

CALIFORNIA COASTAL COMMISSION

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December 20, 2002

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TO: CALIFORNIA COASTAL COMMISSIONERS

FROM: PETER M. DOUGLAS, EXECUTIVE DIRECTOR

SUBJECT: STAFF RECOMMENDATION ON MAP OF POST-LCP CERTIFICATION
JURISDICTION, CITY OF ENCINITAS
(for Commission consideration at its January 7-10, 2003 meeting)

This recommendation was developed by Jonathan Van Coops and Darryl Rance, Coastal Program Analysts, Mapping/GIS Unit, working under the direction of Susan Hansch, Chief Deputy Director and Manager - Technical Services Division.

SUBSTANTIVE FILE DOCUMENTS

- San Elijo Lagoon Boundary Study, California State Lands Commission, February 1976.
- National Wetland Inventory Maps, U.S. Department of the Interior, Fish & Wildlife Service, Encinitas and Rancho Santa Fe Quadrangles, 1990.
- Sheet 6, NOAA/ USCOE Cooperative Shoreline Movement Study, Imperial Beach – San Pedro, CA, 1985.
- Potential Public Trust Land Maps No. 155 & No. 156 (Encinitas and Rancho Santa Fe Quadrangles), California State Lands Commission, 1979-80.
- Coastal Commission 1: 12,000-scale Vertical Aerial Photography 1970-2001.
- Review of San Elijo Lagoon Tidal Study: Eastern Limit of Tidal Action in San Elijo Lagoon by Tierra Environmental Services, Inc., John Dixon, Ph.D., California Coastal Commission, April 20, 1999.
- San Elijo Lagoon Tidal Study: Eastern Extent of Tidal Action in San Elijo Lagoon, Tierra Environmental Services, Inc., Chris Nordby, Principal Author, March 1999.
- Letter from Tom Curriden, Senior Planner, City of Encinitas to Jonathan Van Coops, California Coastal Commission, January 11, 2002.
- Letter from Michael T. Larsen, Attorney for M&M Development, LLC to Sara Wan, Chair, California Coastal Commission, and California Coastal Commissioners, July 9, 2002. (Note: document submitted at July 9, 2002 Coastal Commission hearing)
- Letter from Chris Nordby, Tierra Environmental Services, Inc. to Sara Wan, Chair, California Coastal Commission, and California Coastal Commissioners, February 7, 2002. (Note: document submitted at July 9, 2002 Coastal Commission hearing)
- Letter from Mark J. Dillon, Attorney for Encinitas Country Day School, Inc., dba Encinitas Country Day School, Kathleen Porterfield, and M&M Development, LLC to

Commission continued action on the item. Section IV of this report contains responses to the comments submitted at the July 2002 hearing.

BACKGROUND

I. Post-LCP Certification Permit and Appeal Jurisdiction

After an LCP certification becomes effective, coastal development permit authority within that jurisdiction is largely delegated to the local government. However, pursuant to Section 30519(b) of the Coastal Act, the Commission retains permit authority (with certain exceptions) after LCP certification over developments occurring on tidelands, submerged lands, and public trust lands. As provided in Section 30613 of the Coastal Act, local jurisdictions may request that primary permit authority in areas subject to the public trust that are filled, developed, and committed to urban uses be transferred to the local government's jurisdiction. The City of Encinitas, for which effective LCP Certification occurred in May of 1995, has not made a Section 30613 request as of this date. General location maps depicting the City of Encinitas are included as Exhibits 1 and 2.

In addition to the retained permit jurisdiction, Section 30603 of the Coastal Act defines certain areas and types of development for which approvals by the local government may be appealed to the Commission. Appeal jurisdiction is retained, for example, over development that is within 100 feet of streams or wetlands, on lands subject to the public trust, within 300 feet of the top of the seaward face of coastal bluffs, and between the sea and the First Public Road paralleling the sea or within 300 feet of the inland extent of the beach or the mean high tide line, whichever is the greater inland distance. The Commission's regulations provide specific boundary determination criteria for mapping the Commission's permit and appeal jurisdiction. (See 14 C.C.R. §13577 Exhibit 10).

II. Post-LCP Certification Map Adoption

For each coastal zone City or County with an effectively certified local coastal program, the Commission adopts a map or maps depicting the geographic areas where the Commission retains permit authority and where it has appeal jurisdiction (See 14 C.C.R. §13576(a)). This "post-LCP certification map" is intended to assist local governments, applicants, and other interested persons determine jurisdictional boundaries, but it remains a representation of these permit and appeal jurisdiction areas, and does not supercede Sections 30519(b) and 30603(a) of the Coastal Act, which define the Commission's retained original permit and appellate jurisdiction. In any location where there is a question about the mapped boundary, or where by virtue of cartographic generalization, map scale, changed conditions, compilation error, or any other reason, the map does not accurately depict conditions on the ground, the Commission's original and appellate jurisdiction is determined by applying the requirements of the Coastal Act and Commission regulations to the physical geographic conditions of a coastal area.

The staff now knows this is not the case, and that there is, in fact, a series of connected, continuous public roads that form an access system encompassing the lagoon. The First Public Road paralleling the Sea described further on in this report, and recommended for adoption is made up of that system of roads. In prior actions, the Commission has treated this system of roads, including Manchester Avenue, as the First Public Road Paralleling the Sea. See, e.g., CDP 6-83-314 (Manchester Estates), A-6-ENC-96-34 (Fletcher), A-6-ENC-97-070 (Kirkorowicz), A-6-ENC-98-109 (Fletcher), A-6-98-158 (Encinitas Country Day School).

Due to the interpretation in 1981 that no system of roads encompassed San Elijo Lagoon consistent with 14 C.C.R. Section 13577(i)(1)(E), and the fact Highway 101 met all the criteria in Section 13577(i)(1), except (i)(1)(E), the staff applied 14 C.C.R. Section 13577(i)(2). As a result, the mapped geographic appeal area included lands between the sea and Highway 101, and lands inland of the highway consisting of parcels fronting on the lagoon or 300 feet from the mean high tide line of the lagoon, whichever is the greater distance. A map note was included to indicate that the draft geographic appeal jurisdiction along San Elijo Lagoon inland of Highway 101 was the first row of parcels or 300 feet from the mean high tide line, whichever was the greater distance. This is the appeal jurisdiction that is provided for when there is no public road that meets all the criteria in 14 C.C.R. Section 13577(i)(1). As mentioned above, the boundaries and map notes shown on the 1981 draft map were replicated on a draft large-scale parcel base map in 1988, and distributed to the City and the Commission's San Diego District office staff for review at that time.

The City sent a letter concurring with the 1988 draft large-scale post-LCP Certification map in January of 1989, but presented several questions that were answered by staff in an April 1989 letter. No further activity regarding the City's drafts post-LCP Certification map occurred until 1994, when the LCP was approved. A 1995 draft map was updated and a staff recommendation prepared for adoption in June of that year. The City again concurred with the draft map, but requested postponement when it was determined that an 850 acre annexation was not depicted on the draft map. No public hearing was ever held concerning the initial draft maps which depicted Highway 101 as the First Public Road. Thus, interested members of the public did not have an opportunity to provide testimony as to whether Highway 101 was the appropriate road to designate as the First Public Road. An updated version of the large-scale draft post-LCP Certification map including the 850-acre annexation was prepared in 1999. This version is the first draft map that correctly depicts the First Public Road around San Elijo Lagoon and encompasses the "Sea" as defined in Section 30115 of the Coastal Act.

As of the date of this report, the Commission has not taken any action regarding adoption of a Post-LCP Certification Map for the City of Encinitas.

STAFF ANALYSIS

The depiction of certain segments of the First Public Road paralleling the Sea (FPR) on the Encinitas draft post-LCP Certification map is the only area of controversy regarding this map

IIa. San Elijo Lagoon as the "Sea"

The language of 14 C.C.R. Section 13577(i)(1) was intended to ensure that the designated "First Public Road Paralleling the Sea" (FPR) extend inland around water bodies that are considered the Sea as defined by P.R.C. Section 30115. Section 30115 defines the "Sea" to include "estuaries, salt marshes, sloughs, and other areas subject to tidal action through any connection with the Pacific Ocean." Based on the staff's analysis of available information, San Elijo Lagoon clearly meets the criteria in P.R.C. Section 30115 and is the "Sea" for purposes of the Coastal Act.

14 C.C.R. Section 13577 defines "estuary" as "a coastal water body, usually semi-enclosed by land, having open, partially obstructed, or intermittent exchange with the open ocean, and in which ocean water is at least occasionally diluted by freshwater from the land." As far back as 1972 and the earliest days of the Coastal Zone Conservation Commission (as it was called during the "Prop 20" era), the staff has always considered San Elijo Lagoon as the "Sea", and strong evidence supports that conclusion. Aerial Photography taken over a period of years often shows an open connection to the Pacific Ocean. In 1976 the State Lands Commission published a report entitled San Elijo Lagoon Boundary Study that provided detailed information about tidal action in San Elijo Lagoon, and states that the lagoon has historically been open to the waters of the Pacific Ocean on a seasonal basis. Field observations performed as part of the study indicated that the waters within the lagoon rise and fall in harmony with the tides on the ocean, whether or not the mouth is open. The study further concluded that the natural bed of the lagoon continued to be subject to tidal action. A map showing the historic natural bed and areas subject to tidal action in San Elijo Lagoon prepared by the State Lands Commission is attached as Exhibit 4.

At the federal level, the US Army Corps of Engineers (USCOE), The US Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration (NOAA) have each produced maps depicting the San Elijo Lagoon as subject to tidal action. The Corps produced a map from field surveys depicting detailed topography and mean higher high water levels well inland of Interstate 5. USFWS has produced the National Wetland Inventory maps that classify significant portions of the lagoon as estuarine subtidal and intertidal wetlands, and NOAA has produced detailed topographic maps of the lagoon as well. The States Lands Commission considers a 1934 map prepared by NOAA (Topographic Survey Map T-5411) as the best depiction of the general configuration of the historic natural bed and areas subject to tidal action in San Elijo Lagoon (See Exhibits 4, 5, and 6).

More recent materials received during the course of litigation referred to earlier also support the position that the lagoon is subject to tidal action. The Commission's staff biologist has reviewed the 1999 Nordby report prepared for Tierra Environmental Systems, Inc. and other available materials and concurs with mapping staff that San Elijo Lagoon is subject to tidal action, meets the criteria in P.R.C. Section 30115, and is the "Sea" for purposes of the Coastal Act (See Exhibit 8). The Commission's coastal engineer has reviewed the materials submitted to the

Section 13577(i)(2) the mapped boundary was simply drawn along the old Coast Highway, and a series of map notes added to the area inland of the Highway, stating that in those areas the appeal jurisdiction includes the first row of parcels or lands within 300 feet from the Mean High Tide Line, whichever is the greater distance.

After a series of questions related to Boundary Determinations in late 1998, it became clear that the draft map did not reflect conditions on the ground, or the First Public Road Paralleling the Sea in use at the district level. Once the draft map error was identified and a map revision process begun, the question of extent of tidal action again became central. Returning to the earlier source material from the State Lands Commission, USFWS, and NOAA, staff determined that tidal action extends inland of the Interstate 5 highway bridge and some distance inland. The State Lands Commission and NOAA information indicate San Elijo Lagoon is subject to tidal action approximately 700 – 1000 feet east of Interstate 5. The USFWS National Wetlands Inventory map includes an even larger area east of Interstate 5 within its "E2" or Estuarine Intertidal Wetland category. The USCOE map also shows an area of tidal action extending east of Interstate 5.

Evidence submitted by the public also supports the position that tidal action extends inland of Interstate 5. An oceanographer (Dr. H.S. Elwany) with Scripps's Institute of Oceanography points out that the traditional inland extent of tidal action was considered to be a dike or weir structure located 700 to 1700 feet east of Interstate 5. The Tierra Environmental Systems (Nordby) report asserts that tidal action is limited to the area west of the bridge, however, the Commission biologist's review of that report states that the work presents a "snapshot" characterization, based on short-term observations of cyclically variable systems. The review indicates that the conclusions in this short-term study are wrong and even contradict the author's own previous work.

The Commission's senior coastal engineer has reviewed monitoring data collected during 2002 and also concluded that tidal action extends at least as far east as the Interstate 5 bridge. Data collected at the Interstate 5 bridge by the San Elijo Lagoon Conservancy demonstrate the presence of brackish water and diurnal fluctuations in water and salinity levels. These factors are all indicative of tidal action. (See Exhibit 9).

Staff's conclusion regarding the location of the First Public Road Paralleling the Sea in this part of the City has three components: (1) that San Elijo Lagoon is an estuary that is subject to tidal action, and the "Sea" for purposes of the Coastal Act (see P.R.C. Section 30115), (2) that tidal action in San Elijo Lagoon extends inland of the I-5 highway bridge, and (3) that Manchester Ave., Rancho Santa Fe Rd., La Bajada, and La Noria meet the criteria for designation as the First Public Road Paralleling the Sea, specifically the requirement that the designated road(s) must "generally parallel and follow the shoreline of the Sea so as to include all portions of the Sea where the physical features such as bays, lagoons, estuaries and wetlands cause the waters of the Sea to extend landward of the generally continuous coastline."

proposed post-LCP certification map accurately depicts the First Public Road as referenced in Coastal Act Section 30603(a)(1) and defined in 14 C.C.R. § 13577(i).

One commenter asserts that Commission staff did not consult with the City of Encinitas regarding the post-LCP certification map. This is incorrect. Commission staff met in person with staff from the City Manager's office, the City Attorney's office, and the planning department to discuss the map in detail. Commission staff also had numerous telephone conversations with City of Encinitas staff regarding the post-LCP certification map. As indicated in the City's letter to the Commission dated January 11, 2002, Commission staff incorporated the City's suggestions when preparing the proposed post-LCP certification map.

The commenters argue that tidal action does not extend as far east as the Interstate 5 bridge. The Commission's senior coastal engineer has prepared a memorandum addressing the issue of tidal action in San Elijo lagoon and concurs with mapping staff that San Elijo Lagoon is subject to tidal action (See Exhibit 9). The memorandum evaluates both the data submitted by the commenters and more recent and complete data submitted by the San Elijo Lagoon Foundation. It concludes that the presence of brackish water and the existence of diurnal fluctuations in water and salinity levels are all indicative of tidal action at the Interstate 5 bridge. This memorandum supplements the earlier staff analysis and evaluation done by the Commission's staff biologist and supports the conclusion that tidal action extends east of Interstate 5.

The commenters argue that the earlier version of the draft post-LCP certification that depicts Highway 101 as the first public road across the lagoon should apply. Information supplied by the commenters' own consulting firm, however, unequivocally demonstrates that tidal action extends eastward of the Highway 101 bridge. See, e.g., Tierra Environmental Services, Inc., San Elijo Lagoon Tidal Action Study: Eastern Limit of Tidal Action in San Elijo Lagoon, Synthesis Report (July 8, 2002), at pages 3, 8-10, tables 4, 5, 6, figures 7, 8, 9. The Highway 101 bridge, therefore, would not be the appropriate road to designate as the First Public Road at San Elijo Lagoon even on the basis of the commenters' information.

Another commenter characterizes the findings of the trial court in ongoing litigation between Encinitas Country Day School, Inc. and the Coastal Commission. The Commission disagrees with the trial court's findings and has appealed those rulings. Even if there were a final judgment in that action adverse to the Commission, it would not bind the Commission's action with regard to adoption of the post-LCP certification map. At issue in the Encinitas Country Day School is whether the Commission properly asserted appellate jurisdiction over a development proposed by Encinitas Country Day School. The lawsuit does not address whether the record currently before the Commission supports the depiction of the First Public Road on the proposed post-LCP certification map.

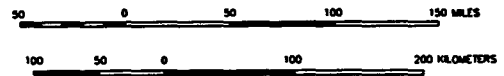
A commenter misinterprets the note that appears on the proposed post-LCP certification map regarding parcels that are bisected by the appeals jurisdiction boundary. The Commission only has appellate jurisdiction over local government actions regarding development that falls within one or more of the categories specified in Coastal Act Section 30603(a), most of which are

EXHIBIT 1

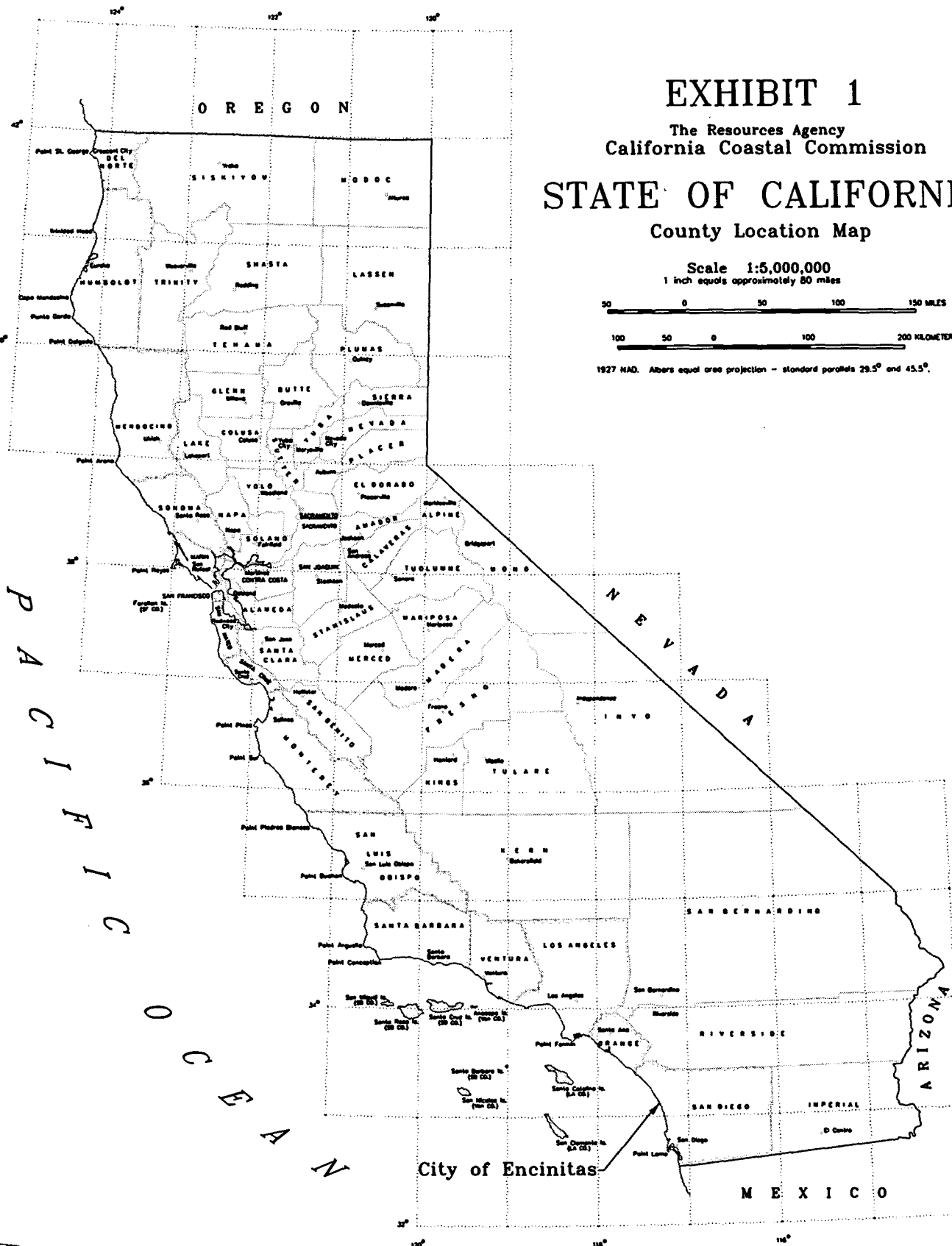
The Resources Agency
California Coastal Commission

STATE OF CALIFORNIA County Location Map

Scale 1:5,000,000
1 inch equals approximately 80 miles



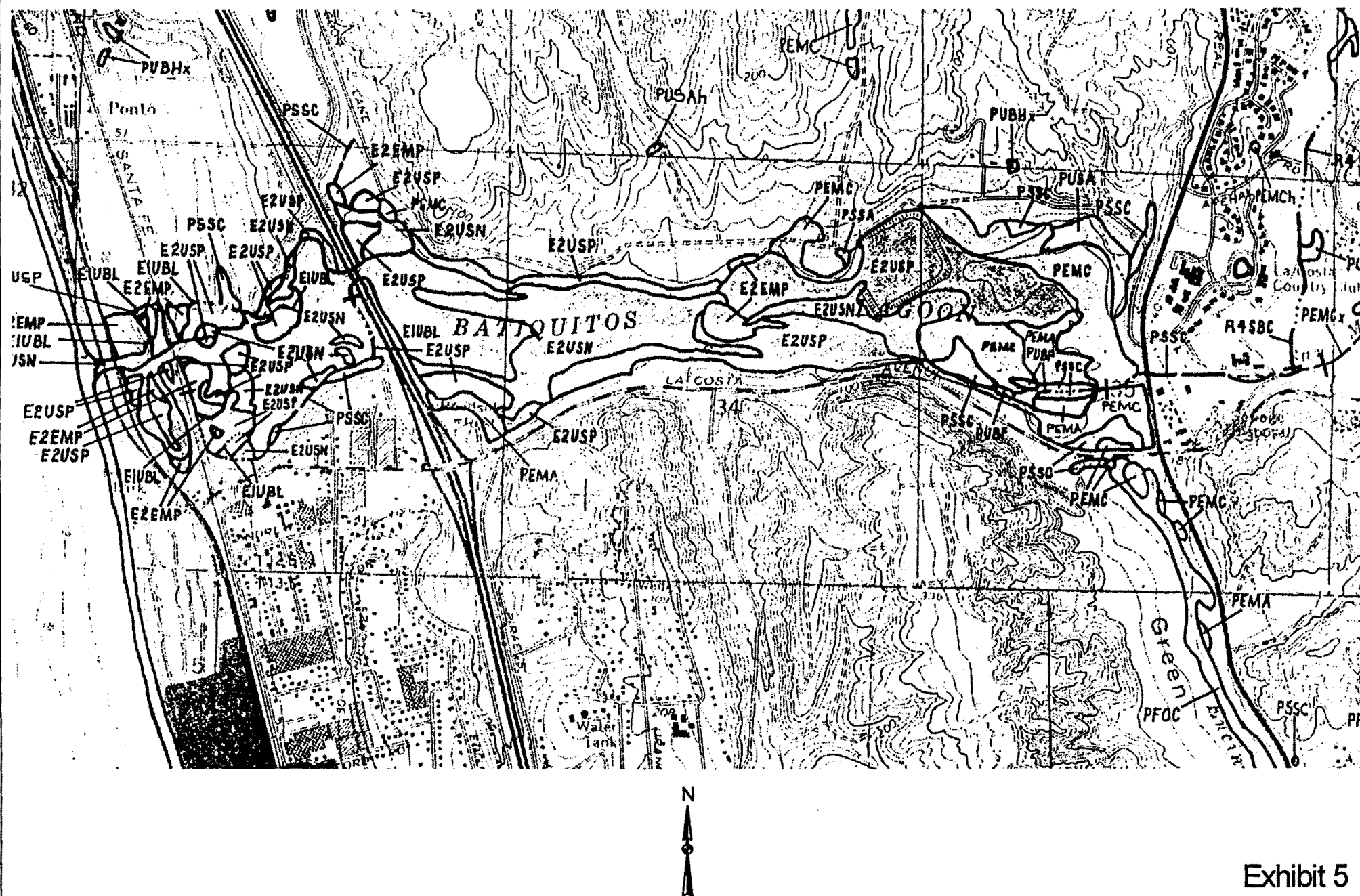
1927 NAD. Albers equal area projection - standard parallels 29.5° and 45.5°.



City of Encinitas

DSM, Revised 1/02

Portion of National Wetland Inventory Map #156,
Rancho Sante Fe Quadrangle - Batiquitos Lagoon





*City of
Encinitas*

RECEIVED

JAN 11 2002

CALIFORNIA
COASTAL COMMISSION

California Coastal Commission
ATTN: Jonathan Van Coops, Mapping/GIS Program Manager
45 Fremont Street
San Francisco, CA 94105-2219

RE: Revised draft post-certification map and appeal jurisdiction map for the City of Encinitas.

Pursuant to my conversation with Mr. Darryl Rance of your office on January 8, 2002, this letter is to inform you that Community Development Department staff has reviewed the revised draft post-certification map and appeal jurisdiction map accompanying your letter of December 14, 2001, and has found that it satisfactorily addresses the earlier comments and corrections identified by the City. Therefore, the City requests that you proceed with agendizing the map for adoption by the California Coastal Commission.

Once again, thank you for your assistance and cooperation in the preparation of these materials.

Sincerely,

A handwritten signature in cursive script, appearing to read "Tom Curriden".

Tom Curriden
Senior Planner

EXHIBIT 7

Under natural conditions, the San Elijo Lagoon and other southern California estuaries are characterized by a gradient from ocean waters at the mouth to freshwater at the inland extreme. As a result of tidal fluctuations, sporadic opening and closing of the connection to the sea, seasonal variations in freshwater input, and interannual differences in weather patterns and oceanic conditions, the physical environment within these estuaries is extremely variable on several time scales. A few point estimates of environmental factors, such as in the Tierra tidal study, provide a "snap-shot" which is not useful for characterizing the range of conditions in a variable habitat.

Fortunately, long-term observations of water quality at several stations within the estuary are available (San Elijo Lagoon Conservancy Data). The eastern-most station is at the I-5 bridge, but since there are no physical obstructions in the short distance from the bridge to the dike and weir to the east, observations at I-5 are probably roughly applicable as far as that dike. At, or just west of the bridge, there is a heavy growth of cattails. The roots of these plants capture sediments and act as a shallow dam or weir.

In addition, Dr. H. S. Elwany¹ conducted a study of tidal action in the San Elijo Lagoon with field observations during April – August 1994, April – December 1995, and October 1996 – April 1997. Dr. Elwany determined inlet and channel profiles, examined aerial photographs, and measured tidal fluctuations in water depth at various locations with a continuously recording pressure gauge (personal communication). Based on this study, Dr. Elwany concluded that the estuary at the I-5 bridge is subject to tidal action (letter dated April 14, 1999).

During Dr. Elwany's study, tidal changes in depth were measured at the station under the I-5 bridge during May 1994. In addition, a continuously recording pressure gauge and salinity meter were installed at the I-5 bridge during the period 2/24 – 3/10/99 by the San Elijo Lagoon Conservancy (D. Gibson¹, personal communication). In both May 1994 (Figure 1) and during February and March 1999 (Figure 2*), there were clear semi-diurnal changes in water depth that were correlated with the predicted oceanic tides. The lower portion of the tidal fluctuations was truncated because the presence of the cattail dam sets a lower limit to the outflow of water. In addition, the 1999 measurements clearly show the influx of seawater during the highest tides. The salinity of the bottom water was generally around 2 ppt but surged to 10 ppt or greater during the four highest tides. The water at the surface was dominated by freshwater flow and remained at about 2 ppt but with small spikes in salinity at the highest tides. The difference in bottom and surface salinity reflects the fact that freshwater is less dense and floats on salt water. The relative flatness around the 2 ppt mark for the graph of bottom water compared to that for surface water is a function of the different scales for the y-axes. It is not clear why there were no significant differences in surface and bottom salinity in the Tierra samples. Both the Tierra and Conservancy measurements are no doubt accurate within the limits of their instruments. The difference in results is probably related to methodological differences. The Conservancy data are from a continuous data

*1999 measurements are relative to the starting the depth of the instrument and are not related to a standard reference elevation such as Mean Lower Low Water or National Geodetic Vertical Datum. Also, the depth scale is inverted - peaks in tidal height are downward.

¹Dr. Hany Elwany, a physical oceanographer and ocean engineer, is a Research Associate at the Scripps Institution of Oceanography, President of the consulting firm Coastal Environments, and a member of the Scientific Advisory Panel for the San Elijo Lagoon Conservancy. Mr. Douglas Gibson is the Executive Director of the San Elijo Lagoon Conservancy.

invasion, and concluded that, "Once brackish species have invaded an intertidal area, it is likely that they will persist. With continually augmented streamflows,...species with salt-tolerant, vegetatively reproducing adults might never die out." The invasion of freshwater species in the San Elijo Lagoon is undoubtedly due to man-made disturbances that have periodically resulted in much of the lagoon being dominated by freshwater for extended periods.

In summary, the San Elijo Lagoon is a tidal estuary. Over the last 100 years or so, the relative importance of marine and freshwater influences has changed throughout the estuary as a result of construction and other human disturbances and this has resulted in severe degradation of the intertidal salt marsh. Nevertheless, despite alterations to the natural system, it is clear that under current conditions tides carry seawater to the I-5 bridge and some unknown distance further inland during much of the year.

- October 12, 2002 Technical Assessment, Tidal Action Monitoring and Experiment at San Elijo Lagoon, Encinitas, CA. prepared by San Elijo Lagoon Conservancy. (SELC, 2002)

2001 Regional Beach Monitoring Annual Report, prepared by Coastal Frontiers Corporation for the San Diego Association of Governments, pages 77 and 78 (SANDAG, 2001).

Tidal Action: The conditions that can be used to determine tidal action are:

1. A connection to the ocean
2. Evidence of natural, regular changes in water level
3. Evidence of salinity and possibly temporal changes in salinity
4. Evidence of tidal currents

These conditions are not the only tests for tidal action. They are the physical elements that can be used to identify tidal action; they do not include other factors such as biological, soil chemistry or others. Also, these conditions individually are not necessarily proof for or against tidal action; but rather need to be used in the aggregate.

The analysis by Tierra Environmental Services defines Tidal Action as "the landward extent of seawater at mean high tide" (Nordby and Wolfson, 2002, page 4). This definition seems to be merging together two separate concepts. The tidal action could be indicated by the extent of seawater, as indicated above. The mean high tide is the elevation used to identify the mean high tide line. The mean high tide line is used to establish the land/water interface from which a jurisdictional line would be measured. So the question of jurisdiction is to determine whether the area east of I-5 is subject to tidal action, and if so, use the mean high tide line as the location from which the jurisdictional boundary is drawn. It does not mean that tidal action is only assessed during an average high tide.

A Connection to the Ocean: The 1976 State Lands Commission San Elijo Lagoon Boundary Study states that San Elijo Lagoon "historically has been open to the waters of the Pacific Ocean on a seasonal basis; the frequency of the opening depends upon weather conditions. It is shown as a tidal lagoon on the earliest maps." The intermittent opening and closing of lagoon mouths is a characteristic of most southern California lagoon (or estuary) systems. Historic development in and adjacent to southern California lagoons and estuaries has tended to decrease the lagoon area, increase sedimentation, restrict water circulation and increase the length of time that the lagoon or estuary is closed. Restoration efforts throughout many of the southern California lagoons and estuaries are trying to reverse these development effects and keep the mouths open either permanently, such as the Bataquitos project that deepened the lagoon and installed jetties at the mouth, or more frequently, such as the maintenance dredging and management program for San Diegueto Lagoon. The inter-annual variability of opening and closing is a characteristic of a lagoon or estuary. There is no specified number of open days or

Over an 11 day period from 3 - 14 August 2002, Eric Terrill, Ph. D. studied tidal influences at locations east of I-5 for the San Elijo Conservancy. Water level measurements were made every 15 minutes over the full 11-day sampling period. Terrill's results (provided in SELC, 2002) show fluctuations in water levels at the area east of I-5, with a lag from the ocean tides of approximately 2 hours (Figure 2 attached). Terrill's data show a strong tidal signal for the rise and fall of the higher high and lower high tides. There is less change in water level for the lower low and higher low tides.

The "truncation" of the lower tidal signal may be attributed to the controlling elevation at the ocean opening for San Elijo Lagoon. The Regional Beach Monitoring Program found a controlling elevation of +1.4 ft. MLLW for the fall of 2001. This was at the lower range of controlling elevations observed for the lagoon (ranging from +7.0 to +0.9 ft. MLLW for the time period from spring 1997 to fall 2001) (SANDAG, 2001). The controlling elevation will prevent the outward flow of tides lower than the lagoon mouth elevation -- +1.4 ft. for the fall of 2001. There is no information on the controlling elevation for the field studies of 2002, but it is likely that the truncation of the lower water levels recorded by Terrill and the lower amplitude observed by Tierra are both the result of this control at the mouth.

Tierra Environmental's analysis of its water level data attributes all the change in level to the dam effect by the incoming tide on the out-bound freshwater flow. However, the water level measurements were all made during times when the "weir gates were closed, minimizing stream flows into the lagoon." (Nordby and Wolfson, 2002, page 7) The San Elijo Lagoon Conservancy report provides evidence that challenges the contention that freshwater flows were minimized; however, assuming that Tierra Environmental is correct that freshwater flows were curtailed during their measurements, then there would be little if any freshwater to be "dammed." The changes in water level seem tied more to tidal changes than to a second damming of freshwater flows, downstream of the initial damming by the weir. Terrill monitored the area east of I-5 for about 4.5 days when the floodgate was open, approximately 3.5 days while the floodgate was closed and then an additional 3 days when the floodgate was again open. The open floodgate condition would allow freshwater flows, while the closed gate condition would be a no freshwater flow condition, similar to what Tierra Environmental attempted to monitor. The data from Terrill shows fairly similar changes in water level with and without the open floodgate. These measurements, taken at 15-minute intervals over 11 days, show water levels that have a diurnal change in elevation that track with ocean tides, with about a 2-hour lag. The truncation of the lower tidal changes reduces the overall amplitude of the water level change. Nevertheless, these changes are evidence of tidally cyclic changes in water level.

Evidence of Salinity and Possible Temporal Changes in Salinity: It takes only a small amount of salt to make water saline. Ocean water has a salinity of 30 to 35 parts per

the surface and 33 ppt at the bottom. Surface measurements of salinity dropped significantly once freshwater flows resumed, but continued to show diurnal fluctuations.

The apparent discrepancies between data from Tierra Environmental and Terrill may result because of the different seasons in which the data were collected (Tierra in the late winter, early spring; Terrill in late summer). The variability may also be a result of the differences in sampling frequency for each study. If Terrill's data correctly identifies a 2 hour lag in tidal response from the La Jolla station to the central and/or eastern basins of San Elijo, then, half (8 out of 16) of Tierra's measurements for the east basin (collectively identified as I-5 Bridge, I-5 or east I-5) were taken during a low tide. For the remaining measurements, 6 were during high tide and 2 were well into a falling tide. Thus 8 and possibly 10 of the 16 measurements were during a time that the tidal influence was limited by the controlling elevation at the mouth. Just as this elevation prevents the flood tide from dropping below the control elevation, it also prevents the lower tides from entering the lagoon. While the 16 samples for salinity can show some variability over tidal conditions, the 6-hour sampling intervals are not frequent enough to show or disprove daily variability in salinity. The 15-minute sampling frequency used by Terrill shows a cyclic nature to the salinity data that is not obvious in the Tierra Environmental data.

In support of its conclusion that the east basin is not tidal, Tierra Environmental drew on previous work by PWA and Elwany, et al. By letter dated May 10, 1999, Peter Goodwin clarified the mis-understanding presented by the earlier PWA work. In this he notes, "The tidal prism in the Eastern Basin is negligible compared with the 105 acre-feet for the entire lagoon, and neglecting the tidal prism in the Eastern basin provided a conservative estimate of the inlet closure characteristics. However, it was not the intent of the report to imply that I-5 is the upstream boundary of tidal action nor the upstream limit of estuarine conditions." (Goodwin, 1999, page 2) He also states:

Specifically in San Elijo Lagoon, at the time of our fieldwork in 1991, there were tidal fluctuations at the I-5 bridge and in the basin to the east of I-5. The more recent measurements of Dr. Elwany appear to confirm that significant tidal fluctuations still exist. From memory, I believe that these tidal fluctuations extend as far as the levee and weir in the Eastern basin. Tidal fluctuations do not extend further east because of this structure. There are several definitions of an estuary, but if it is defined as regions subject to tidal action, then there is no question that the area to the East of I-5 is part of the tidal estuary. (Goodwin, 1999, page 2)

In 1999, Elwany provided a letter report that focused on water level and water quality (salinity, temperature and oxygen) data from a continuous monitor installed under the I-5 Freeway for April and August 1994, April and December 1995, October 1996 and April 1997. Much of this work was to characterize the changes in water quality for conditions when the lagoon mouth was open and when it was closed. It is not clear that Tierra had

often connected to the ocean. (2) It displays a change in water level that closely tracks the ocean tides, with a 2-hour lag. (3) When the lagoon is open to the ocean, the area east of I-5 is saline, with changes in salinity during the tidal cycle. The salinity is stratified, with denser, higher saline water closer to the bottom and less dense freshwater on the surface. Finally, salinity drops when the inlet is closed and rises when the inlet is opened. These conditions indicate that the area east of I-5 is subject to tidal action. There is no information about tidal currents, thus it is not possible to comment on whether or not there is any evidence of currents. Given the data on the ocean connection, water levels and salinity, there is compelling evidence of tidal action east of I-5.

In 1999 Dr. Dixon provided a very thorough analysis of the information available to him concerning the Eastern Limit of Tidal Action in San Elijo Lagoon. This memo is a supplement to that earlier memo, and not a replacement to it. This memo adds an engineering evaluation to the earlier analysis by Dr. Dixon. The two memos should be considered in concert.

Attachments: Figures 2 and 3 from SELC, 2002; prepared by Eric Terrill, Ph.D.

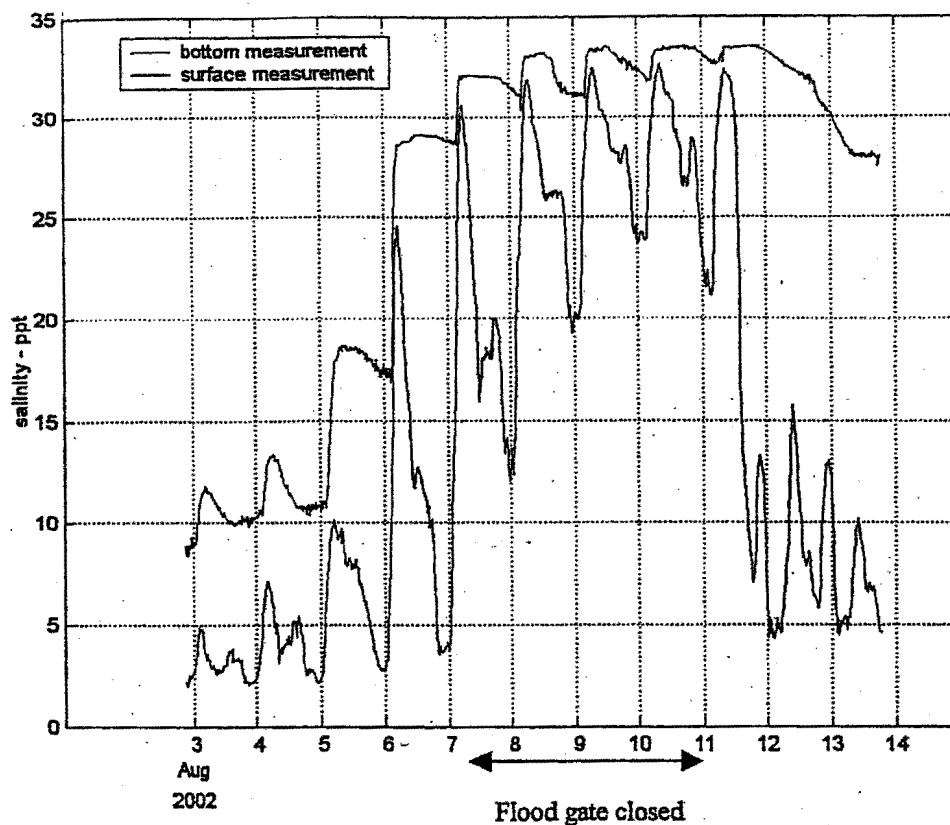


Figure 3. Time series of measured lagoon water salinity from the surface sensor and the near-bottom sensor. Fresh water input to the lagoon system was restricted between 10:40UTC on 8/7 until 06:50 UTC on 8/11. This time period was coincident with spring tides. Note that prior to restricting the fresh water input, both near surface and near bottom salinities were brackish with values of approximately 5 and 10 ppt, respectively. When the fresh water input was restricted by closing the gates, the salinity values approached marine levels, indicated seawater exchange to this region. The data also indicates a stable two layer system, with the lighter fresh water overlying the denser saltwater. During the low tides on 8/9, 8/10, 8/11 when the fresh water input is limited by the flood gate closure, the local daily minimum in salinity at the site indicates the fresh, near-surface water upstream of the site is transported to the measurement location during the outgoing tide, forming a lens of freshwater over the deeper marine water. As the tide floods, the seawater intrusion dominates the system and the lens is pushed back upstream by the oceanic waters, resulting in an increase in water salinity with high tide at the near-surface sensor location. This is in contrast to the salinity values when the flood gates are open at the beginning or end of the experiment when the fresh water input at this region dominates the near-surface salinity values. Times are presented in UTC time coordinates which leads Pacific Daylight Time by 7 hours (UTC