sand Mine site in Marina without a coastal development permit. Cal. Coastal Commission Notice of Intent at 4. The Lapis Sand Mind is located in the Coastal Conservation and Development District, and CEMEX has not obtained a coastal development permit from the City of Marina. Finally, no coastal development permit exemption in the Coastal Act or LCP applies to the property or operations. In fact, the Municipal Code and the LCP both expressly provide that dredge ponds located in the Coastal Conservation and Development District—the district in which CEMEX sand mine is located—are considered a conditional use and require a coastal development permit. *See* Marina Municipal Code § 17.25.030; *see also* LCP Implementation Plan at 19. Accordingly, City staff recommends that the City Council authorize the City Attorney to pursue the possibility of commencing action or proceedings for abatement under section 17.25.030 of the Municipal Code to require a coastal development permit for any future mining activities.

<u>ANALYSIS OF IMPACTS FROM SAND MINING</u>:

For the past several decades, the CEMEX Lapis Sand mine has been removing approximately 47 to 63 percent of the local beach sand in southern Monterey Bay annually. Young Report at 8. This volume of extraction—on average between 150,000 m^3 and 205,000 m^3 of sand annually—is the equivalent of removing approximately 20,000 to 30,000 dump trucks loads of sand from the beach each year. Removing this volume of sand from the local sand supply "budget" has contributed significantly to shoreline erosion rates in the southern Monterey Bay, which are higher than anywhere else in along the California coast. Sand mining has damaged public and private property, jeopardized public health and safety, impeded public access, and shrunk beaches, causing habitat loss, impairing already threatened species, and reducing the amount of beach available for recreational use.

The Southern Monterey Bay Littoral Cell

The CEMEX mine is located within the southern Monterey Bay littoral cell, a relatively self-contained section of coast from Moss Landing in the north to Monterey in the south within which sand circulates. A littoral cell, or a Sand Sharing System, "is based on the uncontroversial science-based concept that sand is constantly being exchanged from one coastal feature to another: from dunes to the beach, from one stretch of shoreline to the next, from the beach to the nearshore sand bars." Young Report at 3. Littoral cells are separated from each other by topographical features like rocky headlands or submarine canyons that block the exchange of sand. "Removal of sand from the system will impact all portions of the system eventually." Young Report at 3.

The southern Monterey Bay littoral cell has been divided into a few sections, or sub-cells. Young Report at 3; K. Patsch and Gary Griggs, *Development of Sand Budgets for California's Major Littoral Cells. California Coastal Sediment Management Workgroup* (2007) (Attachment J). The Lapis Sand Mine sits approximately in the middle of the Central sub-cell of the southern Monterey Bay, stretching from the Salinas River to Sand City in the south.

Sediment budget: Sand Inputs and Outputs in the Southern Monterey Bay

A sand budget is useful for understanding beach processes and the impact of sand mining. In a sand budget, the sand inputs and outputs are measured as closely as possible: "If there is a balance between sand entering and leaving the beach, then the beach maintains its shape. If there is an imbalance in sand moving in and out of the beach, then it either grows or shrinks, depending upon which process prevails." D. Smith, et al., *Are "stable shorelines" and "broad beaches" mutually exclusive management goals along southern Monterey Bay?* The Watershed Institute, California State University Monterey Bay, Report WI-2005-09, 23 (2005) (Attachment K). "The analytical process is the same as managing a checkbook and bank account, where the volume of beach sand at any point in time represents the amount of money in the bank. Creating a sand budget can also allow predictions to be made about the likely result of various coastal management options." *Id.*

The most recent sand budget for the southern Monterey Bay littoral cell that looks at the inputs and outputs of beach sand[2] shows that in the Marina area, sand mining is the only significant sink (or loss) of beach sand in the sand budget. E.B. Thornton, *Temporal and spatial variations in sand budgets with application to southern Monterey Bay, California*. Marine Geology 382, 56–67 (2016) (Attachment L); Young Report at 6. The predominant source of sand to the southern Monterey Bay littoral cell is from coastal dune erosion: "sand within this cell moves from dunes to the beach as the shoreline recedes." PWA at E-7; Young Report at 5. Dunes contribute most

[2] For purposes of this discussion, "beach sand' means sand that feeds the beaches because it is coarse enough to stay on the beach rather than being blown into the dunes or transported offshore. This coarse beach-sized sand is the kind of sand that CEMEX mines. Young Report at 5.

of the sand to the Central sub-cell—an estimated 155,000 cubic meters/year. Young Report at 5. The Salinas River only contributes a small amount of sand—8,000 to 34,000 cubic meters/year. PWA at E-7, 31; Thornton, 2016 at 61; Young Report at 6. "Sand mining that removes sand from this active system becomes a permanent sink— taking away sand that will never return." Young Report at 6.

CEMEX Sand Extractions

Although there appear to be year-to-year fluctuations in mining levels at the Lapis facility, studies and estimates based on CEMEX's self-reported extraction data suggest that CEMEX extracts between 153,000 and 205,000 cubic meters of beach sand each year. Young Report at 8. The total sand volume exchanged annually in southern Monterey Bay is estimated at approximately 326,000 cubic meters per year. Young Report at 7 (citing Thornton, 2016). "Therefore, sand mining at the Lapis site is removing approximately 47% to 63% of the local sand budget." Young Report at 8.

According to one recent analysis, if the Lapis Mine were closed, beach erosion between Moss Landing and Point Pines in Monterey would "decrease by at least 60 percent." ESA PWA at 109. Based on these and other figures, various studies conclude that the Lapis Sand Mine is a leading or primary contributor to shoreline erosion in southern Monterey Bay. *See, e.g.*, Pohl at 5 ("[T]he main factor exacerbating shoreline erosion in southern Monterey Bay is hydraulic sand mining from the beach at the Lapis mine in Marina."); ESA PWA at 108 (explaining that one study "concluded that sand mining had greatly increased coastal erosion in southern Monterey Bay," and another concluded that the CEMEX Mine is "a primary cause of high erosion rates in" the Bay).

Connection Between Sand Mining and Coastal Erosion

Multiple studies looking at long-term average erosion rates show that erosion rates have increased dramatically over the last century in the southern Monterey Bay and are now higher than anywhere else in California. Young Report at 10; C. Hapke et al., *National assessment of shoreline change part 3; historical shoreline change and associated coastal land loss along sandy shorelines of the California coast.* U.S. Geological Survey Open-File Report. 2006-1219 (2006) (Attachment M). In the first half of the twentieth century, erosion rates were approximately 1.0 foot per year; by the end of the twentieth century, erosion rates had risen to an estimated 4.15 to 4.7 feet per year. Young Report at 10; Hapke, 2006; E.B. Thornton et al., *Sand mining impacts on long-term dune erosion in southern Monterey Bay*. Marine Geology 229 (1–2), 45–58 (2006) (Attachment N).

Table 1 below, taken from a 2008 study prepared for the Association of Monterey Bay Area Governments, helps illustrate the connection between sand mining activity and harmful coastal erosion. On a decade-by-decade basis, it compares beach sand extraction with average erosion rates at Marina State Beach.

Table 1: Beach sand extraction and erosion rates at Marina State Beach

Decade	Sand Mined from Beach (yd^3/year x 1000)	Average Erosion Rate at Marina State Beach (ft/year)
1940s	20	
1950s	40	
1960s	84	1.0
1970s	129	
1980s	143	
1990s	200	4.7
2000s	200	

Source: PWA, Table 14 at 87(with data from Thornton 2006)

As this table illustrates, removing sand "at these volumes over the long term from a relatively closed littoral cell necessarily causes a negative impact on the coastal systems within that cell." Young Report at 9. Sand mining induces erosion by reducing the available sand supply to downcoast beaches in the littoral cell. "Less sand moving along the coast can decrease beach widths, which allows waves to more readily attack back-beach dunes and erode the coast." R. Stamski. *Coastal Erosion And Armoring In Southern Monterey Bay*. A Technical Report in support of the Monterey Bay National Marine Sanctuary Coastal Armoring Action Plan, Vers. 1.1., 13 (2005) (Attachment O). Conversely, cessation of extraction mining positively impacts sand supply and reduces erosion: in Sand City, erosion rates decreased after three mining sites, which extracted a total average of approximately 84,000 cubic meters per year, were closed between 1970 and 1990. PWA at E-7.

Given the lack of data supporting any other major sand sinks or large impediments to sand sources, there is no explanation for the anomalously high erosion rates in southern Monterey Bay other than sand extraction from the littoral zone at the Lapis Mine. Young Report at 11. And, "unless there is some major change in the sand budget," the shoreline of southern Monterey Bay will continue to erode. G. Jones, G and G. Griggs, *Erosion along an "Equilibrium Coastline," Southern Monterey Bay, California* in in California's Battered Coast: proceedings from a Conference on Coastal Erosion, San Diego, 106 (February 6-8, 1985) (Attachment N).

Impacts of Erosion on Public and Private Property[3]

Erosion results in "high economic" and "high environmental" consequences, negatively impacting public safety and placing facilities in danger. PWA at 51–53. "Erosion compromises the ability of the beaches and dunes to buffer oceanfront development and infrastructure from storms and flooding, to provide vital natural habitat, and to successfully accommodate recreation and tourism." PWA at 1. The CEMEX Lapis Sand Mine is responsible for about two feet of erosion per year in the southern Monterey Bay. ESA PWA at 88. Thus, an additional 4.36 acres of beach space disappears each year that the CEMEX Mine continues to operate. Pohl at 8. The annual recreational value of Monterey Bay beaches affected by erosion due to the CEMEX Mine is nearly $1.1 million. Pohl at 8.

The detrimental impacts from erosion to public and private property in the southern Monterey Bay have been well documented. In 2004, Stillwell Hall (part of Fort Ord), just sound of the CEMEX operation, was demolished due to years of high erosion rates that threatened the structure and cut off public lateral access along the beach. From 1982 through1998 alone, the shoreline in front of Fort Ord eroded 70 feet. PWA at 37, 92.

Figure 1: Fort Ord

Photo taken: Unknown (pre-2004)

Photo taken: October 28, 2005; California Coastal Records project by Kenneth and Gabrielle Adelman

Source: PWA at 93

Other critical areas of erosion—those areas at the highest risk for potential loss of facility, potential loss of habitat, and human health and safety issues—in southern Monterey Bay include: the Sanctuary Beach resort, the Marina Coast Water District facilities, Sand City, the Seaside Pump station, Monterey Beach resort, Ocean Harbor House Condominiums, and La Playa Street. *See* PWA at 51–66.

[3] While this staff report summarizes some of the available literature and the conclusions of the independent Young Report, there are other publicly-available photographic documentation and technical analyses that support the same conclusion. Some of these other sources are collected in Attachment P.

Table 2: Critical Areas of Erosion in Southern Monterey Bay

Location	Summary of Facility	Erosion Rate (ft/year)	Risk of Erosion	Consequences of Erosion
Sanctuary Beach Resort near Reservation Road	Vacation complex approximately 120 feet from the bluff top	~5.5	High (compromised in approximately 20 years)	High economic
Marina Coast Water District buildings near Reservation Road	Office buildings approximately 70-90 feet from the bluff top	~5.5	High (compromised in approximately 15 years)	High economic (if buildings are converted to other uses)
Sand City and Tioga Avenue west of Highway 1	Bluff top road, storage facility, Highway 1, and proposed hotel developments, and desalination wells	~3.5	High (seaward end of Tioga Avenue eroding)	High environmental safety economic
Seaside Pump Station at Bay Avenue	Raw wastewater pump station approximately 100 feet from the bluff top	~3.0	High (compromised in approximately 30 years)	High economic environmental human health
Monterey Interceptor between Seaside Pump Station and Wharf II	Raw wastewater pipeline approximately 115 to 175 feet from the bluff top or buried mid-beach	~1.0-3.0	High to moderate (some dune portions compromised in approximately 40 years; beach sections exposed in winter)	High economic environmental human health
Monterey Beach Resort, Highway 1 and Resort Access Road	Hotel on Del Monte Beach, Highway 1, and hotel access road	~1.5	High (erosion compromising fronting seawall)	High economic safety
Ocean Harbor House Condominiums/Del Monte Beach Subdivision	Condominium complex and adjacent family homes on the bluff top	~1.0-1.5	High (erosion compromising fronting riprap and homes to the west)	High economic safety
Monterey La Playa Town Homes at La Playa Street	Homes, one of which is 30 feet from the bluff top	~1.0	High to moderate (some homes compromised in approximately 30-50 years)	High economic

Source: PWA Table 11 at 53.

The eight oceanfront facilities in southern Monterey Bay listed in the Table 2 above will require substantial mitigation efforts in the coming decades to prevent (or at least delay) destruction from beach erosion. PWA at 51–66 (detailing each of the properties). A 2012 study estimates that the total costs of revetments necessary to combat the CEMEX Mine's adverse effects will top $700 million. ESA PWA at 112–13.

And, as suggested in the photographs below, seawalls and revetments may not be sufficient to protect these and at-risk facilities, in part because such hardening or armoring efforts tend to exacerbate coastal erosion. Young Report at 11. When the Ocean Harbor House condos pictured below were built in 1968, the condos were on top of the dunes and did not need the protection of a seawall. PWA at 62. In 1984, after significant beach erosion had taken place, the owners constructed a 55-foot deep concrete retaining structure and installed reinforced grade beams to buttress the condos. *Id.* at 63. In 2002, the condo association arranged for emergency riprap to be placed on the beach to protect the front row of houses and approved construction of a seawall. *Id.* These "improvements" cost $4 million, and the condo association was assessed an additional $5.3 million mitigation fee by the Coastal Commission to compensate the public for the wall's future contributions to beach erosion. *See Ocean Harbor House Homeowners Ass'n v. Cal. Coastal Comm'n*, 163 Cal. App. 4th 215, 224 (2008) (upholding the record-setting mitigation fee).

Figure 2: Erosion in front of Ocean Harbor House Condominiums

Source: Gary Griggs. Left: Ocean Harbor House in 1975; Right: Ocean Harbor House in 2003

Similarly, when the Monterey Beach Resort, pictured below, was built in 1968, a large beach existed in front of the hotel. PWA at 60. Since then, it has eroded to such a degree that the hotel has become a headland. *Id.* Beach level has dropped by three feet and there is no longer beach access in front of the hotel during high tides. *Id.* at 61. In 2008, the hotel's 600-foot seawall underwent major renovations at an estimated cost of $4.5 million, with an annual maintenance cost of $37,000. *See* California Department of Boating and Waterways, Economic Costs of Sea-

Level Rise to California Beach Communities 45 (undated, but published in 2011 or thereafter) (estimating costs of seawalls in Northern California to be $7200 per foot in 2010 dollars), available at http://www.dbw.ca.gov/PDF/Reports/CalifSeaLevelRise.pdf; *see also* Pohl at 9.

Figure 3: Erosion in front of Monterey Beach Resort

Source: Gary Griggs

As these two examples graphically illustrate, beach erosion along the southern Monterey Bay has accelerated in recent decades, causing significant ongoing injury to both private and public property. As the existing scientific literature concludes, permanent loss of approximately one-half of the coarse beach sand from the littoral cell as a result extraction operations at the Lapis Sand Mine in Marina is a major contributor to this harm.

Habitat and Wildlife Impacts from Sand Mining and Erosion

Sand mining also significantly and negatively affects habitat and wildlife. The CEMEX Lapis Mine property contains critical habitat for native plants, including the federally threatened Monterey spineflower, the state and federally endangered Yadon's wallflower, and the coast wallflower. Cal. Coastal Commission Notice of Intent at 6. The federally endangered Smith's blue butterfly and the federally threatened Western snowy plover are also present and critical habitat for these species exists on the property. *Id.* Unpermitted sand extraction and the use of mechanized equipment, including the dredge, create noise and physical disturbances that impact these species and degrade their critical habitat. *Id.*

Downcoast erosion from mining also contributes to the loss of critical habitat for these and other species. There are many unique and sensitive areas of southern Monterey Bay that provide habitat for imperiled species and native plants. California grunion spawn on the beaches in southern Monterey Bay and Western snowy plovers nest and rear their young on the beaches. PWA at 67-75. As erosion from sand mining causes the beaches to narrow, these species become further threatened. Reduced beach area as a result of sand mining also compromises haul-out areas for harbor seals and sea lions, roosting areas for shorebirds, pelicans, and gulls, and habitat for a variety of invertebrate species such as crustaceans.

Public Access Impacts from Sand Mining and Erosion

Increased erosion and narrower beaches caused by sand mining adversely affect access to and use of public tidelands and beaches. Erosion can cause steep scarps, making vertical beach access difficult. Beaches narrowed by erosion reduce lateral access, especially as sea levels rise and where the beach is backed by a hard structure, effectively eliminating the sandy beach area and impeding recreational uses of the public tidelands for recreation and other purposes. Cal. Coastal Commission Notice of Intent at 6. Figures 1 and 3 above of Stillwell Hall and Monterey Beach Resort provide examples of how lateral beach access is eliminated at certain tides and times of year. Reduction in beach width also impairs and injures uses by the public of the dry sand area on nearby publicly-owned beaches.

Figure 4: Rapidly Eroding Shoreline within City of Marina

Source: Young Report at 9

Public Health and Safety Impacts from Sand Mining and Erosion
CEMEX operations at the Lapis Sand Mine have reduced the amount of sand on the Monterey Bay shoreline, causing the beaches within Monterey Bay to become narrower. Narrow beaches, in turn, mean that existing development is closer to wave action, leading to greater susceptibility to erosion and inundation from wave action and storms. This negative impact implicates public health and safety in connection with existing public infrastructure such the storm drain system, the regional wastewater treatment plant, Marina Coast Water District facilities, and Highway 1 and other roads downcoast of the Lapis Sand Mine. Cal. Coastal Commission Notice of Intent at 6. With increased erosion, revetments and rebar can become exposed, posing a safety hazard for beachgoers. In addition, outfall pipes, CalAm slant wells and other infrastructure that are supposed to be buried under the sand have also been exposed as a result of beach sand erosion, which is a visual blight in addition to being potentially hazardous to the public.

Figure 5: Erosion exposing storm drain outfalls on Former Fort Ord

Source: David Norris, Sep. 2002 (from Smith et al 2005)

Sea Level Rise Will Exacerbate These Issues
The impacts of erosion in the southern Monterey Bay will be exacerbated by climate changes and sea level rise. Studies indicate that "over the next 50 years, sea level rise will increase erosion by about 40 feet (0.8 ft/year)," an increase of approximately 20-25 percent over recent erosion rates (approximately 3-4 ft/year). PWA at 40. Over the next 100 years, erosion will increase by an additional 80 feet (1.6 ft/year), an increase of 40-50 percent over recent erosion rates. *Id.* These natural background conditions make any loss of beach sand from the littoral cell even more problematic. Sound coastal planning and management require that the City take appropriate action to minimize ongoing damage to both the public interest and private property caused by extraction of beach sand from the nearshore and public tidelands.

CONCLUSION:

This request is submitted for City Council consideration and possible action with regard to the five recommendations set forth on page 1 of this report.

Respectfully submitted by:

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Molly Melius
Stanford Environmental Law Clinic

An Evaluation of the Ongoing Impacts of Sand Mining at the CEMEX Lapis Sand Plant in Marina, California on the Southern Monterey Bay Shoreline

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<u>Purpose and Overview:</u> The City of Marina commissioned this report to assist in its management and decision-making for coastal property and resources within the City's jurisdiction. Consistent with that purpose, this report provides a review and synthesis of available documentary information and scientific literature addressing the impact of current sand mining activities within southern Monterey Bay. To assist in preparation of this report, in March 2017, the author visited the Lapis Sand Mine, the site of current beach sand mining activities in the City of Marina. It is my understanding that the Lapis Sand Mine is the only coastal mining activity in Monterey County at this time, and that other sand mining operations that previously operated along the Monterey Bay shoreline ceased operations in the late 1980s. Accordingly, all references to ongoing beach sand mining in this report are to the Lapis Sand Mining operation in the City of Marina.

This report is intended for an informed lay audience and, in particular, for City of Marina officials seeking to base coastal management decisions on the best available science. It provides a distillation of the most relevant facts and science related to the basic question: "Are sand mining activities at the Lapis Sand Mine (Figure 1) impacting the sediment budget and shoreline change rates in the vicinity of the mine?" Based on my review of the available information, data, and scientific literature, I conclude that beach sand extraction by the Lapis Sand Mine constitutes a significant source of sand loss from the southern Monterey Bay central littoral cell and, as a result, is causing or contributing to significant adverse effects on coastal property, resources, and uses.

The portions of southern Monterey Bay shoreline have the highest erosion rates in the state. None of the documents reviewed for this report can offer any explanation for these anomalously high erosion rates beyond the sand extraction from the littoral zone at the Lapis Mine. The overwhelming evidence leads me to conclude that continued sand mining activities have led to a substantial sand deficit in southern Monterey Bay. This sand deficit is driving these anomalously high rates of coastal erosion. In order to grapple with the serious erosion problems in southern Monterey Bay, I recommend that the

City of Marina pursue options to stop beach sand mining activities at the Lapis facility.

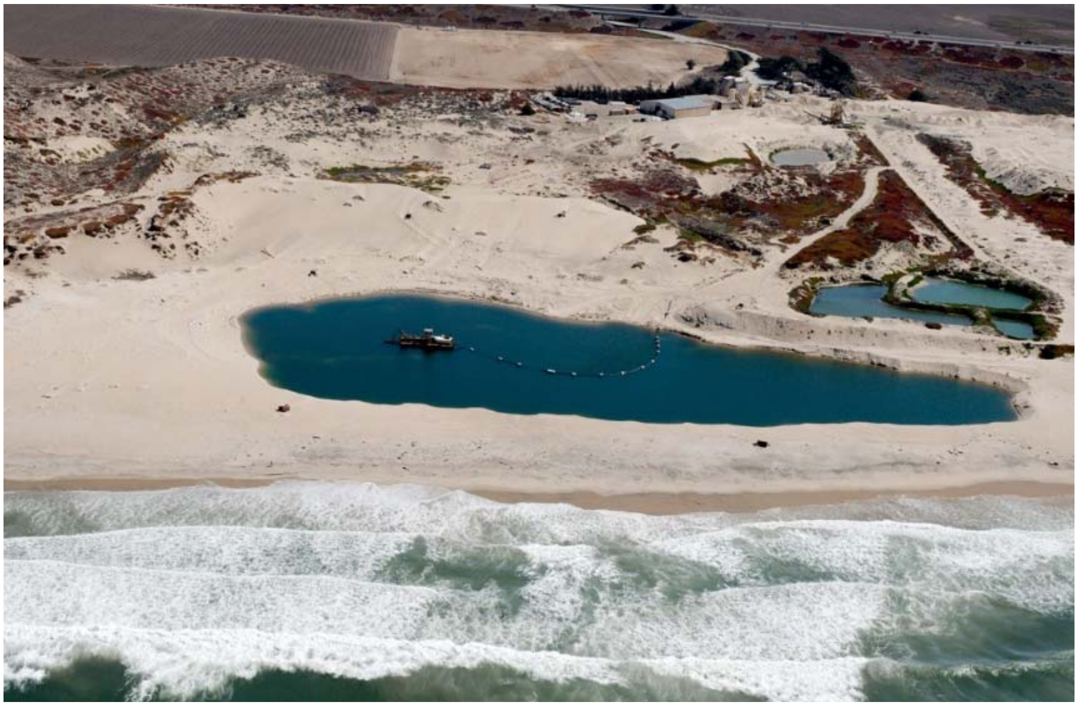

Figure 1. Aerial view of the Lapis Sand Plant, Marina, CA.

Introduction: Sand is to beaches and shorelines, as water is to western urbanization and agriculture. Sand moves between sources and temporary sinks. Preserving this sand and its movement is the key to maintaining the broad coastal economy, providing storm protection to infrastructure and shoreline development, ensuring recreational use of a state's beaches, and protecting coastal ecosystems. This free movement of sand between sources and sinks is commonly referred to as the **Sand Sharing System**. Many legislative and rule-making bodies have codified the importance of the Sand Sharing System. [1]

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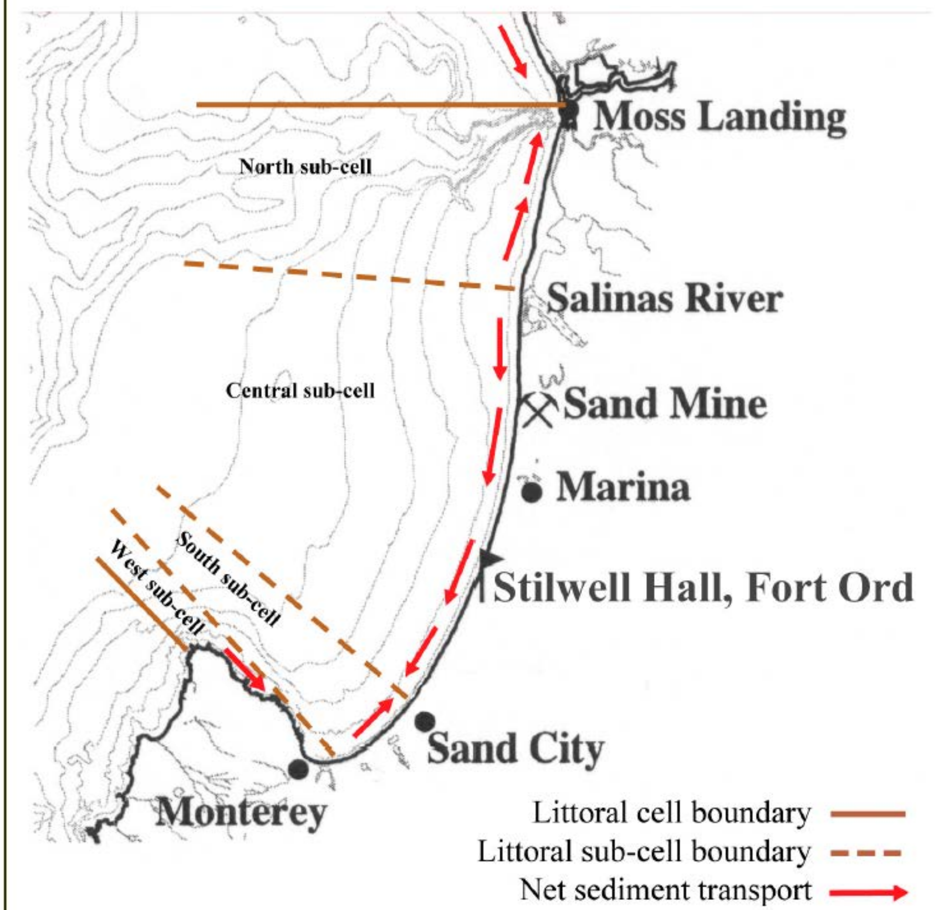
[1] For example, the State of Georgia Code § 12-5-231 (2015) reads:

> *The General Assembly finds and declares that coastal sand dunes, beaches, sandbars, and shoals comprise a vital natural resource system, known as the sand-sharing system, which acts as a buffer to protect real and personal property and natural resources from the damaging effects of floods, winds, tides, and erosion. . . . The General Assembly further finds that this sand-sharing system is a vital area of the state and is essential to maintain the health, safety, and welfare of all the citizens of the state. . . . It is declared to be a policy of this state and the intent of this part to protect this vital natural resource system by allowing only activities and alterations of the sand dunes and beaches which are considered to be in the best interest of the state and which do not substantially impair the values and functions of the sand-sharing system and by authorizing the local units of government of the State of Georgia to regulate activities and alterations of the ocean sand dunes and beaches . . . .*

This Sand Sharing System is based on the uncontroversial, science-based concept that sand is constantly being exchanged from one coastal feature to another: from dunes to the beach, from one stretch of shoreline to the next, from the beach to the nearshore sand bars. Removal of sand from the system will impact all portions of the system eventually.

The Sand Sharing System can be described by the development of a sediment budget. Sediment (sand) budgets are important tools in understanding regional sand supply, loss, and movement. Best and Griggs, 1991; Rosati, 2005. A sand budget itemizes and quantifies the sources (inputs), sinks (outputs), and movement of the sand within a littoral cell. A littoral cell is a relatively self-contained section of coast where the sand circulates, i.e "a defined length of shoreline along which the cycle of sediment erosion, transportation, and deposition is essentially self-contained." Philip Williams & Associates, 2008 at 21. Littoral cells are separated from each other by features that block the exchange of sand, like a rocky headland. The south Monterey Bay shoreline has been divided into sub-cells, which are essentially delineated by differing sand transport directions (shown in Figure 2). Patsch and Griggs, 2007. The Lapis Mine sits approximately in the middle of the Central sub-cell, stretching from the Salinas River to Sand City in the south. The basic sources and sinks within this sub-cell are listed in Table 1.

Numerous researchers have quantified the sediment movement within the southern Monterey Bay littoral cell. The sediment budgets in these studies vary depending on the area within Monterey Bay they are considering and the type of sediment being quantified (e.g. beach sand vs. all sediment). Patsch and Griggs, 2007; Jones and Griggs, 1985; Smith, 2005; Philip Williams & Associates et al., 2008; Thornton, 2016. However, all of the studies conclude that sand mining removes a significant amount of sand from the sand budget and is contributing to shoreline erosion.



Note: Net is defined as southward minus northward transport and is smaller than the gross transport (defined as northward plus southward transport). Gross transport occurs across the net transport convergence at Sand City (across the central and south sub-cell boundary)

Figure 2. Southern Monterey Bay Littoral Sub-Cells and Net Sediment Transport. Source: Figure 12 from Philip Williams & Associates et al. (2008).

The most recent sediment budget for the Central sub-cell was presented by Thornton (2016) and is summarized in Table 1. It is significant that these data are presented in the peer-reviewed scientific journal, *Marine Geology*. This offers a high level of confidence in the data quality. This sand budget is useful because it is focused on the Central sub-cell and considers only beach compatible sand. Thornton's recent sediment budget indicates that the biggest source of sand in the southern Monterey Bay is from dune erosion. However, only about 25% of the dune sand is coarse enough to stay on the beach; the remaining 75% of the finer grained sand ends up being transported offshore (or blown back into the dunes). Thornton, 2016. Because CEMEX mines the coarse beach sand tracked in his budget, Thornton's 2016 budget is the most appropriate sediment budget to use for the purposes of determining the sources and sinks of the sand that feed the beaches in the City of Marina.[2]

Table 1. Sand budget for SMB central sub-cell.[3] Values in m^3/year × 10^3. Uncertainties are presented with the values. Source: Table 2 from Thornton (2016).

	1940–1989	1989–2011
Mean recession (m)	−1.0	−1.3
Dune erosion	190	155
Dune erosion × compatibility factor, 0.25	48 ± 5	39 ± 4
Beach erosion	105 ± 9	127 ± 11
River input	56 ± 6	34 ± 3
Littoral transport in from south	20 ± 4	10 ± 2
Littoral transport in from south × 0.29	6 ± 2	3 ± 1
Sand mining	−174 ± 43	−205 ± 50
Residuals	41 ± 69	−2 ± 71

Dunes contribute an estimated sand volume of 155,000 cubic meters/year to the littoral system. Thornton 2016. There is also a small sediment input to the Central sub-cell system from the Salinas River that has decreased through time.[4] The sand input to the Central sub-cell from riverine sources is relatively modest – about 34,000 cubic meters/year – because most sand from the Salinas River is transported north.[5] Thornton, 2016; Patsch and Griggs, 2007.

[2] Only sand with a grain size greater than .25 mm typically stays on the beach. Thornton, 2016. This coarse beach size sand is the type of sand that CEMEX mines. Thornton, 2016. Therefore, other broader sediment budgets showing large amounts of sand being lost offshore are not relevant to the analysis of impacts from sand mining. See, e.g., Philip Williams & Associates et al., 2008 at 46.

[3] Beach sand budgets were calculated for two time periods to examine the impact of sand mining: "The first budget is calculated from 1940 to 1989 during the time of intensive drag-line sand mining of the surf zone focused on the south end of the littoral cell. The second budget is calculated from 1989 to 2011 after all the drag-line mines were closed leaving only a dredge pond mining operation at the north end of the littoral cell." Thornton, 2016.

[4] Two dams, built in 1941 and 1961, are estimated to have reduced the total annual sediment input from the Salinas river by 33%. Willis and Griggs, 2003. However, this does not have a major impact on the Central sub-cell sand budget since most of the sand from the Salinas is "is driven northward by the dominant littoral drift" and is eventually carried into the Monterey Submarine Canyon. Patsch and Grigggs, 2007.

[5] Other studies estimate an even lower volume of sediment – less than 8,000 cubic meters – traveling south from the Salinas river. Philip Williams & Associates et al., 2008.

Sand within this cell moves from dunes to the beach as the shoreline recedes. It also moves back and forth along the shore by waves (this is known as longshore sediment transport or littoral drift). But, for the most part, the sand remains in the cell as a part of the Sand Sharing System, maintaining a balance that stabilizes the shoreline and the beaches. If there is a balance between sand entering and leaving the beach, then the shoreline position will remain stable. If there is a deficit of sand entering the beach, the shoreline will move landward, or erode. Sand mining that removes sand from this active system becomes a permanent sink— taking away sand that will never return. Thornton (2016) finds that sand mining is the only significant sink (or loss) of beach size sand in the sand budget for this sub-cell.

<u>Impacts of sand mining:</u> There is no scientific dispute that removing sand from the active Sand Sharing System will decrease the amount of sand available for building and maintaining beaches. The question for setting policy direction is whether such removal is significant enough to have a long-term effect on shoreline position, beach volume, and beach/dune erosion. The first step in understanding the potential impact of the sand removal at the Lapis Mine is to determine if the sand is actually being removed from the active Sand Sharing System (from the littoral zone).

All of the available evidence shows that sand is being removed from the littoral zone. The dredging activity relies on a suction dredge operating in an artificial lagoon immediately adjacent to the beach. The lagoon is filled during coincident high tides and large waves, and the sand is removed by the dredge for processing. The sand filling the lagoon comes directly from the beach and nearshore immediately in front of the mine (Figure 3). The lagoon also traps sand that is moving in either direction along the beach. During a site visit by the author in 2017, recent storm waves had clearly reached well past the seaward portion of the lagoon (Figure 4). The visible wrack line was across the footprint of the lagoon. It is clear that the sand repeatedly filling the lagoon could not be coming from anywhere else other than the adjacent beaches and nearshore. Numerous peer-reviewed papers examining the sediment budget of southern Monterey Bay support the conclusion that the sand being removed at the Lapis Mine is coming from the local Sand Sharing System; and thus, it is a permanent, annual sink (deficit) in the littoral cell sand budget. Patsch and Griggs, 2007; Jones and Griggs, 1985; Smith, 2005; Philip Williams & Associates et al., 2008; Thornton, 2016.

Figure 3. Image of the sand mining operations at the CEMEX Lapis Mine. Note the fact that waves are pouring over the berm and into the lagoon. Effectively, the mining here is occurring in the active surf zone. Photo credit: Gary Griggs

Figure 4. In a March 2017 visit to the site, the author noted that the lagoon had been filled by storm waves and heavy equipment. The high tide wrack lines crossed the tracks of the equipment and the outer edge of the lagoon footprint.

The Lapis Sand Mine has not provided current extraction volumes to the City of Marina, nor publicly shared annual extraction information. Thornton (2016) estimated the sand removal to be approximately 205,000 cubic meters per year based on a CEMEX Annual Report from 2000. The Coastal Regional Sediment Management Plan for Southern Monterey Bay (Philip Williams & Associates et al., 2008) used an estimate of around 153,000 cubic meters per year. Both numbers represent a significant removal of sand from the littoral cell. It is important to keep in mind that these numbers represent average, annual removal. It is likely that the sand volume mined each year has fluctuated from slightly below to above this average rate range. As Table 1 indicates, the total sand volume exchanged annually in the sub-cell is estimated at approximately 326,000 cubic meters per year. Therefore, sand mining at the Lapis site is removing approximately 47% to 63% of the local sand budget.

To put these numbers in perspective, the Lapis mining operation is removing somewhere around 750,000 to just over 1 million cubic meters of sand every five years. This is the equivalent of a large beach nourishment project for many beaches in the United States. For example, a proposed U.S. Army Corps of Engineers beach nourishment project along an eroding stretch of the Southern California coast would (1) initially place 260,000 cubic meters of replacement sand on the Encinitas beach, with 168,000 cubic meters of replacement sand added every five years and (2) initially place 535,000 cubic meters of sand along Solana Beach, with planned renourishment of 221,000 cubic meters every ten years.[6] The projected cost for this project is $165 million, with annual costs of over $3.5 million.[7] Given the costs of such projects, it is difficult, from a public policy perspective, to justify a similar beach nourishment effort along the similarly erosive southern Monterey Bay coast when the Lapis Sand Mine will quickly offset any replenishment benefits by sand removal for commercial profit.

Evidence of impact: Removal of sand at these volumes, over the long term, from a relatively closed littoral cell necessarily causes a negative impact on the coastal systems within that cell. Because the longshore sediment transport rates in southern Monterey Bay are small (on the order of 10,000 to 20,000 cubic meters per year) relative to the amount of material being removed annually at the Lapis

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[6] See U.S Army Corps of Engineers Project Description (numbers converted from cu yards to cu meters): http://www.spl.usace.army.mil/Missions/Civil-Works/Projects-Studies/Solana-Encinitas-Shoreline-Study/.

[7] Cost estimates are the most recent numbers in the media from December 2016: http://www.thecoastnews.com/2016/12/15/federal-funding-for-50-year-sand-project-approved/.

Sand Mine, the greatest sand deficit will be closest to the mine, within the municipality of Marina (Figure 5). Thornton, 2017; Philip Williams & Associates et al., 2008.

Figure 5. Typical section of rapidly eroding shoreline with the City of Marina.

A comprehensive evaluation of coastal erosion rates for the State of California conducted by the United States Geological Survey (Hapke et al., 2006) shows that the Central sub-cell has the highest erosion rates in the state (Figure 6).[8] Hapke et al. (2006) and other studies looking at long-term average erosion rates show that erosion rates have increased dramatically over the last century in the southern Monterey Bay. This is illustrated by how much higher recent erosion rates are than long-term erosion rates. For Marina State Beach, Hapke et al. (2006) calculated an average erosion rate from 1910-2002 of 1.4 to 2.0 ft/yr and from 1970 to 2002 of 3.1 to 5.2 ft/year.[9] Other studies support the increasing trend

[8] Hapke et al. (2006) calculated an average erosion rate from 1970 to 2002 of 4.0 ft/year for southern Monterey Bay between the Salinas River and Monterey. Thornton et al., 2006 estimated approximately 3.0ft/year of erosion from 1985 to 2005. Smith (2005) calculated erosion rates in southern Monterey Bay at 1m/yr (3.28 ft/yr).

[9] These results are broadly consistent with the erosion rate results in Thornton et al. (2006). Thornton et al., (2006) estimated approximately 1.0 ft/year of erosion in Marina from 1940-1985 and 4.7 ft/year of erosion in Marina from 1985 to 2005.

in erosion rates in southern Monterey Bay over the past century. Thornton, 2006; Jones and Griggs, 1985. The difference between the long-term erosion rates (which include a period of time before sand mining and older mining methods before the suction dredge) and the short-term erosion rates (including only the period of modern mining with current sand extraction amounts) in Hapke et al. 2006 is significant: it demonstrates that the impact of current sand mining practices on local shorelines has been an increase in the rate of erosion.

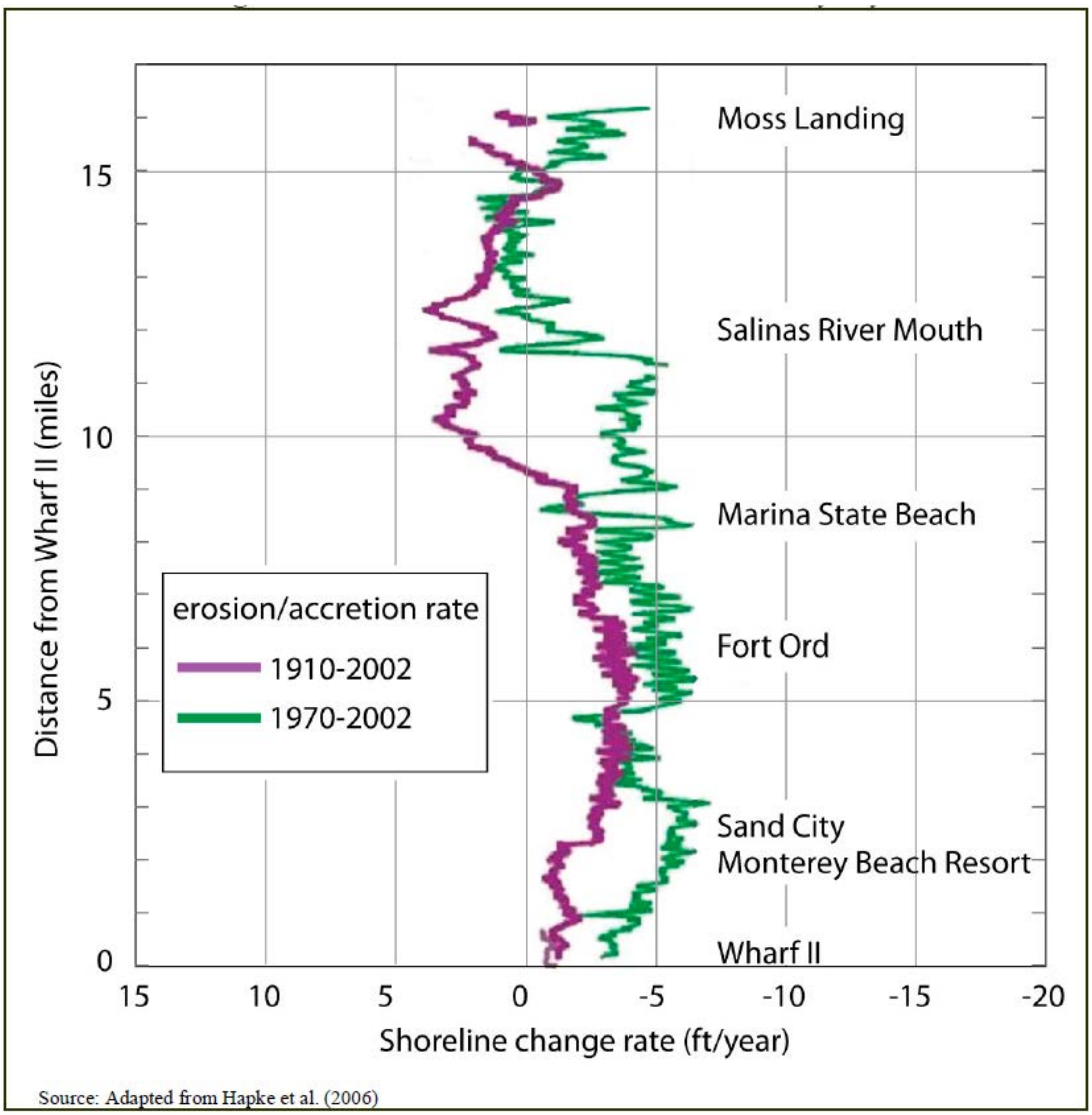


Figure 6. Dune Erosion Rates in Southern Monterey Bay. Source: Figure 18 from Philip Williams & Associates et al. (2008).

None of the documents reviewed for this report can offer any explanation for these anomalously high erosion rates beyond the sand extraction from the littoral zone at the Lapis Mine. The overwhelming evidence leads me to conclude that continued sand mining activities have led to a substantial sand deficit in southern Monterey Bay. This sand deficit is driving high rates of coastal erosion.

Coastal management implications and recommendations: In the vast majority of coastal communities in the continental United States, rising sea level is the primary driver of long-term coastal erosion. In those localities, managers have little choice but to accept the fact that halting global sea-level rise is not a problem they can tackle alone. Coastal management, therefore, becomes an exercise in planned adaptation and perhaps some degree of shoreline stabilization— typically with beach nourishment as a key component.

In southern Monterey Bay, municipalities and coastal managers are confronted with a unique complicating factor for the development of any sediment management plan (e.g. Philip Williams & Associates et al., 2008) or erosion mitigation plan (e.g. ESA PWA, 2012). Coastal erosion is being exacerbated by (at best) or driven by (at worst) the direct and intentional removal of sand from the Sand Sharing System.

Given the costs and other significant disadvantages of long-term beach nourishment programs, coastal managers can best serve the public interest by first attempting to eliminate sand sinks that are contributing to coastal erosion. In southern Monterey County, the Lapis Sand Mine is a substantial sand sink that is removing roughly 50 percent or more from the littoral system sand budget and, therefore, is a significant source of the coastal erosion that is negatively affecting coastal property, resources, and uses. Mitigating this ongoing erosion with hard structures (seawalls, revetments, and other coastal armoring) is not a sound policy response to the problem, as seawalls and groins will also directly interfere with the Sand Sharing System and create additional sand deficits. Before municipalities and regional managers can meaningfully implement any serious, comprehensive, long-term coastal planning, they will have to deal with the harmful sand deficit caused by the Lapis Sand Mine. Based on my review of the available information and literature and my professional expertise, I recommend that the City of Marina pursue options for halting the beach sand mining activities at the Lapis facility.

About the Author

Robert S. Young is the Director of the Program for the Study of Developed Shorelines, a joint Duke University/Western Carolina University venture. He is also a Professor of Geology at Western Carolina University and a licensed professional geologist in three states (FL, NC, SC). The Program for the Study of Developed Shorelines (PSDS) is a research and policy outreach center serving the global coastal community. The primary mission of PSDS is to conduct scientific research into coastal processes and to translate that science into management and policy recommendations through a variety of professional and public outreach mechanisms. The Program specializes in evaluating the design and implementation of coastal engineering projects. In California, Dr. Young is the Principal Investigator of a National Park Service project to map the vulnerability of every building, road, and facility in the state's National Parks.

References

2012 SMARA Mine Inspection, CEMEX Lapis Sand Plant, CA Mine No. 91-27-0006 (Jan. 17, 2013). Prepared for State Mining and Geology Board.

Best, T. and Griggs, G., 1991. A Sediment Budget for the Santa Cruz Littoral Cell, California. Society for Sedimentary Geology Special Publication No. 46.

Brew, D.S., Battalio, R.T., Thornton, E.B., Davenport, C., and Damitz, B. 2011. *Coastal Regional Sediment Management Planning In Southern Monterey Bay, California*. Littoral 2010 – Adapting to Global Change at the Coast: Leadership, Innovation, and Investment, 05009. https://doi.org/10.1051/litt/201105009.

ESA PWA, *Evaluation of erosion mitigation alternatives for southern Monterey Bay* (May 30, 2012). Prepared for by ESA PWA with Ed Thornton, Meg Caldwell, Philip King, Aaron McGregor for the Monterey Bay Sanctuary Foundation and The Southern Monterey Bay Coastal Erosion Working Group. http://montereybay.noaa.gov/research/techreports/esapwa2012.pdf.

Griggs, G. 1994. *California's Coastal Hazards*. Journal of Coastal Research Special Issue No. 12. Coastal Hazards 1-15. http://www.jstor.org/stable/25735586.

Hapke, C., Reid, D., Richmond, B.M., Ruggiero, P., List, J., 2006. *National assessment of shoreline change part 3; historical shoreline change and associated coastal land loss along sandy shorelines of the*

California coast. U.S. Geological Survey Open-File Report. 2006-1219. http://pubs.usgs.gov/of/2006/1219/of2006-1219.pdf.

Jones, G. and Griggs, G. 1985. *Erosion along an "Equilibrium Coastline," Southern Monterey Bay, California* in in California's Battered Coast: proceedings from a Conference on Coastal Erosion, San Diego, February 6-8, 1985, p. 102-119.

Orzech, M.D., Thornton, E.B., MacMahan, J.H., O'Reilly, W.C., Stanton, T.P., 2010. *Alongshore rip channel migration and sediment transport*. Marine Geology 271, 278–291.

Patsch, K. and Griggs, G. 2006. *Littoral cells, sand budgets, and beaches: Understanding California's shoreline*. Institute of Marine Sciences, University of California, Santa Cruz. http://www.dbw.ca.gov/csmw/PDF/LittoralDrift.pdf.

Patsch, K., Griggs, G., 2007. Development of Sand Budgets for California's Major Littoral Cells. California Coastal Sediment Management Workgroup, http://dbw.ca.gov/csmw/PDF/Sand_Budgets_Major_Littoral_Cells.pdf.

Philip Williams & Associates, Ltd [PWA], Thornton, E., Dugan, J., Halcrow Group, 2008. *Coastal Regional Sediment Management Plan for Southern Monterey Bay*. Prepared for Association of Monterey Bay Area Governments and the Coastal Sediment Management Workgroup. http://www.dbw.ca.gov/csmw/pdf/SMontereyBay_CRSMP_3Nov2008_ALL_rev_040411.pdf.

Pohl, A. and Johnston, L. 2012. *Lapis sand dollars: An economic analysis of non-market impacts of Lapis Sand Mine in southern Monterey Bay*. Working Paper, Center for the Blue Economy, Middlebury Institute of International Studies at Monterey. http://cbe.launchbrigade.com/research/working-papers.

Quan, S., Kvitek, R., Smith, D., and Griggs, G. 2013. *Using vessel-based LIDAR to quantify coastal erosion during El Niño and inter-El Niño periods in Monterey Bay, California*. Journal of Coastal Research 29(3), 555-565. http://dx.doi.org/10.2112/JCOASTRES-D-12-00005.1.

Rosati, J.D., 2005. *Concepts in sediment budgets*. J. Coast. Res. 21, 307–322.

Smith, D., Gref, K., Hofmann, A. and Turrini-Smith, L. 2005. *Are "stable shorelines" and "broad beaches" mutually exclusive management goals along southern Monterey Bay?* The Watershed Institute, California State University Monterey Bay, Report WI-2005-09.

Stamski, R. 2005. *Coastal Erosion And Armoring In Southern Monterey Bay*. A Technical Report in support of the Monterey Bay National Marine Sanctuary Coastal Armoring Action Plan, Vers. 1.1. http://montereybay.noaa.gov/resourcepro/resmanissues/pdf/061305erosion.pdf.

Thornton, E.B., Sallenger, A.H., Conforto Sesto, J., Egley, L.A., McGee, T., Parsons, A.R., 2006. *Sand mining impacts on long-term dune erosion in southern Monterey Bay*. Marine Geology 229 (1–2), 45–58.

Thornton, E.B., Sallenger, A.H., MacMahan, J.H., 2007. *Rip currents, cuspate shorelines and eroding dunes*. Marine Geology 240 (1–4), 151–167.

Thornton, E.B. 2017. *Temporal and spatial variations in sand budgets with application to southern Monterey Bay, California*. Marine Geology 382, 56–67.

Willis, C.M. and Griggs, G.B. 2003*. Reductions in fluvial sediment discharge by coastal dams in California and implications for beach sustainability*. Journal of Geology, 111, 167-182.

RESOLUTION NO. 2017-____

A RESOLUTION OF THE CITY COUNCIL OF MARINA FINDING THE CURRENT OPERATION OF THE CEMEX MINE MEETS THE ELEMENTS REQUIRED FOR A PUBLIC NUISANCE DUE TO ITS EROSIVE EFFECTS ON THE SOUTHERN MONTEREY BAY COAST AND FINDING THE CEMEX MINE TO BE IN VIOLATION OF SECTIONS 17.41.260 AND 17.25.030 OF THE MUNICIPAL CODE

WHEREAS, the CEMEX Sand Mine facility, located between Lapis Road and the Monterey Bay in the City of Marina (hereinafter "Lapis Sand Mine"), extracts large volumes of sand from an artificial dredge pond located on the beach adjacent to the shoreline; and

WHEREAS, the CEMEX dredge operations are maintained by mechanical manipulation of the beach dredge pond, which changes shape and location over time to draw in coarse beach sand from the nearshore and public tidelands during high tide events; and

WHEREAS, the coastal dunes and beach on the CEMEX property contain federally threatened and endangered species and habitat that has been designated as Environmentally Sensitive Habitat Area under the Coastal Act; and

WHEREAS, the Lapis Sand Mine operates and maintains sand-moving equipment, moves wet/dry sand, and extracts sand within an environmentally sensitive beach habitat; and

WHEREAS, the Lapis Sand Mine stockpiles its extracted sand in the sensitive coastal dune habitat; and

WHEREAS, the Lapis Sand Mine operations degrade the environment by interfering with sensitive coastal resources and habitat; and

WHEREAS, the southern Monterey Bay coast suffers from extremely high rates of erosion; and

WHEREAS, the Lapis Sand Mine annually extracts an estimated 153,000 to 205,000 cubic meters of sand; and

WHEREAS, the City resolved on March 15, 2016 to authorize the City Manager "to request the California Coastal Commission to assist the City with and/or assume responsibility for, in coordination with the City, any enforcement proceedings that may be pursued relative to possible violations of the California Coastal Act and the Marina Local Coastal Program by the Cemex Sand Mining operations"; and

WHEREAS, on March 17, 2016, the California Coastal Commission issued a Notice of Intent to Commence Cease and Desist Order and Restoration Proceedings and Administrative Civil Penalties Proceedings against CEMEX for unpermitted development, including sand dredging and extraction and related activities and development; and

WHEREAS, on May 16, 2017, the State Lands Commission issued a letter to CEMEX concluding that the Lapis Sand Mine is engaged in unlawful conversion of state public trust resources and indicating that CEMEX must either immediately submit a lease application to the Commission or cease dredge pond operations because of the financial and resource impacts its operations have on the state; and

WHEREAS, the City commissioned Dr. Robert S. Young, Ph.D., Director of the Program for the Study of Developed Shorelines and a Professor of Coastal Geology at Western Carolina University, to independently review the available information and academic literature on coastal erosion in the southern Monterey Bay and prepare an expert report to evaluate the effects, if any, of the Lapis Sand Mine on coastal erosion; and

WHEREAS, Dr. Young concluded that the Lapis Sand Mine constitutes a significant source of sand loss from the southern Monterey Bay littoral cell and, as a result, is causing erosion and significant adverse effects on coastal property, resources, and uses; and

WHEREAS, there is a scientific consensus that the Lapis Sand Mine extracts sand at a level that significantly contributes to high rates of erosion along the southern Monterey coast; and

WHEREAS, erosion due to the Lapis Sand Mine extraction activities causes significant physical and economic injury to public and private property along the southern Monterey coast; and

WHEREAS, the Lapis Sand Mine interferes with the public's access to and use and enjoyment of the beaches along Marina's coastline in a customary manner; and

WHEREAS, section 3479 of the California Civil Code states: "Anything which is injurious to health, including, but not limited to, the illegal sale of controlled substances, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property, or unlawfully obstructs the free passage or use, in the customary manner, of any navigable lake, or river, bay, stream, canal, or basin, or any public park, square, street, or highway, is a nuisance."; and

WHEREAS, section 3480 of the California Civil Code states: "A public nuisance is one which affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal."; and

WHEREAS, the current operations of the Lapis Sand Mine appear to this Council to meet the required elements for a public nuisance under sections 3479 and 3480 of the California Civil Code; and

WHEREAS, section 731 of the California Code of Civil Procedure authorizes the City Attorney, at the direction of the City Council, to bring a civil action in the name of the people of the State of California to abate a public nuisance; and

WHEREAS, section 17.41.260 of the Municipal Code requires "all operators of existing mining operations" to submit to the planning department (1) a brief statement specifying the approximate annual volume of sand being removed and (2) an accurate cronaflex ortho-topographic map by January 1st of every year "[i]n order to establish reference base data for the purpose of determining whether or not any particular mining activity constitutes new mining activity and to monitor shoreline erosion"; and

WHEREAS, City records indicate that the Lapis Sand Mine has not complied with these requirements since 1992, when the prior facility owner submitted extraction levels for year 1991; and

WHEREAS, section 17.25.030 of the Municipal Code requires a coastal development permit for conditional uses, such as dredge ponds, in the Coastal Conservation and Development District; and

WHEREAS, the CEMEX Sand Mine is located in the Coastal Conservation and Development District and CEMEX has not obtained a coastal development permit; and

WHEREAS, this resolution does not enjoin CEMEX from continuing sand mining activities unless and until the City Attorney seeks judicial enforcement of this nuisance declaration and a judicial order enjoining further sand mining; and

WHEREAS, section 17.60.040 of the Municipal Code empowers the City Council to direct the City Attorney to either commence civil action or abatement proceedings for violations of the City's zoning title, including sections 17.41.260 and 17.25.030; and

WHEREAS, the action below is taken by this Council following careful consideration of a) all written materials submitted by staff, consultants, and members of the public, and b) comments made at the public hearing by staff, consultants, the public, and members of this Council.

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Marina does hereby:

1. Approve this Resolution; and

2. Authorize the City Attorney to pursue the possibility of a civil action against CEMEX to declare and abate the Lapis Sand Mine as a public nuisance under sections 3479 and 3480 of the California Civil Code pursuant to California Code of Civil Procedure section 731; and

3. Authorize the City Attorney to pursue the possibility of commencing action or proceedings for abatement under section 17.60.040 of the Municipal Code due to CEMEX's continued violations of the reporting requirements under section 17.41.260 of the Municipal Code; and

4. Authorize the City Attorney to pursue the possibility of commencing action or proceedings for abatement under section 17.25.030 of the Municipal Code; and

5. Direct the City Attorney, at such time as he deems appropriate, to report back to the City Council, in closed session, with regard to which of the above-listed litigation actions he recommends and has decided to pursue on behalf of the City.

PASSED AND ADOPTED by the City Council of the City of Marina at a regular meeting duly held on the 6th of June, 2017, by the following vote:

AYES, COUNCIL MEMBERS:
NOES, COUNCIL MEMBERS:
ABSENT, COUNCIL MEMBERS:
ABSTAIN, COUNCIL MEMBERS:

____
Bruce Delgado, Mayor

ATTEST:

____
Anita Sharp, Deputy City Clerk

From: E. B. Thornton and R.T. Guza 20 June 2017

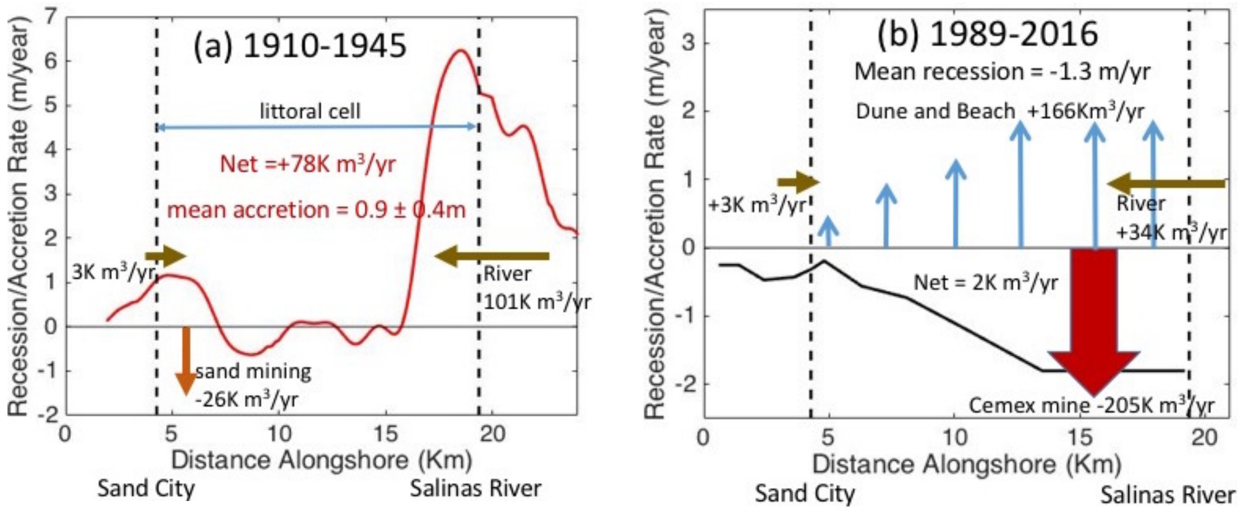
To: California Coastal Commission

Subject: Impacts by the Cemex mine on the southern Monterey Bay shoreline

Summary: Based on results in the peer reviewed literature, Cemex sand mining has and is eroding the southern Monterey Bay (SMB) shoreline. Relevant observations between Sand City and the Salinas River include dune [7, 8] and beach [3] recession rates between 1910 to 2011, sand discharge from the Salinas River [2, 9], alongshore sediment transport direction and amounts [4], and sediment mean grain sizes, distributions and petrology [1, 8]. Mined sand volumes were obtained through the public records act, Cemex statements, reclamation plans, and surveys of the CEMEX dredge pond. Observations show that the alongshore relocation of the most intense mining causes a corresponding relocation of the most rapid shoreline recession. Recession rates increased dramatically at the new mine location, and decreased dramatically at the old location. Cessation of mining will dramatically reduce erosion rates in SMB, and shorelines could even slightly accrete with no climate change. The effects of future climate change are unknown, but sea level rise will (with all else constant) increase shoreline erosion. With no climate change, and with all plausible climate scenarios, continued sand mining substantially increases future shoreline erosion relative to no mining.

Background: Sand budgets estimate the sand mass balance within prescribed littoral cell boundaries. Beach sand is mobilized by energetic waves. Cross-shore sand transport is between the shoreline and offshore, with the beach face most eroded by winter storms. On stable beaches, the summer recovery equals and winter erosion. Sand is redistributed, but not created, by seasonal cross-shore sand exchange. Sand also moves alongshore, transported by alongshore currents driven by obliquely incident breaking waves. In southern Monterey Bay (SMB), wave height and direction both vary seasonally, and SMB beach sand at various times of the year moves onshore, offshore, upcoast and downcoast. On an idealized long straight beach, sand can be transported alternately (seasonally) up and down coast, and onshore and offshore, but with no net change in total nearshore sand volume. In this idealization, the beach sand volume is stable over time. Real beaches are often unstable because of changes in the amount of sand received from rivers and, in the case of SMB, beach sand is mined. When loss exceeds gain, the shoreline erodes, with dune or cliff retreat. Real shorelines are stable only when gains equal losses.

Southern Monterey Bay: Between 1910 and 1945 [3], the Salinas River delivered 101k m^3/yr, mining at Sand city was relatively small (26K m^3/yr after 1927), and on average SMB shoreline accreted 0.9 m/yr (Figure 1a). Between 1989-2016 after all dragline mines closed, Cemex sand mining increased (205K m^3/yr), river flood control reduced sediment input to 34Km^3/yr, and beach and dune eroded (166m^3/yr) (Figure 1b). Fine sand excluded above, increase beach and dune loss to ~280 m^3/yr. If mining is stopped, and all else is held constant, dune and beach erosion in SMB will slow dramatically and even reverse although the accretion rate will be slower than pre-1945, prior to river damming (Figure 1c). Integrating the present recession rates over the shoreline length yields a loss >6 acres/yr. The total losses from the SMB littoral cell attributed to the Cemex mine since 1965 exceed 140 acres and 14 million m^3 of sand, comparable to the famous 17 million m^3 "mega-nourishment" on the Dutch coast, intended to widen beaches for decades over 10s of kms [6]. The CEMEX mine is a slow (in time) mega-unnourishment of SMB.



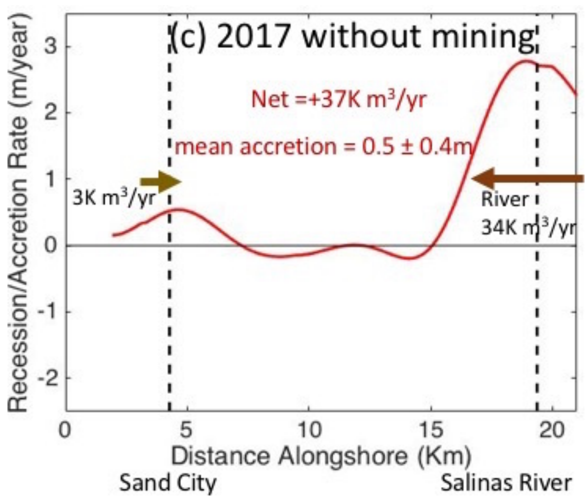


Figure 1. Shoreline recession rate versus alongshore location between Sand City and Salinas River [3] (a) 1910-1945, small mining rate (~26K m^3/yr) at Sand City and large river input (101K m^3/yr). The net gain was 78K m^3/yr. The average shoreline accreted 0.9 m/yr. (b) 1989-2016, large Cemex mining rate (205 m^3/yr) and smaller river load (34K m^3/yr). The net loss of dune and beach of ~166K m^3/yr. The average shoreline recessed -1.3 m/yr. (c) Projection assuming no mining. Dune and beach erosion is reduced, and even reversed. Future climate change is not included in (c) and could increase erosion.

Details: Between 1940 and 1989 the largest amount of sand mining was in Sand City. By 1990, dragline mines closed with no mining in Sand City and mining increased at Marina (locations in Figure 2a). Recession rates and mining locations changed contemporaneously (Figure 2b). High dune recession rates followed the mining, and the Marina recession rate (Figure 2b) is one of the highest in California. These observations show, with a clarity rare in nearshore processes, the detailed effect of a large alteration in local sediment budgets.

The mined sand replacement comes from the adjacent beaches and dunes. When the beach is narrowed owing to mining, the dune is vulnerable to large waves at high tide that act to undercut the dune toe with the dune face slumping onto the beach. By this process, the beach is nourished by the dune sand and the width of the beach restored to an equilibrium width at the expense of dune recession.

The Cemex pond is filled by interrupting alongshore transport, at the expense of downdrift beaches. The pond captures beach sand moving alongshore when large waves occur anytime of year. The pond fills during a few days of intense winter storms where the fronting beach is shoved landward as overwash. The recovery of the fronting beach occurs over weeks with the indentation of the shoreline drawing beach sand from both up- and down-coast. Annual net alongshore fluxes are not relevant to the efficiency of hole filling. With seasonally reversing alongshore transport, the hole fills from both sides.

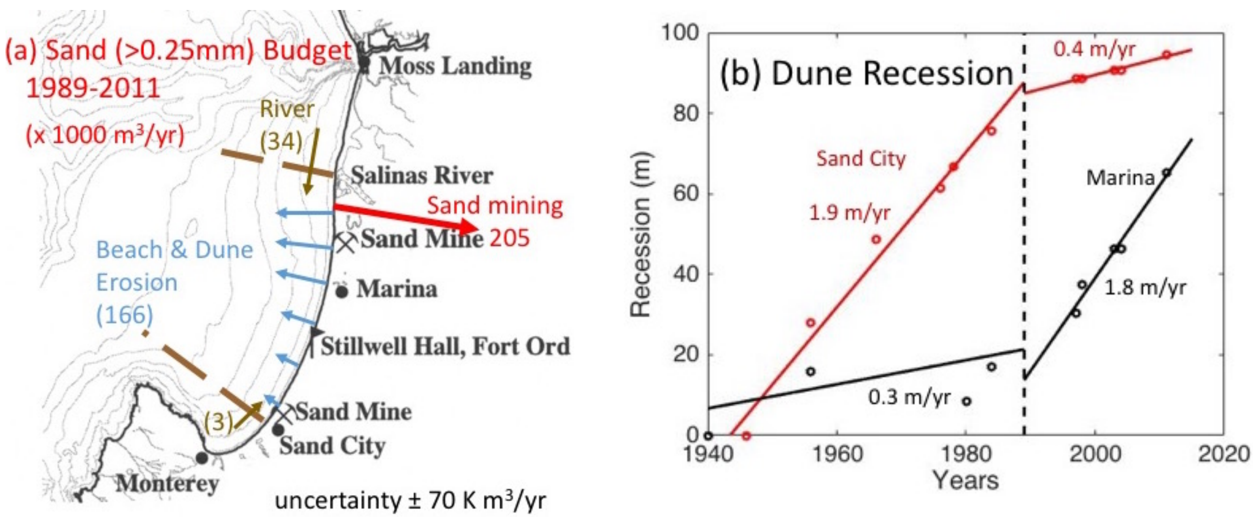


Figure 2. (a) Sediment budget for beach size sand (>0.25mm) for littoral cell from Sand City to Salinas River (dashed brown lines) between 1989-2011 showing input of beach size sand from beach and dune (blue arrows), plus Salinas River from north and littoral transport from south (brown arrows) balances loss owing to Cemex sand mine. (b) Alongshore averaged dune top recession rate versus time at Sand City and Marina [7, 8]. By1989 (vertical dashed line), mining ceased at Sand City, and increased at Marina. The recession rates changed accordingly. If future Cemex mining at Marina stops, and all else stays the same, shoreline recession at Marina will decrease dramatically. The effects of future sea level rise are not included. There are no plausible climate scenarios where continued sand mining does not substantially increase shoreline erosion relative to no mining.

Decision: Recent decisions regarding the Cemex sand mine are pertinent to the consideration before the California Coastal Commission and support a decision to close the mine. The California State Lands Commission requires Cemex to either obtain a permit or close because the mine captures and steals beach sand moved alongshore below mean high tide that belongs to the public trust. The loss of sand from both up- and downdrift results in significant regional shoreline recession and loss of land. The City of Marina decreed the Cemex mine, located within their city, causes significant recession of their shoreline and that the loss of land is a public nuisance in violation of their LCP, and therefore must stop.

References:

1. Combellick, R.A., Osborne, R.H., 1977. Sources and petrology of beach sand from southern Monterey Bay, California. J. Sediment. Petrol. 47, 891–907.

2. Gray, A.B., Pasternack, G.B., Watson, E.B., Warrick, J.A., Goni, M.A., 2014. The effect of El Nino Southern Oscillation cycles on the decadal scale suspended sediment behavior of a coastal dry-summer subtropical catchment. Earth Surf. Process. Landf. http://dx.doi.org/10.1002/esp.3627 wileyonlinelibrary.com.

3. Hapke, C., Reid, D., Richmond, B.M., Ruggiero, P., List, J., 2006. National assessment of shoreline change part 3; historical shoreline change and associated coastal land loss along sandy shorelines of the California coast. U.S. Geological Survey Open-File Re- port. 2006-1219.

4. Orzech, M.D., Thornton, E.B., MacMahan, J.H., O'Reilly, W.C., Stanton, T.P., 2010. Along-shore rip channel migration and sediment transport. Mar. Geol. 271, 278–291.

5. Patsch, K., Griggs, G., 2007. Development of Sand Budgets for California's Major Littoral Cells. California Coastal Sediment Management Workgroup 115 pp http://dbw.ca.gov/csmw/PDF/Sand_Budgets_Major_Littoral_Cells.pdf.

6. de Schipper, M. A., S. de Vries, G. Ruessink, R. C. de Zeeuw, J. Rutten, C. van Gelder-Maas, and M. J. Stive (2016), Initial spreading of a mega feeder nourishment: observations of the sand engine pilot project, Coastal Engineering, 111, 23–38.

7. Thornton, E.B., Sallenger, A.H., Conforto Sesto, J., Egley, L.A., McGee, T., Parsons, A.R., 2006. Sand mining impacts on long-term dune erosion in southern Monterey Bay. Mar. Geol. 229 (1–2), 45–58.

8. Thornton, E.B., 2017, Temporal and spatial variations in sand budgets with application to southern Monterey Bay, California, *Marine Geology* 382, 56–67.

9. Willis, C.M., Griggs, G.B., 2003. Reductions in fluvial sediment discharge by coastal dams in California and implications for beach sustainability. J. Geol. 111 (2), 167–182.

About the authors:

Ed Thornton, Distinguished Professor Emeritus at the Naval Postgraduate School. Honors include Monterey Bay National Marine Sanctuary 2007 Citizen of Year, American Society of Civil Engineers 2007 International Coastal Engineering award, Calif. Shore & Beach Preservation Association 2014 award for outstanding contributions to coastal engineering. Supervised 93 Masters and 9 PhD students, mentored 11 Post-docs, 83 reviewed journal publications, 60 years of coastal processes research.

Bob Guza, Distinguished Professor Emeritus at Scripps Institution of Oceanography, UCSD. AGU citation for excellence in refereeing (1990, 1994), Outstanding Journal Paper Award (Amer. Soc. Civil Eng., Ocean Division (1991), AGU Fellow (l993), Calif. Shore & Beach Preservation Association 2001 award for outstanding contributions to coastal engineering (with Pawka and O'Reilly), AGU Outstanding Student Paper (co-supervisor of 5 awardees), supervised 20 PhD students, 168 reviewed journal publications, 50 years of coastal processes research.

TESTIMONY TO CALIFORNIA COASTAL COMMISSION ON SAND MINING IN CITY OF MARINA

GARY GRIGGS
DIRECTOR INSTITUTE OF MARINE SCIENCES
DISTINGUISHED PROFESSOR OF EARTH AND PLANETARY SCIENCES
UNIVERSITY OF CALIFORNIA SANTA CRUZ

SOUTHERN MONTEREY BAY SHORELINE PROCESSES AND SAND REMOVAL

1. Sand movement along California shoreline has been well understood for over 50 years within the concept of littoral cells or beach compartments consisting of sources, littoral transport, and sinks or losses.

2. Monterey Bay contains two distinct self-contained littoral cells: 1] The Santa Cruz Littoral Cell, which extends from Point San Pedro on the north to Monterey Submarine Canyon at Moss Landing on the south where littoral sand moves offshore; and 2] The Southern Monterey Bay Littoral Cell, which extends from the breakwater in Monterey north to the head of Monterey Submarine Canyon.

3. The primary sand sources historically for the Southern Monterey Bay Littoral Cell were the Salinas River and erosion of the dunes. Bulge in shoreline off of the river mouth provides evidence of the historic past importance of the Salinas River sand discharge. Very little sand is delivered to the shoreline today as a result of both two dams that trap about about 33% of the sand load and heavy water pumping and diversions from the river basin for agricultural uses.

4. Littoral drift or longshore transport of sand moves north from Salinas River into head of Monterey Canyon. Sand along southern bay shoreline moves both up and downcoast with changing direction of wave approach.

5. Southern Monterey Bay beach sands have been mined or extracted since about 1906 because of their composition, hardness, roundness, color and purity making them valuable for a wide variety of commercial uses. Accurate numbers on annual volumes of sand removed are difficult to obtain but best conservative estimates are in the range that about 200,000 – 250,000 cubic yards (260,000 to 325,000 tons), or about 20,000 – 25,000 dump truck loads.

6. As many as 6 sand mines were active at various time over the past century in both Marina and Sand City. Five of these took sand directly off the beach whereas at the site of the present CEMEX mine, sand was removed by dredge from a pond on the back beach.

7. In the late 1980s all sand mining permits were terminated with the exception of the CEMEX dredging operation, although at this time the extraction volumes were increased to more-or-less equal the total volumes previously removed by all of the mines combined.

8. Best estimates today are that CEMEX removes 200,000 – 250,000 cubic yards annually from the pond. This volume is equivalent to a line of dump trucks extending from the pond in Marina to Half Moon Bay or Pacifica (20,000 to 25,000 trucks) every year (or a truck every 20-30 minutes).

9. Average annual erosion rates of the unconsolidated sandy bluffs backing the southern Monterey Bay shoreline have been measured at: 1] about 4-6 feet/year at Marina State Beach; 2] about 6 feet/year at former site of Stilwell Hall at Ft. Ord; 3] about 3-4 feet/year at the Monterey Beach Hotel, and 4] about 1-2 feet/year at Ocean Harbor House condominiums on Del Monte Beach. These rates are highest in the north, closer to the sand mine and decrease southward.

10. The volume of sand eroded annually on average from the bluff was determined by using the 8 miles of bluffs from the CEMEX mine to Del Monte Beach, an average bluff height of 40 feet and an average retreat rate of 4 feet/year and totals 250,000 cubic yards/year, This is essentially the same volume of sand as is now being removed by CEMEX.

11. If all 200-250,000 cubic yards/year of sand had come from the pond, they would have created a hole 2,500 to 3,100 feet deep. The pond continues to be filled from sand washed in from the surf zone at high tide or during large wave events.

12. Detailed study of sands collected along the Monterey Bay shoreline which involved analysis of grain size, mineralogic composition and grain surface and shape attributes suggests that Salinas River does yield significant sand to nourish the southern Monterey Bay beaches and indicate that the sand withdrawn by mining operations is primarily eroded dune sand.

13. The Southern Monterey Bay littoral cell must be considered a relatively closed system with limited sand sources.

14. Nourishment of southern bay beaches from the Salinas River is not significant and cannot be invoked to provide a mechanism to support the concept that the mined sand is a renewable resource.

June 23, 2017

Memo

To: California Coastal Commission

From: Philip G. King, Ph.D.

Re: Economic Analysis of Proposed Cessation of Sand Mining in Marina, CA

I have been asked by staff members of the California Coastal Commission (CCC) to provide an analysis of the economic costs associated with sand mining in Marina, California.

I have been studying the economics of beaches and coastal ecosystems in California for over twenty years and have prepared reports analyzing the economics of coastal tourism and recreation (primarily at beaches) for various State agencies such as the California Coastal Commission and California State Parks, as well as Federal agencies such as NOAA and the U.S. Army Corps of Engineers. I've also worked on beach economics for over a dozen coastal cities as well as regional agencies such as the San Diego Area Governments (SANDAG) and the Coastal Sediment Management Workgroup, where I have prepared coastal regional sediment master plans for several planning areas. (More details are in my attached CV.) I have published many of these studies in peer-reviewed journals and I have served as a referee for a number of journals as well as the California Seagrant. I also am on the editorial board of the *Journal of Ocean and Coastal Economics* (JOCE).

Summary of Results

The estimates contained in this memo are based on several recent studies I participated in, discussed and cited below. Table 1 below summarizes my findings.

Table 1: Economic Losses ($Millions) Associated with Sand Mining in Marina

Type of Economic Loss	2030 Time Horizon		2100 Time Horizon	
Recreation	$	(22.90)	$	(70.00)
Public/Private Property Loss	$	(0.10)	$	(47.80)
Ecology Losses	$	(3.10)	$	(11.88)
Nourishment Costs	$	(192.54)	$	(627.55)
Total	$	(218.64)	$	(757.23)

Table one presents the present value of losses due to sand mining in Marina, CA. **If one looks at a time horizon between 2015 and 2030 (dates of the study) the total losses from sand mining are $218.6 million. If one extends the loss estimates to 2100 (2015-2100), these losses are significantly greater, $757.2 million.**

Methodology

The primary source of data used in this analysis is a forthcoming report prepared for The Nature Conservancy and funded by the California State Coastal Conservancy (The Nature Conservancy 2017). This report updated and extended and earlier report (ESA-PWA 2012) funded by NOAA and the Monterey Bay Sanctuary Foundation. This 2012 report estimated losses associated with sand mining and found they were of a similar order of magnitude –in the hundreds of millions of dollars. Readers more interested in a fuller discussion of the method employed are encouraged to read the report. This memo will provide a brief overview of the methods and data used in the report and how they were applied to this analysis.

It should be noted that after reflecting on the matter, I decided that the best way to estimate these losses (and one consistent with the best data available) was to assume that some agency would have to nourish the beach to maintain current beach width. This "avoided cost" method is a standard way of estimating the costs of shoreline erosion.

Study Area

Figure 1: TNC Study Area (TNC, 2017)

Figure 1 above presents a map of the study area used. The TNC study divided the southern Monterey Bay Coast into four reaches:

- Del Monte, including Del Monte Beach in Monterey
- Sand City
- Marina
- Moss Landing

The impacts on Moss Landing will be significantly small (if there are any) and I determined that it was best to only look at the first three reaches.

Recreation

The recreational value of beaches in these three reaches was measured using the CSBAT model, which Dr. King developed for the State of California and the US Army Corps of Engineers (e.g., see King, 2015). The purpose of the CSBAT model is to provide meaningful estimates of losses in beach width to recreational value. This model has been applied in dozens of projects in California for the local, State and Federal agencies. Estimates of recreational losses are relatively small compared to other losses since my method assumes nourishment.

Public/Private Property Losses

Public/Private Property Losses were evaluated using a geospatial model incorporating private and pubic property. Estimates of damages include losses due to erosion (structure and land loss) and flooding (using FEMA depth damage curves). Land was valued at current market rates given current zoning; structures/infrastructure was valued at replacement cost. All values are 2015 dollars. The TNC 2017 analysis did not include infrastructure losses for nourishment, so we were not able to estimate these losses, which are likely significant.

Ecological Losses

Measuring the ecological loss from shoreline erosion is challenging. The 2017 TNC study relied on estimates developed in an earlier study for the California Coastal Commission (2015). Although nourishment retains beach width, it degrades ecological value since many flora and fauna are buried (e.g., see Dugan et. al., 2010, Defeo et. Al., 2009). Typically nourishment degrades ecological value immediately after, but beach ecosystems recover (at least partly) over time.

Nourishment Costs

Nourishment Costs were obtain from ESA and were incorporated into the TNC (2017) analysis. Although the analysis did assume some modest increases in nourishment costs over time, if sand becomes unavailable in the future, or very expensive, our estimates may be too low.

Detailed Results

Table 2: Economic Losses ($Millions) Associated with Sand Mining 2015-2030

Reach/Item	No Sand Mining	Sand Mining	Economic Loss
Del Monte Recreation	$ 42.90	$ 40.20	$ (2.70)
Del Monte Public/Private Property Loss	$ (12.60)	$ (12.60)	$ -
Del Monte Ecology	$ 4.00	$ 3.60	$ (0.40)
Nourishment Costs		$ (2.00)	$ (2.00)
Sand City Recreation	$ 54.50	$ 40.20	$ (14.30)
Sand City Public/Private Property Loss	$ (22.30)	$ (22.40)	$ (0.10)
Sand City Ecology	$ 3.60	$ 3.10	$ (0.50)
Nourishment Costs		$ (42.00)	$ (42.00)
Marina Recreation	$ 22.50	$ 16.60	$ (5.90)
Marina Public/Private Property Loss			$ -
Marina Ecology	$ 11.00	$ 8.80	$ (2.20)
Nourishment Costs		$ (148.54)	$ (148.54)
Total Recreation	$ 119.90	$ 97.00	$ (22.90)
Total Public/Private Property Loss	$ (34.90)	$ (35.00)	$ (0.10)
Total Ecology	$ 18.60	$ 15.50	$ (3.10)
Nourishment Costs	$ -	$ (192.54)	$ (192.54)
Total	**$ 103.60**	**$ (115.04)**	**$ (218.64)**

Table 2 above presents estimates for the time period 2015-2030. Overall, the losses due to sand mining are substantial, estimated at $218.6 million. Note that nourishment costs are a significant art of the estimate. However, without nourishment the other losses would be significantly greater.

Table 3: Economic Losses ($Millions) Associated with Sand Mining 2015-2100

Reach/Item	No Sand Mining		Sand Mining		Economic Loss	
Del Monte Recreation	$	188.40	$	167.30	$	(21.10)
Del Monte Public/Private Property Loss	$	(28.90)	$	(64.10)	$	(35.20)
Del Monte Ecology	$	12.70	$	10.16	$	(2.54)
Nourishment Costs			$	(7.40)	$	(7.40)
Sand City Recreation	$	197.60	$	167.40	$	(30.20)
Sand City Public/Private Property Loss	$	(57.90)	$	(70.50)	$	(12.60)
Sand City Ecology	$	12.00	$	9.60	$	(2.40)
Nourishment Costs			$	(136.70)	$	(136.70)
Marina Recreation	$	93.50	$	74.80	$	(18.70)
Marina Public/Private Property Loss					$	-
Marina Ecology	$	34.70	$	27.76	$	(6.94)
Nourishment Costs			$	(483.45)	$	(483.45)
Total Recreation	$	479.50	$	409.50	$	(70.00)
Total Public/Private Property Loss	$	(86.80)	$	(134.60)	$	(47.80)
Total Ecology	$	59.40	$	47.52	$	(11.88)
Nourishment Costs	$	-	$	(627.55)	$	(627.55)
Total	**$**	**452.10**	**$**	**(305.13)**	**$**	**(757.23)**

Table 3 above presents estimates for the time period 2015-2100. Overall, the losses due to sand mining are substantial, estimated at $757.2 million. Note that nourishment costs are a significant part of the estimate. However, without nourishment the other losses would be significantly greater.

These Estimates may be too Low

I believe the estimates provided in this memo are conservative for several reasons:

1. The TNC report assumes a lower erosion rate than recent work by Thornton (2017) indicates. If Dr. Thornton's recent work is correct, the losses would be substantially higher.
2. The reports are in 2015 dollars. Correcting for 2017 would increase costs/losses by a few per cent.
3. Nourishment costs assume some diminishment of sand availability, but is sand becomes unavailable or significantly more costly, then the estimates would be higher than indicated here.
4. We were unable to determine public/private property losses in the Marina, the reach most impacted by sand mining. Incorporating these losses would have significantly increased our estimate.

Economic Impact

The sand mining operations in Marina do provide a small number of jobs. I haven't seen any official estimates, but my conversations with people familiar with the operation indicates that the current operation provides on the order of 20 jobs per year. This is a quite a small number of jobs, equal to one hundredth of one per cent of the total number of Jobs in Monterey County (200,900 in May 2017 according to the California Dept. of Labor). In contrast, beach recreation in the area generates $4.2 million per year in spending, $436,000 in Transient Occupancy taxes, and $79,000 in local sales taxes.

Table 4: Economic Impact of Beach Spending in the three Reaches

Reach	Spending CA	TOT Tax	Local Spending	Sales Tax
Sand City	$ 1,171,000.00	$ 123,000.00	$ 1,054,000.00	$ 22,000.00
Del Monte	$ 2,334,000.00	$ 245,000.00	$ 2,100,000.00	$ 45,000.00
Marina	$ 651,000.00	$ 68,000.00	$ 586,000.00	$ 12,000.00
Total	$ 4,156,000.00	$ 436,000.00	$ 3,740,000.00	$ 79,000.00

If the City of Marina or County or Monterey is concerned with job creation, other activities at this site could be considered. For example, a typical Taco Bell employees 30 people. If the City had a small restaurant similar to the Taco Bell in Pacifica, it would generate more jobs (though at lower wages).

References

Barbier, E. B., S. D. Hacker, C. Kennedy, E. W. Koch, A. C. Stier, and B. R. Silliman. 2011. The value of estuarine and coastal ecosystem services. Ecological Monographs 81: 169-193.

California Employment Development Dept., (Employment Statistics) http://www.labormarketinfo.edd.ca.gov/cgi/databrowsing/localareaprofileqsresults.asp?selectedarea=Monterey+County&selectedindex=1&menuchoice=localareapro&state=true&geogarea=0604000053&countyname=

California Coastal Commission. 2015. Improved Valuation of Impacts to Recreation, Public Access, and Beach Ecology from Shoreline Armoring. Principal Authors: Jonna Engel, Ph.D., Lesley Ewing, Ph.D., Michelle Jesperson, Jeannine Manna, Mary Matella, Ph.D., and Elena Perez. Developed with Input from: Jenny Dugan, PhD, Karen Martin, PhD, Dave Hubbard, Phil King, PhD, and Chad Nelson, PhD. August 7, 2015. Funded by National Oceanic and Atmospheric Administration, as a FY 2012 Project of Special Merit (NA12NOS4190026).

Defeo, O., A. McLachlan, D. S. Schoeman, T. A. Schlacher, J. Dugan, A. Jones, M. Lastra, and F. Scapini. 2009. Threats to sandy beach ecosystems: a review. Estuarine, Coastal and Shelf Science 81, 1-12.

Dugan, J. E., O. Defeo, E. Jaramillo, A. R. Jones, M. Lastra, R. Nel, C. H. Peterson, F. Scapini, T. Schlacher, and D. S. Schoeman. 2010. Give beach ecosystems their day in the sun. Science 329, 1146.

ESA-PWA. 2012. Evaluation of Erosion Mitigation Alternatives for Southern Monterey Bay, Report prepared for the Monterey Bay Sanctuary Foundation and the Southern Monterey Bay Coastal Erosion Working Group. May 30, 2012. Available at: http://montereybay.noaa.gov/research/techreports/tresapwa2012.html.

Griggs, G.B., Patsch, K. and Savoy, L.E., 2005. *Living with the changing California coast*. Univ of California Press.

King, P. and McGregor, A. (2012). "Who's counting: An analysis of beach attendance estimates and methodologies in southern California." Ocean & Coastal Management, 10.1016/j.ocecoaman.2011.12.005, 17-25.

King, P., A. McGregor and J. Whittet. 2015. Can California Coastal Managers Plan for Sea-Level Rise in a Cost-Effective Way. Journal of Environmental Planning and Management.

King, P. and Giliam, J. 2015 The Economics Benefits and Impacts of SANDAG's Regional Nourishment Project, Prepared for California State Parks, Unpublished.

Melius, M.L. and Caldwell, M.R., 2015. California Coastal Armoring Report: Managing Coastal Armoring and Climate Change Adaptation in the 21st Century. http://coastalcare.org/2015/05/california-coastal-armoring-report-managing-coastal-armoring-and-climate-change-adaptation-in-the-21st-century/.

The Nature Conservancy. 2017. Economic Impacts of Climate Adaption Strategies for Southern Monterey Bay, SCC Climate Ready Grant #13-107, forthcoming.

Pendleton, L., & Kildow, J. 2006. The Non-market Value of Beach Recreation in California. Shore & Beach, 74(2), 34–37.

Pendleton, L., Mohn, C., Vaughn, R.K., King, P., & Zoulas, J.G. 2012. Size matters: the economic value of beach erosion and nourishment in Southern California. Contemporary Economic Policy, 30(2), 223-237.

Pendleton, L., P, King., Mohn, C., Webster, D.G., Vaughn, R., & Adams, A. 2011. Estimating the potential economic impacts of climate change on Southern California beaches. Climatic Change, 109(S1), 277-298.

Thornton, E.B., 2017, Temporal and spatial variations in sand budgets with application to southern Monterey Bay, California, *Marine Geology* 382, 56–67.

U.S. Bureau of Labor Statistics Consumer Price Index, 2017. https://www.bls.gov/cpi/cpi_dr.htm.

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“Can California coastal managers plan for sea-level rise in a cost-effective way?” w. Aaron McGregor and Justin Whittet, Jnl of Environmental Planning and Management, v. 59, pp. 98-119. January 2015.

“ESTIMATING THE POTENTIAL ECONOMIC IMPACTS OF CLIMATE CHANGE ON SOUTHERN CALIFORNIA BEACHES,” with L. Pendleton, C. Mohn, D. G. Webster, R. Vaughn, and P. Adams, November 2011, *Climatic Change*.

“The Economic Costs of Sea Level Rise to California Beach Communities,” w. A. McGregor and J. Whittet, California Resources Agency & Dept. of Boating and Waterways (Refereed through California Ocean Science Trust).

“Who’s Counting: An Analysis of Beach Attendance Estimates in Southern California,” w. A. McGregor, *Ocean and Coastal Management*, March 2012, Pages 17–25.

“Size Matters: The Economic Value of Beach Erosion and Nourishment in Southern California’, with L. Pendleton, C. Mohn, R. Vaughn, and J. Zoulas., *Contemporary Economic Policy*, April 2012.

“Economic Analysis of Reconfiguring the Long Beach Breakwater,” w. A. McGregor, *Shore and Beach*, April/May 2011.

"Potential Loss in GNP and GSP from a Failure to Maintain California’s Beaches", Fall 2004, with Douglas Symes, *Shore and Beach*.

Books:

International Economics and International Economic Policy, 5th Edition, McGraw-Hill, 2009.

International Economics and International Economic Policy, 4th Edition, McGraw-Hill, 2004.

International Economics and International Economic Policy, 3rd Edition, McGraw-Hill, 2000.

International Economics and International Economic Policy, 2nd Edition, McGraw-Hill, 1995.

International Economics and International Economic Policy, 1st Edition, McGraw-Hill, 1990.

Policy Papers prepared for Government and Non-Profit Organizations:

Access for All: A New Generation's Challenge on the California Coast, w. Jon Christenson (UCLA) January 2017. https://www.ioes.ucla.edu/coastal-access/

Economic Analysis of Seal Level Rise Hazards for the City of Imperial Beach, prepared for the City of Goleta w Revell Coastal; Fall 2016.

Economic Analysis of Seal Level Rise Hazards for the City of Goleta, prepared for the City of Goleta w Revell Coastal; Spring 2016.

Economic Impacts of Climate Change Adaptation Strategies for Southern Monterey Bay, prepared for the California Coastal Conservancy (Grant #13-107) w The Nature Conservancy, March 2016.

Improved Valuation of Impacts to Recreation, Public Access, and Beach Ecology from Shoreline Armoring. (Unpublished report). Prepared for the California Coastal Commission under NOAA contract number CC-13-22.

Contributed Economics portion of Regional Sediment Master Plan for BEACON (Beach Erosion Authority for Clean Oceans and Nourishment—Santa Barbara and Ventura Counties), February 2009, with Noble Consultants.

ESTIMATING THE POTENTIAL ECONOMIC IMPACTS OF CLIMATE CHANGE ON SOUTHERN CALIFORNIA BEACHES, prepared for the California Energy Commission (Energy Commission) and the California Environmental Protection Agency (Cal/EPA), with Linwood Pendleton, Craig Mohn, D. G. Webster, Ryan K. Vaughn, and Peter Adams.

Contributed Economics Portion of: "The ARC GIS Coastal Sediment Analysis Tool: A GIS Support Tool for Regional Sediment Management Program: White Paper, Draft Technical Report for U.S. Army Corps of Engineers, by Ying Poon (Everest Consultants), Los Angeles District, April 2006.

Contributed Economics Portion of: "Coastal Sediment Analysis Tool (CSBAT) Beta Version--Sediment Management Decision Support Tool for Santa Barbara and Ventura Counties," Draft Technical Report for U.S. Army Corps of Engineers, by Ying Poon (Everest Consultants), Los Angeles District, June 2006.

"The ArcGIS Coastal Sediment Analyst: A Prototype Decision Support Tool for Regional Sediment Management, John Wilson et. al., USC Geography Department, 2004 (contributed economic analysis for paper).

"The Economic of Regional Sediment Management in Ventura and Santa Barbara Counties," prepared for the California State Resources Agency, Final draft (refereed) , Fall 2006, prepared for the Coastal Sediment Management Work group (CSMW).

"The Potential Loss in GNP and GSP from a failure to Maintain California's Beaches," with Douglas Symes, prepared for the California State Resources Agency, 2002, http://userwww.sfsu.edu/~pgking/pubpol.htm.

"The (Economic) Benefits of California's Beaches," prepared for the California State Resources Agency, 2002, http://dbw.ca.gov/beachreport.htm.

"The Economic and Fiscal Impact of Beach Recreation in San Clemente," presented as part of Hearings on Congressional Appropriations for California Coastal Projects, US House of Representatives, April 2002. Also completed similar projects for Cities of Carlsbad, Carpinteria, Encinitas, and Solana Beach.

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November 24, 2015

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Re: Cemex Pacific Lapis Sand Mining Plant In Violation of Coastal Act for Operating Without a Coastal Development Permit.

Dear Honorable Coastal Commission Staff and City of Marina,

On behalf of the Monterey Chapter of the Surfrider Foundation, we are writing to express our serious concerns with respect to the CEMEX Pacific Lapis sand mining plant, in Marina, California. The Surfrider Foundation is a non-profit 501(c)(3) organization that is dedicated to the protection and enjoyment of our oceans, waves and beaches through a powerful activist network, and towards this mission, the Surfrider Foundation Monterey Chapter is very engaged in protecting central California's coastline, and safeguarding it from activities which promote coastal erosion and jeopardize its well-being. Surfrider Foundation provides this letter memorandum to the Commission and City of Marina in order to share the information and analysis which supports our belief that CEMEX is violating the

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Coastal Act. We hope that this will assist the Commission with its investigation into the matter,[1] and help to inform the City with respect to this matter and potential courses of action.

To Surfrider Foundation's knowledge, CEMEX has operated the Pacific Lapis sand mining plant since 2005, and the plant was previously operated by Pacific Concrete and Aggregates and Lone Star Industries between 1965 and 2005. As detailed below, to Surfrider's knowledge, present day operations involve mining approximately 200,000 cubic yards of sand a year (and perhaps more), from a self-made pond on the beach, which is double the amount of sand initially mined prior to the Coastal Act.

CEMEX Activities Are Within the Coastal Zone

The plant is located on and between Lapis Road and the Pacific Ocean in Marina, California, and sits squarely within the Coastal Zone. (Pub. Res. Code §§ 30103, 30160(a).) The plant's sand mining activities occur at this site, landward of the mean high tide line, as indicated in the photograph below. Therefore, this matter is within the Commission and City of Marina's jurisdiction. The City of Marina has a Local Coastal Program, certified by the Commission in 1982, and therefore generally has current CDP permitting authority.[2] However, pursuant to Coastal Act Section 30601, a CDP must also be obtained from the Commission for "[d]evelopments *between the sea and the first public road paralleling the sea* or within 300 feet of the inland extent of any beach or of the mean high tide line of the sea where there is no beach, whichever is the greater distance. (Pub. Res. Code § 30601(1)(emphasis added).) Further, as explained in more detail below, both the City and the Commission have enforcement authority to abate CEMEX's unpermitted activities.

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[1] To our knowledge, the Commission has been investigating CEMEX since 2009, and has previously anticipated completing the investigation and likely issuing a statement of findings, in late 2013 or early 2014, based on the following articles, http://www.montereyherald.com/general-news/20130826/sand-plant-investigated-state-examining-claims-that-cemex-in-marina-mining-more-than-permitted,
http://www.montereyherald.com/general-news/20130826/sand-plant-investigated-state-examining-claims-that-cemex-in-marina-mining-more-than-permitted.

[2] *See* http://www.ci.marina.ca.us/documentcenter/view/5278.

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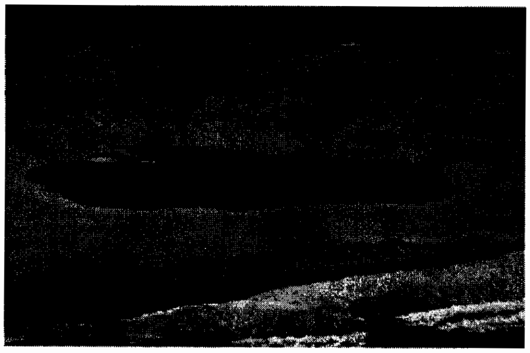
Figure 20. Aerial Photographs of the Beach at Marina Sand Mine



Normal dredging operation showing extent of dredge pond (Photo taken: October 28, 2005; California Coastal Records project by Kenneth and Gabrielle Adelman)

Pond filled with sand by high waves at high tide carrying sand over the berm. (Photo taken: January 15, 2008 by Robert Wyland, NPS)

[3]

CEMEX Activities Constitute "Development"

CEMEX's sand mining activities squarely fall within the definition of "development" requiring a Coastal Development Permit (CDP).

"Development" is defined to include "[...] *on land, in or under water*, the placement or erection of any solid material or structure; discharge or disposal of any dredged material or of any gaseous, liquid, solid, or thermal waste; *grading, removing, dredging, mining, or extraction of any materials*; *change in the* density or *intensity of use of land* [...], construction, reconstruction, demolition, or alteration of the size of any structure, including any facility of any private, public, or municipal utility [...]." (Pub. Res. Code § 30106.)

The operations of a company extracting sand falls within the literal definition of "development" in Pub. Res. Code § 30106 (removing, dredging, mining, or extraction of any materials on land or under water), thus requiring CDPs under Pub. Res. Code § 30600(a) for development in the coastal zone. (*Monterey Sand Co. v. California Coastal Comm.*, 191 Cal.App.3d 169, 176. ("*Monterey Sand Co.*"))

[3] Phillip Williams and Associates, 2008, Coastal Regional Sediment Management Plan for Southern Monterey Bay, Prepared for Association of Monterey Bay Area Governments, at 43; *available at* http://www.dbw.ca.gov/csmw/pdf/SMontereyBay_CRSMP_3Nov2008.pdf.

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Since 2005, CEMEX has mined approximately 200,000 cubic yards of sand a year, from the beach site in Marina, and since at least between 1965 and 1970, CEMEX's predecessors mined approximately 68,000 to 98,000 cubic yards of sand a year from the same site. (Phillip Williams and Associates, 2008, Coastal Regional Sediment Management Plan for Southern Monterey Bay, Prepared for Association of Monterey Bay Area Governments, at 44, A-1, and A-2.) Thus, CEMEX and its predecessors are and have been engaging in "development" under the Coastal Act.

Neither CEMEX Nor Its Predecessor(s) Have Obtained a Required Vested Rights Determination from the Commission

Given that the plant engaged in sand mining operations prior to the implementation of the 1976 Coastal Act, arguably it might have obtained vested rights to its sand mining operations, such that it would not be required to obtain a CDP for those activities. (Pub. Res. Code § 30608). However, operators are not merely grandfathered in automatically, but instead must apply for and obtain a vested rights determination from the Commission, pursuant to the Commission's regulations (*See,* e.g., 14 Cal. Code of Regs. §§ 13200-13204, 13207; *Billings v. California Coastal Com.* (1980) 103 Cal App 3d 729.) This process includes filing a claim of vested right, on a form acceptable to the Commission, and substantiating that claim in a proceeding before the Commission, where the claimant bears the burden of proof. (14 Cal. Code of Regs. §§ 13200 - 13202.) Commission action on a claim of vested right must be substantiated by findings of fact. (14 Cal. Code of Regs. § 13205.)[4]

To our knowledge, neither CEMEX, nor its predecessors Pacific Concrete and Aggregates and Lone Star Industries, have ever filed a claim for or obtained a vested rights determination from the Commission. Therefore, CEMEX has no right - grandfathered or not – to continue its sand mining operations at the Marina plant,

[4] And note, case law holds that in view of the comprehensive scheme of the Coastal Act for protecting and preserving the natural and scenic resources of the coastal zone and insuring that any development which occurs within the zone will be consistent with that overall objective, any substantial doubts regarding the meaning and effect of Pub. Res. Code Section 30608 exempting persons having "vested rights" from the Act's CDP requirement, should be resolved *against* the person seeking exemption. (*Urban Renewal Agency v. California Coastal Zone Conservation Com.* (1975) 15 Cal. 3d 577.)

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and is and has been violating the Coastal Act every day that it is mining sand without a CDP.

Even if CEMEX Had a Vested Rights Claim, Operations Have Undergone Substantial Expansion and Necessitate a Coastal Development Permit

Further, even if CEMEX had vested rights to some sand mining operations, which it does not, a vested rights determination only affords a person the right to continue its operations within the same scope. "[N]o substantial change may be made in any such development" without receiving prior approval through a CDP. (Cal. Pub. Res. Code § 30608; 14 Cal. Code. Regs. § 13207; see also *Monterey Sand Co.,* at 176 (operations for which there are vested rights must be carried out "within the scope of the preexisting authorization for use of the coastal resource in question."))

Here, evidence greatly suggests that CEMEX and its predecessors' operations have undergone substantial change. When operations began, between 1965 and 1970, the plant was extracting sand at a rate of 68,000 to 98,000 cubic yards per year. (Philip Williams and Associates, at 44, A-1, and A-2.) Further, it appears from an October 16, 1969 memorandum, that on August 28, 1969 the State Lands Commission (SLC) had authorized a lease extension, which limited the maximum amount of sand extracted to only 80,000 cubic yards per year. (See Exhibit A, attached hereto, State Lands Division 1969 Memo).

The last reported value of 98,000 cubic yards, to the California State Lands Commission, was in 1970 and is conservatively used as the estimate for the amount dredged until the mid 1980s when the operation started using an improved larger dredge. It is assumed that the amount of sand extracted from the beach increased using the larger dredge, and that the mine further increased their extraction after other mines in the region closed in 1990, to meet consumer demand. (Phillip Williams and Associates, at 44 and A-1.)[5]

To Surfrider's knowledge, the total amount of sand sold annually between 1998 and 2008 (and presumably, today) from the plant was between 225,000 and 280,000 tons, or approximately 167,000- 207,000 cubic yards per year, based on an approximate density of 1.35 tons per cubic yard, as reported by Cemex. (Id., at pp. 44, and A-1.) Commonly reported estimates are that the plant currently mines approximately 200,000 cubic yards of sand a year. (Id., at A-2) In fact, the amount presently mined could be higher, as CEMEX stated publicly in 2006 that it was

[5] *Available at*
http://www.dbw.ca.gov/csmw/pdf/SMontereyBay_CRSMP_3Nov2008.pdf

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mining as much as 300,000 tons (or approximately 222,222 cu yards) of sand annually at that time. (See Exhibit B, attached hereto, 2006 email correspondence from CEMEX employee to Monterey County Weekly, at 2).

This substantially increased – more than *doubled* - rate is not within the scope of the plant's pre-1976 Coastal Act sand mining activities, but instead constitutes a substantial change which requires obtaining a CDP.

Further, there is no argument that this activity – either pre-Coastal Act or now – constitutes "repair or maintenance" exempt from the Coastal Act's CDP requirement (*See* Pub. Res. Code § 30610(d)(providing exemption for "repair or maintenance activities that do not result in an addition to, or enlargement or expansion of, the object of those repair or maintenance activities.")) Instead, sand is dredged and carried away from the property for sale, repairing and maintaining nothing, and instead is suspected to be a primary cause of beach and dune erosion in southern Monterey Bay. (*See*, e.g., Phillip Williams and Associates, at E-7 and 87-88, "As other mines closed, the ongoing operation at Marina increased its extraction to 200,000 yd3/year today. This is similar to the annual sand volume eroded from the dunes. Erosion rates at Marina increased after 1985, and are believed to be related to an increase in sand extraction at the Marina sand mine in the mid 1980s, 1990s, and 21st century.") Due to a persistent rise in sea level, changes in sand availability, and previous unsustainable public and private development practices, the southern Monterey Bay beaches and coastal dunes south of the Salinas River, in close proximity to the CEMEX plant, are eroding, on average, at the fastest rate in California (Hapke et al., 2006). (Id., at 1.)

This is in contravention of Coastal Act policies, including Section 30253 ("New development shall [...] [a]ssure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area [...]," and operations may even be prohibited by Section 30233, which limits the kinds of dredging and sediment movement projects which can be carried out in the coastal zone.

Conclusion

In conclusion, Surfrider Foundation believes that CEMEX and its predecessors' sand mining operations are likely violating the Coastal Act by undertaking development in the coastal zone without a CDP or a vested rights determination. Further, even if there had been a vested rights determination, CEMEX would not be exempt, since its operations vastly exceed the scope of its pre-Coastal Act sand mining activity. Further, the operations appear to conflict with Coastal Act policies, particularly

Sections 30253 and 30233. Surfrider Foundation respectfully requests that the Commission diligently continue and complete its investigation into CEMEX's activities.

We also ask that the Commission and City of Marina take all appropriate actions based on the outcome of the Commission's investigation and/or the City's findings, which may include issuing a notice of violation and cease and desist order pursuant to Coastal Act Section 30809, and seeking declaratory and equitable relief to restrain CEMEX's Coastal Act violations pursuant to Coastal Act Section 30803. We respectfully remind the City and Commission, that pursuant to Coastal Act Section 30809, the executive director of the Commission may issue a cease and desist order to enforce requirements of a certified local coastal program where the local government requests the Commission to assist with or assume primary responsibility for issuing a cease and desist order; or where the Commission requests and the local government declines to act or does not take action in a timely manner, regarding an alleged violation which could cause significant damage to coastal resources.

We hope that the foregoing information is helpful to the Commission and City, and welcome the opportunity to assist both as you address this matter. Please share this with any other appropriate City and Commission staff members, and I ask that you please cc me so that we know the appropriate individuals to correspond with on this matter. Please also keep us abreast of any updates on the Commission's investigation, and feel free to contact me for further discussion.

Sincerely,

Staley Prom

Staley Prom, Esq.
Legal Associate
Surfrider Foundation

Ximena Waissbluth
Monterey Chapter Chair
Surfrider Foundation

July 27, 2016

RECEIVED

JUL 2 9 2016

CALIFORNIA
COASTAL COMMISSION

California Coastal Commission
725 Front Street, Suite 300
Santa Cruz, CA 95060

Re: Hearing on Sand Mining Operation, Monterey Bay
August 10, 2015 - Public Comment

To Whom It May Concern:

It is way past time for the sand mining in Monterey Bay to stop. Monterey Bay has the highest erosion rate in all of California due to the continued mining of 220,000 cubic yards of sand annually. Climate change is going to drastically affect our coastline and we cannot afford the operation of the mining by CEMEX any longer.

If someone were swindling the people out of valuable coastal property, criminal charges would be filed. The science on the reason for the loss of coastal land is clear and this mining operation is a major contributor to the loss of over 380 acres of coastline due to erosion. We cannot afford to have this continue any longer.

The small amount of tax revenue and the small number of jobs are greatly offset by the damage to our public beaches and the tourist industries that this coastline supports. It is vital that we stop the erosion that this mining operation is causing and shut it down immediately.

Thanks you.

James Raine
Michelle Raine

James and Michelle Raine
1310 Buena Vista Avenue
Pacific Grove, CA 93950
(831) 747-1666

July 28, 2016

Dear CA Coastal Commissioners,

My name is Kathy Biala and I am a resident of Marina. I support the CCC Cease and Desist NOI and I hope that the illegal sand-mining will be stopped as soon as possible.

I would like to call attention to this 50 pound bag of Cemex Monterey Lapis Sand that is essentially part of the 200,000 cubic yards of sand mined annually by Cemex on the Monterey Bay. I purchased this for $4.15 at the local Home Depot in Seaside, CA, our neighboring city.

If 200,000 cubic yards are being mined from our beaches, and one cubic yard of sand equals 3,000 pounds, this equates to <u>**60 million pounds**</u> of sand or <u>**12 million bags**</u> just like this one of 50 pds each. At $4.15 per bag, Cemex is selling our sand to customers for $50 ML with relatively no costs to them!

This bag of sand harvested for free from our shoreline is worth real money to Cemex, contributing to a large, lucrative sand-mining industry but to us, in the Monterey Bay, this bag is priceless. Please understand that public sentiment is clearly against the illegal sand-mining from our shores.

Thank you

July 31, 2016

AUG - 2016

California Coastal Commission
725 Front Street, Suite 300
Santa Cruz, CA 95060

Re: Hearing on Sand Mining Operation, Monterey Bay
August 10, 2016 – Public Comment

To Whom it May Concern:

As resident homeowners in Monterey County, we are very concerned about the increased erosion of the Monterey Bay coastline.

The erosion is causing great environmental harm to wildlife and economic expense for coastline repair as well as residential damage. In addition, it is harming the tourist industry.

A key and well documented cause of this erosion is related to the CEMEX sand mining operation. Please put a stop to this operation. Now.

Sincerely,

Gina Gianfala and Robert Roland
1056 Sawmill Gulch Rd
Pebble Beach, CA 93953
571-375-5155

California Coastal Commission

725 Front Street, Suite 300

Santa Cruz, CA 95060

AUG - 2016

Re: Hearing on Sand Mining Operation, Monterey Bay August 10, 2016 Public Comment

To CA Coastal Commission Members:

It is way past time for the sand mining in Monterey Bay to stop.

Monterey Bay has the highest erosion rate in all of California due to the continued mining of 220,000 cubic yards of sand annually. Climate change is going to drastically affect our coastline and we cannot afford the operation of the mining by CEMEX any longer. The fact that the Cemex sand plant is the ONLY beach sand mining operation in the United States, seems to be in direct conflict with the principles of the Marine Sanctuary and conservation efforts on our coast.

If someone were swindling the people out of valuable coastal property, criminal charges would be filed. The science on the reason for the loss of coastal land is clear and this mining operation is a major contributor to the loss of over 380 acres of coastline due to erosion. We cannot afford to have this continue any longer.

The small amount of tax revenue and the small number of jobs are greatly offset by the damage to our public beaches and the tourist industries that this coastline supports. It is vital that we stop the erosion that this mining operation is causing and shut it down immediately.

Thank you for your attention to this important matter

Francie Mitchell Jim Mitchell

Francie and Jim Mitchell

50 La Playa

Monterey, CA

MONTEREY COUNTY

THE BOARD OF SUPERVISORS

JANE PARKER - Chair
SUPERVISOR - FOURTH DISTRICT
KRISTI MARKEY - Chief of Staff

August 8, 2016

California Coastal Commission
1121 L Street #503
Sacramento, CA 95814

RE: **Support to proceed with enforcement activities in Marina**

Dear Commissioners,

I am writing to express my support for your commission to proceed with enforcement activities as stated in your Cease and Desist Notice of Intent regarding sand mine operations in Marina. The Southern Monterey Bay has the highest coastal erosion rates in the state. It is my understanding that the California Coastal Act and the City of Marina's Local Coastal Program both have clear language prohibiting the sand mine and the mine operates without a permit from the County. Despite its lack of permits and approvals, the operation continues, causing damage to both our natural and built infrastructure through severe erosion.

The issue has been studied by scientists, economists, and the Coastal Commission, and all have concluded that the mine should cease operations. Thank you for your attention to this matter and please do not hesitate to contact me if you have any questions or if I can support your efforts.

Sincerely,

Jane B Parker

Supervisor Jane Parker
Fourth District

Cc: Senator Bill Monning
Assemblymember Mark Stone
County of Monterey Legislative Affairs
John Ainsworth
Michael Watson

2616 1ST Avenue, Marina, CA 93933 • (831) 883-7570 • district4@co.monterey.ca.us

California Shore & Beach Preservation Association

October 7, 2016

California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105

Attn: Lisa Haage, Chief of Enforcement

Re: Support Cease and Desist Order CEMEX Sand Mining

Dear Ms. Haage,

California Shore & Beach Preservation Association is the state chapter of the American Shore & Beach Preservation Association and we support actions that restore, preserve and enhance our coasts and beaches based on an integration of science and public policy. On behalf of the Board of CSBPA, I wish to assert our science-based determination that the CEMEX Lapis beach pond sand mine has had and continues to have significant adverse impacts to the local beach areas and to the Southern Monterey Bay Littoral Cell. In addition, we support the Commission's action to require that CEMEX "cease and desist" operations at the Lapis beach pond sand mine so that these on-going adverse impacts can be stopped.

California's beaches are of major recreational, social, ecological and economic importance to the state and the nation. For over thirty years, CSPBA has published articles and proceedings, and held conferences, workshops, symposia, and local meetings to inform coastal professionals, local officials, and interested citizens about coastal processes in California, causes of erosion and shoreline change and efforts to enhance beach areas. Adequate sand supplies are fundamental to beach stability; therefore, removal of sand or blocking the supply of sand to the littoral system is detrimental to the nearby beaches. As the adage goes, if you find yourself in a hole, the first thing to do is stop digging. The beaches of the Southern Monterey Bay Littoral cell are experiencing erosion and, quite literally, the first thing to do it is to stop digging. The excavation of sand at the Lapis beach pond site must end.

The CSBPA Board of Directors, collectively, has several hundred years of experience with the California coast; our memberships' experience expands this many fold. Based on our scientific understanding of the California coast in general and of Monterey Bay and Marina in particular, we offer the following reasons for terminating the last beach mining operation in the United States.

- The Lapis beach pond sand mine is interfering with natural coastal processes, interrupting longshore sand transport, removing sand from the littoral cell and causing erosion of the nearby beaches.
- The Lapis beach pond sand mine is causing beach erosion to the detriment of many public facilities and resources, such as Marina State Beach, the Monterey Bay National Marine Sanctuary, Marina Coast Water District Facilities, Dune Road and Cabrillo Highway.

- The sand that is being excavated from the Lapis beach pond is a public resource that should remain in the littoral system. In 1999, CSBPA, in conjunction with the American Society of Civil Engineers and the Coastal Zone Foundation, held Sand Rights 1999[1], a conference that details the public values of littoral sand.
- Existing erosion threats will be exacerbated by rising sea level.
- Beach erosion from sand mining operations can be reversed. When dragline sand mining operations halted in Monterey Bay in 1990, shoreline erosion rates dropped from 2.3 ft/yr to 1 ft/yr at a beach survey point about 1.2 miles down coast of the mining activity and dropped from 2 ft/yr to 0.3 ft/yr about 2.5 miles downcoast of the mining operation[2].
- Recent research by Professor Ed Thornton, an internationally recognized expert in coastal processes who has decades of experience with the Monterey coast, concluded that terminating excavation from the Lapis beach pond sand mine would not only end the existing condition of erosion that is occurring at the nearby beaches, but that restoration of natural conditions would result in a trend of accretion or beach growth.
- Onshore sand transport by waves and wave uprush carry littoral sand into the Lapis beach pond. When excavation is stopped, onshore sand transport will cause the pond to fill, reestablishing this section of the coast as a natural beach feature, removing an artificial interruptive feature within this littoral cell and allowing natural coastal processes to reestablish.
- The Coastal Regional Sediment Management Plan for southern Monterey Bay recommends cessation of the beach sand mining[3]. This report, prepared for local, State and Federal government agencies, identified the beach sand mining at Marina to be a major cause of coastal erosion for the entire shore south to and including Monterey.

In summary, the Lapis beach pond sand mine, the last remaining beach sand mining operation in the United States, is an obsolete relic that should not remain on the California coast. The excavation of sand is causing continued degradation of the beaches and the sediment supply in the Southern Monterey Bay Littoral Cell. We strongly agree with the environmental concerns of beach sand mining and fully support the California Coastal Commission's efforts to stop beach sand mining in Marina, California.

Sincerely,

Susan Brodeur
President, CSBPA

---

[1] Ewing, Lesley, Orville Magoon and Sheila Robertson, Editors. 2000. Sand Rights: Bringing back the beaches: conference proceedings September 23 – 26, 1999, Holiday Inn Ventura Resort, Ventura. California; American Society of Civil Engineers, Reston.

[2] Thornton, E.B., Sallenger, A., Conforto Sesto, J., Egley, L., McGee, T. and Parsons, R. 2006. Sand mining impacts on long-term dune erosion in southern Monterey Bay. Marine Geology, 229, 45-58.

[3] PWA and others, Coastal Regional Sediment Management Plan for Southern Monterey Bay, prepared for the Association of Monterey Bay Area Governments (AMBAG) and the Coastal Sediment Management Workgroup (CSMW), Nov. 3, 2008, http://www.dbw.ca.gov/csmw/pdf/SMontereyBay_CRSMP_3Nov2008.pdf and http://www.dbw.ca.gov/csmw/crsmp.aspx .

-> JUSTIN 1/25/2017

RECEIVED

JAN 25 2017

CALIFORNIA
COASTAL COMMISSION
CENTRAL COAST AREA

THE LEADING EDGE OF COASTAL ACTIVISM

Dan Carl, Deputy Director, Central Coast/North Central Coast Districts
CALIFORNIA COASTAL COMMISSION
4877 Central Coast District Office
725 Front Street, Suite 300
Santa Cruz, California 95060-4508

City of Marina c/o Mr. Bruce Carlos Delgado, Mayor,
211 Hillcrest Ave.
Marina, CA 93933

RE: Cemex Pacific Lapis Sand Mining Plant In Violation of Coastal Act for Operating Without a Coastal Development Permit

January 23, 2017,

Aloha from Surfers' Environmental Alliance (SEA),

We are writing to express our serious concerns with respect to the CEMEX Pacific Lapis sand mining plant, in Marina, California. CEMEX has operated the Pacific Lapis sand mining plant since 2005, and the plant was previously operated by Pacific Concrete and Aggregates and Lone Star Industries between 1965 and 2005. As detailed below, to Surfers' Environmental Alliance's knowledge, present day operations involve mining approximately 200,000 cubic yards of sand a year from a self-made pond on the beach, which is double the amount of sand initially mined prior to the Coastal Act.

We write in support of the Surfrider Foundation's Monterey Chapter that has previously commented on this issue.

SEA West Coast: 410 Seacliff Drive Aptos, CA 95003 scseasurfer@gmail.com
SEA East Coast: 543 2nd Avenue Long Branch, N.J. 07740 rlee@seasurfer.org

As a preliminary matter, Surfers' Environmental Alliance (SEA) is committed to the preservation and protection of the environmental and cultural elements that are inherent to the sport of surfing. Our goals are achieved through grassroots activism, community involvement, education and humanitarian efforts. We engage in projects that strive to conserve the quality of our marine environment, preserve or enhance surf breaks, protect beach access rights, and safeguard the coastal surf zone from unnecessary development. www.seasurfer.org

CEMEX Activities are within the Coastal Zone The plant is located on and between Lapis Road and the Pacific Ocean in Marina, California, and sits squarely within the Coastal Zone. The plant's sand mining activities occur at this site, landward of the mean high tide line. Therefore, this matter is within the Commission and City of Marina's jurisdiction. The City of Marina has a Local Coastal Program, certified by the Commission in 1982, and therefore generally has current CDP permitting authority. However, pursuant to Coastal Act Section 30601, a CDP must also be obtained from the Commission for "developments between the sea and the first public road paralleling the sea or within 300 feet of the inland extent of any beach or of the mean high tide line of the sea where there is no beach, whichever is the greater distance. Further, as explained in more detail below, both the City and the Commission have enforcement authority to abate CEMEX's unpermitted activities.

To our knowledge, the Commission has been investigating CEMEX since 2009, and has previously anticipated completing the investigation and likely issuing a statement of findings, in late 2013 or early 2014, examining-claims-that-CEMEX-in-marina-mining-more- CEMEX Activities Constitute "Development" CEMEX's sand mining activities squarely fall within the definition of "development" requiring a Coastal Development Permit (CDP). "Development" is defined to include "[…] on land, in or under water, the placement or erection of any solid material or structure; discharge or disposal of any dredged material or of any gaseous, liquid, solid, or thermal waste; grading, removing, dredging, mining, or extraction of any materials; change in the density or intensity of use of land […], construction, reconstruction, demolition, or alteration of the size of any structure, including any facility of any private, public, or municipal utility […]." (Pub. Res. Code § 30106.) The operations of a company extracting sand falls within the literal definition of "development" in Pub. Res. Code § 30106 (removing, dredging, mining, or extraction of any materials on land or under water), thus requiring CDPs under Pub. Res. Code § 30600(a) for development in the coastal zone. (Monterey Sand Co. v. California Coastal Comm., 191 Cal.App.3d 169, 176. ("Monterey Sand Co.")) 3 Phillip Williams and Associates, 2008, Coastal Regional Sediment Management Plan for Southern Monterey Bay, Prepared for Association of Monterey Bay Area Governments, at 43; available at http://www.dbw.ca.gov/csmw/pdf/SMontereyBay_CRSMP_3Nov2008.pdf. 4

Since 2005, CEMEX has mined approximately 200,000 cubic yards of sand a year, from the beach site in Marina, and since at least between 1965 and 1970, CEMEX's predecessors mined approximately 68,000 to 98,000 cubic yards of sand a year from the same site. (Phillip Williams and Associates, 2008, Coastal Regional Sediment Management Plan for Southern Monterey Bay, Prepared for Association of Monterey Bay Area Governments, at 44, A-1, and A-2.) Thus, CEMEX and its predecessors are and have been engaging in "development" under the Coastal Act. Neither CEMEX Nor Its Predecessor(s) have Obtained a Required Vested Rights Determination from the Commission. Given that the plant engaged in sand mining operations prior to the implementation of the 1976 Coastal Act, arguably, it might have obtained vested rights to its sand mining operations, such that it would not be required to obtain a CDP for those activities. (Pub. Res. Code § 30608). However, operators are not merely grandfathered in automatically, but instead must apply for and obtain a vested rights determination from the Commission, pursuant to the Commission's regulations (See, e.g., 14 Cal. Code of Regs. §§ 13200-13204, 13207; Billings v. California Coastal Com. (1980) 103 Cal App 3d 729.) This process includes filing a claim of vested right, on a form acceptable to the Commission, and substantiating that claim in a proceeding before the Commission, where the claimant bears the burden of proof. (14 Cal. Code of Regs. §§ 13200 - 13202.) Commission action on a claim of vested right must be substantiated by findings of fact. (14 Cal. Code of Regs. § 13205.)4

To our knowledge, neither CEMEX, nor its predecessors Pacific Concrete and Aggregates and Lone Star Industries, have ever filed a claim for or obtained a vested rights determination from the Commission. Therefore, CEMEX has no right - grandfathered or not – to continue its sand mining operations at the Marina plant. And note, case law holds that in view of the comprehensive scheme of the Coastal Act for protecting and preserving the natural and scenic resources of the coastal zone and insuring that any development which occurs within the zone will be consistent with that overall objective, any substantial doubts regarding the meaning and effect of Pub. Res. Code Section 30608 exempting persons having "vested rights" from the Act's CDP requirement, should be resolved against the person seeking exemption. (Urban Renewal Agency v. California Coastal Zone Conservation Com. (1975) 15 Cal. 3d 577.) 5 and is and has been violating the Coastal Act every day that it is mining sand without a CDP. Even if CEMEX Had a Vested Rights Claim, Operations Have Undergone Substantial Expansion and Necessitate a Coastal Development Permit. Further, even if CEMEX had vested rights to some sand mining operations, which it does not, a vested rights determination only affords a person the right to continue its operations within the same scope. "[N]o substantial change may be made in any such development" without receiving prior approval through a CDP. (Cal. Pub. Res. Code § 30608; 14 Cal. Code. Regs. § 13207; see also Monterey Sand Co., at 176 (operations for which there are vested rights must be carried out "within the scope of the preexisting authorization for use of the coastal resource in question."))

Evidence greatly suggests that CEMEX and its predecessors' operations have undergone substantial change. When operations began, between 1965 and 1970, the plant was extracting sand at a rate of 68,000 to 98,000 cubic yards per year. (Phillip Williams and

SEA West Coast: 410 Seacliff Drive Aptos, CA 95003 scseasurfer@gmail.com
SEA East Coast: 543 2nd Avenue Long Branch, N.J. 07740 rlee@seasurfer.org

Associates, at 44, A-1, and A-2.) Further, it appears from an October 16, 1969 memorandum, that on August 28, 1969 the State Lands Commission (SLC) had authorized a lease extension, which limited the maximum amount of sand extracted to only 80,000 cubic yards per year. (See Exhibit A, attached hereto, State Lands Division 1969 Memo). The last reported value of 98,000 cubic yards, to the California State Lands Commission, was in 1970 and is conservatively used as the estimate for the amount dredged until the mid- 1980s when the operation started using an improved larger dredge. It is assumed that the amount of sand extracted from the beach increased using the larger dredge, and that the mine further increased their extraction after other mines in the region closed in 1990, to meet consumer demand. (Phillip Williams and Associates, at 44 and A-1.)5 To S.E.A's knowledge, the total amount of sand sold annually between 1998 and 2008 (and presumably, today) from the plant was between 225,000 and 280,000 tons, or approximately 167,000- 207,000 cubic yards per year, based on an approximate density of 1.35 tons per cubic yard, as reported by CEMEX. Commonly reported estimates are that the plant currently mines approximately 200,000 cubic yards of sand a year.

In fact, the amount presently mined could be higher, as CEMEX mines as much as 300,000 tons of sand annually at this time. This substantially increased – more than doubled - rate is not within the scope of the plant's pre-1976 Coastal Act sand mining activities, but instead constitutes a substantial change which requires obtaining a CDP. Further, there is no argument that this activity – either pre-Coastal Act or now – constitutes "repair or maintenance" exempt from the Coastal Act's CDP requirement (See Pub. Res. Code § 30610(d)(providing exemption for "repair or maintenance activities that do not result in an addition to, or enlargement or expansion of, the object of those repair or maintenance activities." Instead, sand is dredged and carried away from the property for sale, repairing and maintaining nothing, and instead is suspected to be a primary cause of beach and dune erosion in southern Monterey Bay: "As other mines closed, the ongoing operation at Marina increased its extraction to 200,000 yd/year today. This is similar to the annual sand volume eroded from the dunes. Erosion rates at Marina increased after 1985, and are believed to be related to an increase in sand extraction at the Marina sand mine in the mid-1980s, 1990s, and 21st century.") Due to a persistent rise in sea level, changes in sand availability, and previous unsustainable public and private development practices, the southern Monterey Bay beaches and coastal dunes south of the Salinas River, in close proximity to the CEMEX plant, are eroding, on average, at the fastest rate in California (This is in contravention of Coastal Act policies, including Section 30253 ("New development shall [...] assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area [...]," and operations may even be prohibited by Section 30233, which limits the kinds of dredging and sediment movement projects which can be carried out in the coastal zone.

In conclusion, Surfers' Environmental Alliance believes that CEMEX and its predecessors' sand mining operations are likely violating the Coastal Act by undertaking development in the coastal zone without a CDP or a vested rights determination. Further, even if there had been a vested rights determination, CEMEX would not be exempt, since its operations vastly exceed the scope of its pre-Coastal Act sand mining activity. Further, the operations appear to conflict with Coastal Act policies, particularly 7 Sections 30253 and 30233. S.E.A. respectfully requests that the Commission diligently continue and complete its investigation into CEMEX's activities.

We also ask that the Commission and City of Marina take all appropriate actions based on the outcome of the Commission's investigation and/or the City's findings, which may include issuing a notice of violation and cease and desist order pursuant to Coastal Act Section 30809, and seeking declaratory and equitable relief to restrain CEMEX's Coastal Act violations pursuant to Coastal Act Section 30803.

We respectfully remind the City and Commission that pursuant to Coastal Act Section 30809, the executive director of the Commission may issue a cease and desist order to enforce requirements of a certified local coastal program where the local government requests the Commission to assist with or assume primary responsibility for issuing a cease and desist order; or where the Commission requests and the local government declines to act or does not take action in a timely manner, regarding an alleged violation which could cause significant damage to coastal resources.

We hope that the foregoing information is helpful to the Commission and City, and welcome the opportunity to assist both as you address this matter. Please share this with any other appropriate City and Commission staff members, and we ask that you please cc us so that we know the appropriate individuals to correspond with.

This effort is all about preserving and protecting the coastal resources that help make the State of California such an attractive place to live, work, and visit. We look forward to your reply

Sincerely,

Richard Lee, Executive Director

James Littlefield, West Coast Director, www.seasurfer.org

SEA West Coast: 410 Seacliff Drive Aptos, CA 95003 scseasurfer@gmail.com
SEA East Coast: 543 2nd Avenue Long Branch, N.J. 07740 rlee@seasurfer.org

SURFRIDER
FOUNDATION
SANTA CRUZ CHAPTER

Dan Carl, Deputy Director, Central Coast/North Central Coast Districts
CALIFORNIA COASTAL COMMISSION
4877 Central Coast District Office
725 Front Street, Suite 300
Santa Cruz, California 95060-4508

Mayor Bruce Carlos Delgado
City of Marina
211 Hillcrest Ave.
Marina, CA 93933

January 25, 2017

RE: REQUESTING A FULL AND COMPLETE INVESTIGATION OF THE SAND-MINING ACTIVITIES OF CEMEX IN MARINA, CA.

Respectful greetings from the Surfrider Foundation,

To: All Interested Parties.

The Santa Cruz Chapter of the Surfrider Foundation hereby requests a full and complete investigation of the CEMEX sand mining plant in Marina, California and in the Coastal Zone. We believe it is operating without the necessary permits and is removing sand from this heavily-eroding beach segment far in excess of pervious permitted years.

In this matter, we write in support of Surfrider's Monterey Chapter, and we hereby support all allegations made in their previous letter on this coastal matter.

CEMEX has operated the Pacific Lapis sand mining plant since 2005, and the plant was previously operated by Pacific Concrete and Aggregates and Lone Star Industries between 1965 and 2005. As detailed below, to Surfrider's knowledge, present day operations involve mining approximately 200,000 cubic yards of sand a year from a self-made pond on the beach, which is double the amount of sand initially mined prior to the Coastal Act.

The Surfrider Foundation is a non-profit grassroots organization dedicated to the protection and enjoyment of our world's oceans, waves and beaches. Founded in 1984 by a handful of visionary surfers in Malibu, California, the Surfrider Foundation now maintains over 50,000 members and 80 chapters worldwide. For more information on the Surfrider Foundation, go to www.surfrider.org

JBL
DC

CITY OF MONTEREY

Colton Hall, California Constitution Hall 1849

Mayor:
CLYDE ROBERSON

Councilmembers:
TIMOTHY BARRETT
DAN ALBERT
ALAN HAFFA
ED SMITH

City Manager:
MICHAEL McCARTHY

March 13, 2017

RECEIVED
MAR 16 2017
CALIFORNIA
COASTAL COMMISSION
CENTRAL COAST AREA

California Coastal Commission
725 Front Street #300
Santa Cruz, CA 95060

Re: Cemex Plant Notice of Violation

Dear Sir/Madame:

The Monterey Bay is experiencing some of the highest coastal erosion rates in the State of California. Erosion is evident along Del Monte Beach and threatens the City's beaches, public infrastructure (utility lines, Monterey Bay Scenic Recreation Trail, etc) and private/public buildings. Continued loss of sand will threaten the City's waterfront and is reaching a critical stage.

Erosion rates appear to be exacerbated by the Cemex Sand Plant located in the City of Marina. This sand plant has a unique operation in that sand is extracted from a pond located on the sandy beach. Various studies have pinpointed the Cemex plant as significantly contributing to the loss of sand. Estimates range up to 270,000 cubic yards of sand yearly.[i] [ii]

The City Council is deeply concerned about the increasing erosion along the Central Coast and urges your agency to do whatever is in its power to cause the cessation of sand mining. We support the Coastal Commission efforts to eliminate causes of coastal erosion, including sand mining.

Sincerely,

Clyde Roberson
Mayor
City of Monterey

---

[i] RMC Lonestar, Reclamation Plan, Lapis Plant, April 10, 1991

[ii] Borgen, Jennifer, Cemex. Email from Jennifer Borgen, May 11, 2006

CITY HALL • MONTEREY • CALIFORNIA • 93940 • 831.646.3760 • FAX 831.646.3793
Web Site • http://www.monterey.org

County of Santa Cruz

BOARD OF SUPERVISORS

701 OCEAN STREET, SUITE 500, SANTA CRUZ, CA 95060-4069
(831) 454-2200 • FAX: (831) 454-3262 TDD/TTY - Call 711

JOHN LEOPOLD	ZACH FRIEND	RYAN COONERTY	GREG CAPUT	BRUCE MCPHERSON
FIRST DISTRICT	SECOND DISTRICT	THIRD DISTRICT	FOURTH DISTRICT	FIFTH DISTRICT

April 11, 2017

Coastal Commission
725 Front Street, #300
Santa Cruz, CA 95060

RE: Cemex Pacific Lapis Sand Mining Plant

Dear Honorable Commissioners,

The coastline of Santa Cruz County, which represents the landward margin of a portion the Monterey Bay National Marine Sanctuary, is made up of diverse coastal terraces, natural bridges and sandy shorelines. It is home to one of only nine World Surf Reserve locations globally, and provides critical habitat to diverse marine life and terrestrial animals. Coastal erosion and sea level rise are a constant threat to this precious resource and we must do everything we can to protect our coastline from all threats.

CEMEX has operated the Pacific Lapis sand mine in Marina, California since 2005. It is the last operating coastal sand mine in the U.S. The mine was previously operated by Pacific Concrete and Aggregates and Lone Star Industries between 1965 and 2005. It is believed that CEMEX currently mines approximately 200,000 cubic yards of sand a year (and perhaps as much as 300,000 cubic yards) from a self-made pond on the beach. At this time, CEMEX is removing all of this sand without any permits.

As the sandy shoreline of the Monterey Bay stretches from Capitola to Monterey and straddles two Counties we share the goal of protecting this precious coastline with the coastal communities of Monterey County. Actions to mine sand from the coastal zone has resulted in dramatic coastal erosion. Research indicates that some of the most rapid coastal erosion in all of California is occurring on the southern reaches of the Monterey Bay primarily due to the aforementioned sand mining. Removal of hundreds of thousands of cubic yards of sand per year equates to the loss of acres of coastal land annually.

Middlebury Institute *of*
International Studies at Monterey
Center for the Blue Economy

April 25, 2017

Commissioners
California Coastal Commission
45 Fremont Street #2000
San Francisco, CA 94105

Dear Commissioners:

Hello and greetings from the Center for the Blue Economy at the Middlebury Institute of International Studies. Our mission is to provide leadership in research, education and analysis regarding the overall economic contribution of the oceans and coastlines, promoting the sustainability of these assets.

It has been clear for many years that the negative economic impacts of the CEMEX/Lapis Sand Mine are much greater than the benefits. In August of 2012, two of our students in the International Environmental Policy program at the Middlebury Institute performed a very rudimentary analysis for a class project that highlighted the incredible cost impacts to the Southern Monterey Bay region from the Lapis sand mine[1]. Later that year, Dr. Phil King, Chair of the Economics Department at San Francisco State University, co-authored a study entitled *Evaluation of Erosion Mitigation Alternatives for Southern Monterey Bay.* In this paper (pages 111-113), Dr. King estimates the loss in recreational value to Monterey County due to sand mining at ~$726 million (2010 dollars, over 100 years). That equates to more than $8-10 million per year in today's dollars if sand loss continues at the current rate—the highest rate of sand loss in the state of California.

The CEMEX plant does not pay royalties for the mining of this public good. The company contributes a nominal amount in taxes to Monterey County each year, roughly $200,000.00, and provides 19 full-time jobs. These contributions are dwarfed by the economic losses due to the intensive loss of sand to beaches south of the mine.

It is our conclusion that the negative economic impacts of the CEMEX/Lapis Sand Mine far outweigh the benefits to the Monterey Bay economy under even the most conservative estimates. We urge you to consider these tremendous environmental and economic costs in your deliberations about the future of the mine.

Sincerely,

Jason Scorse, Director
Center for the Blue Economy | Middlebury Institute of International Studies
460 Pierce Street, Monterey, CA 93940
831-647-3548 | jscorse@miis.edu

[1] *Lapis Sand Dollars: An Economic Analysis of Non-Market Impacts of Lapis Sand Mine in Southern Bay*

City of Carmel-by-the-Sea

POST OFFICE BOX CC
CARMEL-BY-THE-SEA, CA 93921
(831) 620-2000

May 17, 2017

RECE[illegible]

MAY 2 2 2017

CA[illegible]
COAS[illegible]
CENTRAL [illegible]

California Coastal Commission
725 Front Street, #300
Santa Cruz, CA 95060

Re: CEMEX Plant Notice of Violation

Dear Sir/Madam:

The southern part of the Monterey Bay is experiencing alarming rates of coastal erosion. Recent studies suggest that the average shoreline erosion rate for the southern Monterey Bay is higher than any other region in the State of California. Shoreline erosion threatens public beaches that are a tremendous resource for our local communities, providing recreational value to our residents and visitors alike, and generating significant economic activity in our local municipalities.

Erosion rates appear to be exacerbated by the CEMEX lapis sand plant located in Marina. Several studies have noted that, by removing sand from the beach area, the plant's dredge pond disrupts the natural replenishment of beaches of the southern Monterey Bay as sand moves up and down the shoreline.

The City of Carmel-by-the-Sea is concerned about the high erosion rates along the Monterey Bay, which will impact our residents, visitors, and our many businesses associated with the visitor industry. We support the Coastal Commission's efforts to reduce human contributions to coastal erosion, including sand mining.

Sincerely,

Steve Dallas
Mayor
City of Carmel-by-the-Sea

SAND CITY

RECEIVED
MAY 22 2017
CALIFORNIA
COASTAL COMMISSION
CENTRAL COAST AREA

May 18, 2017

California Coastal Commission
725 Front Street #300
Santa Cruz, CA 95060

Re: Cemex Plant Notice of Violation

Dear Sir/Madame:

The Monterey Bay is experiencing some of the highest coastal erosion rates in the State of California. Erosion rates appear to be exacerbated by the Cemex Sand Plant located in the City of Marina. This sand plant has a unique operation in that sand is extracted from a pond located at the sand beach. Various studies have pinpointed the Cemex plant as significantly contributing to the loss of sand. Estimates range up to 270,000 cubic yards of sand yearly.

Although sand mining in Sand City, California has been a big part of the City's history, the last sand mining operation closed in the 1980's. The City, through its Local Coastal Program (LCP), now does not allow sand mining as a permitted use along its coast.

At their May 16, 2017 Sand City Council meeting, Council authorized letters in opposition be sent to various agencies that we are deeply concerned about the increasing erosion along the Central Coast and urges your agency to do whatever is in its power to cause the cessation of sand mining. We support the Coastal Commission efforts to eliminate causes of coastal erosion, including sand mining.

Sincerely,

Mary Ann Carbone

Mary Ann Carbone
Mayor
City of Sand City

City Hall
1 Sylvan Park,
Sand City, CA
93955

Administration
(831) 394-3054

Planning
(831) 394-6700

FAX
(831) 394-2472

Police
(831) 394-1451

FAX
(831) 394-1038

Incorporated
May 31, 1960

CEMEX Sand Mining Plant in Monterey Bay National Marine Sanctuary

Photo courtesy of Prof. Ed Thornton

Waves push sand into the pond. Sand is dredged out, kiln dried, trucked away, packaged, and sold. Meanwhile, the coastline erodes and the beaches disappear...

SURFRIDER FOUNDATION

- CEMEX removes approximately **200,000 cubic yards of sand** every year from the beach in Marina.[1,2] This is equivalent to **a pile of sand 10 feet high by 30 feet wide by 3.4 miles long, every year.** The CEMEX sand mine in Marina is **the only remaining coastal sand mine in the entire United States.**[1]

- Southern Monterey Bay was identified by the U.S. Geological Survey as having the **highest average erosion rate in the State of California.**[3] Coastal erosion issues are expected to intensify as a result of sea level rise and climate change.

- Studies show that **CEMEX's mining operation is a primary cause of beach erosion in Monterey Bay.**[3,4] With 2-6 feet of erosion per year, numerous coastal structures, infrastructure and public beaches are put in jeopardy.

- The **costs** associated with beach erosion caused by CEMEX sand mining, including recreational value of lost beaches and future building of seawalls, are estimated **in excess of $10,000,000 annually for the cities in Monterey Bay.**[5]

-Evidence suggests that CEMEX has increased extraction by 250% from historical levels[1], without benefit of a public hearing or permit from responsible agencies like the California Coastal Commission.

- Though it is abundant, sand is not an endless natural resource. **The California Coastal Commission needs to hear strong public support for stopping CEMEX sand mining in Monterey Bay**. Help keep our coast from being taken away, one dump truck full of sand at a time. Learn more & show your support: **http://www.surfrider.org/campaigns/cemex-sand-mining**

References:
1. *http://www.montereycountyweekly.com/news/cover/cemex-mine-reflects-human-hunger-for-sand/article_a7535ade-ba34-11e5-99c5-6fa7fd2f622a.html*
2. *http://www.ventanasierraclub.org/conservation/marina/sandMiningErosion.shtml*
3. *Hapke C., Reid D., and Richmond D. "Rate and Trends of Coastal Change in California..." Journal of Coastal Research, 25(3), May 2009, 603-615.*
4. *Coastal Regional Sediment Management Plan for Southern Monterey Bay http://montereybay.noaa.gov/research/techreports/trpwa2008.html*
5. *http://montereybay.noaa.gov/research/techreports/esapwa2012.pdf* (see p. 111-113)