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Th17b

Prepared June 11, 2012 (for the June 14, 2012, hearing)

To: Coastal Commissioners and Interested Persons

From: Mark Delaplaine, Manager, Energy, Ocean Resources and Federal Consistency Division

Subject: STAFF REPORT ADDENDUM for Item 17b Consistency Determination (CD-019-12, U.S. Fish and Wildlife Service, Termination of the Southern Sea Otter Translocation Program, Southern California

The staff is proposing the following changes to its staff recommendation

[Proposed new language is shown in underline text; language to be deleted is shown in ~~strikeout~~ text.]

Summary, page 2, last paragraph, make the following changes:

The Commission staff recommends that the Commission find that the effect of the proposed termination of the "failed" translocation Program ~~would be generally beneficial to the marine environment. The only real effect of the proposal~~ would be to provide additional regulatory protection to otters at San Nicolas Island and in the management zone. Such additional protection would enhance their ability to naturally expand into what was their historic range in southern California~~, which would, in turn, improve overall marine biodiversity~~. The staff therefore recommends the Commission **concur** with the Service's consistency determination and find the "project" consistent with the marine resource ~~and commercial and recreational fishing~~ policy~~ies~~ (Section~~s~~ 30230~~, 30234, 30234.5, and 30220~~) of the Coastal Act. The staff further recommends that the Commission find that, if sea otter expansion is highly successful, it may result in adverse effects on sea urchin fisheries in a manner inconsistent with the requirements of Sections 30234 and 30234.5 to protect these fishing resources. The staff recommends that the Commission find that the proposal then presents a conflict between two Coastal Act policies, the marine resource policies on the one hand (Section 30230) and the commercial and recreational fishing policies (Sections 30234 and 30234.5) on the other. Section 30007.5 of the Coastal Act provides that when Coastal Act policy conflicts exist, they should be resolved in a manner which, on balance, is the most protective of significant coastal resources. The staff recommends that the Commission find that it would be more protective of significant coastal resources to allow natural expansion of sea otters within their historic range than it would be to attempt to limit or contain them from that range, even if the consequences are economic losses to commercial and recreational fisheries, and that the Service's proposed action can therefore be authorized under the conflict resolution policy of the Coastal Act (Section 30007.5).

Marine Resources Findings, page 20, last paragraph in Marine Resources section, make the following changes:

The Commission notes that in its comments on the RDSEIS, the Sea Urchin Commission contended that the Service had underestimated impacts to white and black abalone. The Service has, in its consistency determination, acknowledged that the species relationships are complex and difficult to predict. In its response (Attachment 1) to the Sea Urchin Commission's comments, the Service acknowledged this complexity and future uncertainty. ~~agrees with all but the last two sentences of this conclusion.~~ The Commission believes that too much uncertainty exists to attempt to reliably predict future biological conditions that may result if sea otter populations are allowed to continue to evolve naturally. The Commission further finds it is not necessary (or even appropriate) to apply a "maximum extent practicable" test, because the Commission finds that the proposed action would be fully consistent with the requirements of Section 30230. Given the information available, the Commission is simply unable to predict long term effects on white and black abalone populations, and given their status, the Service will need to undertake continuing efforts to protect them as well. However, given the continued threatened status of the sea otter, the policy of allowing its return to its historic habitat would be consistent with Section 30230.~~As described above, the presence of a keystone species, like the sea otter, is expected to enhance overall habitat and biodiversity, and the Service does not anticipate that the termination of the Program will result in adverse impacts to white or black abalone or other marine resources.~~ The Commission finds that the termination of the Program will help protect sea otters, which are a species of special biological significance.~~ and will otherwise be generally beneficial to the marine environment~~. In fact, the only tangible "effect" of the "proposal" in practical terms is to provide additional regulatory protection to otters at San Nicolas Island and in the management zone, which would, for the reasons discussed above, benefit the marine environment. The Commission therefore concludes that the proposed formal termination of the Program would be consistent with the requirements of Section 30230 of the Coastal Act to maintain, enhance, and, where feasible, restore marine resources, to give special protection to areas and species of special biological or economic significance, to sustain the biological productivity of coastal waters, and to maintain healthy populations of all species of marine organisms.

Commercial and Recreational Fishing Findings, page 23, final paragraph, make the following changes:

The Commission agrees with the Service that a natural expansion of sea otters into their historic range in southern California coastal waters ~~w~~could, on an overall basis, generally benefit some commercial species, such as kelp bed fishes, but could adversely affect others, such as sea urchins. The Commission acknowledges that in some areas where sea otters are abundant, benthic species, such as sea urchins, are driven to such low numbers that commercial harvest may not be feasible. However, it is difficult to quantify either temporally or spatially the likely adverse or beneficial effects, and the “de facto” discontinuation of sea otter relocation has not resulted in a large, rapid, or sustained expansion of the sea otter range over the past 20 years, which is twice as long a time period than one during which biological changes can be predicted with any reliability. The most recent range survey data have been mapped as shown on the map below (with 2010 data showing a roughly 15 mile seasonal eastward expansion since the relocation efforts were ceased, although in some years the springtime expansion has reached as far as Coal Oil Point). However, as noted above on pages 6-7, the overall number of sea otters has not been increasing over the past 5 years, and it is simply unclear whether continued expansion will occur, and what effects to other species are likely to occur. If large scale sea otter expansion south does in fact occur, the available evidence does support the conclusion that such expansion could result in adverse effects to the sea urchin fishery. As noted previously, such expansion would be within the historical range of the sea otter, which would thus represent natural conditions in the marine environment that occurred prior to the development of the commercial and recreational fishing industries.

The Commission finds that such adverse effects on some fisheries would be inconsistent with the requirements of Sections 30234 and 30234.5 to protect these fishing resources. At the same time, as noted in the previous section of this report, the need to protect the threatened sea otter necessitates that the proposed action be allowed.

Conflict Resolution

As is indicated above, the standard of review for the Commission’s decision whether to concur with a consistency determination is whether the project as proposed is consistent the California Coastal Management Plan. In general, a proposal must be consistent with all relevant policies in order for the Commission to concur with a consistency determination. Put differently, consistency with each individual policy is a necessary condition for concurrence. Thus, if a proposal is inconsistent with one or more policies, the Commission must normally object.

However, the Legislature also recognized that conflicts can occur among those policies Section 30007.5 of the Coastal Act provides guidance for resolving policy conflicts when such a situation arises. Section 30007.5 provides:

> *The Legislature further finds and recognizes that conflicts may occur between one or more policies of the division. The Legislature therefore declares that in carrying out the provisions of this division such conflicts be resolved in a manner which on balance is the most protective of significant coastal resources. In this context, the Legislature declares that broader policies which, for example, serve to concentrate development in close proximity to urban and employment centers*

may be more protective, overall, than specific wildlife habitat and other similar resource policies.

In order to invoke conflict resolution, the Commission must conclude all of the following with respect to the proposed project before it: (1) approval of the project would be inconsistent with at least one of the policies listed in Chapter 3; (2) denial of the project would result in coastal zone effects that are inconsistent with at least one other policy listed in Chapter 3, by allowing continuing degradation of a resource the Commission is charged with protecting and/or enhancing; (3) the project results in tangible, necessary resource enhancement over the current state, rather than an improvement over some hypothetical alternative project; (4) the project is fully consistent with the resource enhancement mandate that requires the sort of benefits that the project provides; (5) the benefits of the project are a function of the very essence of the project, rather than an ancillary component appended to the project description in order to "create a conflict"; and (6) there are no feasible alternatives that would achieve the objectives of the project without violating any Chapter 3 policies.

As noted above, the Service's proposed action may be inconsistent with Sections 30234 and 30234.5, while objecting to the project would be inconsistent with Section the mandate of 30230 to provide special protection to species of special biological significance. Concurrence with this consistency determination would allow the Service to officially terminate a program to translocate sea otters that it was unable to carry out in a manner protecting sea otters; therefore it did not in practice enhance sea otter populations. Thus, allowing the official termination of a project that failed to protect sea otters would allow the natural expansion of sea otters within their historic range, fully consistent with Section 30230. The essence of the project is sea otter protection, therefore such protection is not just an ancillary benefit of the project. Finally, any alternative project that results in the retention of a "no otter zone" could result in future translocation of sea otters, inconsistent with Section 30230. The proposed project therefore presents an actual conflict among Coastal Act Policies.

After establishing a conflict among Coastal Act policies, Section 30007.5 requires the Commission to resolve the conflict in a manner that is on balance most protective of coastal resources. In determining the outcome most protective of significant coastal resources the Commission must weigh the continuing increased risk to the threatened sea otter from not taking the proposed action, which could inhibit the ability of the southern sea otter to recover from its threatened status and potentially increase the risk of extinction to southern sea otters, against uncertain economic effects to some commercial and recreational fishing activities. Although the fishing activities are important components of the coastal economy and are afforded protection under the Coastal Act, given the uncertainty in effects to these activities, when weighed against the protection of another vitally important coastal species (the southern sea otter) that is threatened with extinction, this weighing must be resolved in favor of increasing protection to the sea otters. The Commission therefore finds in this situation that it would be more protective of significant coastal resources to allow natural expansion of sea otters within their historic range than it would be to attempt to limit or contain them from that range. The

Commission concludes that the Service's proposed action would be consistent with the Coastal Act by virtue of the conflict resolution policy articulated in Section 30007.5.

~~as well as water-oriented recreational activities, such as wildlife viewing. Although, at least in the short run, some portions of the commercial and recreational fishing industry will be adversely affected by the termination of the Program, the finfishing portion of the industry is expected to benefit, and in the long run the termination of the Program is expected to result in a healthier ecosystem, which ultimately benefits commercial and recreational fishing generally. In fact, the only tangible "effect" of the "proposal" in practical terms is to provide additional regulatory protection to otters at San Nicolas Island and in the management zone, which would, for the reasons discussed above, assist in kelp production, which cwould benefit a number of commercially and recreationally caught fish species. The Commission therefore concludes that the proposed formal termination of the Program would be consistent with the requirements of Sections 30230, 30234, 30234.5, and 30220 to give special protection to areas and species of special economic significance, recognize and protect the economic, commercial, and recreational importance of fishing activities, and protect coastal areas suited for water-oriented recreational activities.~~

2010 Map:

Figure 5. Map showing the current range of the southern sea otter along the mainland coast of California. Sea otters that were counted outside of the officially recognized range are also plotted, scaled according to group size.

Attachment

USFWS Responses to RDSEIS Comments, p. 16-19

		the island, but a PIT tag scan and external observation failed to detect any tags or tag scars. From 2000 to 2007, two sea otters were detected at other islands as well, one at Santa Cruz Island in 2006, and one at Anacapa Island in 2007. We acknowledge in section 6.1.4.1 of the DSEIS/RDSEIS that individual sea otters have made and will continue to make sporadic long-distance movements throughout the Southern California Bight, but because such movements are impossible to predict, and because the effects of their foraging activities are not likely to be detectable in environmental or fishery contexts, we do not attempt to quantify the effects of these individuals. Although it is conceivable that range expansion to the northern Channel Islands could begin in the short term, several factors suggest that this scenario is not likely. A sensitivity analysis conducted by Tinker *et al.* (2008a) demonstrated that range expansion rates south of Point Conception are driven primarily by female dispersal and survival. Because population growth and subsequent re-colonization of unoccupied habitat requires the presence of reproductive females, range expansion to the islands is limited by female movement patterns. Male sea otters are known to make long-distance movements, but female sea otters (particularly reproductive-age females) exhibit much greater site fidelity and are less likely to make long distance movements (Tinker *et al.* 2006a, Chapter 3). When female sea otters do arrive at the islands, the rate of population growth for the first few years is likely to be slow due to Allee effects associated with small initial population sizes. Therefore, we do not believe it is reasonable to assume that range expansion to the northern Channel Islands will occur in the short term, and we do not attempt to quantify associated impacts because we have no information on which to base such predictions. However, to give a sense of the past and current value of the commercial fisheries at the northern Channel Islands that may eventually be affected when sea otters expand their range to those islands, we have added information specific to the northern Channel Islands to sections 6.2.4.2, 6.2.4.3, 6.2.4.4, and 6.2.4.5 of the RDSEIS.
44	Several commenters stated that the effects of sea otter range expansion and predation on white abalone recovery would likely be greater than acknowledged in the DSEIS for the following collective reasons: 1) recent information on the diving depths of sea otters contradicts statements in the analysis that white abalone have depth refugia from sea otter predation, 2) the assumption that the primary habitat of white abalone is too	The analysis of effects on white abalone has been updated in the RDSEIS to include recent information and to address comments received on the DSEIS. Information pertaining to points 1-5 has been incorporated into the analysis. Please see the revised discussion in sections 6.2.3.1, 6.3.3.1, 6.4.3.1, 6.5.3.1, 6.6.3.1, and 6.7.3.1. We address the remaining statements here. The effect of individual sea otter foraging specializations on white abalone recovery is uncertain. Sea otters have been shown to exhibit individualized prey preferences when they

deep for sea otters is questionable because they were originally most abundant in shallow, protected areas at depths of 40 feet or less and were driven into deeper waters, which are probably suboptimal habitat, by human exploitation, 3) there is no evidence to suggest that offshore banks will provide a geographic refuge from sea otter predation, 4) the habitat used by white abalone (rock-sand interfaces of boulders) provides no crevice refuge from predation, 5) sea otter range expansion into the Southern California Bight will not likely occur slowly enough to allow white abalone to recover before becoming subject to sea otter predation, especially if the possibility of sea otter range expansion to the northern Channel Islands within 10 years is considered.

Other comments stated that the analysis fails to consider the potential impact of individual sea otters' prey preferences; that the 10-year time horizon for the quantitative assessment of impacts is inappropriate to the time scale of white abalone recovery, which may take decades; that USFWS is required under section 7(a)(2) of the Endangered Species Act to consult with the National Marine Fisheries Service to ensure that its actions will not jeopardize the continued existence of listed abalone species prior to undertaking any action that may affect the species; and that USFWS should work with the California Department of Fish and Game, the National Marine Fisheries Service, and the Abalone Recovery Team to monitor the impacts of the proposed action on protected abalone populations.

are at high densities in areas where food resources have become limiting (Estes *et al.* 2003b; Tinker *et al.* 2006a, Chapter 5; Tinker *et al.* 2008b; Newsome *et al.* 2009). Individual diet types can be grouped into three distinct foraging specializations. Type 1 specialists consume large prey, such as abalones and crabs, but have low dive efficiency. Type 2 specialists consume small to medium size prey with high dive efficiency. Type 3 specialists consume very small prey, mostly snails, but have very high dive efficiency (Tinker *et al.* 2007). It is possible that, if sea otter range expansion progressed more deeply into the range of white abalone and food became limiting, the effect of an individual could be greater than would be expected from mean dive depths across the population. A Type 1 specialist encountering patches of occupied white abalone habitat could conceivably affect a local population disproportionately, but Type 1 specialists tend also to have greater variation in dive success, meaning that many dives are unsuccessful. The low densities at which white abalone are currently found and the patchy distribution of white abalone habitat reduce the probability that a sea otter specializing in large prey like abalone would happen to encounter one or more white abalone within its dive-depth range. The effect of individual sea otter foraging specializations on white abalone recovery thus remains unclear, beyond the expectation that it will increase the variance, and therefore the uncertainty, in predicted outcomes.

As described in section 6.1.3 of the DSEIS/RDSEIS, we use a 10-year time horizon for the quantitative analysis of effects. The rationale for limiting the quantitative analysis to 10 years is based in part on the extent of uncertainty involved in predicting sea otter range expansion, in part on the indirect nature of most projected impacts (and hence possible changes over time in the relationship between sea otter presence and resultant impacts), and in part on the uncertainty associated with management regimes and economic conditions beyond 10 years (see section 6.1.3 of the RDSEIS for a more detailed explanation). For effects that are expected to occur after 10 years, we provide a qualitative analysis. The effects of sea otter range expansion on white abalone recovery fall into this second time horizon. The Final White Abalone Recovery Plan (NMFS 2008) does not project a time to recovery for white abalone. The time it will take sea otters to expand their range throughout the Southern California Bight is similarly uncertain. Given these uncertainties, we believe that our qualitative analysis provides a reasonable assessment of likely future effects.

We would complete formal consultation with the National Marine Fisheries Service under section 7 of the Endangered Species Act and confer with the California Department of Fish and Game before implementing an alternative affecting white

		abalone. USFWS would also work with the California Department of Fish and Game, the National Marine Fisheries Service, and the White Abalone Recovery Team to monitor the impacts of our action on protected abalone populations.
45	The removal of large sea urchins, not targeted by urchin divers intent on harvesting quality product but easy prey for sea otters, has ecosystem effects not mentioned in the DSEIS. According to Laura Rogers-Bennett of CDFG, almost 50% of abalone recruit under large sea urchins.	As we note in the DSEIS/RDSEIS, because there are complex interactions between the species preyed on by sea otters, the effects of sea otter predation on these species are not necessarily unidirectional. Sea urchins have a dual relationship of competition and dependence with abalone. Sea urchin-abalone interactions, including the effects of sea urchin spine canopies on abalone recruitment, are summarized in section 6.2.2 of the DSEIS/RDSEIS.
46	The DSEIS's conclusion with respect to black abalone relies on the unlikely assumption that the species' recovery will proceed faster than range expansion and on an assumption that sea otters do not forage in the intertidal zone.	NMFS listed black abalone as endangered under the ESA in 2009 [74 FR 1937]. A final status review report was issued in 2009 (Butler *et al.* 2009), and critical habitat was proposed in 2010 [75 FR 59900]. However, as of the time of revision of this document, a recovery team had not been convened, and formal recovery criteria had not yet been developed. Hence there is no formal time estimate for when black abalone might be considered recovered under the ESA. Whereas the State's Abalone Recovery and Management Plan (CDFG 2005c) gives criteria for black abalone recovery [defined as "rebuilding abalone populations to a self-sustaining level (reproducing successfully to survive natural changes in abundance), and eventually to a condition where a fishery might be considered"], it does not specify the time expected for black abalone to recover. Because the time it will take black n of southern sea otters. Using information obtained over the decades since the plan's implementation, we evaluate the impacts of alternatives to the current translocation program, including termination of the program or revisions to it. The decades), we cannot state whether black abalone would recover before sea otters expanded their range throughout the Southern California Bight. We acknowledge this uncertainty in the DSEIS, but the discussion in the RDSEIS has been revised to emphasize it more strongly (please see the revised discussion of effects on black abalone in sections 6.2.3.2, 6.3.3.2, 6.4.3.2, 6.5.3.2, 6.6.3.2, and 6.7.3.2). Analysis in the DSEIS/RDSEIS does not depend on the assumption that sea otters do not forage in the intertidal zone. On the contrary, as section 6.2.3.2 of the DSEIS/RDSEIS states, "black abalone inhabit water depths well within the range of sea otter predation (generally rocky intertidal areas), although cryptic and inaccessible habitats provide refuge for the species." Rather, our assessment of the effects of sea otter predation on black abalone under each alternative is based largely on the ability of black abalone to exploit cryptic and inaccessible habitat, which provides a refuge from sea otter predation. We would complete formal consultation with the National

		Marine Fisheries Service under section 7 of the Endangered Species Act and confer with the California Department of Fish and Game before selecting an alternative affecting black abalone. USFWS would also work with the California Department of Fish and Game, the National Marine Fisheries Service, and the Black Abalone Recovery Team, when a recovery team is convened, to monitor the impacts of our action on protected abalone populations.
47	Page 8 of the DSEIS inaccurately implies that USFWS has been implementing the translocation program over the past 18 years. In fact, USFWS has not translocated a sea otter to San Nicolas Island since 1990 and has not managed the no-otter zone since 1993.	Language in the introduction to the RDSEIS has been clarified in response to this comment.
48	USFWS failed to effectively deploy a containment team, and commitments published in the Federal rulemaking for the project, such as an 800 phone number to report otters in the management zone and weekly aircraft surveys, never occurred.	USFWS made a good-faith effort, in cooperation with the California Department of Fish and Game, to achieve containment. We established a 24-hour hotline to accept information on sea otters detected in the management zone. Most reports of sea otters in the management zone were received by this means. Aerial flights were also undertaken to locate sea otters in the management zone. However, for reasons discussed in the "Containment Results" section of the translocation program evaluation (Appendix C to the DSEIS/RDSEIS), containment was more difficult than anticipated.
49	Page 13 of the DSEIS should read "analysis of carcasses indicated that southern sea otters were being exposed to environmental contaminants and diseases that could be affecting the health of the *mainland* population throughout California" (italics indicate changed or added text).	Section 2.1 of the RDSEIS has been revised as suggested.
50	Page 58 of the DSEIS should read, "Fishing has significantly reduced densities of red sea urchins in many areas, and catch-per-unit of effort has *decreased*" (italics indicate changed or added text).	Section 4.4.2.2 of the RDSEIS has been revised as suggested.
51	Along the southern California mainland, there are a number of relatively shallow areas that are outside State jurisdiction and within the sea otter's diving depths. The incidental take of sea otters in gill and trammel nets in central California was a cause of significant mortality before gill and trammel nets were prohibited in waters less than 60 fathoms. Therefore, gill and trammel net fishing should be considered further in the document.	A consideration of effects on gill and trammel net fishing has been added to the DSEIS/RDSEIS. Please see sections 4.4.2.6, 6.2.4.6, 6.3.4.5, 6.4.4.5, 6.5.4.5, 6.6.4.5, 6.7.4.5.
52	Page 61 of the DSEIS lists types of	Section 4.4.6 of the RDSEIS has been revised as suggested.

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STAFF REPORT: REGULAR CALENDAR

Consistency Determination No.:	**CD-019-12**
Federal Agency:	**U.S. Fish and Wildlife Service**
Location:	Southern California Ocean Waters (Exhibit 1)
Project Description:	Termination of the Southern Sea Otter Translocation Program (Exhibit 2)
Staff Recommendation:	Concurrence

SUMMARY OF STAFF RECOMMENDATION

The U.S. Fish and Wildlife Service (Service) has submitted a consistency determination for its decision to terminate the Southern Sea Otter Translocation Program. Commenced in 1987, the Program was intended to establish a separate colony of Southern sea otters (*Enhydra lutris nereis*), also known as California sea otters, at San Nicolas Island. The goal of having a separate colony was to protect the species from a major threat such as a catastrophic oil spill. Due to their fur characteristics otters are particularly sensitive to oil spills and are prone to dying from hypothermia after exposure to oil.

The Program was admittedly experimental, and controversial from its inception. The Service submitted to the Commission, and the Commission concurred with, a consistency determination for the Program (CD-010-87). The determination included measures to minimize effects on

commercial and recreational fishing and diving, including a commitment, which was to be jointly administered by the Fish and Wildlife Service and the California Dept. of Fish and Game (CDFG), to capture and relocate any otters found in the “no-otter zone” (or “management zone”), defined to be coastal waters south or east of Point Conception (except, obviously, San Nicolas Island waters).

Under the Program, from 1987 to 1990, the Service transported 140 sea otters to San Nicolas Island. Some sea otters died as a result of translocation, many swam back to the parent population, and some moved into the no-otter zone. By March 1991, only approximately 14 otters (10% of those translocated) remained at the island. In 1991 the Service stopped translocating sea otters to the island “due to high rates of dispersal and poor survival,” although it continued for several more years to relocate otters out of the no-otter zone.

After additional otter deaths from capture and relocation, in 1993 the Service suspended all sea otter capture activities in the no-otter zone. In 1997, CDFG indicated it would no longer support otter capture and relocation. In 2001, the Service formally announced as a policy statement that it would (1) no longer capture or relocate otters, and (2) conduct a final evaluation as to whether the Program had “failed.” Criteria for determining “failure” had been included in the Program since its inception.

As it agreed to do during the Commission’s 1987 consistency review, the Service has submitted the subject consistency determination for its conclusion that the Program has failed. Under this current proposal the Service would: (1) discontinue considering the San Nicolas Island otters as an “experimental population”; (2) abolish translocation and management zones; (3) formally eliminate all capturing and relocation of otters; and (4) formally allow otters to continue to expand their range naturally into southern California waters.

The Commission staff recommends that the Commission find that the proposed termination of the “failed” translocation Program would be generally beneficial to the marine environment. The only real effect of the proposal would be to provide additional regulatory protection to otters at San Nicolas Island and in the management zone. Such additional protection would enhance their ability to naturally expand into what was their historic range in southern California, which would, in turn, improve overall marine biodiversity. The staff therefore recommends the Commission **concur** with the Service’s consistency determination and find the “project” consistent with the marine resource and commercial and recreational fishing policies (Sections 30230, 30234, 30234.5, and 30220) of the Coastal Act.

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APPENDICES

Appendix A: Substantive File Documents

EXHIBITS

Exhibit 1 – Historic and Current Southern Sea Otter Ranges
Exhibit 2 – Fish and Wildlife Service Consistency Determination

I. FEDERAL AGENCY'S CONSISTENCY DETERMINATION

The U.S. Fish and Wildlife Service has determined the project consistent to the maximum extent practicable with the California Coastal Management Program (CCMP).

II. MOTION AND RESOLUTION

Motion:

> *I move that the Commission* ***concur*** *with consistency determination CD-019-12 that the project described therein is fully consistent, and thus is consistent to the maximum extent practicable, with the enforceable policies of the California Coastal Management Program.*

Staff recommends a **YES** vote on the motion. Passage of this motion will result in an agreement with the determination and adoption of the following resolution and findings. An affirmative vote of a majority of the Commissioners present is required to pass the motion.

Resolution:

> *The Commission hereby concurs with consistency determination CD-019-12 by the U.S. Fish and Wildlife Service on the grounds that the project is fully consistent, and thus consistent to the maximum extent practicable, with the enforceable policies of the CCMP.*

III. FINDINGS AND DECLARATIONS

A. PROJECT DESCRIPTION AND BACKGROUND

The U.S. Fish and Wildlife Service (Service) proposes to terminate the Southern Sea Otter Translocation Program (Program). The proposal would:

- terminate the experimental population designation of southern sea otters at San Nicolas Island;
- abolish the southern sea otter translocation and management zones;
- eliminate future actions, required under the current regulations, to capture and relocate southern sea otters for the purpose of establishing an experimental population or restricting movements of southern sea otters into an "otter-free" management zone; and
- allow southern sea otters to continue to expand their range naturally into southern California waters.

The Program was established in 1986 and commenced in 1987. Under the Program, the Service proposed to capture up to 250 (at a rate of no more than 70/year) Southern sea otters (*Enhydra lutris nereis*), also known as California sea otters, and relocate them to San Nicolas Island. The underlying concept was to establish a separate colony of sea otters to protect the species in the event that a catastrophic oil spill threatened the mainland population. Otters are particularly sensitive to oil spills because they are prone to die from hypothermia after exposure to oil.

On July 7, 1987, after a lengthy public hearing, the Commission concurred with the consistency determination for the Program. The Program was controversial; conservation groups generally supported the Program and commercial and recreational fishing and diving groups opposed it. The primary issues raised concerned:

- whether otters could be safely transported without being harmed;
- whether the Program would succeed in establishing a second, viable population;
- whether it would reduce commercial and recreational fishing and diving opportunities at San Nicolas Island; and
- whether the Fish and Wildlife Service would be able to honor its commitment to minimize fisheries impacts by continuing to relocate, with the assistance of the California Dept. of Fish and Game, any otters found in the “no otter zone,” or “management zone,” which the Service determined to be: “…the coastline from Point Conception to the Mexican border and all of the offshore islands except San Nicolas Island.”

The Commission agreed with the Service in 1987 that, under the Coastal Act, the risks to sea otters justified the establishment of the experimental translocation Program. The Commission understood that the Program might not succeed, and through this review the Service agreed to provide annual reports to the Commission on the success of the Program, as well as to submit a consistency determination in the event the Service determined the Program was a failure.

The Service had indicated in its consistency determination that if the Program failed, it would; (1) submit a new consistency determination to the Commission; and (2) return any remaining San Nicolas Island otters to the mainland population. The Program also included specific criteria for making any determinations that the Program had failed, which will be discussed in the next section of this report.

After Commission concurrence, between August 1987 and March 1990, the Service captured 252 sea otters from the mainland and released 140 at San Nicolas Island. (Of the remaining otters, over 100 were deemed unsuitable for translocation and released near their capture sites and six died of stress-related conditions before translocation had occurred.) As of March 1991, only 10% remained. Although the Service modified its capture and translocation techniques to attempt to reduce stress on the otters, problems persisted. In 1991 the Service stopped translocating sea otters to the island. Two years later it stopped relocating sea otters from the “no-otter zone.” In 2000 the Service issued a final biological opinion, stating that continuing the Program would likely jeopardize the continued existence of the species, and in 2001 it issued a policy statement indicating that it would "not capture and remove southern sea otters from the management zone" pending completion of its Program reevaluation, including performing a "final evaluation of the translocation Program that contained an analysis of failure criteria."

B. MARINE RESOURCES

Section 30230 of the Coastal Act states:

> *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

Otters were historically present at San Nicolas Island and throughout southern California coastal waters. Prior to European exploration and the 18th-19th century fur trade, they ranged from the northern Japanese islands to mid-Baja California, Mexico (Exhibit 1). The estimated pre-fur-trade California population is 16,000 animals (or roughly six times the current population). After being hunted to the brink of extinction, in 1911 they first received legal protection through the International Fur Seal Treaty. In 1914 a small colony (about 50 sea otters) was discovered in Big Sur, and due to the treaty protection the population was able to gradually expand (and it was later identified as a separate subspecies, the southern sea otter, *Enhydra lutris nereis*, distinguishing it from other remnant populations remaining in Russia and Alaska).

Standardized range-wide counts of southern sea otters were initiated in 1982. The survey data consist of uncorrected counts and thus do not represent population abundance estimates. Rather, they are used to assess trends. Running 3-year averages are generally used as the metric to determine trends. Based on the standardized counts, the population generally increased from 1983 to 2010, although as can be seen on the chart on the following page, which depicts the running 3-year trends, there have been periods of decline. From 1983 to 2010, the spring population count increased from 1,277 animals to 2,719 animals. However the trend data for the last 5 years has shown declining population trends (-0.3%/year). The most recent (Spring 2010) running 3-year average was 2,711 otters, representing a 3.6% drop from the previous year's running average. Growth has also slowed (although not dropped) for the San Nicolas Island population, with a 9% average growth from the early 1990s to the mid 2000s, but annual growths of only 2.5% from 2006-2010.

For the mainland population, most of the increases that have occurred in recent years have been at the south end of the range (south of Morro Bay), with a slower rate of growth in the north and center of the range where densities are highest, suggesting that sea otters may be approaching local carrying capacity in some areas (Tinker *et al.* 2006b, Tinker *et al.* 2008b). At San Nicolas Island recent data show that sea otters are larger and spend less time foraging than those in the central part of the range, providing further evidence that food limitation may be a factor in the recovery of southern sea otters in central California (Bentall 2005, Tinker *et al.* 2008b).

The following chart shows the running average trends and pup production from 1983 to the present:

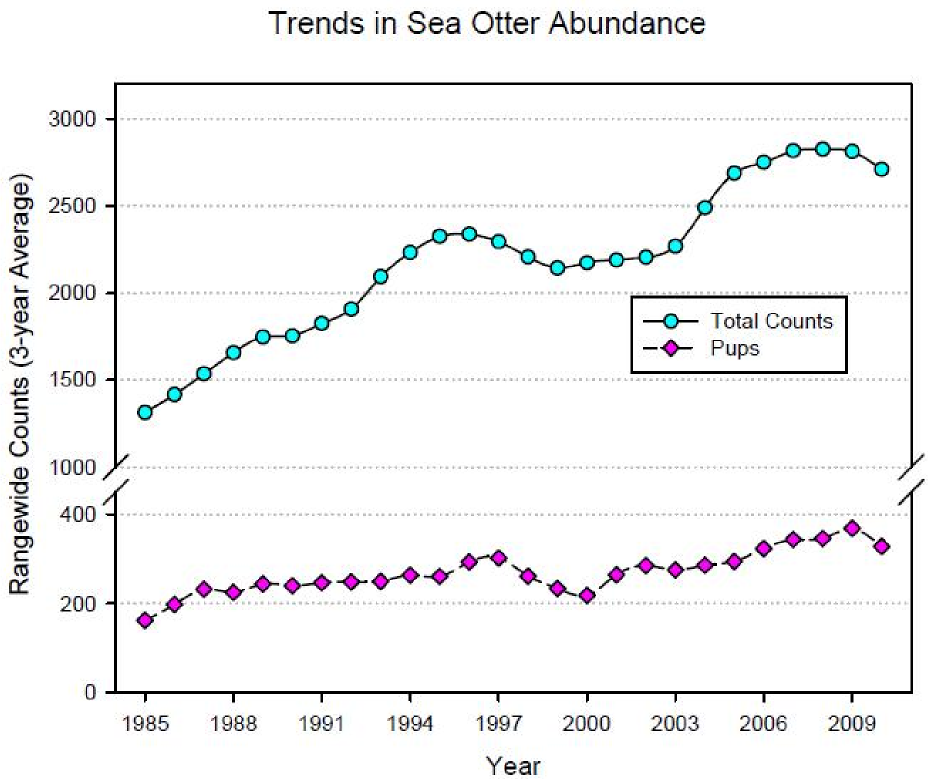

Figure 1. Number of southern sea otters counted during spring surveys, plotted as 3-year running averages. (Example: values for 2010 are the averages of the 2008, 2009, and 2010 counts.)

Trend assessment also considers other factors, including strandings, pup ratios, and mortality by age class. High mortality (rather than low fecundity) appears to be responsible for the slow overall growth and periods of decline in southern sea otters. Causes of death determined from recovered carcasses include white shark attacks, infectious disease (such as encephalitis caused by the protozoal parasites *Toxoplasma gondii* and *Sarcocystis neurona*), acanthocephalan worms, bacterial and viral infections, domoic acid toxicity, and cardiac lesions. The Service is unsure whether the causes of death in recovered carcasses represent an unbiased picture of mortality in the population as a whole, and it believes food limitation, nutritional deficiencies, and exposure to chemical contaminants are also likely influencing patterns of mortality.

Regardless of the combination of factors that has been limiting sea otter populations, it became clear to the Service within a few years of its inception that the translocation Program was not benefitting the otters. Ninety percent of those translocated were gone within three years of commencement of the Program. These otters either died, swam back to the parent population, or moved into the “no-otter zone,” leading the Service to stop translocating sea otters to the island in 1991, citing “high rates of dispersal and poor survival.”

Within two years, the Service also realized the relocations from the "no-otter" zone were detrimental as well. Between December 1987 and February 1993, the Service captured and relocated 24 sea otters from the management zone to the parent range. The Service states:

> *Of these, two sea otters were captured twice in the management zone, despite being released at the northern end of the parent range after their first removal. In February 1993, two sea otters that had been recently captured in the management zone were found dead shortly after their release in the range of the parent population. In total, four sea otters were known or suspected to have died within 2 weeks of being moved from the management zone. We were concerned that sea otters were dying as a result of our containment efforts; therefore, in 1993, we suspended all sea otter capture activities in the management zone to evaluate capture and transport methods. We recognized that available capture techniques, which had proven to be less effective and more labor-intensive than originally predicted, were not an efficient means of containing sea otters. From 1993 to 1997, few sea otters were reported in the management zone, and there appeared to be no immediate need to address sea otter containment. In 1997, the California Department of Fish and Game notified us that it intended to end its sea otter research project and would no longer be able to assist if we resumed capturing sea otters in the management zone.*

After finding that approximately 100 otters regularly moved large distances into and out of the management zone, after a 3-year decline of 10% of the total California otter population, and supported by the recommendation of the Southern Sea Otter Recovery Team (a team of biologists with expertise pertinent to southern sea otter recovery), the Service determined that it would stop relocating sea otters from the management zone to the parent population. As stated by the Sea Otter Recovery Team, "… moving large groups of southern sea otters and releasing them within the parent range would be disruptive to the social structure of the parent population." In March 1999 the Service circulated a draft document declaring the Program a failure and soliciting public comment. On July 19, 2000, the Service issued a final biological opinion, in which it determined that continuing the Program "… would likely jeopardize the continued existence of the species…" because it would both result in otter mortalities due to their capture, and render otters more rather than less vulnerable to a major oil spill and other threats.

On July 27, 2000, the Service published a Federal Register notice of intent to supplement the Program, and on January 22, 2001, it issued a policy statement indicating that it would "not capture and remove southern sea otters from the management zone" pending its completion of its reevaluation of the Program, including performing a "final evaluation of the translocation Program that contained an analysis of failure criteria."

In making this determination the Service relied on both the originally-defined failure criteria for the Program, as well as newer information. In 1987 the Service had defined "Failure" as meeting one or more of the following criteria:

> *Criterion 1: If, after the first year following initiation of translocation or any subsequent year, no translocated southern sea otters remain within the*

translocation zone, and the reasons for emigration or mortality cannot be identified and/or remedied.

Criterion 2: If, within 3 years from the initial transplant, fewer than 25 southern sea otters remain in the translocation zone and the reason for emigration or mortality cannot be identified and/or remedied.

Criterion 3: If, after 2 years following the completion of the transplant phase, the experimental population is declining at a significant rate, and the translocated southern sea otters are not showing signs of successful reproduction (i.e., no pupping is observed); however, termination of the project under this and the previous criterion may be delayed, if reproduction is occurring and the degree of dispersal into the management zone is small enough that the effort to remove southern sea otters from the management or no-otter zone would be acceptable to us and the affected State.

Criterion 4: If we determine, in consultation with the affected State and the Marine Mammal Commission, that southern sea otters are dispersing from the translocation zone and becoming established within the management zone in sufficient numbers to demonstrate that containment cannot be successfully accomplished. This standard is not intended to apply to situations in which individuals or small numbers of southern sea otters are sighted within the management zone or temporarily manage to elude capture. Instead it is meant to be applied when it becomes apparent that, over time (1 year or more), southern sea otters are relocating from the translocation zone to the management zone in such numbers that: (1) An independent breeding colony is likely to become established within the management zone; or (2) they could cause economic damage to fishery resources within the management zone. It is expected that we could make this determination within a year, provided that sufficient information is available.

Criterion 5: If the health and well-being of the experimental population should become threatened to the point that the colony's continued survival is unlikely, despite Federal and State laws. An example would be if an overriding military action for national security was proposed that would threaten to devastate the colony and the removal of southern sea otters was determined to be the only viable way of preventing loss of the colony.

In hindsight (Federal Register, August 26, 2011: Termination of the Southern Sea Otter Translocation Program (p, 53385)), the Service subsequently acknowledged that these criteria:

…were defined before any translocations of southern sea otters were undertaken and without the benefit of what we know today about the translocation, containment, and recovery needs of southern sea otters. The criteria focus on the status of the translocated population and, in hindsight, do not address all the circumstances that are relevant to a complete evaluation of the Program. For example, the failure criteria do not address the possibility that containment might

not be successfully accomplished because of southern sea otters entering the management zone from the mainland range rather than from the population at San Nicolas Island, the possibility that the founding population of the San Nicolas Island colony might be fewer than 70 animals, or even the possibility that an ``established'' population at San Nicolas Island (as defined at 52 FR 29754; August 11, 1987) may be insufficient to attain the recovery goals established for the Program.

Similarly, the failure criteria do not anticipate the possibility that the capture and relocation of sea otters from the management zone could result in the deaths of some animals. Ultimately, failure is determined by our inability to attain the objectives of the translocation Program, which are clearly set out in the final rule for the establishment of an experimental population of southern sea otters [52 FR 29754; August 11, 1987).

Nevertheless the Service determined (in the same FR Notice) that original Failure Criterion 2 above was met, stating:

Criterion 2 has been met. The initial transplant occurred in August 1987. Within 3 years of the initial transplant (August 1990), a maximum of 17 sea otters (14 independent animals and 3 pups) resided in the translocation zone.

We chose to delay declaring the translocation Program a failure in 1990 because southern sea otters were reproducing, dispersal into the management zone had abated, and the California Department of Fish and Game expressed a desire to continue zonal management of southern sea otters. Although sea otters at the island continue to reproduce, the colony remains small to this day; dispersal of sea otters from the parent range into the management zone is now regularly occurring; and the California Department of Fish and Game informed us in 1997 that it would no longer be able to assist us if we resumed capturing sea otters in the management zone.

We consider emigration from San Nicolas Island to be the primary reason for the small size of the population (17 sea otters, including pups) remaining at the island within 3 years of the initial transplant. Fifty-four (54) translocated sea otters were later detected elsewhere (either back in the mainland range or in southern California waters). The number of sea otters resighted in the mainland range (36), despite the absence of a focused effort to identify them there (efforts were focused instead at San Nicolas Island and in the management zone), suggests that additional sea otters may have returned without being detected. There is some evidence of sea otter mortality at San Nicolas Island (three sea otters were found dead at San Nicolas Island within days of being translocated), but no additional deaths of translocated sea otters at San Nicolas Island were verified. Of the *animals that remain unaccounted for, it seems likely that most either emigrated successfully and escaped further detection or attempted to emigrate but died before reaching suitable habitat.*

Although high rates of dispersal had been seen in all earlier sea otter translocations (Estes et al. 1989), we believed that the translocation to San Nicolas Island would not result in the significant dispersal of animals because of the abundance of prey items, the apparent suitability of the habitat, and the perceived barrier imposed by the surrounding deep water. After the first year of translocation, we made significant changes to the Program with the intent of minimizing or eliminating emigration (53 FR 37577; September 27, 1988). These changes were implemented during the second year of the Program, when we selected younger sea otters for translocation, transported sea otters more quickly and in smaller groups, abandoned the use of holding pens at the island, and released newly translocated sea otters in the vicinity of sea otters already residing at the island. Despite our efforts, none of these changes appeared to result in a decrease in emigration. In the final year of the translocation effort, we attempted to gain more information on sea otter movements by implanting radio transmitters in sea otters immediately prior to their transport to San Nicolas Island. Two of the initial three southern sea otters that received implants died before they could be transported to the island, causing us to abandon this effort.

We conclude that the translocation Program has failed under criterion 2. We believe that emigration from San Nicolas Island is the primary reason that substantially fewer than 25 otters remained in the translocation zone within 3 years of the initial transplant. Although we modified the Program significantly after the first year in an attempt to reduce emigration and otherwise reduce sea otter mortality associated with the Program, we were unable to remedy the situation. Therefore, failure criterion 2 has been met.

The fact that the translocation Program has failed under criterion 2 does not necessarily mean that the sea otter colony at San Nicolas Island is destined to disappear. In fact, it appears to have a low cumulative probability of extinction (Carswell 2008). However, the final rule establishing the Program clearly states, ``The Service does not consider the mere presence of sea otters in the translocation zone as an indication that a new population is established'' (52 FR 29754 at 29774; August 11, 1987). The colony would be considered ``established'' when at least 150 southern sea otters resided at the island and the population had a minimum annual recruitment of 20 animals (52 FR 29754 at 29774; August 11, 1987). The initial high rate of dispersal of translocated sea otters from San Nicolas Island is the primary cause of failure under this criterion not only because of its direct effect on the subsequent size of the San Nicolas Island colony, but also because of its implications for the recovery strategy at the heart of the Program: the intended function of the San Nicolas Island population as a self-sustaining ``reserve colony for providing stock to restore subsequently damaged areas'' in the southern sea otter's range (52 FR 29754 at 29774; August 11, 1987). The high rate of dispersal

> *of translocated sea otters suggests it is unlikely that the colony will ever be large enough to supply the numbers of sea otters necessary to perform a successful translocation and re-establishment of population in the mainland range if the parent population were reduced or eliminated by a catastrophic event.*

Thus, in examining the history of the Program and the above "failure" analysis, it is clear that the Service is essentially formally acknowledging what it has understood for two decades, and in practice implemented, which is to accept that natural range expansion is critical to otter recovery, and that it should stop removing of sea otters from the "no-otter" management zone because it is contrary to sea otter protection needs. Moreover, it is also clear that allowing natural otter population expansion benefits the overall health of the marine environment, due to the otters' role as a "keystone" species, including but not limited to its role in benefitting kelp production. This beneficial role is described further below.

Despite the fact that in declaring failure of the Program the Service is essentially "letting nature take its course," in part due to its prior to commitments, the Service nevertheless analyzed in its consistency determination the "effect" that allowing predicted future expansion of otter populations would have on marine ecosystems, and on commercial and recreational fishing.

The Service indicates that the proposed termination of the translocation Program would:
(1) change the regulatory status of southern sea otters in the translocation zone (surrounding San Nicolas Island) and management zone (all other southern California waters from Point Conception to the Mexican border); and (2) allow for the continued natural range expansion of southern sea otters into southern California waters. The Service's otter population predictions for the next 10 years are that between 73 and 299 independent sea otters will reside year-round along a stretch of the mainland coastline between Point Conception and the southernmost range end, and that the range end will fall somewhere between Carpinteria and Oxnard (as shown in the figure below, copied from the Service's August 2011 Revised Draft Supplemental EIS).[1]

[1] Considerable uncertainty is involved in forecasting sea otter range expansion. These predictions are based on the results of a simulation model (Tinker et al. 2008) that has accurately predicted recent range expansion (2009-2010).

For the San Nicolas Island population, the Service predicts a 7% annual growth, which would roughly double the existing Island population (i.e., from 53 in 2012 to approximately 103 sea otters by 2021). Although it is conceivable that range expansion to the northern Channel Islands could also begin in the short term (ten years), review and analysis by the Service suggest that scenario is not likely. The Service believes there are too many uncertainties to enable it to accurately predict otter population expansions over a longer time period.

In analyzing impacts such expansion would have, the Service assumes as the baseline condition the actual conditions that have been present since 1993 when it suspended otter relocation activities. The Service states:

> *Under the proposed action, containment activities would not be resumed and southern sea otters would remain at San Nicolas Island. Southern sea otters would have the ability, as they have had since 1993, to continue to expand their range into southern California waters southeast of Point Conception and to increase in number at San Nicolas Island. Accordingly, the effects of both the baseline and the proposed action are the same (in that sea otters are allowed to expand their range naturally in both cases) except with respect to regulatory changes, which we describe above and analyze below as appropriate.*

Analyzing effects of future expansion, the Service's consistency determination focuses primarily on analyzing effects of assumed increases in otter population (outside the mainland population) on sensitive marine species, the otters themselves, and commercial and recreational fishing and diving. The marine resources looked at included nearshore ecosystems in general, and specifically, the sea otter, listed as threatened under the Endangered Species Act (ESA), and two endangered (under ESA) abalone species: white abalone (*Haliotis sorenseni*) and black abalone (*Haliotis cracherodii*).

Analyzing nearshore ecosystems effects, the Service states:

> *Although the reduction of invertebrate prey populations would begin immediately upon the arrival of sea otters in an area, subsequent environmental effects would occur gradually as sea otter densities increased. The environmental changes caused by sea otter predation may be broadly summarized as follows:*
>
> *A considerable reduction in the abundance of invertebrate prey species to depths of 25 m (82 ft), with effects decreasing at depths greater than 25 m (82 ft) and approaching zero at depths greater than 40 m (131 ft);*
>
> *A probable increase in the abundance of kelp in areas where grazing pressure by sea urchins is limiting kelp growth or establishment; and*
>
> *A probable increase in abundance of kelp-canopy-dependent species.*
>
> *Sea otters are important predators in the nearshore marine ecosystems of the North Pacific Ocean and are generally considered to be a keystone species in these communities (Estes and Palmisano 1974, Palmisano and Estes 1977, Estes et al. 1978, Duggins 1980, Palmisano 1983, Estes and Harrold 1988). Keystone species are organisms that have large-scale community effects disproportionate to their abundance (Meffe and Carroll 1997).*
>
> *The effects that sea otters have on their environment arise largely from predation. Sea otters consume a wide variety of nearshore marine invertebrates (including sea urchins, abalone, crabs, lobsters, clams, mussels) and exert a strong limiting influence on their prey populations (see section 4.3.1.2 of the RDSEIS; Riedman and Estes 1990). Sea otters tend to restrict prey populations to cryptic and inaccessible habitats, such as deep cracks and crevices in rocky areas, or to deep waters [sea otters usually forage in waters of 25 m (82 ft) or less and only rarely in depths exceeding 40 m (131 ft)] (Riedman and Estes 1990). In sandy areas, bivalves may escape predation by burrowing deeply. Sea otters also tend to select larger prey, which minimizes predation on smaller individuals (Riedman and Estes 1990).*

The Service then analyzes the fairly complex relationship between sea otters, sea urchins, and kelp. Sea urchins graze on kelp, and while they generally consume smaller algae, some research suggests that they can prevent the reestablishment of kelp once it has disappeared from an area. When giant kelp is healthy, the urchins feed on drift kelp (pieces of algae that have broken off the kelp). However when shortages of drift kelp occur, starving sea urchins gather together in moving "fronts," which have the potential to clear all attached macroalgae and lead to the formation of sea urchin "barrens" (i.e., areas devoid of kelp). Sea otter preferences for urchins thus can benefit kelp. The Service states:

> *According to a generally accepted sea otter-sea urchin-kelp community ecological paradigm, sea otters function as top predators in a three-level trophic cascade, in which sea otter predation limits populations of herbivorous invertebrates that would otherwise limit kelp and other macroalgae (Van Blaricom and Estes 1988, Estes and Duggins 1995). A number of studies have established a link between sea otter predation on invertebrate herbivores and increased algal abundance at specific sites (McLean 1962, Estes and Palmisano 1974, Estes et al. 1978, Simenstad et al. 1978, Duggins 1980, Breen et al. 1982, Laur et al. 1988, Oshurkov et al. 1988, Duggins et al. 1989, Watson 1993). Estes and Duggins (1995) have shown that sea otter predation has a broadly generalizable influence on the structure of kelp forests in Alaska.*

However the Service also states that this relationship is less clear in California than Alaska, stating that urchin effects on California kelp:

> *… are overshadowed at larger scales by a complex of other factors that can influence kelp distribution, such as water motion, light, nutrient levels, substratum type and availability, and the presence of other sea urchin predators. They point out that the effects of sea urchin grazing are highly variable in the absence of sea otters, and that deforestation by sea urchins in California is the exception rather than the rule (10 to 20 percent of sites surveyed) (Foster and Schiel 1988, Foster 1990).*

Further complicating the relationships is that predators other than sea otters (e.g., spiny lobsters, sea stars, crabs, and fishes (such as sheephead)), as well as human harvest, can affect sea urchin abundance in California. Nevertheless, the Service states:

> *Rocky habitats in the Southern California Bight may periodically alternate between sea urchin-dominated and kelp-dominated states for reasons unrelated to overgrazing, such as the action of severe storms (Ebeling et al. 1985). However, sea otters may strengthen the resilience of kelp forest communities in the face of major perturbations by preventing overgrazing by sea urchins (which can follow the loss of drift kelp due to severe storms or periods of unusually strong sea urchin recruitment) (Van Blaricom 1984). In areas where sea urchin grazing is limiting kelp establishment or growth, the presence of sea otters can generally be expected to result in an increased abundance of kelp.*

In attempting to estimate these benefits, given all the above complexity, the Service generally predicts that "… the development of giant kelp canopies (in areas where sea urchins are limiting kelp abundance) would likely require a minimum of a decade after the restriction of sea urchins to cryptic and inaccessible habitat by sea otter predation." Such effects would nevertheless clearly benefit marine ecosystems and biodiversity; the Service states:

Kelp Forests and Biodiversity

The importance of macroalgae to nearshore communities is described by Mann (1982), Foster and Schiel (1985), and Duggins (1988). Giant kelp forests are highly productive and can be compared to the most productive of terrestrial systems (Tegner and Dayton 2000). They provide a complex biological structure that supports an extremely rich variety of species (Foster and Schiel 1985). More than 125 species of fish live in and near shallow rock reefs and kelp beds of the Southern California Bight (Cross and Allen 1993). The abundance of fishes on reefs is positively correlated with the presence of kelp and substrate relief. Fishes are more abundant on cobble reefs with higher densities of kelp (23-30 thalli per 100 square meters) than on those with lower densities (8 thalli per 100 square meters) (Larson and DeMartini 1984), and the abundances of fishes such as kelp surfperch, kelp bass, giant kelpfish, and kelp rockfish are directly correlated with kelp density (Cross and Allen 1993).

…

Overall, sea otters reoccupying the nearshore marine environment are expected to enhance biodiversity and the stability and persistence of kelp forest habitat. Kelp forests provide numerous direct and indirect benefits, including reductions in coastal erosion and increases in benthic productivity (Duggins et al. 1990) and carbon storage that can moderate climate change (Wilmers et al. 2010). The marine environment of southern California has been dramatically affected by human activities, such as the direct removal of many of the animal components of the community and the input of pollution, making it difficult to determine the "natural" functioning of the community (Dayton et al. 1998). "Trophic downgrading," or the loss of apex predators from ecological systems, may have far-reaching and unanticipated effects on ecosystem processes (Estes et al. 2011). The return of sea otters, apex predators that were historically present in the ecosystem, is expected to enhance ecosystem functioning and to bring the nearshore marine ecosystem to a state more closely resembling its historic (pre-fur-trade), or "natural," condition.

Analyzing effects on white abalone, the Service states:

Because relatively low numbers of white abalone occur (both presently and historically) in areas expected to be reoccupied by sea otters over the next 10 years, we do not expect sea otters to affect the white abalone population, as a whole, substantially during this period. However, if within the next 10 years the natural recovery of local white abalone populations occurred in waters within the depth range utilized by sea otters along this stretch of coastline, then it is likely that sea otters would negatively affect these local populations. Similarly, if white abalone recovery efforts included the outplanting of individuals in waters within *the depth range utilized by sea otters along this stretch of coastline, then it is likely that sea otter predation would negatively affect this portion of the overall recovery effort.*

The rate at which sea otters would recolonize other nearshore areas of the Southern California Bight after 10 years would be a function of their demographic rates, food supply, and other variables. Given the relative scarcity of white abalone and the regions and depths in which they now occur, opportunities for sea otter and white abalone interaction would likely be limited in the near term. We would not expect sea otters to expand their range into key white abalone recovery areas for many decades, if ever.[2]

Analyzing effects on black abalone, the Service states:

Intertidal habitat along much of this section of mainland coastline does not support black abalone. If local recovery of black abalone populations nevertheless occurred within this stretch of coastline in areas lacking sufficient cryptic habitat, whether naturally or as a result of outplanting efforts, sea otters would likely have a detrimental effect on these populations. The effect that a persistent colony of sea otters would have on black abalone at San Nicolas Island is uncertain. As noted above, a population of black abalone that may be partially resistant to withering-syndrome has been detected there (Van Blaricom et al. 2009). However, observations from 2003-2005 indicate that abalone constitute only a very small fraction (less than one percent) of the sea otter diet at San Nicolas Island (Bentall pers. comm. 2008). The fact that sea otters and black abalone historically co-occurred and continue to co-occur at the island suggests that black abalone populations have sufficient refuge from sea otter predation to maintain viable populations there. In its responses to comments in the final critical habitat designation for black abalone, NMFS states, "one of the only places in southern California where black abalone populations have been increasing and where multiple recruitment events have occurred since 2005 (i.e., San Nicolas Island) is also the only place south of Point Conception where a growing population of southern sea otters exists, indicating that black abalone populations can recover and remain stable in the presence of sea otters" (66 FR 66806).

Whether sea otters would recolonize other nearshore areas of the Southern California Bight after 10 years would be a function of their demographic rates, food supply, and other variables. The effect that sea otters may have on depleted black abalone stocks throughout the area is uncertain. … Ultimately, in areas of the Southern California Bight with sufficient cryptic and inaccessible habitat, portions of the black abalone population will be shielded from sea otter predation. However, in areas with insufficient cryptic and inaccessible habitat,

[2] For instance, sea otters may never expand their range to white abalone recovery areas such as Tanner Bank and Cortes Bank.

> *into which black abalone populations may have expanded following the human-caused extirpation of sea otters, black abalone will be more vulnerable to predation resulting from sea otter range expansion. According to one assessment by NMFS, "the best available data do not support the idea that sea otter predation was a major factor in the decline of black abalone populations or that it will inhibit the recovery of the species" (76 FR 66806).*
>
> *… The primary constituent elements of critical habitat essential for the conservation of black abalone are: rocky substrate; food resources; juvenile settlement habitat; suitable water quality; and suitable nearshore circulation patterns (76 FR 66806). Of these five elements, only one, food resources, may potentially be affected by sea otters. Sea otters would generally be expected to improve food resources for adult black abalone through predation on sea urchins. However, ecological relationships are complex, and it is likely that numerous positive and negative interactions will occur simultaneously.*

In terms of effects on sea otters themselves, the Service states:

> *The proposed action would maximize the opportunity for sea otter recovery under the ESA. … The revised recovery plan for the southern sea otter (USFWS 2003) continues to focus on efforts to increase the size of the southern sea otter's population, but it no longer recommends the translocation of sea otters as a means to achieve this goal. The recovery plan acknowledges the recovery team's recommendations to declare the translocation Program a failure, to allow natural range expansion to occur, and to allow the colony at San Nicolas Island to remain at the island upon termination of the Program rather than capturing these sea otters and releasing them in the mainland range (USFWS 2003).*
>
> *Under the Marine Mammal Protection Act (MMPA), federal agencies are charged with managing marine mammals to their Optimum Sustainable Population level. The Optimum Sustainable Population level is defined by the MMPA as the number of animals, with respect to any population stock, that "will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element" (16 U.S.C. 1362). For the southern sea otter, the Optimum Sustainable Population level is believed to be greater than the population level needed to achieve recovery under the ESA. The final revised recovery plan for the southern sea otter identifies a population size of 3,090 as necessary to consider delisting of the species under the ESA and gives the lower bound of the Optimum Sustainable Population level as approximately 8,400 animals for the California coast (USFWS 2003).*
>
> *This estimated lower bound of the Optimum Sustainable Population level, also known as the maximum net productivity level (MNPL), is roughly 50 percent of the estimated carrying capacity of California (Laidre et al. 2001). Carrying capacity in this context is defined as the maximum number of sea otters that can*

be supported by the nearshore marine environment of California. Laidre et al. (2001) estimated carrying capacity as a product of the densities of sea otters in rocky, sandy, and mixed habitats in portions of their range believed to be at equilibrium, and the total amount of rocky, sandy, and mixed habitat to the 40 meter isobath in California. The carrying capacity of the Southern California Bight has been estimated as 6,441 sea otters, which accounts for about 40 percent of the carrying capacity of California as a whole (Laidre et al. 2001).

Under baseline conditions, sea otters would likely continue to expand their range into the Southern California Bight. Over the next 10 years, the southern sea otter's range is predicted to expand gradually along the coastline to Carpinteria (lower bound) or Oxnard (upper bound). Range expansion of the mainland population is expected to result in between 73 (lower bound) and 299 (upper bound) independent sea otters residing year-round south of Point Conception in 10 years. If the colony at San Nicolas Island persists, it is predicted to grow at a rate similar to that observed at the island since the colony's low point in the early 1990s, an average of 7 percent annually (from a projected 53 independent animals in 2012 to 103 in 2021). Whether sea otters would recolonize other nearshore areas of the Southern California Bight after 10 years would be a function of their demographic rates, food supply, and other variables. If recolonization occurs, it is expected to occur gradually over the course of many decades.

Continued sea otter range expansion into the area southeast of Point Conception will allow the population size to increase. Additional habitat is essential to population growth because, as several lines of evidence suggest, sea otters in some areas of the central California coast are food-limited (Tinker et al. 2008). Although range expansion into southern California waters will expose sea otters to a somewhat degraded marine habitat (like portions of the southern sea otter's existing range) and natural hazards such as oil seeps, the risk to sea otters of expanding their range into this area is expected to be minimal in comparison to the benefits of allowing natural range expansion to occur. Continued natural range expansion will maximize habitat available for southern sea otter recovery, allow sea otters to exploit areas that are not food-limited, and reduce the species' vulnerability to widespread catastrophic events. Allowing natural range expansion also avoids the potential threat to the species caused by capturing sea otters in southern California waters and releasing them into other parts of the mainland range and the potential for injuring or killing individual sea otters removed from the management zone. The proposed action reflects the recommendations made in the revised recovery plan for the southern sea otter with respect to the translocation Program (USFWS 2003).

The Service concludes:

> *The proposed action (including the continuation of natural sea otter range expansion) will thus have a mixed, but generally beneficial, effect on the maintenance of marine resources. The effect may be moderately negative, at least in the short term, for white and black abalone, whereas the effect will be positive for the nearshore marine environment as a whole (on which many species, including all abalone species, depend) and for southern sea otters. We have determined in the RDSEIS that the proposed action is the "environmentally preferable" alternative, as defined under the National Environmental Policy Act. We believe that, on balance, Alternative 3C causes the least damage to the biological and physical environment, in that it would allow a "keystone species" to return to its former range off southern California and would help to restore the natural functioning of the nearshore marine ecosystem. Because there are mixed negative and positive effects depending on whether sea otters are present or absent, it is not possible for this outcome to be fully consistent with the policies enumerated under Article 4, Section 30230. However, this outcome is consistent to the maximum extent practicable with these policies.*

The Commission agrees with all but the last two sentences of this conclusion. The Commission finds it is not necessary (or even appropriate) to apply a "maximum extent practicable" test, because the Commission finds that the proposed action would be fully consistent with the requirements of Section 30230. As described above, the presence of a keystone species, like the sea otter, is expected to enhance overall habitat and biodiversity, and the Service does not anticipate that the termination of the Program will result in adverse impacts to white or black abalone or other marine resources. The Commission finds that the termination of the Program will help protect sea otters, which are a species of special biological significance and will otherwise be generally beneficial to the marine environment. In fact, the only tangible "effect" of the "proposal" in practical terms is to provide additional regulatory protection to otters at San Nicolas Island and in the management zone, which would, for the reasons discussed above, benefit the marine environment. The Commission therefore concludes that the proposed formal termination of the Program would be consistent with the requirements of Section 30230 of the Coastal Act to maintain, enhance, and, where feasible, restore marine resources, to give special protection to areas and species of special biological or economic significance, to sustain the biological productivity of coastal waters, and to maintain healthy populations of all species of marine organisms.

C. Commercial and Recreational Fishing

Section 30230 of the Coastal Act, quoted in full on page 6 above, includes providing protection for species of special economic significance, and maintaining healthy populations of all species of marine organisms adequate for long-term commercial and recreational purposes. Section 30234 states:

> *Facilities serving the commercial fishing and recreational boating industries shall be protected and, where feasible, upgraded. Existing commercial fishing and recreational boating harbor space shall not be reduced unless the demand for*

those facilities no longer exists or adequate substitute space has been provided. Proposed recreational boating facilities shall, where feasible, be designed and located in such a fashion as not to interfere with the needs of the commercial fishing industry.

Section 30234.5 states:

The economic, commercial, and recreational importance of fishing activities shall be recognized and protected.

Section 30220 states:

Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.

The Service states that water-oriented recreational activities that may be affected by the natural range expansion of sea otters include recreational lobster fishing, recreational marine finfish fishing, recreational abalone diving, and ecotourism (marine wildlife watching). Analyzing recreational fishing and diving effects, the Service states that while direct effects on diving may occur due to competition between divers and sea otters for recreationally targeted species, the overall enhanced ecosystem effects described in the previous section of this report could benefit recreational fishing through increased production of targeted finfish species. The Service states:

Southern sea otters primarily consume shellfish. Sea otter predation may thus reduce the abundance of spiny lobsters available to the recreational lobster fishery (see sections 6.2.8.1 and 6.7.8.1 of the RDSEIS). However, sea otter predation would also reduce the abundance of herbivorous invertebrates, which would in turn promote the development, stability, and persistence of the nearshore kelp forest ecosystem in areas where herbivores are limiting kelp production. A healthy kelp forest ecosystem is important for a wide range of finfish species harvested by the recreational fishery (see section 6.2.2 of the RDSEIS) and would therefore be expected to have a positive effect on the abundance of finfish available for harvest (see sections 6.2.8.2 and 6.7.8.2 of the RDSEIS).

The Service states that sea otter range expansion may thus preclude the reopening of the now-closed recreational abalone fishery in some areas, but at the same time would benefit ecotourism opportunities by enhancing "… the quality of marine wildlife watching trips in the Southern California Bight when sea otters are observed." The Service concludes that sea otter range expansion will thus have a mixed effect on coastal water-oriented recreational activities, with potential adverse effects on recreational lobster fishing and the potential for reopening a recreational abalone fishery, but potential beneficial effects with respect to recreational finfish fishing and marine wildlife watching.

Addressing commercial fishing, the Service states:

> *Effects on commercial fishing outlined here are identical to those under the baseline (please refer to the discussion under Article 3, Section 30220, for effects on recreational fishing), with the exception of the possible indirect effects on gill and trammel net fisheries described …* [in Exhibit 2].[3] *Under the baseline, as well as under the proposed action, the commercial sea urchin, lobster, crab, and sea cucumber* [fisheries]*, would likely be eliminated in mainland coastline areas predicted to be re-occupied by sea otters over the next 10 years: Point Conception to Carpinteria (lower bound) or Oxnard (upper bound). For the commercial sea urchin fishery, the 10-year landings average along this portion of affected coastline is 56,360-61,016 pounds, representing approximately 1 percent of Southern California Bight landings as a whole. For the commercial lobster fishery, the 10-year landings average along this portion of affected coastline is 54,674-75,649 pounds, representing approximately 8-11 percent of Southern California Bight landings as a whole. For the commercial crab fishery, the 10-year landings average along this portion of affected coastline is 253,572-385,743 pounds, representing approximately 23-35 percent of Southern California Bight landings as a whole. For the commercial sea cucumber fishery, the 10-year landings average along this portion of affected coastline is 155,714-158,636 pounds, representing approximately 27-28 percent of Southern California Bight landings as a whole. These fisheries are also likely to be affected, to some degree, by a growing sea otter population at San Nicolas Island. Whether sea otters would recolonize other nearshore areas of the Southern California Bight after 10 years would be a function of their demographic rates, food supply, and other variables. If sea otters recolonized these areas at the densities seen in the mainland range for comparable habitat, commercial landings for these species would likely approach zero in these areas because fishers targeting these species would fish other areas where their catch per unit effort would be greater. Please see sections 6.2.4 and 6.7.4 of the RDSEIS for a comprehensive analysis of effects of the proposed action on commercial fisheries.*
>
> *The reduction in densities of herbivorous invertebrates that will precipitate changes in shellfish fisheries may be accompanied by enhancements to finfish fisheries as a result of the changes in the nearshore marine ecosystem outlined under Article 4, Section 30230 above.*

The Service therefore concludes, similar to its recreational fishing and diving analysis, that sea otter range expansion would thus have a mixed effect on commercial fisheries, with adverse effects on sea urchin and sea cucumber fishing, and potential effects on gill and trammel net fishing if the State acts to further limit such fishing in additional areas, but with enhancement of finfish fishing due to improved biodiversity. The Service therefore concludes:

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[3] The Service's consistency determination, (p. 27-28) describes potential indirect effects that are "not within not within the management authority of the Service" and which include "potential indirect economic effects stemming from regulatory changes, namely the elimination of incidental take exemptions associated with the management zone upon termination of the translocation Program." This analysis is contained in Exhibit 2.

> *The natural range expansion of sea otters (which will occur under the baseline as well as under the proposed action) and the regulatory changes associated with the proposed action (which could precipitate further restrictions on the gill and trammel net fishery in southern California), may result in the elimination of certain fisheries in areas recolonized by sea otters. At the same time, finfish fisheries may be enhanced. The proposed action is consistent to the maximum extent practicable with the policies enumerated under Article 4, Section 30234.5.*

The Commission agrees with the Service that a natural expansion of sea otters into their historic range in southern California coastal waters would, on an overall basis, generally benefit commercial and recreational fishing as well as water-oriented recreational activities, such as wildlife viewing. Although, at least in the short run, some portions of the commercial and recreational fishing industry will be adversely affected by the termination of the Program, the finfishing portion of the industry is expected to benefit, and in the long run the termination of the Program is expected to result in a healthier ecosystem, which ultimately benefits commercial and recreational fishing generally. In fact, the only tangible “effect” of the “proposal” in practical terms is to provide additional regulatory protection to otters at San Nicolas Island and in the management zone, which would, for the reasons discussed above, assist in kelp production, which would benefit a number of commercially and recreationally caught fish species. The Commission therefore concludes that the proposed formal termination of the Program would be consistent with the requirements of Sections 30230, 30234, 30234.5, and 30220 to give special protection to areas and species of special economic significance, recognize and protect the economic, commercial, and recreational importance of fishing activities, and protect coastal areas suited for water-oriented recreational activities.

APPENDIX A: SUBSTANTIVE FILE DOCUMENTS

Consistency Determination CD-019-12, U.S. Fish & Wildlife Service, Proposed Termination of the Southern Sea Otter Translocation Program, April 29, 2012.

Revised Draft Supplemental Environmental Impact Statement, Translocation of Southern Sea Otters, U.S. Fish & Wildlife Service, August 2011.

Consistency Determination CD-010-87, U.S. Fish & Wildlife Service, Southern Sea Otter Translocation Program, March 20, 1987

U.S. Fish and Wildlife Service, Southern Sea Otter Recovery Plan, 1982.

U.S. Fish and Wildlife Service, Final Revised Recovery Plan for the Southern Sea Otter (*Enhydra lutris nereis*), 2003.

Tinker, M.T., D.F. Doak, and J.A. Estes. 2008. Using demography and movement behavior to predict range expansion of the southern sea otter. Ecological Applications 18(7):1781–1794.

* Maps and ranges not to scale

EXHIBIT 1
CD-019-12
USFWS

Coastal Consistency Determination
Proposed Termination of the
Southern Sea Otter Translocation Program
U.S. Fish and Wildlife Service
Ventura, California

1. AUTHORITY

This Coastal Consistency Determination is submitted in compliance with Section 930.34 *et seq.* of the National Oceanic and Atmospheric Administration Federal Consistency Regulations (15 CFR Part 930).

2. DETERMINATION

We, the U.S. Fish and Wildlife Service (Service), have determined that the proposed termination of the southern sea otter translocation program (proposed action) (76 FR 53381; August 26, 2011) is consistent to the maximum extent practicable with the California Coastal Management Program (CCMP), pursuant to the requirements of the Coastal Zone Management Act of 1972, as amended, and the California Coastal Act of 1976, as amended (Coastal Act). This determination is based upon an evaluation of the proposed action in relation to the relevant enforceable policies of the CCMP. A Revised Draft Supplemental Environmental Impact Statement (RDSEIS) (USFWS 2011, available at *http://www.fws.gov/ventura/*), which we have prepared in accordance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq*.) and which is hereby incorporated by reference, provides the analytical basis for this finding.

3. PROJECT DESCRIPTION

Background

On August 11, 1987, under the authority of Public Law 99-625, we published a final rule to establish an experimental population of southern sea otters at San Nicolas Island, Ventura County, California, in conjunction with a management zone from which sea otters would be excluded (52 FR 29754).[1] We designated the management zone to include the coastline from Point Conception to the Mexican border and all of the offshore islands except San Nicolas Island. The final rule provided implementing regulations for the translocation program, which are codified at 50 CFR 17.84(d). These regulations define the boundaries of the translocation and management zones, provide the framework for the program, and include a set of criteria for determining if the translocation should be considered a failure. In 1991, we translocated the last sea otter to San Nicolas Island, and in 1993, we suspended all sea otter capture activities in the management zone (these actions are described in greater detail under the heading "Implementation of the Southern Sea Otter Translocation Program" below). As a result, sea otters have had the ability, since 1993, to expand their range naturally into southern California waters.

[1] A consistency determination on this action was adopted by the California Coastal Commission on July 7, 1987.

EXHIBIT 2
CD-019-12 USFWS
Consistency Determination

Implementation of the Southern Sea Otter Translocation Program

The purpose of the southern sea otter translocation program was to: (1) implement a primary recovery action for the southern sea otter; and (2) obtain data for assessing southern sea otter translocation and containment techniques, population dynamics, ecological relationships with the nearshore community, and effects on the donor population of removing individual southern sea otters for translocation (52 FR 29754; August 11, 1987). The translocation of southern sea otters was intended to advance southern sea otter recovery, with the ultimate goal of delisting the species under the ESA. Through translocation, we hoped to establish a self-sustaining southern sea otter population (experimental population) that would provide a safeguard in the event that the parent southern sea otter population were adversely affected by a catastrophic event, such as an oil spill. We expected that, to achieve this aim, the colony at San Nicolas Island would need to grow to a size such that it could remain viable while furnishing up to 25 sea otters per year for up to 3 years to repopulate affected areas of the parent range. Based on the magnitude of oil spills that had occurred up to that time, San Nicolas Island appeared to be sufficiently distant from the parent range to provide a reasonable safeguard in the event of such a catastrophic occurrence.

On August 24, 1987, we began to implement the translocation plan by moving groups of southern sea otters from the coast of central California to San Nicolas Island. The translocation plan allowed for a maximum of 70 southern sea otters to be moved to San Nicolas Island during the first year of the program (52 FR 29754; August 11, 1987). This number could be supplemented with up to 70 animals annually (up to 250 total) in subsequent years, if necessary, to ensure the success of the translocation and to prevent the colony from declining into an irreversible downward trend. Assuming that a core population of 70 southern sea otters could be maintained through translocation, we anticipated that the experimental population could be established within as few as 5 or 6 years. In this context, the term “established” had a specific meaning: when at least 150 southern sea otters resided at the island and the population had a minimum annual recruitment of 20 animals (52 FR 29754; August 11, 1987).

Between August 1987 and March 1990, we captured 252 southern sea otters along the central California coast and released 140 at San Nicolas Island. More than 100 of the captured sea otters were deemed unsuitable for translocation and released near their capture sites, and 6 of the 252 animals died of stress-related conditions before translocation to San Nicolas Island. Some sea otters died as a result of translocation, many swam back to the parent population, and some moved into the management zone. As of March 1991, approximately 14 independent (non-pup) southern sea otters (10 percent of those translocated) were thought to remain at the island.

Because of the unexpected mortalities and high emigration encountered during the first year, we amended our regulations for the translocation program in 1988 (53 FR 37577; September 27, 1988). The amendments were intended to minimize stress on captured sea otters, to improve the survival of translocated animals, and to minimize the dispersal of translocated sea otters from the translocation zone. Specifically, we provided more flexibility in selecting the ages of sea otters for translocation, eliminated the restriction to capture them only within an August to mid-October timeframe, eliminated the requirement to move a specified number of sea otters previously implanted with transmitters, provided the flexibility either to transport them immediately or to hold them on the mainland before releasing them at San Nicolas Island, and eliminated the requirement to translocate a minimum of 20 animals at a time.

The fate of approximately half the sea otters taken to San Nicolas Island was never determined, although an intense effort was made to locate translocated animals at San Nicolas Island, in the management zone, and in the parent range. In 1991, we stopped translocating sea otters to San Nicolas Island due to high rates of dispersal and poor survival. However, we continued monitoring the sea otters remaining in the translocation zone.

In December 1987, in coordination with the California Department of Fish and Game, we began capturing and moving southern sea otters that entered the designated management zone. Containment efforts were intended to keep the management zone free of otters, in accordance with Pub. L. 99-625 and our implementing regulations. Containment operations consisted of three interdependent activities: (1) surveillance of the management zone; (2) capture of southern sea otters in the management zone; and (3) relocation of captured animals to the parent range or San Nicolas Island.

Between December 1987 and February 1993, 24 southern sea otters were captured, removed from the management zone, and released in the parent range. Of these, two sea otters were captured twice in the management zone, despite being released at the northern end of the parent range after their first removal. In February 1993, two sea otters that had been recently captured in the management zone were found dead shortly after their release in the range of the parent population. In total, four sea otters were known or suspected to have died within 2 weeks of being moved from the management zone. We were concerned that sea otters were dying as a result of our containment efforts; therefore, in 1993, we suspended all sea otter capture activities in the management zone to evaluate capture and transport methods. We recognized that available capture techniques, which had proven to be less effective and more labor-intensive than originally predicted, were not an efficient means of containing sea otters. From 1993 to 1997, few sea otters were reported in the management zone, and there appeared to be no immediate need to address sea otter containment. In 1997, the California Department of Fish and Game notified us that it intended to end its sea otter research project and would no longer be able to assist if we resumed capturing sea otters in the management zone.

In 1998, a group of approximately 100 southern sea otters moved from the parent range into the northern end of the management zone, inaugurating a pattern of seasonal movements of large numbers of sea otters into and out of the management zone. Subsequent radio-telemetry studies have determined that these animals are moving great distances throughout their range and are an important component of the population (*i.e,* the same territorial males that hold territories and sire pups within the center of the range may be found seasonally aggregated in “male areas,” often at the range ends) (Tinker *et al.* 2006). At the same time, rangewide counts of the southern sea otter population indicated a decline of approximately 10 percent between 1995 and 1998. In light of the decline in the southern sea otter population, we were concerned about the potential effects on the parent population of moving the large number of southern sea otters that had moved into the management zone. We asked the Southern Sea Otter Recovery Team, a team of biologists with expertise pertinent to southern sea otter recovery, for their recommendation regarding the capture and removal of southern sea otters in the management zone. The recovery team recommended that we not move southern sea otters from the management zone to the parent population because moving large groups of southern sea otters and releasing them within the parent range would be disruptive to the social structure of the parent population. We agreed with their recommendation.

In order to notify stakeholders of our intended course of action, we held two public meetings in August 1998. At these meetings, we provided information on the status of the translocation program, solicited general comments and recommendations, and announced that we intended to reinitiate consultation under section 7 of the ESA for the containment program and to begin the process of evaluating the failure criteria established for the translocation program. Subsequent to these meetings, the group of technical consultants (a body composed of representatives from the fishery and environmental communities, as well as State and Federal agencies) to the Southern Sea Otter Recovery Team was expanded to assist in evaluating the translocation program. We provided updates on the translocation program and the status of the southern sea otter population to the California Coastal Commission, the Marine Mammal Commission, and the California Fish and Game Commission in 1998 and 1999.

In March 1999, we distributed a draft evaluation of the translocation program to interested parties for their comment. The draft document included the recommendation that we declare the translocation program a failure because fewer than 25 sea otters remained in the translocation zone, and reasons for the translocated sea otters' emigration or mortality could not be identified or remedied. We received comments from State and Federal agencies and the public following release of the draft for review. Some comments supported declaring the translocation program a failure, while others opposed it. The majority of respondents cited new information that became available after publication of our 1987 EIS and record of decision for the program. Many respondents encouraged us to look at new alternatives that were not identified in our 1987 EIS or corresponding implementing regulations.

During the same period, we prepared a draft biological opinion, pursuant to section 7 of the ESA, evaluating the containment aspects of the southern sea otter translocation program. We distributed the draft to interested parties for comment on March 19, 1999, and issued a final biological opinion on July 19, 2000. Our reinitiation of consultation was prompted by the receipt of substantial new information on the population status, behavior, and ecology of the southern sea otter that revealed adverse effects of containment that were not previously considered. In the biological opinion, we cited the following information and circumstances as prompting reinitiation:

> 1) In 1998 and 1999, southern sea otters moved into the management zone in much greater numbers than in previous years;
> 2) Analysis of carcasses indicated that southern sea otters were being exposed to environmental contaminants and diseases that could be affecting the health of the population throughout California;
> 3) Rangewide counts of southern sea otters indicated that numbers were declining;
> 4) Recent information, in particular the observed effects of the Exxon Valdez oil spill, indicated that southern sea otters at San Nicolas Island would not be isolated from the potential effects of a single large oil spill; and

5) The capture and release of large groups of southern sea otters could result in substantial adverse effects on the parent population.

The biological opinion concluded with our assessment that continuation of the containment program would likely jeopardize the continued existence of the species on the grounds that: (1) Reversal of the southern sea otter's population decline is essential to the survival and recovery of the species, whereas continuation of containment could cause the direct deaths of individuals and disrupt social behavior in the parent range, thereby exacerbating population declines; and (2) expansion of the southern sea otter's distribution is essential to the survival and recovery of the species, whereas continuation of the containment program would artificially restrict the range to the area north of Point Conception, thereby increasing the vulnerability of the species to oil spills, disease, and stochastic events.

On July 27, 2000, we published in the Federal Register a notice of intent to prepare a supplement to our 1987 EIS on the southern sea otter translocation program (65 FR 46172), and on January 22, 2001, we issued a policy statement regarding the capture and removal of southern sea otters in the designated management zone (66 FR 6649). Based on our July 2000 biological opinion, we determined that the containment of southern sea otters was not consistent with the requirement of the ESA to avoid jeopardy to the species. The notice advised the public that we would not capture and remove southern sea otters from the management zone pending completion of our reevaluation of the southern sea otter translocation program, which would include the preparation of a supplement to our 1987 EIS and the release of a final evaluation of the translocation program that contained an analysis of failure criteria.

Proposed Action

We are proposing to terminate the southern sea otter translocation program (76 FR 53381; August 26, 2011). Specifically, we are proposing to remove the regulations that govern the southern sea otter translocation program, including the establishment of an experimental population of southern sea otters, and all associated management actions. We are also proposing to amend the Authority citation for 50 CFR Part 17 by removing the reference to Public Law (P.L.) 99-625, the statute that authorized the Secretary of the Interior to promulgate regulations establishing the southern sea otter translocation program. Removal of the regulations will effectuate our decision to terminate the program. We are proposing this action because we believe that the southern sea otter translocation program has failed to fulfill its purposes, as outlined in the southern sea otter translocation plan, and that our recovery and management goals for the species cannot be met by continuing the program. Our conclusion is based, in part, on an evaluation of the program against specific failure criteria established at the program's inception. This draft translocation program evaluation is included as Appendix C to the RDSEIS.

The proposed action would:

- Terminate the experimental population designation of southern sea otters at San Nicolas Island;
- Abolish the southern sea otter translocation and management zones;

- Eliminate future actions, required under the current regulations, to capture and relocate southern sea otters for the purpose of establishing an experimental population or restricting movements of southern sea otters into an “otter-free” management zone; and
- Allow southern sea otters to continue to expand their range naturally into southern California waters.

Removal of the translocation program regulations in their entirety would also eliminate the current requirement at 50 CFR 17.84(d)(8)(vi) to remove southern sea otters from San Nicolas Island and from the management zone upon termination of the program.

Regulatory Environment upon Termination of the Translocation Program

P.L. 99-625 states that the Service, through the Secretary of the Interior, “may” develop and implement a plan for the relocation and management of sea otters, and it specifies what must be included if such a plan is developed. Termination of the translocation program and removal of the regulations governing the program would render the specific provisions of P.L. 99-625 inoperative. The translocation and management zones would be abolished, and the exemptions associated with these zones under P.L. 99-625 would end. These exemptions include: 1) an exemption from the duty to consult under section 7 of the ESA for defense-related activities within the translocation zone; 2) an exemption from the duty to consult under section 7 of the ESA for all Federal activities within the management zone; and 3) an exemption from the take prohibitions of the ESA and the MMPA for activities within the management zone that incidentally take southern sea otters. All sea otters in California, including those found in southern California waters, would be considered “threatened” under the ESA upon termination of the program.

The current exemption under State law for incidental take of southern sea otters in the management zone would also end upon termination of the program. While California Fish and Game Code Section 4700 generally prohibits the take of southern sea otters, section 8664.2 of the Fish and Game Code provides that “the taking of a sea otter that is incidental to, and not for the purpose of, the carrying out of an otherwise lawful activity within the sea otter management zone … is not a violation of the California Endangered Species Act … or Section 4700.” Section 8664.2 further provides, “this section shall become inoperative if the sea otter translocation experiment is declared a failure pursuant to the provisions of Public Law 99-625.” A recent amendment to Section 4700 went into effect in 2012 and allows for the take of southern sea otters otherwise prohibited under section 4700, if such take is authorized under a Natural Communities Conservation Plan (NCCP) approved pursuant to the state’s Natural Communities Conservation Planning Act (Cal. Fish and Game Code Section 2835).

Proposed non-federal activities in California otherwise allowable under State and other federal law that would result in take of southern sea otters would require an incidental take permit from the Service under section 10(a)(1)(B) of the ESA upon termination of the program. Among other requirements, an applicant for an incidental take permit under section 10(a)(1)(B) of the ESA must submit a conservation plan that we find minimizes and mitigates the impacts of the proposed take to the maximum extent practicable. In addition, we must find that the proposed take will avoid appreciably reducing the likelihood of the survival and recovery of the southern sea otter in the wild.

Action Area

The affected area includes portions of Santa Barbara, Ventura, Los Angeles, Orange, and San Diego Counties in California. Termination of the translocation program would change the regulatory status of southern sea otters in the translocation zone (surrounding San Nicolas Island) and management zone (all other southern California waters from Point Conception to the Mexican border) and allow for the continued natural range expansion of southern sea otters into southern California waters.

Sea Otter Range Expansion into Southern California Waters

Under both baseline conditions and the proposed action, sea otters are expected to continue to expand their range into southern California waters. The model used in the RDSEIS predicts that, by 2021, between 73 and 299 independent sea otters will reside year-round along a stretch of the mainland coastline between Point Conception and the southernmost range end, and that the range end will fall somewhere between Carpinteria and Oxnard. At San Nicolas Island, the sea otter colony is projected to grow, on average, 7 percent annually, resulting in approximately 103 sea otters by 2021. The assumptions underlying these predictions are described in section 6.1.4 of the RDSEIS. Whether sea otters would reoccupy other areas of the Southern California Bight in subsequent years would be a function of sea otter demographic rates, food supply, and other variables.

4. CONSISTENCY WITH PROVISIONS OF THE CALIFORNIA COASTAL ACT

This portion of the federal consistency determination analyzes consistency between the proposed action and the policy sections of the Coastal Act. Under each article, we first address policies that are not relevant to the proposed action. Where policies are relevant, we give the full text of the appropriate section in italics, followed by our comment and analysis. Our comment and analysis relies on information that is described in much more extensive detail in the RDSEIS. That document analyzes several alternatives for the future of the translocation program, including its resumption, revision, or termination.

A note about the baseline for analysis: The proposed action would allow southern sea otters to continue to recolonize their historic range throughout southern California. The baseline (status quo) is the current physical and regulatory environment (*i.e.,* the biological and socioeconomic environment resulting from management practices that have been in place since 1993). These practices include the suspension of containment activities in the management zone resulting from our determination that containment would likely jeopardize the continued existence of the southern sea otter and therefore, violate the Endangered Species Act. Using the current physical and regulatory environment (rather than the environment as it might be today if containment activities had not been suspended) as the baseline is essential to an accurate characterization of present conditions in this consistency determination and in the RDSEIS, and also to predictions of how conditions would change under each of the alternatives under consideration in the

RDSEIS. Under baseline conditions, southern sea otter movement throughout the species' range is not restricted or contained. Under the proposed action, containment activities would not be resumed and southern sea otters would remain at San Nicolas Island. Southern sea otters would have the ability, as they have had since 1993, to continue to expand their range into southern California waters southeast of Point Conception and to increase in number at San Nicolas Island. Accordingly, the effects of both the baseline and the proposed action are the same (in that sea otters are allowed to expand their range naturally in both cases) except with respect to regulatory changes, which we describe above and analyze below as appropriate. This statement should not be interpreted to mean that effects would not occur as a result of natural range expansion, but rather that any effects would occur equally under baseline conditions and under the proposed action.

This consistency determination evaluates only Alternative 3C, as it is the proposed action. In each case, we first assess the consistency of our proposed action, relative to the baseline, with the relevant policies of the Coastal Act. Next, we assess the consistency of the overall outcome with the relevant policies of the Coastal Act, even where that outcome is identical to the baseline. Relevant sections of the RDSEIS are referenced in parentheses. For a detailed discussion of the effects of resuming implementation of the translocation program, please see section 6.3 (Alternative 1—Resume Implementation of the 1987 Translocation Plan) of the RDSEIS.

Article 2: Public Access

The policies enumerated under Article 2 are not relevant to the proposed action or alternatives under consideration.

Article 3: Recreation

The following policies enumerated under Article 3 are not relevant to the proposed action or alternatives under consideration: Section 30221 (oceanfront land; protection for recreational use and development), Section 30222 (private lands; priority of development purposes), Section 30222.5 (oceanfront lands; aquaculture facilities; priority), Section 30223 (upland areas), Section 30224 (recreational boating use; encouragement; facilities).

Section 30220: Protection of certain water-oriented activities. Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.

Water-oriented recreational activities that cannot readily be provided at inland water areas and that may be affected by the natural range expansion of sea otters include recreational lobster fishing, recreational marine finfish fishing, recreational abalone diving, and ecotourism (marine wildlife watching).

<u>Consistency of Proposed Action Relative to Baseline</u>

The proposed action will not affect water-oriented recreational activities relative to the baseline. Under both the proposed action and the baseline, natural range expansion of sea otters will be allowed to continue, and the effects of sea otters on water-oriented recreational activities (described below) will occur in the areas to which the sea otter range has expanded. Because it has no effect relative to the baseline, the proposed action is consistent with the policies enumerated under Article 3, Section 30220.

Consistency of Outcome

Recreational fishing may be affected by the presence of sea otters in two ways: 1) direct competition between recreational divers and sea otters for recreationally targeted species consumed by sea otters, or 2) indirect habitat enhancement that could benefit recreational fishing through increased production of targeted finfish species. Southern sea otters primarily consume shellfish. Sea otter predation may thus reduce the abundance of spiny lobsters available to the recreational lobster fishery (see sections 6.2.8.1 and 6.7.8.1 of the RDSEIS). However, sea otter predation would also reduce the abundance of herbivorous invertebrates, which would in turn promote the development, stability, and persistence of the nearshore kelp forest ecosystem in areas where herbivores are limiting kelp production. A healthy kelp forest ecosystem is important for a wide range of finfish species harvested by the recreational fishery (see section 6.2.2 of the RDSEIS) and would therefore be expected to have a positive effect on the abundance of finfish available for harvest (see sections 6.2.8.2 and 6.7.8.2 of the RDSEIS).

The California abalone fishery was closed in 1997 (with the exception of a sport-only fishery for red abalone north of San Francisco County) due to the depletion of multiple species of abalone caused by commercial and recreational harvest. However, a limited commercial and recreational fishery for red abalone is currently being considered at San Miguel Island (http://www.dfg.ca.gov/marine/armp/sanmiguelisland.asp), and the reopening of portions of the abalone fishery may eventually be considered elsewhere. In 2005, the California Department of Fish and Game (CDFG) published a final Abalone Recovery and Management Plan (ARMP) for all seven species of abalone (red, black, green, pink, white, pinto, and flat) in California (CDFG 2005). The ARMP specifies that, if abalone populations recover to sufficient levels, the management portion of the plan "will apply to any fully recovered species in central and southern California, *outside of the Central California Sea Otter Range*" (CDFG 2005, emphasis added). As indicated here and elsewhere in the ARMP, areas of southern California that are reoccupied by sea otters would not be considered for the development of commercial or recreational abalone fisheries. Natural sea otter range expansion may thus preclude the reopening of the recreational abalone fishery in some areas (see sections 6.2.9 and 6.7.9 of the RDSEIS).

Expenditures for wildlife-watching activities in the state of California are the highest of any state and totaled about $4.2 billion in 2006 (U.S. Department of the Interior *et al.* 2006). The number of people participating in wildlife watching in 2006 was more than three times the number of people participating in recreational fishing and hunting in California (U.S. Department of the Interior *et al.* 2006). Like whales, sea otters can be a considerable draw for tourists. Sea otters in Monterey Bay and Morro Bay attract visitors who contribute to the local economies through spending on accommodations, meals at restaurants, recreation, and retail purchases. Natural sea otter range expansion is expected to enhance the quality of marine wildlife watching trips in the

Southern California Bight when sea otters are observed (see sections 6.2.10 and 6.7.10 of the RDSEIS).

Consistency of Outcome: Summary

Sea otter range expansion will thus have a mixed effect on coastal water-oriented recreational activities. The effect will be negative with respect to recreational lobster fishing and the potential for reopening a recreational abalone fishery. The effect will be positive with respect to recreational finfish fishing and marine wildlife watching. Because there are mixed negative and positive effects depending on whether sea otters are present or absent, it is not possible for this outcome to be fully consistent with the policies enumerated under Article 3, Section 30220. However, this outcome is consistent to the maximum extent practicable with these policies.

Article 4: Marine Environment

The following policies enumerated under Article 4 are not relevant to the proposed action or alternatives under consideration: Section 30231 (biological productivity; water quality), Section 30232 (oil and hazardous substance spills), Section 30233 (diking, filling or dredging; continued movement of sediment and nutrients), Section 30234 (commercial fishing and recreational boating facilities), Section 30235 (construction altering natural shoreline), Section 30236 (water supply and flood control),

Section 30230: Marine resources; maintenance. Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

Marine resources discussed here include the nearshore marine ecosystem as a whole and the following species of special biological significance: white abalone, black abalone, and southern sea otters. Commercial fishing is discussed under Section 30234.5 below.

Consistency of Proposed Action Relative to Baseline

The proposed action will not affect the nearshore marine ecosystem or white or black abalone relative to the baseline. Under both the proposed action and the baseline, natural range expansion of sea otters will be allowed to continue, enhancing sea otter recovery (as described below), and the effects of sea otters on the nearshore marine ecosystem and white and black abalone (also described below) will occur in the areas to which the sea otter range has expanded. Sea otters will be affected, relative to the baseline, only in that the incidental take regulations that apply to them will change in southern California waters, potentially affording them more protection if incidental take is occurring now or begins to occur in the future. The proposed action is thus consistent with the policies enumerated under Article 4, Section 30230.

Consistency of Outcome

Effect on Nearshore Marine Ecosystem

The effects of sea otter range expansion on the nearshore marine ecosystem under the baseline and under the proposed action are described in sections 6.2.2 and 6.7.2 of the RDSEIS. As noted above, these effects are identical.

Although the reduction of invertebrate prey populations would begin immediately upon the arrival of sea otters in an area, subsequent environmental effects would occur gradually as sea otter densities increased. The environmental changes caused by sea otter predation may be broadly summarized as follows:

1) A considerable reduction in the abundance of invertebrate prey species to depths of 25 m (82 ft), with effects decreasing at depths greater than 25 m (82 ft) and approaching zero at depths greater than 40 m (131 ft);
2) A probable increase in the abundance of kelp in areas where grazing pressure by sea urchins is limiting kelp growth or establishment; and
3) A probable increase in abundance of kelp-canopy-dependent species.

Sea otters are important predators in the nearshore marine ecosystems of the North Pacific Ocean and are generally considered to be a keystone species in these communities (Estes and Palmisano 1974, Palmisano and Estes 1977, Estes *et al.* 1978, Duggins 1980, Palmisano 1983, Estes and Harrold 1988). Keystone species are organisms that have large-scale community effects disproportionate to their abundance (Meffe and Carroll 1997).

The effects that sea otters have on their environment arise largely from predation. Sea otters consume a wide variety of nearshore marine invertebrates (including sea urchins, abalone, crabs, lobsters, clams, mussels) and exert a strong limiting influence on their prey populations (see section 4.3.1.2 of the RDSEIS; Riedman and Estes 1990). Sea otters tend to restrict prey populations to cryptic and inaccessible habitats, such as deep cracks and crevices in rocky areas, or to deep waters [sea otters usually forage in waters of 25 m (82 ft) or less and only rarely in depths exceeding 40 m (131 ft)] (Riedman and Estes 1990). In sandy areas, bivalves may escape predation by burrowing deeply. Sea otters also tend to select larger prey, which minimizes predation on smaller individuals (Riedman and Estes 1990).

Sea Urchins and Kelp Abundance

Sea urchins are favored prey for sea otters and have a prominent effect on the nearshore marine environment. They are commonly viewed as the most important subtidal grazers of macrophytes (large algae, including kelp) in the Southern California Bight (Murray and Bray 1993). Most overgrazing is ascribed to red and purple sea urchins (Ebeling *et al.* 1985) or to red, purple, and white sea urchins (Engle 1994). While white sea urchins generally consume smaller algae, at sufficient densities (greater than 10 per square meter) they can effectively prevent the reestablishment of kelp once it has disappeared from an area (Durham *et al.* 1980).

In southern California, overgrazing by sea urchins tends to occur when giant kelp (*Macrocystis pyrifera*) becomes scarce. When giant kelp is abundant, sea urchins typically feed on drift kelp, pieces of algae that break off and drift down from the canopy above (Duggins 1980, Harrold and Reed 1985). Under these conditions, sea urchins remain fairly stationary and feed opportunistically, and large numbers of sea urchins may have little effect on attached thalli (Lowry and Pearse 1973, Foster 1975, Cowen *et al.* 1982). However, shortages of drift kelp can cause starving sea urchins to gather together in moving "fronts," which can clear all attached macroalgae in their path (Dean *et al.* 1984, Harrold and Reed 1985, Engle 1994). Intense grazing in areas densely populated by sea urchins can lead to the formation of sea urchin "barrens," areas that are devoid of kelp and are characterized instead by crustose coralline algal assemblages (Dayton 1985, Foster and Schiel 1985, Engle 1994). Monitoring at sixteen sites throughout CINP from 1992-1998 revealed that percent cover of algae declined with purple sea urchin density, suggesting that purple sea urchins can structure kelp forest communities (Lafferty and Kushner 2000).

According to a generally accepted sea otter-sea urchin-kelp community ecological paradigm, sea otters function as top predators in a three-level trophic cascade, in which sea otter predation limits populations of herbivorous invertebrates that would otherwise limit kelp and other macroalgae (Van Blaricom and Estes 1988, Estes and Duggins 1995). A number of studies have established a link between sea otter predation on invertebrate herbivores and increased algal abundance at specific sites (McLean 1962, Estes and Palmisano 1974, Estes *et al.* 1978, Simenstad *et al.* 1978, Duggins 1980, Breen *et al.* 1982, Laur *et al.* 1988, Oshurkov *et al.* 1988, Duggins *et al.* 1989, Watson 1993). Estes and Duggins (1995) have shown that sea otter predation has a broadly generalizable influence on the structure of kelp forests in Alaska.

However, the general applicability of the sea otter-sea urchin-kelp paradigm to ecosystems in California has been questioned (Foster and Schiel 1988, Foster 1990). Foster and Schiel (1988) contend that while sea otters can have a great impact on the abundances of large sea urchins, which can in turn cause great changes in algal assemblages at particular sites, these effects are overshadowed at larger scales by a complex of other factors that can influence kelp distribution, such as water motion, light, nutrient levels, substratum type and availability, and the presence of other sea urchin predators. They point out that the effects of sea urchin grazing are highly variable in the absence of sea otters, and that deforestation by sea urchins in California is the exception rather than the rule (10 to 20 percent of sites surveyed) (Foster and Schiel 1988, Foster 1990).

One complicating factor arises from the fact that several predators besides sea otters can affect sea urchin abundance in southern California. Known predators of sea urchins in the Southern California Bight also include spiny lobsters, sea stars, crabs, and fishes (such as sheephead) (Kalvass and Rogers-Bennet 2001). Sunflower sea stars and spiny lobsters, where not fished to low levels, have been shown to be important predators of sea urchins at the Channel Islands, and in turn predation has been positively correlated with lower rates of density-dependent bacterial disease in sea urchins (Lafferty and Kushner 2000).

Additionally, human harvest has considerably reduced densities of red sea urchins in many areas of the northern Channel Islands (Kalvass and Rogers-Bennet 2001), and it has been suggested by some that human harvest has filled the niche historically occupied by the sea otter. However, commercial fisheries focus harvest effort on commercially valuable species (*i.e.*, red sea urchins) (Kalvass and Rogers-Bennett 2001), whereas sea otters are less selective and prey on a variety of sea urchin species (Riedman and Estes 1990). The selective harvest of red sea urchins may in turn encourage the growth of white and purple sea urchin populations by releasing them from competition (reviewed in Foster and Schiel 1985), allowing them to reach high densities and to maintain some areas as sea urchin barrens. Sea urchins, when starving (as is often the case in the wake of warm-water El Niño episodes, which adversely affect giant kelp) are of little value to the commercial fishery due to the atrophy of their gonads (the consumable portion of the sea urchin). Due to the resulting fluctuations in harvest effort, these sea urchins tend to remain in their established barrens unless removed by some other form of predation, eliminated by disease (Ebeling and Laur 1988), or removed abiotically, such as by a severe storm (Ebeling *et al.* 1985).

The effectiveness with which sea otters limit invertebrate herbivore populations is not in question and is well-established (McLean 1962, Ebert 1968a and 1968b, Lowry and Pearse 1973, Wild and Ames 1974, Gotshall *et al.* 1976, Benech 1977, Pearse and Hines 1979, Ostfeld 1982, Laur *et al.* 1988). Rather, disagreement focuses on the relative importance of the role of sea urchin herbivory in influencing kelp abundance. Rocky habitats in the Southern California Bight may periodically alternate between sea urchin-dominated and kelp-dominated states for reasons unrelated to overgrazing, such as the action of severe storms (Ebeling *et al.* 1985). However, sea otters may strengthen the resilience of kelp forest communities in the face of major perturbations by preventing overgrazing by sea urchins (which can follow the loss of drift kelp due to severe storms or periods of unusually strong sea urchin recruitment) (Van Blaricom 1984). In areas where sea urchin grazing is limiting kelp establishment or growth, the presence of sea otters can generally be expected to result in an increased abundance of kelp.

Rate of Change in Kelp Abundance

The rate at which community-level changes would occur if sea otters became reestablished in southern California waters cannot be predicted with precision, but the development of giant kelp canopies (in areas where sea urchins are limiting kelp abundance) would likely require a minimum of a decade after the restriction of sea urchins to cryptic and inaccessible habitat by sea otter predation. Van Blaricom (1984) proposed that 10 or more years were required for algal communities in central California to reach a seral stage dominated by giant kelp. Dayton and Tegner (1984) concluded that a minimum of 10 years was required for seral replacement in understory patches in the Point Loma kelp forest near San Diego, and that changes in giant kelp abundance occur over longer time scales. On a much smaller scale, Laur *et al.* (1988) experimentally excluded sea urchins from plots in a sea urchin-dominated barren ground at Naples Reef (to the west of Santa Barbara) and found that algal turfs and small kelp plants (*Macrocystis pyrifera* and *Pterygophora californica*) soon overgrew the coralline algal pavements. However, kelp forests differ in structure and species composition both within and between beds in the Southern California Bight (Murray and Bray 1993), and different abiotic and biotic factors can strongly affect rates of kelp growth or reestablishment in specific areas (Dayton *et al.* 1998).

One such biotic factor, which may affect the rate of macroalgal establishment even in the presence of sea otters, is the regularity of sea urchin recruitment. Because of the size-selection of prey by sea otters, regular sea urchin recruitment may dampen the effects of sea otter predation on kelp abundance, at least initially. Estes and Duggins (1995) found that in the Aleutian Islands, the smallest sea urchins [those less than 15 to 20 mm (0.6 to 0.8 in) in test diameter] were avoided by sea otters, resulting in a sufficient abundance of immature and small mature sea urchins to slow the reestablishment of kelp. However, they found that in southeast Alaska, because of irregular recruitment, few sea urchins were small enough to escape predation, and thus kelp growth was strongly enhanced. If sea urchin recruitment in California is less episodic than in Washington, British Columbia, and southeast Alaska, then sea otter predation should be expected to have a more gradual effect on kelp abundance in California than it does in these other areas (Estes and Duggins 1995). However, the ultimate outcome would likely be similar: a considerable increase in the abundance, biomass, and distribution of macroalgae in areas where sea urchins limit kelp.

Kelp Forests and Biodiversity

The importance of macroalgae to nearshore communities is described by Mann (1982), Foster and Schiel (1985), and Duggins (1988). Giant kelp forests are highly productive and can be compared to the most productive of terrestrial systems (Tegner and Dayton 2000). They provide a complex biological structure that supports an extremely rich variety of species (Foster and Schiel 1985). More than 125 species of fish live in and near shallow rock reefs and kelp beds of the Southern California Bight (Cross and Allen 1993). The abundance of fishes on reefs is positively correlated with the presence of kelp and substrate relief. Fishes are more abundant on cobble reefs with higher densities of kelp (23-30 thalli per 100 square meters) than on those with lower densities (8 thalli per 100 square meters) (Larson and DeMartini 1984), and the abundances of fishes such as kelp surfperch, kelp bass, giant kelpfish, and kelp rockfish are directly correlated with kelp density (Cross and Allen 1993).

Sea Urchin-Abalone Interactions

Because there are complex interactions between the species preyed on by sea otters, the effects of sea otter predation on these species are not necessarily unidirectional. Sea urchins have a dual relationship of competition and dependence with abalone, all species of which are currently at low levels in the Southern California Bight due to human overexploitation, disease, and other factors (Haaker *et al.* 2001). Sea urchins and abalone have similar food and habitat preferences and thus compete for these resources. Because adult abalone subsist mainly on live and drift algae, sea urchins have a detrimental effect on abalone when drift kelp is limited because of the tendency of sea urchins to overgraze (Lowry and Pearse 1973). However, abalone may out-compete sea urchins for space when food is plentiful (Lowry and Pearse 1973). On the other hand, several instances have been identified where abalone benefit from the presence of sea urchins. Juvenile abalone may depend on the spine canopy of adult sea urchins for protection from predation where other cover is limited (Tegner and Dayton 1981, Day 1998). Sea urchins also maintain densities of coralline algal turf on kelp forest substrates that are appropriate for the post-larval settlement of abalone (CDFG 2005).

Abalone and sea urchins share several predators and may indirectly derive benefits from them if predation reduces competition or other forms of predation. Like sea urchins, abalone are preyed on by spiny lobsters, sea stars, crabs, and fishes (such as sheephead), as well as by humans and sea otters (Haaker *et al.* 2001). Although sea otters consume abalone, they also consume large numbers of sea urchins, thereby enhancing kelp forest habitat and reducing sea urchin competition with abalone for food. Sea otter predation on crabs, sea stars, octopuses, and spiny lobsters reduces predation by these organisms on both abalone and sea urchins. In terms of maintaining a healthy population, sea urchins themselves may benefit from sea otter predation through increases in the availability of food (drift kelp) and decreases in disease that tend to follow reductions in sea urchin densities. Abalone have coexisted with sea otters for thousands of years and may even owe their large body size in the North Pacific to the indirect effects of intense sea otter predation pressure (Estes *et al.* 2005). However, two species, white abalone (*Haliotis sorenseni*) and black abalone (*Haliotis cracherodii*) have been severely depleted by overharvesting and/or disease and are currently listed as endangered. We discuss white and black abalone further below.

Overall, sea otters reoccupying the nearshore marine environment are expected to enhance biodiversity and the stability and persistence of kelp forest habitat. Kelp forests provide numerous direct and indirect benefits, including reductions in coastal erosion and increases in benthic productivity (Duggins *et al.* 1990) and carbon storage that can moderate climate change (Wilmers *et al.* 2010). The marine environment of southern California has been dramatically affected by human activities, such as the direct removal of many of the animal components of the community and the input of pollution, making it difficult to determine the "natural" functioning of the community (Dayton *et al.* 1998). "Trophic downgrading," or the loss of apex predators from ecological systems, may have far-reaching and unanticipated effects on ecosystem processes (Estes *et al.* 2011). The return of sea otters, apex predators that were historically present in the ecosystem, is expected to enhance ecosystem functioning and to bring the nearshore marine ecosystem to a state more closely resembling its historic (pre-fur-trade), or "natural," condition.

Effects on White Abalone

The effects of sea otter range expansion on white abalone under the baseline and under the proposed action are described in sections 6.2.3.1 and 6.7.3.1 of the RDSEIS. As noted above, these effects are identical.

Status of the Species in the Action Area

Effects on white abalone are described in sections 6.2.3.1 and 6.7.3.1 of the RDSEIS. With a range extending from Point Conception to Punta Abreojos, Baja California, Mexico, white abalone are the deepest living of *Haliotis* species that occur along the west coast of North America (Hobday and Tegner 2000). They have a high, oval shell with a row of pores (the largest three to five of which are open) spiraling to the highest part of the shell. They may live 35 or 40 years, with a growth rate (based on observations of a few individuals in the laboratory) of about 2.5 cm (1 in) per year for the first five years of life and slower growth thereafter (Haaker *et al.* 2001). White abalone shell lengths of almost 25 cm (10 in) have been reported in

California (Hobday and Tegner 2000). Spawning occurs in winter with the simultaneous release of gametes by male and female individuals, although the trigger remains unknown. As with other species of abalone, reproductive success depends on the density of individuals, the period of spawning, the quantity of gametes produced, and good settlement conditions for the larvae (Haaker *et al.* 2001). Juvenile white abalone are thought to be cryptic, but the habitat used by adult white abalone (rock-sand interfaces of boulders and low-relief rocky reefs) provides no crevice refuge from predation. White abalone are herbivorous, feeding on bacterial and diatom films as juveniles and deep-water kelp (both attached and drift) as adults. They have been observed at the borders between rocky and sandy substrate, where drift kelp is easier to capture. Some evidence suggests that white abalone may move into deeper waters as they age (NMFS 2008).

Predators of white abalone include sea stars, octopus, crabs, lobsters, and fishes such as sheephead, cabezon, and bat rays. Sea otters are important predators of abalone generally, but typical sea otter foraging depths (Tinker *et al.* 2006, Chapter 6) overlap only partially with the depth range of white abalone. Predation by sea otters is not thought to have been an important factor in the decline of white abalone because of the depth range of white abalone and because in recent times, *i.e.*, since approximately 1850 (Scammon 1968), sea otters have been absent from nearly all of the range of white abalone (NMFS 2008). In contrast, human harvest, which began commercially in the late 1960s after the serial depletion of red, pink, and green abalone populations, has affected white abalone significantly and is believed to be the primary cause of dramatic reductions in white abalone abundance. Annual white abalone landings totaled 144,000 pounds in 1972 but subsequently declined, reaching very low levels by the early 1980s (Haaker *et al.* 2001).

White abalone have a depth range of 5-60 m (16-197 ft), but they are now most common at depths of 30-60 m (98-197 ft) (NMFS 2008). Remotely operated vehicle surveys by Butler *et al.* (2006) found highest numbers of white abalone at depths of 40-50 m (131-164 ft) at Tanner Bank and at depths of 30-40 m (98-131 ft) at Cortes Bank. Concern for the viability of the species stems from the fact that most individuals are large, indicating an absence of recent recruitment, and because most individuals are too far from their nearest neighbor, more than 2 m (7 ft), to ensure successful fertilization.

White abalone were federally listed as endangered in 2001 because of dramatic declines in abundance due primarily to overharvesting for human consumption (66 FR 29046). A recovery plan was completed in 2008 (NMFS 2008). Currently, white abalone are nearly extirpated, with no appreciable recruitment having occurred since the late 1960s or early 1970s and most individuals likely reaching the end of their life span. Even in the absence of human harvest, which has been illegal since the closure of the white abalone fishery in 1996, remaining white abalone are at risk because of severe Allee effects (animals may be too far apart for successful fertilization to occur) due to reduced concentrations of individuals and because of natural mortality (from old age and predators such as fishes, octopuses, and sea stars) (CDFG 2005).

White abalone are now rare in California. NMFS listed the species as endangered throughout its range, from Point Conception, California, USA, to Punta Abreojos, Baja California, Mexico, in 2001 (66 FR 29046), citing overharvesting for human consumption as the primary factor in its dramatic decline in abundance. Critical habitat was not designated because the identification of such habitat was expected to increase the risk of poaching (66 FR 29046). Recovery efforts for white abalone have been initiated. NMFS convened a recovery team to identify criteria and tasks for the recovery of white abalone and published a final recovery plan in 2008 (NMFS 2008). CDFG has identified key locations for white abalone recovery, which include three of the Channel Islands (Santa Barbara, Santa Catalina, and San Clemente) and offshore banks (Tanner and Cortes) (CDFG 2005). Although broodstock has been collected for a captive propagation and enhancement program, the recovery plan identifies three factors that are hindering white abalone recovery efforts:

1) lack of funding for a captive propagation and enhancement program;
2) persistent disease problems at the Channel Islands Marine Research Institute since 2002; and
3) an inability to identify mechanisms (*i.e.* adequate funding and streamlining of the permitting process) for establishing multiple scientific research and enhancement facilities, even though a team of international abalone experts has been recommending this approach since 2001 (NMFS 2008).

According to the white abalone recovery plan, "the most significant threat to white abalone is related to the long-term effects that overfishing has had on the species" (NMFS 2008). This threat was removed with the closure of the white abalone fishery in California in 1996, but white abalone have not rebounded.

The primary problems facing white abalone are low density, lack of recruitment, and the advanced age of remaining animals (NMFS 2008). Surveys reported by Butler *et al.* (2006) resulted in an estimate of white abalone numbers at the two offshore banks (12,820 at Tanner Bank and 7,360 at Cortes Bank) that is well above what was previously estimated by Hobday *et al.* (2001) for the entire southern California population (2,600 individuals). However, concern for the viability of the species remains because most individuals detected were large, indicating an absence of recent recruitment, and because most individuals were too far from their nearest neighbor (more than 2 m) to ensure successful fertilization (Butler *et al.* 2006). As broadcast spawners, abalone (including white abalone) must maintain sufficiently high densities for successful fertilization to occur (Hobday *et al.* 2001).

Effect of Sea Otter Range Expansion on White Abalone

Although sea otter range expansion along the central California coast is known to have reduced the population levels and size distributions of other species of abalone (Wendell 1994), it is unknown precisely what level of additional extinction risk the gradual expansion of sea otters into the Southern California Bight would pose. The white abalone recovery plan identifies six broad recovery actions, one of which, Recovery Action 3 (protect white abalone populations and their habitat), could potentially be affected by sea otters. Specifically, an expanding southern sea otter population could negatively affect efforts under Recovery Action 3.3 (protect white abalone populations and habitat as they are discovered or established through enhancement) through predation if white abalone populations occur or are established within the depth range utilized by sea otters and within the geographic area reclaimed by natural sea otter range expansion. The white abalone recovery plan ranks the severity of the risk to white abalone from all combined non-human predation (*i.e.*, fishes, invertebrates, and sea otters) as “moderate” on a scale ranging from low to very high (see Table 5 in the recovery plan, “Threats assessment table for the wild population of white abalone in California”). It also ranks the geographic scope and level of certainty that white abalone would be affected by combined non-human predation as “moderate.” The overall priority ranking of this threat is 9 (1 being highest priority, 10 being lowest priority) (NMFS 2008).

Several factors would appear to moderate the relative increase in risk to white abalone resulting from the natural range expansion of sea otters into the Southern California Bight. A discussion of these factors follows.

1) The depths at which white abalone currently occur and the typical foraging depths of southern sea otters overlap only partially. Adult white abalone may occur at depths of 5-60 m (16-197 ft) Cox 1960, cited in NMFS 2008), but currently they are most commonly found at depths of 30-60 m (98-197 ft) (NMFS 2008). Remotely operated vehicle surveys of two offshore banks and San Clemente Island by Butler *et al.* (2006) found highest numbers of abalone at depths of 40-50 m (131-164 ft) at Tanner Bank and at depths of 30-40 m (98-131 ft) at Cortes Bank (too few abalone were detected at San Clemente Island to include the area in the analysis). Under historical environmental conditions, white abalone may have been restricted to waters deeper than 25 m (82 ft) as a result of sea otter predation or competition from pink abalone (Tutschulte 1976, cited in NMFS 2008).

Southern sea otters usually forage in waters shallower than those in which white abalone are now found. A study utilizing time depth recorders has provided documentation of typical and maximum sea otter dive depths in California that are not subject to the potential shallow-water bias associated with shore-based observations. This study documented that about 50 percent of all foraging dives by both males and females occurred between 4 m (13 ft) and 12 m (39 ft) in depth. Females at the center of the mainland range, near San Simeon, had a mean dive depth of 8.75 m ± 1.81 m (28.71 ft ± 5.94 ft), whereas males had a mean dive depth of 12.40 m ± 4.66 m (40.68 ft ± 15.29 ft) at San Simeon and 14.90 m ± 7.26 m (48.88 ft ± 23.82 ft) at the southern end of the range near Point Conception. Critical foraging habitat (the depth range including 95 percent of recorded foraging dives) was shallowest for females at the center of the range, 2-20 m (7-66 ft), deeper for males at the center of the range, 2-35 m (7-115 ft), and slightly deeper still for males near Point Conception, 2-40 m (7-131 ft).

2) The stretch of coastline that sea otters are expected to reoccupy within the next 10 years is at the northernmost end of the white abalone’s historic range (the historic range of white abalone extends from Point Conception in the north to Punta Abreojos, Baja California, Mexico in the south). White abalone population centers and key recovery areas are mostly in the southern half of the Southern California Bight (Butler *et al.* 2006, CDFG 2005), well away from areas of the coast where sea otter range expansion is likely to occur within the next 10 years. If the sea otter colony at San Nicolas Island persists, it is predicted to grow by an average of about 7 percent annually. Because the colony

appears stable and the number of sea otters at San Nicolas Island will remain well below the estimated carrying capacity of the island over the next 10 years, substantial dispersal of sea otters from the island is unlikely. The white abalone recovery plan (NMFS 2008) does not give an estimated time to recovery; there are also no reliable estimates of the time it would take sea otters to expand their range throughout the Southern California Bight. It seems likely that both processes, if they occurred, would require many decades, but whether white abalone would reach recovery targets before sea otter range expansion occurred in important white abalone recovery areas is unknown.

3) Offshore banks may provide refuge for white abalone from sea otter predation. Cortes Bank and Tanner Bank, which are located in the southernmost portion of the Southern California Bight well south of the current southerly extent of the southern sea otter's range, have the highest population densities of white abalone among areas surveyed (Hobday *et al.* 2001, Butler *et al.* 2006) and have been identified as key recovery areas (CDFG 2005). After San Clemente Island, these offshore banks were historically the most productive areas for the white abalone fishery, followed by Santa Barbara Island (Rogers-Bennett *et al.* 2002). Tanner and Cortes Banks are shallow enough to support sea otter foraging, and it is possible that sea otters were extirpated from this area with no records to note the exact location, but we are unaware of any evidence to suggest that sea otters occurred there historically.

4) The habitat used by adult white abalone (rock-sand interfaces of boulders and low-relief rocky reefs) provides no crevice refuge from predation (NMFS 2008), but there is some evidence to suggest that white abalone are capable of reproducing at sizes small enough to allow them to take advantage of cryptic and inaccessible habitat. Juvenile white abalone are thought to be cryptic (NMFS 2008); if white abalone become reproductively mature at sizes that allow them to remain in crevice habitat, reproductively viable populations may successfully evade sea otter predation in the areas and depth ranges where the two species could eventually overlap as long as a sufficient amount of this habitat is available. Tutschulte and Connell (1981) reported that white abalone become sexually mature at 4 to 6 years of age at a typical size of 88-134 mm (3.46-5.28 in). Although the age and size at which white abalone become reproductively mature depend on a range of environmental conditions, including food availability, some evidence suggests that white abalone are capable of reproducing at a younger age and much smaller size than previously thought, about 22 mm (0.87 in) (in captivity) (McCormick and Brogan 2003).

Under baseline conditions (suspension of containment activities), sea otters are expected to expand their range gradually along the coastline between Point Conception and Carpinteria (lower bound) or Oxnard (upper bound) and to increase in number at San Nicolas Island within the next 10 years. Fishery-dependent data indicate that white abalone formerly occurred in these areas, but fishery data collected from 1955-1997 indicate that less than one half of one percent of all white abalone landings came from these areas combined (Hobday *et al.* 2001). Historical abundance data that are fishery-independent are not available. Because relatively low numbers of white abalone occur (both presently and historically) in areas expected to be reoccupied by sea otters over the next 10 years, we do not expect sea otters to affect the white abalone population, as a whole, substantially during this period. However, if within the next 10 years the natural recovery of local white abalone populations occurred in waters within the depth range utilized by sea otters along this stretch of coastline, then it is likely that sea otters would negatively affect these local populations. Similarly, if white abalone recovery efforts included the outplanting of individuals in waters within the depth range utilized by sea otters along this stretch of coastline, then it is likely that sea otter predation would negatively affect this portion of the overall recovery effort.

The rate at which sea otters would recolonize other nearshore areas of the Southern California Bight after 10 years would be a function of their demographic rates, food supply, and other variables. Given the relative scarcity of white abalone and the regions and depths in which they now occur, opportunities for sea otter and white abalone interaction would likely be limited in the near term. We would not expect sea otters to expand their range into key white abalone recovery areas for many decades, if ever.[2]

Effects on Black Abalone

The effects of sea otter range expansion on black abalone under the baseline and under the proposed action are described in sections 6.2.3.2 and 6.7.3.2 of the RDSEIS. As noted above, these effects are identical.

Status of the Species in the Action Area

Black abalone occur in rocky intertidal habitat to depths of approximately 6 m (20 ft), often in areas heavily pounded by surf. They are relatively long-lived and can reach an age of 25 years or more. They have a smooth bluish-black or gray shell, generally with 5 to 9 (but sometimes as many as 14) open pores flush with the shell surface. Growth is believed to vary with stress, food availability, and climate but is most rapid during the first 5 to 10 years of life. Although maximum shell lengths can exceed 20 cm (8 in) (Morris *et al.* 1980), most individuals are sexually mature at less than 5 cm (2 in). Black abalone spawn in spring and early summer and may spawn again in the fall. Newly settled larvae, juveniles, and abalone up to 10 cm (4 in) in length usually remain cryptic, inhabiting deep fissures or areas beneath rocks. When not subject to harvesting or predation pressure, larger abalone can aggregate in large numbers on rocks or in tidepools (Haaker *et al.* 2001).

Adults feed primarily on drift algae, whereas juveniles consume bacterial films. Black abalone are subject to predation at every stage of life. Planktonic larvae may be consumed by predators such as planktivorous fishes and zooplankton, and newly metamorphosed abalone are consumed by a broad range of small benthic invertebrates (reviewed in Van Blaricom *et al.* 2009). Predators of small cryptic abalone include gastropods, octopuses, lobsters, sea stars, sea urchins, fishes, shore crabs, and shorebirds (reviewed in Van Blaricom *et al.* 2009). Predators of emergent black abalone include sea stars, fishes, sea otters, and humans.

Black abalone were historically found from at least northern California to the tip of Baja California, Mexico, but the species was most abundant south of Monterey, particularly in the

[2] For instance, sea otters may never expand their range to Tanner Bank and Cortes Bank.

Channel Islands (74 FR 1937). The human-caused extirpation of southern sea otters from most of their former range is believed to have been responsible for the large aggregations of black abalone evident in California and Mexico during the nineteenth and twentieth centuries (Haaker *et al.* 2001). Beginning in 1850, black abalone (as well as red and green abalone) were collected from the intertidal zone by Chinese immigrants for local consumption or export. Concerns about overfishing led to the prohibition of shallow-water abalone fishing in 1900 (Rogers-Bennett *et al.* 2002). Twentieth-century commercial harvests began in the late 1960s at the Channel Islands and reached a zenith of almost 2 million pounds statewide in 1973. By 1990, however, landings had declined to 13 percent of the average annual catch of the 1970s and early 1980s (687,000 pounds). An estimated 3.5 million individuals were taken in the commercial and recreational black abalone fisheries before these fisheries were closed in 1993 (Rogers-Bennett *et al.* 2002). As a consequence of the relatively low value of black abalone compared to other abalone species, the collapse of black abalone stocks occurred late in the serial depletion that characterized the commercial abalone fishery as a whole before its complete closure (all species) in 1997 (Haaker *et al.* 2001).

The dramatic decline in abundance of black abalone has been exacerbated by a disease called withering syndrome. Caused by a Rickettsia-like prokaryotic organism (*Candidatus Xenohaliotis californiensis*) that affects the epithelial cells of the gastrointestinal tract, withering syndrome results in malnutrition, loss of tissue mass, and death (74 FR 1937). Withering syndrome began affecting black abalone populations in southern California in the mid-1980s and had spread northward into areas of the coast north of Point Conception by the early 2000s (Bergen and Raimondi 2001). The disease has eliminated black abalone from large areas of its former range, including the mainland coast of southern California (Haaker *et al.* 2001, Miner *et al.* 2006). Elevated seawater temperature, while not believed to be necessary for the occurrence of withering syndrome and the onset of mass mortality, is thought to promote these conditions (Bergen and Raimondi 2001, Raimondi *et al.* 2002). Mass mortalities appear to be followed by recruitment failure, either as a result of limited dispersal of larvae, lack of appropriate settlement habitat (due to changes in intertidal species assemblages following the elimination of adults), or the continued effects of the disease agent (Miner *et al.* 2006). Significant declines in abundance (more than 90 percent) have occurred at most (76 percent) of the long-term monitoring sites in California (Tissot 2007, cited in Van Blaricom *et al.* 2009).

NMFS added black abalone to its list of candidate species in 1999 (64 FR 33466) and listed it as endangered under the ESA in 2009 based on a number of risks, particularly:

> 1) the spread of and mortality caused by a disease called withering syndrome;
> 2) low adult densities below the critical threshold density required for successful spawning and recruitment;
> 3) elevated water temperatures that have accelerated the spread of withering syndrome;
> 4) reduced genetic diversity that will render extant populations less capable of dealing with both long- and short-term environmental or anthropogenic challenges; and
> 5) illegal harvest. (74 FR 1937)

A final status review report was issued in 2009 (Van Blaricom *et al.* 2009). Critical habitat was proposed in 2010 (75 FR 59900) and finalized on October 27, 2011 (76 FR 66806). A recovery plan has not yet been published.

Effects of Sea Otter Range Expansion on Black Abalone

Like other abalone species, black abalone may be preyed upon by sea otters. Black abalone inhabit water depths well within the range of sea otter predation (generally rocky intertidal areas), although cryptic and inaccessible habitats provide refuge for the species. Newly settled larvae, juveniles, and sexually mature individuals up to 100 mm (3.94 in) in length usually remain cryptic, inhabiting deep fissures or areas beneath rocks (Haaker *et al.* 2001). Because black abalone generally become sexually mature at about 50 mm (2 in) in length (Haaker *et al.* 2001), cryptic black abalone are capable of sustaining reproductively viable populations in the presence of sea otters. Micheli *et al.* (2008) found that black and red abalone at eight central California sites, all within sea otter habitat, persisted at low but stable densities when protected from human take (although they did not occur at levels that could support fisheries, even at sites protected from human take). Nearly all (97 percent) of the black abalone encountered during surveys were found in crevice habitat, with significant aggregation of individuals (Micheli *et al.* 2008). Where sea otters and black abalone coexist, abalone are restricted to cryptic and inaccessible habitats that afford protection from sea otter predation, and abalone of the size formerly harvested for human consumption, greater than 150 mm (6 in), are reduced in number.

A considerable portion of the black abalone's range overlaps the current range of the southern sea otter. Whereas southern California stocks have been severely reduced by overfishing and disease (in the general absence of sea otter predation), healthy populations of black abalone can still be found in areas within the sea otter's long-established range along the central California coast. The highest black abalone densities occur at northern long-term monitoring sites near the Monterey peninsula, where sea otters have been present for approximately 50 years. In fact, a recent study along the central coast of California (from Pebble Beach to Rancho Marino), where black abalone appear to be unaffected by disease and densities of sea otters and black abalone are relatively high, has found that sea otters do not negatively affect, and in fact may even increase, the abundance of black abalone (Raimondi *et al.*, in prep.). This dynamic may be due to an increase in the availability of drift kelp arising from the positive relationship between sea otters and kelp abundance, although it likely holds true only in areas where black abalone populations have access to high quality cryptic habitat and have not been severely depleted by disease (Raimondi *et al.*, in prep.). At San Nicolas Island, where approximately 50 sea otters exist, black abalone at one study site have increased since 2001 (when a mass mortality event associated with withering syndrome reduced abundance to its lowest level), suggesting the possibility of genetically based disease resistance in this local population (Van Blaricom *et al.* 2009).

The severe reduction of black abalone populations as a result of human overexploitation and disease has rendered them more vulnerable to all sources of mortality, including natural sources such as predation by marine organisms. The final status review for black abalone ranks the severity of the overall threat level posed by sea otter predation as "medium" (see Table 6, Van Blaricom *et al.* 2009). It notes that although sea otters are known to prey on black abalone, the quantitative ecological strength of the interaction is poorly understood (Van Blaricom *et al.*

2009). It further notes that the effects of sea otter predation on black abalone populations are difficult to predict because they vary in space and time with the movement of particular sea otters (with individualized prey preferences) into and out of foraging locations (Van Blaricom *et al.* 2009).

Under baseline conditions (suspension of containment activities), as well as under the proposed action, sea otters are expected to expand their range gradually along the coastline between Point Conception and Carpinteria (lower bound) or Oxnard (upper bound) and to increase in number at San Nicolas Island within the next 10 years. Intertidal habitat along much of this section of mainland coastline does not support black abalone. If local recovery of black abalone populations nevertheless occurred within this stretch of coastline in areas lacking sufficient cryptic habitat, whether naturally or as a result of outplanting efforts, sea otters would likely have a detrimental effect on these populations. The effect that a persistent colony of sea otters would have on black abalone at San Nicolas Island is uncertain. As noted above, a population of black abalone that may be partially resistant to withering-syndrome has been detected there (Van Blaricom *et al.* 2009). However, observations from 2003-2005 indicate that abalone constitute only a very small fraction (less than one percent) of the sea otter diet at San Nicolas Island (Bentall pers. comm. 2008). The fact that sea otters and black abalone historically co-occurred and continue to co-occur at the island suggests that black abalone populations have sufficient refuge from sea otter predation to maintain viable populations there. In its responses to comments in the final critical habitat designation for black abalone, NMFS states, "one of the only places in southern California where black abalone populations have been increasing and where multiple recruitment events have occurred since 2005 (*i.e.*, San Nicolas Island) is also the only place south of Point Conception where a growing population of southern sea otters exists, indicating that black abalone populations can recover and remain stable in the presence of sea otters" (66 FR 66806).

Whether sea otters would recolonize other nearshore areas of the Southern California Bight after 10 years would be a function of their demographic rates, food supply, and other variables. The effect that sea otters may have on depleted black abalone stocks throughout the area is uncertain. It is unknown how long it might take sea otters to expand their range throughout the Southern California Bight (if this range expansion does indeed occur), and it is unknown whether or how long it will take black abalone populations to increase to the point that they may be considered recovered.[3] Therefore, we cannot state whether black abalone would recover before sea otters expanded their range throughout the Southern California Bight. If sea otters did recolonize the Southern California Bight, the process would likely occur gradually over the course of several decades, allowing time for black abalone populations to rebound from the effects of human harvest and disease in the absence of predation pressure from sea otters. Ultimately, in areas of the Southern California Bight with sufficient cryptic and inaccessible habitat, portions of the black abalone population will be shielded from sea otter predation. However, in areas with insufficient cryptic and inaccessible habitat, into which black abalone populations may have expanded following the human-caused extirpation of sea otters, black abalone will be more vulnerable to predation resulting from sea otter range expansion. According to one assessment by NMFS, "the best available data do not support the idea that sea otter predation was a major

[3] A recovery plan does not yet exist for black abalone; consequently, formal recovery criteria under the ESA and an estimated time to recovery are not yet available.

factor in the decline of black abalone populations or that it will inhibit the recovery of the species" (76 FR 66806).

Critical habitat for black abalone includes a number of areas both within the current sea otter range and outside the current sea otter range (in southern California waters) (76 FR 66806). One segment of mainland coastline designated as critical habitat (from Montana de Oro State Park in San Luis Obispo County, to just south of Government Point, Santa Barbara County) overlaps slightly with the stretch of mainland coastline within the action area that is already occupied, or is expected to be recolonized, by sea otters within 10 years. The area of overlap extends along 11.3 km (7 mi) of coastline from Point Conception to just southeast of Government Point. The remainder of this portion of the mainland coastline has not been designated as critical habitat. All of the Channel Islands have been designated as critical habitat except the military-owned San Nicolas Island and San Clemente Island, which are covered by integrated natural resources management plans (76 FR 66806). If sea otters do recolonize the Southern California Bight gradually over the course of several decades, then their range will overlap with black abalone critical habitat in southern California, just as it currently overlaps with black abalone critical habitat in central California. The primary constituent elements of critical habitat essential for the conservation of black abalone are: rocky substrate; food resources; juvenile settlement habitat; suitable water quality; and suitable nearshore circulation patterns (76 FR 66806). Of these five elements, only one, food resources, may potentially be affected by sea otters. Sea otters would generally be expected to improve food resources for adult black abalone through predation on sea urchins. However, ecological relationships are complex, and it is likely that numerous positive and negative interactions will occur simultaneously.

Effects on Southern Sea Otters

Effects on southern sea otters under the baseline are described in sections 6.2.3.3 and 6.2.11.1 of the RDSEIS. Effects on southern sea otters under the proposed action are described in sections 6.7.3.3 and 6.7.11.1 of the RDSEIS. As noted above, effects under the baseline and under the proposed action are identical except with respect to regulatory changes.

The proposed action would maximize the opportunity for sea otter recovery under the ESA. The goal of the ESA is to ensure the recovery of listed species so that they are no longer in danger of extinction or likely to become in danger of extinction in the foreseeable future. In 1977, we listed the southern sea otter as a threatened species under the ESA. The listing was based on the southern sea otter's small population size, its greatly reduced range, its vulnerability to oil spills, and the potential risk of oil spills (42 FR 2965). Our original recovery plan (USFWS 1982) for the species sought to encourage range expansion, and the translocation program was an integral part of that plan. However, we have concluded in our draft translocation evaluation that the translocation program has failed to meet its objectives (Appendix C to the RDSEIS). The revised recovery plan for the southern sea otter (USFWS 2003) continues to focus on efforts to increase the size of the southern sea otter's population, but it no longer recommends the translocation of sea otters as a means to achieve this goal. The recovery plan acknowledges the recovery team's recommendations to declare the translocation program a failure, to allow natural range expansion to occur, and to allow the colony at San Nicolas Island to remain at the island upon termination of the program rather than capturing these sea otters and releasing them in the mainland range (USFWS 2003).

Under the Marine Mammal Protection Act (MMPA), federal agencies are charged with managing marine mammals to their Optimum Sustainable Population level. The Optimum Sustainable Population level is defined by the MMPA as the number of animals, with respect to any population stock, that "will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element" (16 *U.S.C.* 1362). For the southern sea otter, the Optimum Sustainable Population level is believed to be greater than the population level needed to achieve recovery under the ESA. The final revised recovery plan for the southern sea otter identifies a population size of 3,090 as necessary to consider delisting of the species under the ESA and gives the lower bound of the Optimum Sustainable Population level as approximately 8,400 animals for the California coast (USFWS 2003).

This estimated lower bound of the Optimum Sustainable Population level, also known as the maximum net productivity level (MNPL), is roughly 50 percent of the estimated carrying capacity of California (Laidre *et al.* 2001). Carrying capacity in this context is defined as the maximum number of sea otters that can be supported by the nearshore marine environment of California. Laidre *et al.* (2001) estimated carrying capacity as a product of the densities of sea otters in rocky, sandy, and mixed habitats in portions of their range believed to be at equilibrium, and the total amount of rocky, sandy, and mixed habitat to the 40 meter isobath in California. The carrying capacity of the Southern California Bight has been estimated as 6,441 sea otters, which accounts for about 40 percent of the carrying capacity of California as a whole (Laidre *et al*. 2001).

Under baseline conditions, sea otters would likely continue to expand their range into the Southern California Bight. Over the next 10 years, the southern sea otter's range is predicted to expand gradually along the coastline to Carpinteria (lower bound) or Oxnard (upper bound). Range expansion of the mainland population is expected to result in between 73 (lower bound) and 299 (upper bound) independent sea otters residing year-round south of Point Conception in 10 years. If the colony at San Nicolas Island persists, it is predicted to grow at a rate similar to that observed at the island since the colony's low point in the early 1990s, an average of 7 percent annually (from a projected 53 independent animals in 2012 to 103 in 2021). Whether sea otters would recolonize other nearshore areas of the Southern California Bight after 10 years would be a function of their demographic rates, food supply, and other variables. If recolonization occurs, it is expected to occur gradually over the course of many decades.

Continued sea otter range expansion into the area southeast of Point Conception will allow the population size to increase. Additional habitat is essential to population growth because, as several lines of evidence suggest, sea otters in some areas of the central California coast are food-limited (Tinker *et al.* 2008). Although range expansion into southern California waters will expose sea otters to a somewhat degraded marine habitat (like portions of the southern sea otter's existing range) and natural hazards such as oil seeps, the risk to sea otters of expanding their range into this area is expected to be minimal in comparison to the benefits of allowing natural range expansion to occur. Continued natural range expansion will maximize habitat available for southern sea otter recovery, allow sea otters to exploit areas that are not food-limited, and reduce the species' vulnerability to widespread catastrophic events. Allowing natural range expansion also avoids the potential threat to the species caused by capturing sea otters in southern California waters and releasing them into other parts of the mainland range and the potential for injuring or killing individual sea otters removed from the management zone. The proposed action reflects the recommendations made in the revised recovery plan for the southern sea otter with respect to the translocation program (USFWS 2003).

As noted above, the effects of the proposed action relative to the baseline are regulatory. The potential benefit of the reversion to "threatened" status for southern sea otters south of Point Conception under the proposed action is difficult to estimate because its value can be realized only in reference to future actions that may affect members of the species found in the Southern California Bight. If, in the future, the incidental take of sea otters were shown to be hindering the recovery of the species, then the value of the regulatory change could be high.

In summary, the proposed action affords the best opportunity for southern sea otters to reach their recovery threshold under the ESA and their Optimum Sustainable Population level under the MMPA because: 1) it maximizes the area available for sea otters to recolonize; 2) it does not require the movement of any sea otters, which can have a detrimental effect on the individuals moved as well as on the receiving population; and 3) it makes additional legal protections available to sea otters in the Southern California Bight (should these become necessary) by reverting their status to that of sea otters in the mainland range (*i.e.,* threatened).

Consistency of Outcome: Summary

The proposed action (including the continuation of natural sea otter range expansion) will thus have a mixed, but generally beneficial, effect on the maintenance of marine resources. The effect may be moderately negative, at least in the short term, for white and black abalone, whereas the effect will be positive for the nearshore marine environment as a whole (on which many species, including all abalone species, depend) and for southern sea otters. We have determined in the RDSEIS that the proposed action is the "environmentally preferable" alternative, as defined under the National Environmental Policy Act. We believe that, on balance, Alternative 3C causes the least damage to the biological and physical environment, in that it would allow a "keystone species" to return to its former range off southern California and would help to restore the natural functioning of the nearshore marine ecosystem. Because there are mixed negative and positive effects depending on whether sea otters are present or absent, it is not possible for this outcome to be fully consistent with the policies enumerated under Article 4, Section 30230. However, this outcome is consistent to the maximum extent practicable with these policies.

Section 30234.5: Economic, commercial, and recreational importance of fishing. The economic, commercial, and recreational importance of fishing activities shall be recognized and protected.

Consistency of Proposed Action Relative to Baseline

The proposed action will not result in effects on fishing beyond those described for baseline conditions under the heading “Consistency of Outcome” below, except in the case of potential indirect economic effects stemming from regulatory changes, namely the elimination of incidental take exemptions associated with the management zone upon termination of the translocation program. We describe those effects here.

Upon termination of the translocation program, Federal agencies planning activities that may affect sea otters in southern California would be required to consult with the Service under the ESA, and, if their activities would result in take of southern sea otters, to seek authorization for incidental take under both the ESA and the MMPA. If otherwise allowable under applicable State law, non-Federal activities that would result in take of southern sea otters in California would require an incidental take permit from the Service under the ESA and authorization for incidental take of sea otters under the MMPA.

Incidental take of southern sea otters in commercial fisheries cannot be authorized under the MMPA. Therefore, incidental take of southern sea otters in commercial fisheries throughout southern California would be prohibited, as it is currently prohibited in the remainder of the range of the species (north of Point Conception, California). Gill and trammel nets are known to be lethal to sea otters (Herrick and Hanan 1988; Wendell *et al.* 1986; Cameron and Forney 2000; Carretta 2001; Forney *et al.* 2001). Therefore, the regulatory changes associated with this proposed rule may indirectly affect portions of the commercial halibut and white seabass fisheries utilizing gill and trammel net gear. Please see section 6.7.4.5 of the RDSEIS for a comprehensive analysis of effects of the proposed action on gill and trammel net fishing.

The use of gill and trammel nets is already banned throughout much of California. In southern California, the Marine Resources Protection Act of 1990 (California Constitution Article 10B) prohibits the use of gill and trammel nets in waters less than 70 fathoms or within 1 mile of the Channel Islands, whichever is less, and generally within 3 nautical miles offshore of the mainland coast from Point Arguello to the Mexican border. However, some areas within southern California waters are characterized by a relatively shallow shelf that extends beyond the area currently closed to gill net fishing. The primary fisheries using gill and trammel net gear in these areas target halibut and white seabass. Effects on these fisheries would occur if the State acted, in response to regulatory changes associated with this rule, to extend the existing gill and trammel net closure in southern California waters to depths that would be fully protective of sea otters. Furthermore, effects would occur only in areas where sea otters are not already fully protected, and likely only in areas that sea otters were expected to recolonize in the near future. (A closure to protect sea otters would not likely be imposed in areas where sea otters did not occur and were not expected to occur in the near future.) No effects would occur at San Nicolas Island because incidental take by commercial fisheries is currently prohibited within the translocation zone and would continue to be prohibited upon termination of the program. Realized effects are likely to be moderated by the fact that (1) the State may not impose an immediate closure and (2) participants in the fishery already using alternate gear would benefit from the increased availability of halibut and white seabass.

Potential effects of the proposed action on gill and trammel net fisheries are indirect, not part of the proposed action, and not within the management authority of the Service. These effects will occur only if the State acts to limit gill and trammel net fishing further offshore in certain areas. Therefore, the proposed action is consistent to the maximum extent practicable with the policies enumerated under Article 4, Section 30234.5.

Consistency of Outcome

Effects on commercial fishing outlined here are identical to those under the baseline (please refer to the discussion under Article 3, Section 30220, for effects on recreational fishing), with the exception of the possible indirect effects on gill and trammel net fisheries described above. Under the baseline, as well as under the proposed action, the commercial sea urchin, lobster, crab, and sea cucumber, would likely be eliminated in mainland coastline areas predicted to be re-occupied by sea otters over the next 10 years: Point Conception to Carpinteria (lower bound) or Oxnard (upper bound). For the commercial sea urchin fishery, the 10-year landings average along this portion of affected coastline is 56,360-61,016 pounds, representing approximately 1 percent of Southern California Bight landings as a whole. For the commercial lobster fishery, the 10-year landings average along this portion of affected coastline is 54,674-75,649 pounds, representing approximately 8-11 percent of Southern California Bight landings as a whole. For the commercial crab fishery, the 10-year landings average along this portion of affected coastline is 253,572-385,743 pounds, representing approximately 23-35 percent of Southern California Bight landings as a whole. For the commercial sea cucumber fishery, the 10-year landings average along this portion of affected coastline is 155,714-158,636 pounds, representing approximately 27-28 percent of Southern California Bight landings as a whole. These fisheries are also likely to be affected, to some degree, by a growing sea otter population at San Nicolas Island. Whether sea otters would recolonize other nearshore areas of the Southern California Bight after 10 years would be a function of their demographic rates, food supply, and other variables. If sea otters recolonized these areas at the densities seen in the mainland range for comparable habitat, commercial landings for these species would likely approach zero in these areas because fishers targeting these species would fish other areas where their catch per unit effort would be greater. Please see sections 6.2.4 and 6.7.4 of the RDSEIS for a comprehensive analysis of effects of the proposed action on commercial fisheries.

The reduction in densities of herbivorous invertebrates that will precipitate changes in shellfish fisheries may be accompanied by enhancements to finfish fisheries as a result of the changes in the nearshore marine ecosystem outlined under Article 4, Section 30230 above.

Consistency of Outcome: Summary

The natural range expansion of sea otters (which will occur under the baseline as well as under the proposed action) and the regulatory changes associated with the proposed action (which could precipitate further restrictions on the gill and trammel net fishery in southern California), may result in the elimination of certain fisheries in areas recolonized by sea otters. At the same time, finfish fisheries may be enhanced. The proposed action is consistent to the maximum extent practicable with the policies enumerated under Article 4, Section 30234.5.

Article 5: Land Resources

The policies enumerated under Article 5 are not relevant to the proposed action or alternatives under consideration.

Article 6: Development

The policies enumerated under Article 6 are not relevant to the proposed action or alternatives under consideration.

Article 7: Industrial Development

The policies enumerated under Article 7 are not relevant to the proposed action or alternatives under consideration.

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