OCEAN RESOURCES ENHANCEMENT AND HATCHERY PROGRAM

FINAL NEGATIVE DECLARATION

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List of Acronyms and Abbreviations

µM	micrometer
AB 522	Assembly Bill 522
AHL	Agua Hedionda Lagoon
BAT	best available technology economically achievable
BCT	best control technology for conventional pollutants
BMP	best management practices
BOD	biochemical oxygen demand
BPT	best practicable control technology
BW	body weight
CAAP	concentrated aquatic animal production
CCR	California Code of Regulations
CDP	Coastal Development Permit
CEQA	California Environmental Quality Act
CESA	California Endangered Species Acts
CFR	Code of Federal Regulations
CFS	cubic feet per second
CHP	Comprehensive Hatchery Plan
CNPS	California Native Plant Society
Coastal Commission	California Coastal Commission
Commission	California Fish and Game Commission
CSF	Catalina Seabass Fund
CTR	California Toxics Rule
CVM	Center for Veterinary Medicine
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
Department	California Department of Fish and Game
DD	deferred decision
DDE	dichloro-diphenyl-dichloroethylene
DDT	dichloro-diphenyl-trichloroethane
DO	dissolved oxygen
DPFEP	Dana Point Fisheries Enhancement Program
DPH	days post-hatch
EC	electrical conductivity
ELG	Effluent Limitations Guidelines and New Source Performance Standards for the Concentrated Aquatic Animal Production Point Source Category
EFH	essential fish habitat
ELISA	enzyme-linked immunosorbent assay
EPA	United States Environmental Protection Agency
ESA	Federal Endangered Species Act
EWA	Encina Wastewater Authority
FC	federal candidate species
FCR	food conversion ratios

FDA	United States Food and Drug Administration
FDA-CVM	United States Food and Drug Administration's Center for Veterinary Medicine
FE	federal endangered species
FGC	Fish and Game Code
FHMT	HSWRI Fish Health Management Team
FP	federal proposed species
FSoC	federal species of concern
FT	federal threatened species
gal	gallons
GPM	Growout and Release of White Seabass (*Atractoscion Noblis*) as Part of the Ocean Resources Enhancement and Hatchery Program
GSS	gas supersaturation
ha	hectares
HOPE	Harbor Ocean Preservation Enhancement
HSWRI	Hubbs-SeaWorld Research Institute
IACUC	HSWRI Institutional Animal Care and Use Committee
LARWQCB	Los Angeles Regional Water Quality Control Board
INAD	investigational new animal drugs
J1	Nursery I (Carlsbad Hatchery)
J2	Nursery II (Carlsbad Hatchery)
KHOEF	King Harbor Ocean Enhancement Foundation
LMMS	larval mass mortality syndrome
LPM	liters per minute
LRP	low regulatory priority
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MBPM-2	Migratory Bird Permit Memorandum
MBTA	Migratory Bird Treaty Act
MCCS	Main Computer Control System
MDRA	Marina del Rey Anglers
MLMA	Marine Life Management Act
MSDS	Material Safety Chemical Sheets
NADA	new animal drug application
NCCP	Natural Community Conservation Planning
ND	Negative Declaration
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	National Oceanic and Atmospheric Administration National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
NSPS	new source performance standards
NTR	National Toxics Rule
OREAP	Ocean Resources Enhancement Advisory Panel
OREHP	Ocean Resources Enhancement and Hatchery Program

PBR	Potential Biological Removal
PCB	polychorinated biphenyl
PCR	Polymerase Chain Reaction
PEIR	programmatic environmental impact report
PFEF	Pacific Fisheries Enhancement Foundation
PRC	Public Resources Code
RWQCB	Regional Water Quality Control Board
SAC	Scientific Advisory Committee
SB 201	Sustainable Oceans Act
SBSEA	Santa Barbara Salmon Enhancement Association
SC	state candidate species
SCB	Southern California Bight
SDAPC	San Diego Country Air Pollution Control District
SDOF	San Diego Oceans Foundation
SDRWQCB	San Diego Regional Water Quality Control Board
SE	state endangered species
SFRA	Sport Fish Restoration Act
SIP	Statewide Implementation Plan
SSC	special species of concern
ST	state threatened species
SWMP	Storm Water Management Plan
SWRCB	State Water Resources Control Board
SWYC	Southwestern Yacht Club
TDS	total dissolved solids
TEM	transmission electron microscopy
TMDL	total maximum daily load
TSS	total suspended solids
TVS	total volatile solids
UASC	United Anglers of Southern California
UASC-VA	United Anglers of Southern California, Ventura Chapter
UCD	University of California, Davis
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
UV	ultraviolet
VHS	viral hemorrhagic septicemia
VNN	viral nervous necrosis
WDR	waste discharge requirements
WSEP	White Seabass Enhancement Plan
WSFMP	White Seabass Fishery Management Plan

Executive Summary

The following Initial Study and Negative Declaration (ND) analyzes the Ocean Resources Enhancement and Hatchery Program (OREHP), and concludes that there are no significant adverse environmental impacts from the continued operation of the OREHP. This analysis was conducted pursuant to, and in compliance with, the California Environmental Quality Act (CEQA). The information in this section is intended to provide an executive level summary of the proposed project and the analysis evaluating potential environmental impacts of the proposed project.

The California Department of Fish and Game (Department) has been managing the State's white seabass population for the benefit of the public since the 1930s. In 1983, the State legislature enacted the OREHP in an effort to enhance important marine finfish species, such as white seabass and California halibut (Statutes of 1983, Chapter 982; Fish and Game Code § 6590 et seq.). The program involved basic research into the captive reproduction and culture of these important finfish. However, due to limited funding, the OREHP reduced operations to focus solely on the artificial rearing of white seabass in 1990. In 1992, the California Coastal Commission authorized funding for the construction of an OREHP hatchery. Initial construction of the hatchery was completed in 1995. Build-out of the facility was not completed until 2000, after additional funding was authorized by the California Coastal Commission. The construction of the hatchery was completed in compliance with all local land use regulations. CEQA compliance for this facility was conducted by the permitting agencies at the time of construction (See City of Carlsbad Agenda Bill 12360, for the 08-10-93 Planning Commission Meeting on the Hubbs-SeaWorld Research Institute Project Conditional Use Permit 92-10/HDP 93-05; and the California Coastal Commission Coastal Development Permit 6-93-113; all relevant files from these two actions being hereby incorporated by reference). Potential impacts from the construction and operation of the hatchery were mitigated during the initial approval of these Development Permits. Hatchery operations have been ongoing without substantial changes since 2000.

In addition to hatchery operations, the OREHP manages the operation of growout pens located in various harbors along the southern California coastline. Thousands of volunteer-hours have been contributed by members of the sportfishing and non-profit communities, who constructed, own, and operate the pens in partnership with the Department. The pens, which first began operation in 1991, are constructed of simple, readily available materials, including dock floats, netting, and plastic frames to support the nets. The pens are relatively small, approximately the size of an average office.

The OREHP continues to conduct basic research on the culture and rearing of white seabass, as well as the benefits and effects of the release of hatchery-raised white seabass into the wild population. Because the Department has been mandated by the Legislature to administer and oversee funding for the OREHP, compliance with environmental review requirements as outlined by CEQA is the responsibility of the Department.

CEQA requires the Department to identify any potentially adverse physical environmental impacts attributable to continuing the OREHP. The OREHP environmental baseline for the purposes of determining CEQA-relevant impacts are limited to existing impacts resulting from current existing operations of the OREHP. The impacts of the proposed project on these environmental baseline conditions have been analyzed in the attached Initial Study and ND.

The Department's analysis of existing baseline conditions and the proposed project's potential changes to existing baseline conditions did not reveal any project-related impacts that would be considered significant under CEQA. In most cases, the proposed project is merely a continuation of the OREHP operations with no change. As such, the proposed project would not be expected to produce any impacts, let alone any new impacts that would be considered significant under CEQA.

As part of the Department's duty to avoid impacts to public trust resources where feasible, the Department also reviewed some impacts as if they were new and not part of baseline. Measured against the CEQA thresholds of significance level, neither the baseline conditions nor the proposed project resulted in a determination of significant adverse environmental impacts. Overall, the information, experience, and expert opinion of Department, hatchery, and growout pen staff has not resulted in the identification of any significant adverse environmental impacts from the existing or continued operation of the OREHP activities and facilities.

Reasons supporting the findings of non-significance include the following: the small footprint of the growout pens in relation to the receiving water body (See Appendix L), the extensive existing human uses of the areas surrounding the growout pens, the lack of significant adverse interactions between the growout pens and the surrounding environment, and the benign nature of the operations conducted by the OREHP. Less than significant impacts that were identified include the following: shading impacts from the operation of the growout pens, potential direct impacts to marine mammals and other wildlife with the growout pens, potential impact from the discharge of fish feces and fish food to the waters and seabed beneath the growout pens, and the potential impacts from the continued operation of the hatchery facility. None of the potential impacts identified during the environmental review rise to the level of a significant adverse environmental effect as defined by CEQA, and no CEQA-related mitigation measures are required. Nevertheless, the Department has incorporated impact reduction measures into the proposed project by implementing best management practices that are required to be followed by hatchery and growout pen owners and operators. The Department continues to work with stakeholders, other trustees, and responsible agencies to minimize adverse impacts. The Department has also solicited and will continue to collect advice and input from these organizations and individuals.

1.0 Introduction

1.1 Project Summary

The California Department of Fish and Game (Department) is the principal jurisdictional agency with responsibility and duty to manage and conserve the biological resources of the state, including fish, wildlife and plants. The mission of the Department is to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. As part of its responsibility, the Department administers the Ocean Resources Enhancement and Hatchery Program (OREHP), a program of basic and applied research into the artificial propagation, rearing, and stocking of important marine finfish species occurring in ocean waters off southern California. Current efforts focus on determining if hatchery released fish can enhance important recreational and commercial species through increased production of fish and increased monitoring of fisheries to assess the hatchery contribution. The ultimate goal of the program is to enhance populations of marine finfish species important to California for their sport and commercial fishing value.

The Department administers the OREHP with advice from a 10-member Ocean Resources Enhancement Advisory Panel (OREAP). The OREAP consists of academic and management agency scientists, representatives of both commercial and recreational fishing groups, and the aquaculture industry. The OREAP provides assistance to the Director of the Department in establishing policy and direction for the OREHP. The annual budget for the OREHP is also determined jointly by the OREAP and the Department.

In 1983, the OREAP identified white seabass and California halibut (*Paralichthys californicus)* as the most appropriate species for use in an experimental stocking program. Original selection criteria included:

- Species indigenous to southern California
- Status as a diminished stock
- Economic value
- Both commercial and sport utilization
- Potential for success

During the first six years of the program, research focused on the capture, maintenance, spawning (both natural and artificial), and grow-out to release size for white seabass and California halibut. However, beginning in 1990, the OREHP focused on white seabass because of limited funding and increased expenses associated with producing

100,000 white seabass annually for release. Raising and releasing a large number of juvenile white seabass was undertaken to gain experience with new hatchery protocols associated with increased production and provide juveniles for release and recapture studies. In addition, the recapture field work provided data on juvenile distribution and natural mortality.

The Department's main OREHP contractor is Hubbs-SeaWorld Research Institute (HSWRI). HSWRI owns and operates the marine fish hatchery that produces white seabass. As part of their OREHP contractual obligations, HSWRI has developed the culture protocols required for the program, as well as the assessment techniques that will help evaluate the impact of hatchery-reared fish on the recreational and commercial fisheries. The primary function of the hatchery is to culture white seabass and supply juveniles to growout pens operated by volunteer organizations. The hatchery releases only a maximum of 350,000 seabass per year; however, the hatchery is capable of producing up to several million white seabass annually.

In addition to HSWRI and the Department, considerable support (greater than 5,000 hours per year) is provided from volunteers who own and operate growout pens in southern California (See Section 3.3 for a detailed description of the growout pens). These growout pens are operated by United Anglers of Southern California (UASC) chapters, nonprofit organizations, and HSWRI. The purpose of these growout pens is to allow the white seabass to grow 4 to 6 inches before they enter the wild, thereby increasing their survival rate.

1.2 Goals and Objectives of the Project

A primary goal of the OREHP is to evaluate the economic and ecological feasibility of releasing hatchery-reared fish to restore depleted, endemic, marine fish populations to a higher, sustainable level. Achievement of this enhancement goal will occur through completion of the following objectives or practices:

1) Develop and implement hatchery operations and growout methods that provide a supply of healthy and vigorous fish;

2) Conduct the replenishment program in a manner that will avoid any significant environmental impacts resulting from operation of either the hatchery or pen rearing facilities;

3) Maintain and assess a broodstock management plan that results in progeny being released that have genotypic diversity very similar to that of the wild population;

4) Quantify contributions to the standing stock in definitive terms by tagging fish prior to release and assessing their survival in the field;

5) Continue to develop, evaluate, and refine hatchery operations to maximize the potential for achieving the goal of the program; and

6) Develop quantitative measures of success.

1.3 California Environmental Quality Act Requirements

California law requires that projects being carried out by State Agencies undergo a review of environmental impacts that may occur and to disclose these impacts to the public for comment (See California Environmental Quality Act [CEQA], California Public Resources Code Division 13). CEQA requires an Agency to identify, and, where feasible, avoid or mitigate significant adverse physical environmental effects of a proposed project (Ca. Pub. Res. Code Section 21002.1 et seq.). CEQA is both an environmental review and public participation statute in that it requires public agencies to conduct environmental impact reviews of projects intended to be carried out by such agencies and requires that such agencies give the public a meaningful opportunity to review and comment on environmental impacts that could result from such projects.

1.3.1 Initial Study

The initial step in complying with CEQA is the determination of whether the project being proposed may have a "significant effect" on the environment through the preparation of an Initial Study. The Initial Study is required to contain: (1) A description of the project including the location of the project; (2) An identification of the environmental setting; (3) An identification of environmental effects by use of a checklist, matrix, or other method provided that entries on a checklist or other form are briefly explained to indicate that there is some evidence to support the entries. This brief explanation may be either through a narrative or a reference to other information sources, such as an attached map, photographs, or an earlier Environmental Impact Report (EIR) or Negative Declaration (ND). A reference to another document should include, where appropriate, a citation to the page or pages where the information is found; (4) A discussion of the ways to mitigate the significant effects identified, if any; (5) An examination of whether the project would be consistent with existing zoning, plans, and other applicable land use controls; and (6) The name of the person or persons who prepared or participated in the Initial Study (CEQA Guidelines §15603(d)). The format of Initial Study is generally left up to the discretion of the lead agency. The Department routinely uses a version of the sample Initial Study contained in Appendix G to the CEQA guidelines (California Code of Regulations [CCR] Title 14, Division 6.0, Chapter 3.0 Article 20, Appendix G). All conclusions drawn in this Initial Study will be supported by factual or logical reasoning.

The Department has conducted a preliminary environmental analysis in order to develop the OREHP with minimum adverse environmental effects and maximum environmental benefits. The preparation of this Initial Study ND is based in part on expert opinion of the Department supported by the 28 years experience in managing the program, supporting documents, or other substantial evidence.

1.3.2 Negative Declaration

Once the Initial Study has been completed, the Department is required to determine if a fair argument can be made that the proposed project may result in significant effect on the environment (CEQA guidelines §15063(b)(1-2)). If the Department determines that there is no substantial evidence that the project or any of its aspects may cause a significant effect on the environment, then the Department "shall prepare a negative declaration" (CEQA guidelines §15063(b)(2)). CEQA defines a "Significant effect on the environment" as a substantial, or potentially substantial, adverse change in the environment (Ca. Pub. Res. Code § 21068). The CEQA guidelines in attempting to interpret the above statutory provision and accumulated case law state that "Significant effect on the environment" means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance.

1.3.3 Use of this Document by other Trustee or Responsible Agencies

Under CEQA, agencies that have jurisdiction over or responsibility for subsequent project approval must actively participate in the lead agency's CEQA process by reviewing the document and using it for the consideration of the project. The responsible agency may also use this document to achieve compliance with CEQA when the responsible agency is required to issue permits for the proposed project. The relevant subsequent permits and responsible agencies for this project include the following:

1) California Coastal Commission (Coastal Commission). Subsequent to certification of this ND, the Department will work with the OREHP facility grantees and volunteer organizations to submit the required Coastal Development Permits (CDP) to the Coastal Commission or local agencies. This ND is being prepared in cooperation with the Coastal Commission and local agencies in the expectation that this ND will be used to satisfy the CEQA requirements for submittal of the Coastal Development Permits.

2) California State Lands Commission. A State Tidelands lease exists for the two growout pens located at Catalina Harbor. This ND is being prepared in coorperation with the California State Lands Commission in the expectation that this ND will be used to satisfy the CEQA requirements for submittal of the tidelands/submerged lands lease permits for these growout pens.

2.0 Background – Relevant Statutes and Regulations

The following section contains a list of statutes and regulations that may or may not apply to the proposed project, but must still be considered pursuant to CEQA guidelines.

2.1 Federal Laws, Regulations, or Policies

2.1.1 Clean Water Act

Several sections of the Clean Water Act (CWA) pertain to regulating impacts on waters of the United States.

2.1.1.1 Section 303

Section 303(d) of the CWA established the total maximum daily load (TMDL) process to guide the application of state water quality standards (See Section 2.2). A TMDL is an estimate of the total load of pollutants from point, non-point, and natural sources that a water body may receive without exceeding applicable water quality standards (with a "factor of safety" included). Once established, the TMDL is allocated among current and future pollutant sources to the water body. The State of California adopts water quality standards to protect beneficial uses of state waters as required by Section 303 of the CWA and the Porter-Cologne Water Quality Control Act of 1969.

2.1.1.2 Section 401

Section 401 of the CWA requires that an applicant pursue a federal permit or obtain a waiver to conduct any activity that may result in a discharge of a pollutant to waters of the United States. Waivers called "water quality certifications" can be issued by the Regional Water Quality Control Boards (RWQCB) in California. Under the CWA, the State (the applicable RWQCB) must issue or waive Section 401 water quality certification for the project to be permitted under Section 404. Water quality certification requires the evaluation of water quality considerations associated with dredging or placement of fill materials into waters of the United States and imposes project-specific conditions on development. A Section 401 waiver establishes standard conditions that apply to any project that qualifies for a waiver.

2.1.1.3 Section 402

The 1972 amendments to the Federal Water Pollution Control Act established the National Pollution Discharge Elimination System (NPDES) permit program to control discharges of pollutants from point sources (Section 402). The 1987 amendments to the CWA created a new section of the CWA devoted to stormwater permitting (Section 402[p]). The U.S. Environmental Protection Agency (EPA) has granted the State of California (the State Water Resources Control Board [SWRCB] and the RWQCBs) primacy in administering and enforcing the provisions of the CWA and NPDES. NPDES

is the primary federal program that regulates point-source and non-point-source discharges to waters of the United States.

2.1.2 Federal Antidegradation Policy

The Federal Antidegradation Policy is designed to protect existing uses and the level of water quality necessary to protect existing uses, and provide protection for higher quality and national water resources. The federal policy directs states to adopt a statewide policy that includes the following primary provisions (40 Code of Federal Regulations [CFR] 131.12):

1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

2) Where the quality of waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located.

3) Where high quality waters constitute an outstanding National resource, such as waters of National and States parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

2.1.3 Environmental Protection Agency Effluent Limitation Guidelines and New Source Performance Standards for the Concentrated Aquatic Animal Production Point-Source Category

In August 2004, the EPA promulgated *Effluent Limitations Guidelines and New Source Performance Standards for the Concentrated Aquatic Animal Production Point Source Category* (ELG). The ELG regulation establishes national technology-based effluent discharge requirements for flow-through and recirculating systems and for net pens based on best practicable control technology currently available (BPT); best control technology for conventional pollutants (BCT); best available technology economically achievable (BAT); and new source performance standards (NSPS). In its proposed rule, published on September 12, 2002, the EPA proposed to establish numeric limitations for a single constituent—total suspended solids (TSS)—while controlling the discharge of other constituents through narrative requirements. In the final rule, however, the EPA determined that, for a nationally applicable regulation, it would be more appropriate to promulgate qualitative TSS limitations in the form of solids control best management practices (BMP) requirements. Furthermore, the final ELG does not include numeric effluent limitations for non-conventional and toxic constituents, such as

aquaculture drugs and chemicals, but also relies on narrative limitations to address these constituents.

2.1.4 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established a requirement to describe and identify "essential fish habitat" (EFH) in each fishery management plan. The act requires all federal agencies to consult with the National Marine Fisheries Service (NMFS) on all actions or proposed actions that are permitted, funded, or undertaken by the agency that may adversely affect EFH. Only species managed under a federal fishery management plan are covered under EFH regulations.

2.1.5 Federal Sustainable Fisheries Act

The Sustainable Fisheries Act (Public Law 104-297) of 1996 reauthorized and amended the Magnuson Fishery Conservation and Management Act (now Magnuson-Stevens Fishery Conservation and Management Act), the latter of which was initially enacted in 1976 to define fisheries jurisdiction within federal waters and create the National Oceanic and Atmospheric Administration (NOAA) structure for federal fisheries management. The revisions provided in the 1996 law brought major changes to requirements for preventing over fishing and revitalizing depleted fisheries, mostly through the scientific management and reporting conducted via fisheries management reports.

2.1.6 Federal Endangered Species Act of 1973

The Federal Endangered Species Act (ESA) provides for the conservation of species that are endangered or threatened throughout all or a significant portion of their range, as well as the conservation of the ecosystems on which they depend. The ESA recognizes that conservation of threatened and endangered species can be facilitated through artificial propagation. Potential benefits of artificial propagation for listed species include supplementing natural populations to speed recovery, reestablishing natural populations in suitable but currently vacant habitat, or both.

2.1.6.1 Endangered Species Act Section 9

Under the ESA, it is illegal for any person, private entity, or government agency to take endangered species without federal authorization. Take of most threatened species is similarly prohibited. *Take* is defined to mean harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in such conduct. *Harm* is defined to mean an act that actually kills or injures fish or wildlife. Take may include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning,

rearing, migrating, feeding, or sheltering. The incidental take of listed species can be authorized under Section 7 or Section 10 of the ESA.

2.1.6.2 Endangered Species Act Section 7

Section 7 requires federal agencies to consult with U.S. Fish and Wildlife Service (USFWS) or NMFS, or both, before performing any action (including actions such as funding a program or issuing a permit) that may affect listed species or critical habitat. Section 7 applies to federal agencies that operate or fund hatcheries operated by the California Department of Fish and Game (Department). These federal agencies include USFWS, Reclamation, and U.S. Army Corps of Engineers (USACE).

2.1.6.3 Endangered Species Act Section 4(d)

Incidental take of a species listed as threatened under the federal ESA may be broadly authorized under Section 4(d) of the ESA, which authorizes incidental take of such threatened species consistent with certain conditions. Section 4(d) is not applicable to species listed as endangered under the ESA. Through a Section 4(d) rule, USFWS or NMFS may apply take prohibitions for threatened species but exempt certain programs or activities (such as hatchery operations or recreational fisheries) if they meet the requirements specified in the rule. The USFWS or NMFS may apply a Section 4(d) rule either at the time of listing or subsequently. A familiar example is the 4(d) rule that protects anglers if they accidentally catch a listed fish species, provided that they release it unharmed.

2.1.6.4 Endangered Species Act Section 10

Absent a 4(d) rule or a completed Section 7 consultation, incidental take of a listed species can only be authorized under Section 10 of the ESA. A Section 10(a)(1)(A) permit authorizes the intentional take of listed species for research or propagation that enhances the survival of the listed species in question, such as the capture of a listed species for brood stock production. Incidental take by a nonfederal entity also may be authorized through a Section 10(a)(1)(B) permit, including approval of a habitat conservation plan.

2.1.6.5 Endangered Species Act Recovery Planning

The USFWS and NMFS are responsible for evaluating the status of species listed under the ESA, and developing recovery plans for those species. The ESA requires that recovery plans be developed that evaluate the current status of the listed population or species, assess the factors affecting the species, identify recovery (delisting) goals, identify the entire suite of actions necessary to achieve these goals, and estimate the cost and time required to carry out those actions.

2.1.7 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (Title 16, United States Code [USC], Part 703) enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and the Soviet Union and authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. It establishes seasons and bag limits for hunted species and protects migratory birds, their occupied nests, and their eggs (16 USC 703, 50 Code of Federal Regulations [CFR] 21, 50 CFR 10). Most actions that result in taking of or the permanent or temporary possession of a protected species constitute violations of the MBTA. The MBTA also prohibits destruction of occupied nests. The Migratory Bird Permit Memorandum (MBPM-2) dated April 15, 2003, clarifies that destruction of most unoccupied bird nests is permissible under the MBTA; exceptions include nests of federally threatened or endangered migratory birds, bald eagles, and golden eagles. USFWS is responsible for overseeing compliance with the MBTA.

2.1.8 U.S. Food and Drug Administration

The U.S. Food and Drug Administration's Center for Veterinary Medicine (FDA-CVM) regulates the manufacture, distribution, and use of animal drugs. The FDA-CVM approves the use of new animal drugs based on data provided by a sponsor (usually a drug company). To be approved by the FDA-CVM, an animal drug must be effective for the claim on the label and safe when used as directed for: treated animals; persons administering the treatment; the environment, including non-target organisms; and consumers. Approved new animal drugs by the U.S. Food and Drug Administration (FDA) are specified for use on specific fish species, for specific disease conditions, for specific dosages, and with specific withdrawal times. Product withdrawal times must be observed to ensure that any product used on aquatic animals at a concentrated aquatic animal production (CAAP) facility does not exceed legal tolerance levels in the animal tissue. These drugs have been screened by the FDA to determine whether they cause significant adverse public health or environmental impacts when used in accordance with label instructions. Approved new animal drugs for use in aquaculture include:

- Antibiotics, such as oxytetracycline (Terramycin), sulfadimethoxine-ormetoprim (Romet-30), sulfamerazine, and florfenicol (Aquaflor);
- Chorionic gonadotropin (Chorulon), used for spawning;
- Tricane methane sulfonate (MS-222, Finquel, and Tricaine-S), an anesthetic;
- Formaldehyde (Formalin-F, Paracide-F, and PARASITE-S), used as a fungus and parasite treatment; and
- Hydrogen peroxide (H_2O_2), used to control fungal and bacterial infections.

A second category of chemicals is investigational new animal drugs (INAD) and can be used only under an exemption. INAD exemptions are granted by the FDA to permit the use of unapproved drugs for investigational purposes and must be renewed each year. Numerous FDA requirements must be met for the establishment and maintenance of INAD drugs. The FDA reviews test protocols, authorizes specific conditions of use, and closely monitors drug use under an INAD exemption. Data recording and reporting are required under the INAD exemption in order to support the approval of a new animal drug or an extension of approval for new uses of the drug. A third category of drugs is unapproved new animal drugs of low regulatory priority (LRP drugs). LRP drugs do not require a new animal drug application (NADA) or INAD exemptions from the FDA. Further regulatory action is unlikely to be taken by the FDA on LRP drugs as long as an appropriate grade of the drug or chemical is used, drugs are used for the prescribed uses and dosages, good management practices are followed, and local environmental requirements are met. Examples of LRP drugs are:

- Acetic acid (parasite dip used on fish);
- PVP iodine (disinfectant for eggs);
- Carbon dioxide (CO_2) gas, or sodium bicarbonate (baking soda) to produce carbon dioxide, as an anesthetic; and
- Sodium chloride (NaCl; salt), used indefinitely or for short-term treatments for osmotic regulation and to reduce stress and shock.

A fourth category of chemicals is deferred decision (DD) chemicals. DD chemicals include those already approved by the EPA as algicides in aquaculture settings. Examples of DD chemicals include:

- Copper sulfate; and
- Potassium permanganate.

2.2 State Laws, Regulations, or Policies

2.2.1 California Coastal Act

The California Coastal Act (California Public Resources Code [PRC] Sections 30000 et. seq.) was enacted by the state legislature in 1976 to provide long-term protection of California's 1,100-mile coastline for the benefit of current and future generations. Section 30001.5 states that the goals are to:

a) Protect, maintain, and where feasible, enhance and restore the overall quality of the coastal zone environment and its natural and artificial resources;

b) Assure orderly, balanced utilization and conservation of coastal zone resources, taking into account the social and economic needs of the people of the state;

c) Maximize public access to and along the coast and maximize public recreational opportunities in the coastal zone consistent with sound resources conservation principles and constitutionally protected rights of private property owners;

d) Assure priority for coastal-dependent and coastal-related development over other development on the coast; and

e) Encourage state and local initiatives and cooperation in preparing procedures to implement coordinated planning and development for mutually beneficial uses, including educational uses, in the coastal zone.

The California Coastal Act created a partnership between the state (acting through the Coastal Commission) and local government (15 coastal counties and 58 cities) to manage the conservation and development of coastal resources through a comprehensive planning and regulatory program. The act mandates that local governments and constitutional entities prepare a land use plan and schedule of implementing actions to carry out the policies of the California Coastal Act. The policies constitute the standards used by the California Coastal Commission (Coastal Commission) to determine the adequacy of local coastal programs and the permissibility of proposed development. The Coastal Commission also reviews and approves local coastal programs, which are the basic planning tools used by local governments to guide development in the coastal zone.

Several of the relevant policies within the California Coastal Act that would apply to the OREHP include the following:

- **Section 30230.** 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.

- **Section 30231.** The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

For the entire California coast, except San Francisco Bay, the Coastal Commission implements the federal Coastal Zone Management Act (CZMA) of 1972. The Coastal Commission is responsible for reviewing proposed federal and federally authorized activities to assess their consistency with the approved state coastal management program. The Coastal Commission developed the California Coastal Management Program pursuant to the requirements of the CZMA. After NOAA approved the California Coastal Management Program in 1977, all federal activities affecting coastal zone resources became subject to the Coastal Commission's regulatory jurisdiction. A federal agency must conduct its activities (including federal development projects, permits and licenses, and assistance to state and local governments) in a manner consistent with the California Coastal Management Program. The process established to implement this requirement is called a "consistency determination" for federal activities and development projects and a "consistency certification" for federal permits, and licenses, and federal support to state and local agencies.

2.2.2 California Environmental Quality Act

The California Environmental Quality Act (CEQA) was chaptered in the PRC Sections 21000–21177 in 1970. CEQA applies to development projects that are funded by, or that require permit approval from, a public agency in the state of California. Its purpose is to help inform government decision makers of potential environmental impacts caused by development projects and to aid in the selection of potentially less environmentally destructive alternatives.

- Section 15380 formally defines the terms *species*, *endangered*, *rare*, and *threatened* as they pertain to CEQA.

- Section 15065 describes situations when a mandatory finding of significance will lead to an environmental impact report.

2.2.3 Porter-Cologne Water Quality Control Act of 1969

The Porter-Cologne Water Quality Control Act, passed in 1969, implements the CWA. It established the SWRCB and divided the state into nine regions, each overseen by a RWQCB. The SWRCB is the primary state agency responsible for protecting the quality of the state's surface and groundwater supplies, but much of its daily implementation authority is delegated to the nine RWQCBs, which are responsible for implementing CWA Sections 402 and 303(d). In general, the SWRCB manages both water rights and statewide regulation of water quality, while the RWQCBs focus exclusively on water quality in their regions.

2.2.3.1 Basin Plan Designated Beneficial Uses and Water Quality Objectives

Each RWQCB is guided by a basin plan which identifies designated beneficial uses of the surface water bodies and groundwater basins, water quality objectives to protect

beneficial uses, and implementation plans and policies for water quality protection. Basin plans are required to be updated every three years and provide the technical basis for permitting waste discharges with waste discharge requirements (WDR) and taking enforcement actions. The process of designating beneficial uses involves defining the resources, services, and qualities of the aquatic system that are the ultimate goals of protecting and achieving high water quality. The basin plans contain specific numeric surface water quality objectives for bacteria, dissolved oxygen (DO), pH, pesticides, electrical conductivity (EC), total dissolved solids (TDS), temperature, turbidity, and trace elements, as well as numerous narrative water quality objectives, that are applicable to certain water bodies or portions of water bodies. Receiving water bodies of each hatchery are further discussed in the "Environmental Setting" (Section 4.0).

2.2.3.2 Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California

In 1994, the SWRCB and EPA agreed to a coordinated approach for addressing priority toxic pollutants in inland surface waters, enclosed bays, and estuaries of California. In March 2000, the SWRCB adopted the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California, commonly referred to as the Statewide Implementation Plan, or SIP, for priority toxic pollutant water quality criteria contained in the California Toxics Rule (CTR). The EPA promulgated the CTR in May 2000. The SIP also implements National Toxics Rule (NTR) criteria and applicable priority pollutant objectives in the basin plans. The CTR and NTR and applicable basin plan objectives, existing RWQCB beneficial use designations, and the SIP together, compose water quality standards and implementation procedures for priority toxic pollutants in non-ocean surface waters in California.

2.2.3.3 State Water Resources Control Board Resolution No. 68-16 (Statement of Policy with Respect to Maintaining High Quality Waters in California)

The goal of SWRCB Resolution No. 68-16 ("Statement of Policy With Respect to Maintaining High Quality Waters in California") is to maintain high quality waters where they exist in the state. SWRCB Resolution No. 68-16 states, in part:

1) Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

2) Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which

will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained. The SWRCB has interpreted Resolution No. 68-16 to incorporate the federal antidegradation policy, which is applicable if a discharge that began after November 28, 1975, will lower existing surface water quality.

2.2.4 California Toxics Rule

As part of the CTR, the EPA has promulgated numeric water quality criteria for priority toxic pollutants and other provisions for water quality standards to be applied to waters in California. The EPA promulgated this rule based on the EPA administrator's determination that the numeric criteria are necessary in California to protect human health and the environment. The rule fills a gap in California water quality standards that was created in 1994, when a state court overturned the state's water quality control plans containing water quality criteria for priority toxic pollutants. Therefore, California was without numeric water quality criteria for many priority toxic pollutants as required by the CWA, necessitating this action by the EPA. These federal criteria are legally applicable in California for inland surface waters, enclosed bays, and estuaries under the CWA.

2.2.5 State of California Fish and Game Code

The California Constitution establishes the Fish and Game Commission (Commission) (California Constitution Article 4, Section 20). The California Fish and Game Code (FGC) delegates the power to the Commission to regulate the taking or possession of birds, mammals, fish, amphibian and reptiles (FGC Section 200). The Commission has adopted regulations setting forth the manner and method of the take of certain fish and wildlife in the California Code of Regulations (CCR), Title 14. The FGC establishes the Department (FGC Section 700) and states that the fish and wildlife resources of the state are held in trust for the people of the state by and through the Department (FGC Section 711.7(a)). All licenses, permits, tag reservations, and other entitlements for the take of fish and game authorized by the Commission are prepared and issued by the Department (FGC Section 1050 (a)). Provisions of the FGC provide special protection to certain enumerated species such as:

- Section 3503 protects eggs and nests of all birds.
- Section 3503.5 protects birds of prey and their nests.
- Section 3513 protects all birds covered under the federal MBTA.
- Section 3511 lists fully protected birds.
- Section 5515 lists fully protected fish species.

- Section 3800 defines non-game birds.
- Section 4700 lists fully protected mammals.
- Section 5050 lists fully protected amphibians and reptiles.

2.2.6 OREHP Statute

The OREHP was created by statute (FGC Section 6590 et. seq.) to conduct research on the artificial propagation and rearing of recreationally and commercially important marine finfish species south of Point Arguello. The OREHP currently focuses on white seabass (*Atractoscion nobilis*); however, the Department and the Ocean Resources Enhancement Advisory Panel (OREAP) may choose to culture other species at the hatchery and raise them to release size in the growout facilities. It should be noted that rearing of salmon, transgenics, and exotics is expressly prohibited under the OREHP.

2.2.7 California Endangered Species Act

The California Endangered Species Act (CESA) (FGC Sections 2050–2116) generally parallels the main provisions of the ESA (16 U.S. Code [USC] 1531–1544) and is administered by the Department. The CESA prohibits the "taking" of listed species except as otherwise provided in state law. Unlike the ESA, the CESA applies the take prohibitions to species under petition for listing (state candidates) in addition to listed species. Section 86 of the FGC defines *take* as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." Section 2081 of the FGC expressly allows the Department to authorize the incidental take of endangered, threatened, and candidate species if all of the following conditions are met.

- The take is incidental to an otherwise lawful activity.
- The impacts of the authorized take are minimized and fully mitigated.
- Issuance of the permit will not jeopardize the continued existence of the species.
- The permit is consistent with any regulations adopted in accordance with Sections 2112 and 2114 (legislature-funded recovery strategy pilot programs in the affected area).
- The applicant ensures that adequate funding is provided for implementing mitigation measures and monitoring compliance with these measures and their effectiveness.

The CESA provides that if a person obtains an incidental take permit under specified provisions of the ESA for species also listed under the CESA, no further authorization is

necessary under CESA if the federal permit satisfies all the requirements of CESA and the person follows specified steps (CFGC section 2080.1).

2.2.8 Natural Community Conservation Planning Act

The Natural Community Conservation Planning (NCCP) Act (FGC Sections 2800-2835) establishes a statewide program for the development of broad-based regional conservation plans. The goals of the NCCP Act are to "provide for effective protection and conservation of the State's wildlife heritage while continuing to allow appropriate development and growth "(FGC Section 2801). The NCCP Program is administered by the Department, and is a voluntary collaborative planning effort between the Department, and other state, federal, and local governments, property owners, developers and environmental groups. NCCP plans seek to conserve ecosystems and their associated species. Some of the conserved species are currently listed as threatened or endangered, but others are considered sensitive species that are not yet listed, but may be so in the future.

2.3 Special-Status Species

2.3.1 Regulatory Classification of Special-Status Species

This section lists those special-status species potentially affected by the proposed project. This list includes all species that have been specifically identified by USFWS, NMFS, or the Department as warranting some level of protection from human impacts. The following terms are used by state and federal agencies to designate special-status species. The terms are ranked approximately from the most to the least protective designation.

1) Fully protected (FP): species designated as fully protected under FGC Sections 3511, 4700, 5050, or 5515. FP species may not be taken at any time unless authorized by the Department for necessary scientific research, which cannot include actions for project mitigation. Necessary scientific research includes efforts to recover fully protected, endangered, and threatened species. A notification must be published in the California Regulatory Notice Register prior to the Department authorizing take of fully protected species.

2) Federal endangered (FE): species designated as endangered under the ESA (described above). An FE species is one that is in danger of extinction throughout all or a significant portion of its range. Incidental take of any individual of an FE species is prohibited except with prior authorization from USFWS or NMFS (most ESA-listed species are within USFWS jurisdiction, but some marine species, including all Pacific salmon and steelhead, are regulated by NMFS).

3) State endangered (SE): species designated as endangered under the CESA (described above). These include native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease (CESA Section 2062). Take, as defined by FGC Section 86, of any State endangered species is prohibited unless authorized in the form of a State Incidental take permit pursuant to FGC Section 2081 or other mechanisms specified in FGC Sections 2080-2089.

4) Federal threatened (FT): species designated as threatened under the ESA (described above). An FT species is one that is likely to become endangered in the foreseeable future throughout all or a significant portion of its range. At the discretion of USFWS or NMFS, incidental take of any individual of an FT species may be prohibited or restricted.

5) State threatened (ST): species designated as threatened under the CESA (described above). These include native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of special protection and management efforts (CESA Section 2067). Take, as defined by FGC Section 86, of any State threatened species is prohibited unless authorized in the form of a State Incidental take permit pursuant to FGC Section 2081 or other mechanisms specified in FGC Sections 2080 2089.

6) State candidate (SC): species designated as candidates for listing under the CESA (described above). These are native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that the Commission has formally noticed as being under review by the Department for addition to either the list of endangered species or the list of threatened species, or a species for which the Commission has published a notice of proposed regulation to add the species to either list (CESA Section 2068). Take, as defined by FGC Section 86, of any State candidate species is prohibited unless authorized in the form of a State Incidental take permit pursuant to FGC Section 2081 or other mechanisms specified in FGC Sections 2080–2089.

7) Species of special concern (SSC): a species, subspecies, or distinct population of a vertebrate animal native to California that has been determined by the Department to warrant protection and management intended to reduce the need to give the species formal protection as an SE, ST, or SC species. “Species of special concern” is an administrative designation and carries no formal legal status. However, Section 15380 of the State CEQA Guidelines clearly indicates that species of special concern should be included in an analysis of project impacts if they can be shown to meet the criteria of sensitivity outlined therein.

8) Federal proposed (FP): species that have been proposed by USFWS or NMFS for listing as endangered or threatened under the ESA. FP species must be evaluated in the Section 7 consultation for any federal action (described above under "Endangered Species Act Section 7") and are normally evaluated in any CEQA review of any action that may affect the species.

9) Federal candidate (FC): species that are candidates for listing as endangered or threatened under the ESA. Such species have not yet been proposed for listing. Consideration of FC species can assist environmental planning efforts by providing advance notice of potential listings, allowing resource managers to alleviate threats and thereby possibly remove the need to list species as endangered or threatened. Thus, FC species are normally evaluated in the CEQA review of any action that may affect the species.

10) Federal species of concern (FSoC): "Species of concern" are not defined or mentioned in the ESA, but some offices of both NMFS and USFWS use this term to describe special status species that have not been designated under any of the formal federal status terms described above. Usually these are species for which the agency (NMFS or USFWS) has some concerns about status or threats, but for which there are insufficient data to indicate that the species warrants treatment as a candidate for listing.

11) Designated critical habitat and recovery plans: Many FE and FT species have designated critical habitat or approved recovery plans, or both. Federal regulations prohibit actions that would destroy or adversely modify designated critical habitat. One reason for designation of critical habitat is that, although such habitat may not be currently occupied, it is essential in order to achieve recovery of these species. Accordingly, for these species, the species' range is assumed to include the known range of the species plus any additional areas of designated critical habitat. Accordingly, the proposed project is assessed with reference to the question of whether it may interfere with the implementation of recovery plans.

2.3.2 Relevant Special-Status Species

Listings of special-status species known to be present at the growout pen locations and area adjacent to the hatchery, is included in Appendix E. This list was obtained from the California Natural Diversity Database and listing of special status species produced by the Department.

3.0 Project Description

This section describes the management and operational plans as well as the activities and facilities that comprise the Ocean Resources Enhancement and Hatchery Program (OREHP). This section is intended to only summarize the various project activities and procedures that have been described in great detail in management and operational plans that are contained in the Appendices to this Initial Study Negative Declaration (ND). These plans include: The Comprehensive Hatchery Plan (CHP) For Operation of the Leon Raymond Hubbard, Jr. Marine Fish Hatchery in Carlsbad California, 2nd Edition, 2007; Procedures Manual For Growout and Release of White Seabass (*Atractoscion noblis*) as Part of the Ocean Resources Enhancement and Hatchery Program, 2nd Edition 2007 (GPM); The White Seabass Enhancement Plan; Final White Seabass Fisheries Management Plan, April 2002; and A Contemporary Plan for Managing White Seabass Broodstock and Production Cohorts for the OREHP, January 2011. In addition, preliminary CEQA analysis was conducted by the Carlsbad Hatchery and the OREHP, and this information was used as a source for this ND (MRS 2008).

3.1 Plans, Procedures and Best Management Practices that Guide the Ocean Resources Enhancement and Hatchery Program

3.1.1 White Seabass Fishery Management Plan (WSFMP)

The WSFMP provides the overall framework for managing and restoring white seabass within California State Waters. The WSFMP was adopted by the Commission on April 2, 2002. The WSFMP provides information on distribution, genetic stock structure, migration, age and growth, reproduction and fecundity, natural mortality, parasites and diseases, predator and prey relationships, competition, habitat and the status of white seabass stocks. The WSFMP then explores the various anthropogenic activities and biological factors that may impact white seabass populations, and proposes guidelines for managing the take of white seabass in both the commercial and recreational fisheries. The WSFMP also contains California Environmental Quality Act (CEQA)-equivalent information and, where relevant, this information has been incorporated into this ND. In addition to restrictions in recreational and commercial take of white seabass, the WSFMP recognizes the importance of the OREHP relevant to the need to increase white seabass populations in the wild possibly through captive culture and release of white seabass. A copy of the WSFMP plan is included (see Appendix G) and is incorporated by reference into this document.

3.1.2 White Seabass Enhancement Plan (WSEP)

This plan guides the operation of the OREHP and comprises a significant part of the project being proposed by the Department under CEQA. This plan was approved by the Commission on October 21, 2010. The direct and indirect adverse physical impacts that may be produced by the implementation of this plan at the hatchery and growout pens are the subject of the current Initial Study and negative declaration (ND). Relevant

information from this plan will be summarized in the ND. The complete WSEP is included in this ND (See Appendix H). The WSEP contains:

- background and biological information on white seabass;
- information on the white seabass fishery;
- detailed information on the operations of the white seabass hatchery and growout pens;
- information on the OREHP's Fish Health Management Program;
- a description of the permits required for the operation of the hatchery and growout pens;
- a description of the environmental monitoring program for the growout pens;
- an overview of population genetic issues related to the culture of white seabass;
- information on juvenile and adult sampling that will be used to assess the proportion of hatchery raised fish in wild populations; and
- information on other methods that will be used to evaluate the OREHP.

Portions of the WSEP were taken from the specific operational plans for the hatchery and growout pens, which are summarized below and included in this ND (See Appendix A and Appendix B).

3.1.3 The Comprehensive Hatchery Plan (CHP) For Operation of the Leon Raymond Hubbard, Jr. Marine Fish Hatchery in Carlsbad California

The CHP describes the particular facilities and activities that occur at the hatchery. Detailed information from this plan will be reprinted below as appropriate. Information from the CHP was also incorporated into the WSEP. The CHP is included in the ND (See Appendix A).

3.1.4 Procedures Manual For Growout and Release of White Seabass (*Atractoscion noblis*) as Part of the Ocean Resources Enhancement and Hatchery Program

This manual describes the procedures used by volunteer groups for the construction and operation of white seabass growout pens. Information from this operation manual has been incorporated into the WSEP. This operation manual is included in this ND (See Appendix B). The operations manual requires reporting of any mammal or bird and pen interactions. Copies of all reports for all pens have been reviewed and the results of this review are reflected in this ND.

3.2 Carlsbad Hatchery Operations and Best Management Practices

3.2.1 Site Map and General Description

The Carlsbad Hatchery is located north of San Diego at 33.145°N latitude and 117.3393°W longitude (Figure 3-1). It is located on a 2.7 ha (6.6 ac) parcel of land originally owned by San Diego Gas and Electric but subsequently purchased by Cabrillo Power. Of the total parcel, approximately 1.3 ha (3.2 ac) is leased to Hubbs-SeaWorld Research Institute (HSWRI). The hatchery is located adjacent to Agua Hedionda Lagoon.

3.2.2 Hatchery Layout and Primary Components

The hatchery facility consists of a main hatchery building and outdoor raceway area that are interconnected by a seawater supply and drainage system (Figure 3-2). The main hatchery building is approximately 2,000 m^2 (22,000 ft^2) and the raceway area is approximately 700 m^2 (7,500 ft^2).

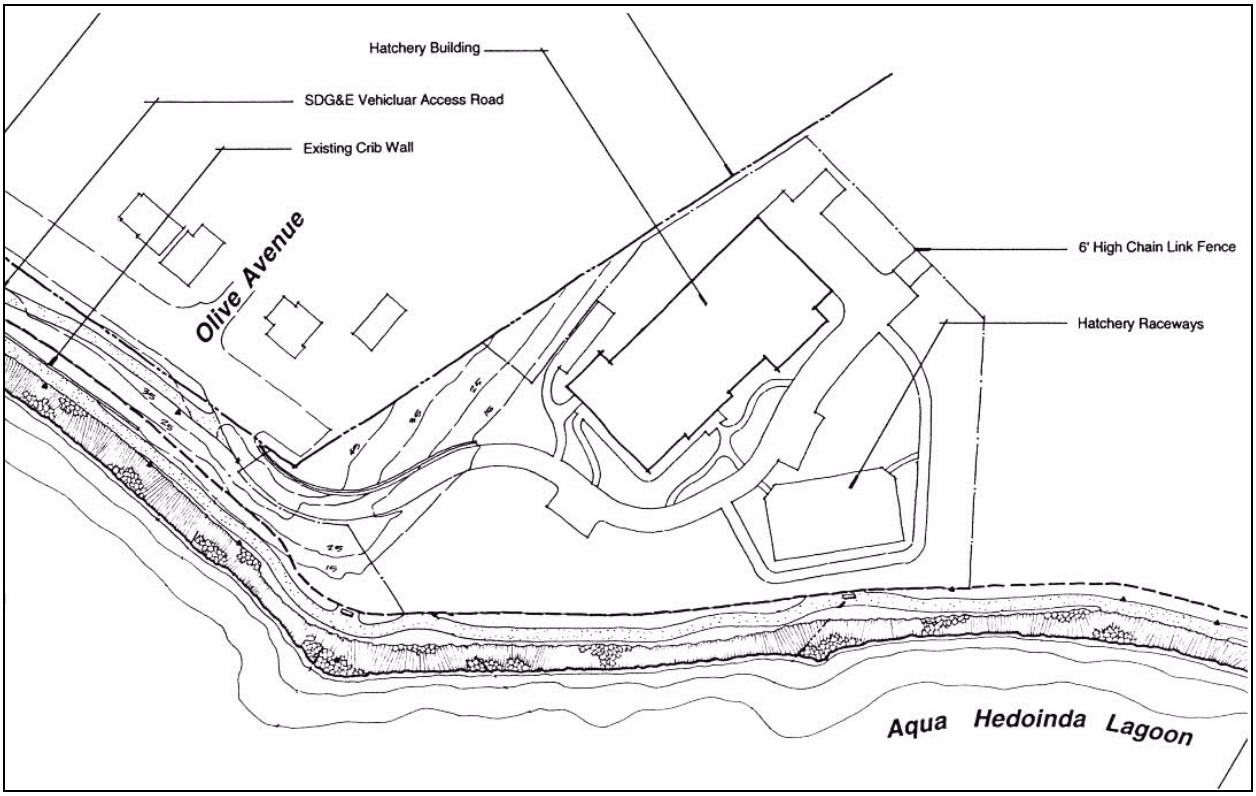
Internally, the hatchery is compartmentalized into specific areas to support the fish culture research program. These areas are shown in Figure 3-3 and discussed briefly in the following section.

Figure 3-1 Aerial photographs of Carlsbad Hatchery and its geographic location.

3.2.2.1 Broodstock Holding

Breeding pools for white seabass are located directly along the back wall of the hatchery as you enter the building. Four white seabass pools measuring 6.1 m (20.0 ft) in diameter occupy the majority of space. A fifth broodstock pool was installed in 2009 and will be used initially to support existing brood fish so the original systems can be upgraded. When all the pools have been upgraded, the fifth pool will serve as a reserve pool that can hold new stock until they are needed in the rotation schedule. Each white seabass breeding pool is recirculated independently from the others. For biosecurity purposes, the make-up water (water used to replace water in the hatchery's four major recirculating systems) supplied to these breeding pools is ozonated. The breeding pools are important in that they are the source of eggs used to initiate the culture process.

Figure 3-2 Site plan of Carlsbad Hatchery site showing main hatchery building and outdoor raceway area.



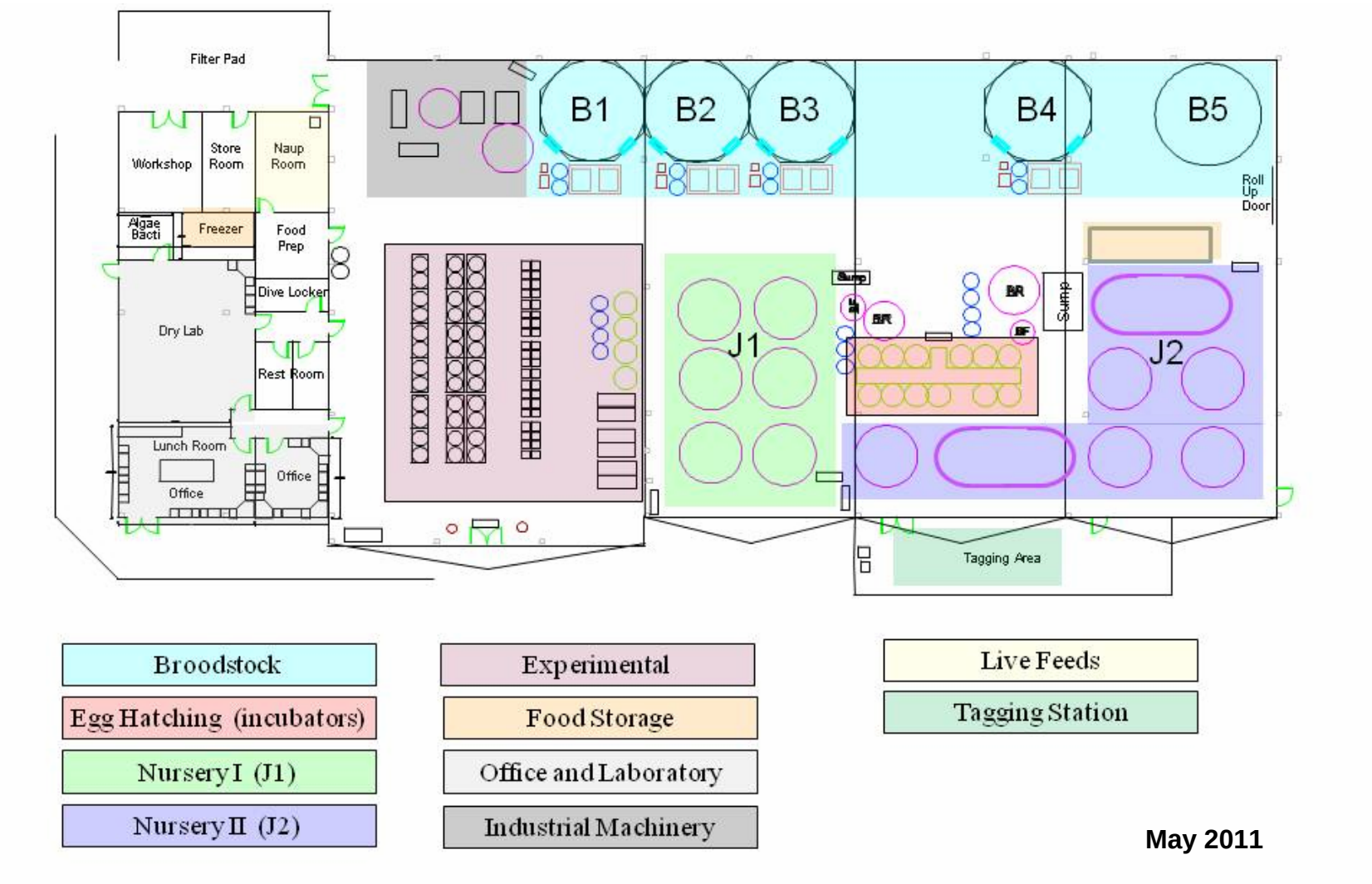
3.2.2.2 Egg Hatching

The egg hatching area is centrally located to facilitate the transfer of eggs from breeding pools, and subsequently to transfer the larvae into the juvenile rearing pools. The egg hatching system consists of twelve 1,650 L (436 gal) rearing vessels that are maintained on one recirculating system. For biosecurity purposes, the make-up water supplied to this incubator system is ozonated. The egg hatching system is particularly important to the culture process because the larvae are undergoing major developmental changes and are extremely sensitive and vulnerable to stressors.

3.2.2.3 Larval Rearing (Nursery I)

The Nursery I system is located adjacent to the egg hatching system to facilitate the transfer of larvae. The Nursery I system consists of six 7,000 L (1,850 gal) rearing vessels that are maintained on one recirculating system. For biosecurity purposes, the make-up water supplied to this Nursery I system is ozonated. During the Nursery I stage, the fish undergo metamorphosis to juveniles and are simultaneously weaned from live to artificial feeds.

Figure 3-3 Color-coded floor plan of Carlsbad Hatchery showing various culture and infrastructure support areas.



3.2.2.4 Juvenile Rearing (Nursery II)

The Nursery II system is adjacent to the Nursery I system to facilitate the transfer of juveniles from Nursery I to Nursery II. The Nursery II system consists of four circular 7,000 L (1,850 gal) and two 19,000 L (5,020 gal) oval rearing vessels that are maintained on one recirculating system. For biosecurity purposes, the make-up water supplied to this Nursery II system is ozonated. The Nursery II stage is generally straight-forward because the juveniles are fully metamorphosed and weaned onto dry feeds.

3.2.2.5 Live Food Production

Live zooplankton is used to feed the larval fish, and algae are often used to produce the live zooplankton. The live food production areas in the main hatchery building accommodate vessels for hatching and increasing the nutritional value (enriching)of *Artemia* and rotifers. *Artemia* are the principle live food used at the hatchery. *Artemia* are hatched at temperatures of 28°C (82°F), so an insulated room was purpose-built for this important culture area.

3.2.2.6 Experimental Area

Because one of the primary objectives of the OREHP is to continue to refine culture techniques for species of interest, an area in the main hatchery building is set aside for conducting controlled, replicated experiments. The experimental area contains a variety of culture vessels ranging from 60 to 800 L (16 to 211 gal) in size and arranged in replicates. Most of these systems are on a flow through water supply with the ability to control water temperature. Over the years, research has been conducted in a variety of specialty areas but the primary focus has been nutrition and physiology of different life stages of white seabass and other endemic species of interest. Research conducted on species other than white seabass at the hatchery is approved on a case-by-case basis by the Department. Because the experimental area is isolated from the main production area, biosecurity measures are relatively easy to implement.

3.2.2.7 Food Storage

Proper food storage is critical to any animal husbandry operation. A walk-in freezer is located adjacent to the food preparation room in the hatchery building. This freezer is used to store fish feeds that require cold storage, such as fresh fish and shellfish for the broodstock, and *mysis* shrimp for larvae. Pelleted feeds are stored in a fully-sealed storage container that prevents vermin from accessing the food. A combination air conditioner and dehumidifier unit is built into the storage container to keep the contents cool and dry.

3.2.2.8 Laboratory and Office

Laboratory and office support facilities are built into the left wing of the hatchery building. A dry laboratory is used to support disease diagnostic work, water quality testing, mixing of chemicals, specimen storage and other general research needs. Equipment in the laboratory includes various microscopes, balances, and freezers, as

well as a dryer, centrifuge, autoclave and fume hood. Office space is provided to staff for managing data and writing reports.

3.2.2.9 Industrial Machinery

Large culture support equipment such as a boiler, chillers, and an emergency generator are maintained in one area of the hatchery to facilitate their maintenance.

3.2.3 Seawater Treatment Processes

Treatment processes for the Carlsbad Hatchery are shown in Figure 3-4. Seawater is pumped directly from Agua Hedionda Lagoon, with 50 to 100 percent passing through rapid sand filters (Zone 1). Seawater then enters one of two types of rearing units – flow-through (Zone 2) or recirculating (Zone 4), before being discharged back into the lagoon.

3.2.3.1 Zone 1 –Primary Sand Filtration

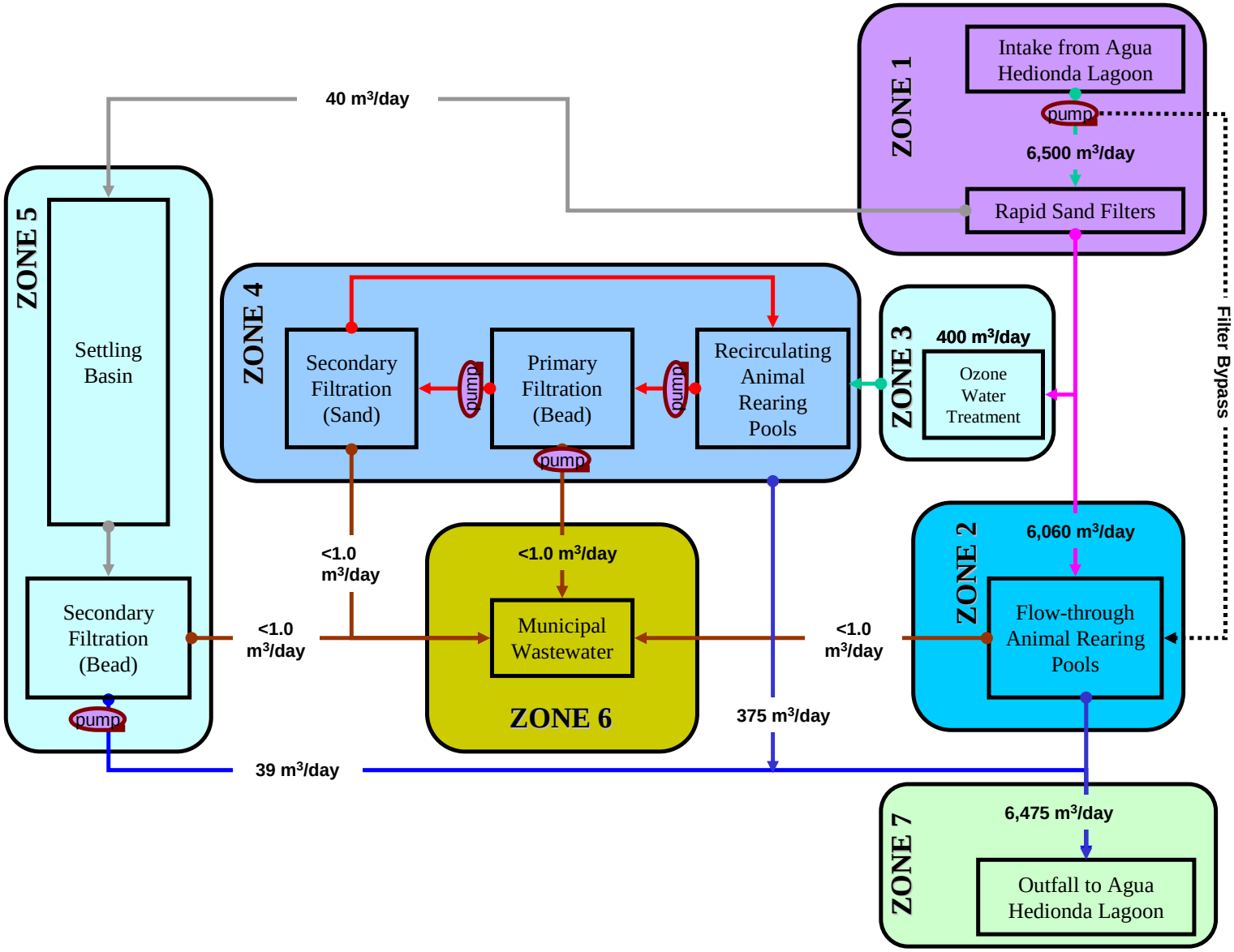
Seawater is pumped directly from outer Agua Hedionda Lagoon at a rate of 6,500 m^3/day (229,545 ft^3/day) (Figure 3-4). The majority of water (50 to 100 percent) is passed through rapid sand filters for particulate removal. Young, sensitive life stages are always given filtered water; older juveniles do not require the water to be filtered. The main sand filters backwash automatically (at a rate of 2,270 L per minute [Lpm] [600 gal per minute]) when flow rates decrease because of fouling. Backwash frequency is affected mainly by environmental conditions – storm and dredging activities result in higher backwash frequencies.

Historically, the main sand filters were backwashed to the municipal sewer but this was discontinued in 2001 due to the high total dissolved solids (TDS) levels associated with seawater and the high volume of discharge. Backwash water from the primary sand filters is now re-treated by settling and re-filtering (Zone 5) before being discharged to the lagoon.

3.2.3.2 Zone 2 –Single Pass Systems

Flow-through or single pass rearing systems require a continuous, high-volume supply of seawater in order to maintain good water quality standards (sufficient oxygen and low ammonia). The dimensions of the raceways in this zone (2.7 x 11.8 x 0.7 m [8.8 x 38.7 x 2.3 ft] deep) and the relatively limited water available (380 Lpm [100 gal per minute] each) result in low current velocities (0.6 cm/sec [0.2 in./sec]) that promote settling of suspended solids (Figure 3-4). Settled material, including detrital material, is siphoned daily from these systems, concentrated using fine screen filters, and rinsed into the municipal sewer system (Zone 6).

Figure 3-4 Process flow diagram for hatchery seawater supply and discharge.



3.2.3.3 Zone 3 –Ozone System

An ozone system is used to sterilize all make-up water supplied to the recirculation systems in Zone 4. This system is a key component to the bio-security program. It provides high-quality water to extremely valuable life stages such as broodstock, sensitive life stages such as larvae, as well as the live feeds that are provided to the larvae.

3.2.3.4 Zone 4 –Recirculation Systems

Recirculating seawater systems use a series of filters, skimmers, and sterilizers to maintain high water quality standards. Water from the pools is pumped through a bead filter to effectively remove detrital material from the water. The water then passes through a floating media filter where ammonia is converted to nitrate (biological filtration). A foam fractionator is used to remove protein residue from the water. Sand filters are used for final polishing before water passes through a UV sterilizer and is returned to the pools. The primary detrital material collected and concentrated by the bead and screen filters is discharged to the municipal sewage system (Zone 6).

3.2.3.5 Zone 5 –Backwash Effluent

Backwash effluent from the primary sand filters is re-treated before being discharged to the Lagoon. First, it is allowed to settle for at least one hour in an 11 m^3 (388 ft^3) settling basin. Once the settling period is complete, the seawater is pumped through a bead filter (model PBF5) and discharged at a low flow rate (95 Lpm) into the main hatchery effluent (Zone 7). The rate of discharge from the settling basin is only 4 percent of that entering the basin from the main sand filters, so the instantaneous dilution is much greater than it would be if the primary sand filters (Zone 1) were backwashed directly into the main effluent stream.

3.2.3.6 Zone 6 –Municipal Sewer

As described in the treatment processes above, concentrated fish wastes (from Zones 2, 4 and 5) are discharged to the municipal sewer system using relatively small volumes of saltwater and/or freshwater.

3.2.3.7 Zone 7 –Effluent Discharge

As a result of the treatment processes described above and the biological (non-industrial) nature of the operation, the effluent discharged is of a similar quality to that of the natural lagoon water drawn into the facility. The characteristics of the effluent in relation to the influent are monitored under a National Pollution Discharge Elimination System (NPDES) Monitoring and Reporting Program, which is described below.

3.2.4 Monitoring and Control of Life Support Systems

The hatchery seawater system and life support components are monitored continuously by a sophisticated, main computer control system (MCCS). Automated valves control filter backwashing and temperature control processes. Alarm points can be set to indicate low water or air flow, as well as temperature variances. Information is transmitted by pager to multiple hatchery personnel.

A 225 kW emergency generator, portable gas-powered water and air pumps and a pure oxygen delivery system are all available for use in emergency situations. The potential for catastrophic loses is further mitigated by holding captive broodstock in one or more offsite locations, including SeaWorld of San Diego.

3.2.5 Operating Permits, Best Management Practices and Monitoring Programs

3.2.5.1 United States Department of Agriculture (USDA)

The hatchery is operated as an Animal Research Center as defined and regulated by USDA standards. Animal husbandry methods are reviewed annually according to the standards established by the Guide for the Care and Use of Laboratory Animals (ILAR 1996).

3.2.5.2 Municipal Wastewater Discharge

From 1995 to 2001, the Carlsbad Hatchery operated under a discharge-waiver from the Encina Wastewater Authority (EWA), which allowed the hatchery to discharge saltwater backwash effluent to the municipal sewer system. In 2001, the EWA modified its policies in an effort to reclaim more of its water. As part of this process, the EWA restricted the amount of seawater that the hatchery could discharge, which required them to develop a secondary treatment system (Zone 5). During this transition phase, the EWA issued a formal permit and implemented a mandatory monitoring program. An example of the monthly monitoring and reporting requirements is given in Appendix A. In 2003, after collecting sufficient data to demonstrate the effectiveness of the secondary treatment system, the EWA classified the hatchery as a “non-significant wastewater discharger” and converted the formal monitoring program to a BMPs program. Currently, the hatchery has not been given a discharge limit by the EWA; however, the hatchery, on average, discharges 21,200 L (5,600 gal) per day.

3.2.5.3 National Pollution Discharge Elimination System

From 1995 to 2001, the Carlsbad Hatchery operated under a discharge-waiver from the California Regional Water quality Control Board, San Diego Region (Regional Water Board) because fish production levels did not meet their criteria for a concentrated aquatic animal holding facility. Although the facility did not require an NPDES permit, HSWRI was required to monitor various parameters of the seawater influent and effluent sources. As a result of the modifications to the wastewater treatment process

described above, HSWRI was required to obtain an NPDES permit in 2001 and a new monitoring program was implemented.

The NPDES monitoring program was intended to:

1. Document short-term and long-term effects of the discharge on receiving waters, sediments, biota, and beneficial uses of the receiving waters.

2. Determine compliance with NPDES permit terms and conditions.

3. Be used to determine compliance with water quality objectives.

4. Determine if water-quality based effluent limits are necessary pursuant to the Policy and California Toxics Rule (CTR), 40 CFR 131.38.

On December 16, 2009, the Regional Water Board rescinded the NPDES permit for the Carlsbad Hatchery because the facility produces less than 45,454 harvest weight kilograms (100,209 lb) of aquatic animals per year and does not meet the definition of a concentrated aquatic animal production (CAAP) facility. HSWRI, however, must continue monitoring and reporting of the intake and effluent flow volumes and pollutant levels at the hatchery (See Appendix M for monitoring and reporting requirements).

As part of its Conditional Use Permit with the City of Carlsbad, HSWRI developed an approved Storm Water Management Plan (SWMP) in 2004, which was revised in March 2011. This SWMP describes the Carlsbad Hatchery and its operations, identifies potential sources of storm water pollution at the facility, identifies current source control and treatment control BMPs and provides for periodic review of the SWMP.

The objectives of the SWMP are to:

1. Identify sources of storm water and non-storm water contamination to the storm water drainage system;

2. Identify and prescribe appropriate "source area control" type BMPs designed to prevent storm water contamination from occurring;

3. Identify and prescribe "storm water treatment" type BMPs to reduce pollutants in contaminated storm water prior to discharge;

4. Prescribe actions needed either to control non-storm water discharges or to remove these discharges from the storm drainage system; and

5. Prescribe an implementation schedule to ensure that the storm water management actions described in this plan are carried out and evaluated on a regular basis.

Possible sources of storm water contamination include parking lot area accumulating oil and grease from vehicles, trash, and sediments. However, staff keeps the area free of

trash and debris and clears gutters of sediment, should any collect. In addition, the parking lot and access road runoff collects into vegetated swales and a detention basin before entering the storm drain system. Another source of pollution is the handling site where material is loaded and unloaded. Materials such as organic fish food, chlorine, and office supplies are received here. The probability of a release of pollutants in this area is low because materials are immediately stored inside in spill containment bins. In addition, chlorine is shipped in sealed drums. The trash disposal area is a source of pollutants due to trash being transported into the storm drain system by wind, rain, or birds. The trash dumpsters at the site are covered and enclosed by a masonry wall, therefore reducing the risk of debris entering the storm drain system. Lastly, the chemical storage areas pose a risk to storm water quality due to the possibility of spillage. The three storage areas are the raceway, the main building and the outside storage area at the northwest corner of the main building. These three areas contain sealed 208 L (55 gal) drums that are also in spill containment bins.

The non-storm water discharges for this site are seawater effluent and landscape irrigation. The seawater effluent is monitored by the Regional Water Board Investigative Order No. 2009-0177 (Appendix M). Existing landscaping is well established and maintained on a regular basis. Landscaping was designed to require a minimum amount of irrigation due to the inclusion of drought-resistant species of plants.

3.2.5.4 Chemical Storage

Chemical use and storage protocols are well established and integrated into each of the operating permits described above. A list of chemicals, their application and storage is presented in Appendix F (Hazards/Hazardous Materials). Material Safety Chemical Sheets (MSDS) for all chemicals are available on site.

3.2.6 Biosecurity

Biosecurity is a Best Management Practice that encompasses quarantine, disinfection, and disease treatment, prevention, and control. All aspects of biosecurity and veterinary care for the OREHP are reviewed regularly (at least bi-annually) by the HSWRI Fish Health Management Team (FHMT) and the HSWRI Institutional Animal Care and Use Committee (IACUC) as noted in the CHP. The FHMT includes a Department fish pathologist, the HSWRI attending veterinarian, a research veterinarian who chairs the IACUC, the principal investigator for the OREHP, the Carlsbad Hatchery operations manager, the program manager for aquaculture facilities at the HSWRI Mission Bay site, and the HSWRI safety officer. Biosecurity for the Carlsbad Hatchery, and the OREHP, is dependent on: 1) the equipment and systems within the hatchery; 2) the protocols and procedures used by hatchery personnel; 3) proper training of hatchery personnel; and 4) organization and coordination by personnel.

3.2.6.1 Hatchery Equipment Layout and System Compartmentalization

Proper location and installation of fish rearing facilities can greatly simplify quarantine and disinfection, and help prevent disease spread. Assessing traffic patterns (for

people, fish, and equipment), along with appropriate positioning of cleaning and disinfection stations, are key elements of overall biosecurity. Traffic patterns are important to evaluate because almost anything can act as a disease vector or fomite[1] – especially in the damp environs of a hatchery where pathogens can survive for extended periods of time on wet hands, boots, and equipment. Knowing traffic patterns allows disinfection stations to be positioned at key locations where they have the greatest chance of intercepting pathogens, thus limiting spread.

Another key concept to minimizing disease spread is compartmentalization. Compartmentalization is separation of different fish species and different age groups within a species. Separation is accomplished by both physically separating pools and equipment, and by having separate recirculating systems for different species and age groups. Separation is beneficial because different species and age groups carry different pathogens, have different pathogen loads, and have differing disease susceptibilities. The Carlsbad Hatchery has already done much in the way of compartmentalization, having four separate recirculating systems: the adult broodstock pools; the egg hatching and early larval phase (incubators); the Nursery I system; and the Nursery II system. In addition, older juvenile and subadult fish are housed outside the main hatchery building in the eight flow-through raceways in the raceway culture area. Physical barriers are used to help to eliminate short-cuts and minimize the number of people avoiding designated pathways and footbaths.

Compartmentalization is enhanced by having dedicated supplies and equipment for specific systems or pools. If a particular system or pool has a set of equipment and supplies that are used just for that system, then opportunities for disease transfer are greatly reduced. Ensuring that pieces of equipment stay with a particular pool or system can be enhanced by the use of color coding. Color coding is preferable to simple labeling (i.e., with letters and numbers) because colors can quickly and easily be matched with a given pool or system. Ideally, each of the five major systems (broodstock, incubators, Nursery I [J1], Nursery II [J2], and raceway) at the hatchery should have a different base color (e.g., red for the broodstock system, blue for the incubators, etc.). Equipment for different pools, within a given system, should be designated by secondary color (e.g., nets for broodstock tent 2 would have a thick red band – indicating the broodstock system –and then a thinner white band – indicating the pool). Color coding has the added benefit of reducing the need for disinfection. The implementation of color coding and compartmentalization are ongoing processes at the hatchery.

3.2.6.2 Water Treatment and Sterilization

Maintenance of overall water quality (high dissolved oxygen, neutral pH, low ammonia, nitrite, and nitrate) will do much to keep fish healthy (by keeping stress levels low), but additional water treatments can serve to further enhance biosecurity. Ultraviolet (UV) sterilizers are commonly used by commercial and private aquaculture operations, and

[1] A fomite is any inanimate object or substance capable of carrying infectious organisms (such as germs or parasites) and hence transferring them from one individual to another.

the Carlsbad Hatchery makes use of them on all of their recirculating systems. UV sterilizers kill a variety of unicellular and multicellular pathogens. Kill rates, however, can vary greatly depending on the number of bulbs in use, bulb wattage and age, flow rates, and level of suspended particulates.

To augment UV sterilizers, the hatchery installed an ozone treatment system for all "make-up water" in the spring of 2003. "Make-up water" originates as untreated lagoon water and is used to replace the small amount (5 to 10 percent) of recirculating water that is discarded on a daily basis to help keep organic waste (i.e., ammonia, nitrite, nitrate) at acceptable levels. The ozone treatment system was installed to sterilize the water – killing almost all viral, bacterial, and protozoal pathogens – and has the added benefit of neutralizing many complex organic compounds.

3.2.6.3 Equipment and System Disinfection

Sodium hypochlorite (bleach) is used on a routine basis to sterilize equipment, and to periodically treat entire recirculating systems. The main hatchery building has always had a large (1,000+ L) central sterilization bath – together with a thiosulfate neutralization rinse – for disinfection of equipment. In 2004, the hatchery added two large, semi-permanent bleach and thiosulfate baths to the raceway building in order to minimize the risk of pathogen transfer back into the main building. Flushing of entire recirculating systems, between different spawn groups, with dilute sodium hypochlorite has also become standard practice following disease outbreaks, to help prevent or minimize the risk of disease spread between different age groups of white seabass.

Another simple technique to minimize the risk of pathogen spread is to flush, clean, and dry pools and raceways when not in use. Cleaning and drying pools and raceways will kill the majority of free-living opportunistic pathogens and those obligate pathogens which can survive for short periods of time without a host.

The same techniques are used for equipment when disinfection baths are unavailable or unsuitable (e.g., truck beds, long sections of pipe). Freshwater rinsing, combined with complete drying in the sun (i.e., using natural UV irradiation) is an effective disease-prevention technique for equipment and supplies that have been used at locations outside the hatchery. Net pen sites are exposed to potential pathogens in the water from free-ranging fish and therefore may serve as a potential source for introducing disease back into the hatchery. Therefore, any equipment – boots, nets, coveralls, buckets, scales, etc. – used at net pens or any other site outside the hatchery is considered contaminated, and is treated as such.

Dilute or "tamed" iodine solutions are used in footbaths to minimize the risk of pathogen spread via contaminated footwear. Footbaths have been installed at the main entrance to the hatchery, between major recirculating systems, and at the entrance to the raceway building. These footbaths are permanent fixtures and are used by everyone at the hatchery – including all visitors. People with non-waterproof footwear are provided with boots or plastic shoe covers so that they can also use the footbaths. Iodine solutions are refreshed or changed on a regular basis, following manufacturer's

instructions, to ensure that they retain their potency. Used dilute iodine solutions are disposed of via the municipal sewer.

Disinfection of hard surfaces (e.g., counters and floors) is routinely done when fish are brought into the dry lab for examination or sample collection. The dry lab is a high traffic area, so consistent disinfection is necessary and routine. Disinfection can be accomplished with commercial Lysol® (dimethyl benzyl ammonium saccharinate and ethanol) sprays, 100 percent ethanol, or "tamed" iodine solutions.

Hand washing and glove use are essential components of good biosecurity. Vinyl or latex gloves are used when working with a particular system or pool, and then discarded when leaving that system or pool. The same goes for equipment and supplies; "new" (disinfected and preferably dry) equipment is used when switching pools or systems. If personnel are participating in some activity which requires them to submerse their hands below wrist level, then glove use is optional (as gloves will simply fill with water), but hands must be washed thoroughly both prior to the action, and again before moving on to a new pool or system.

Hand washing must be thorough, although the use of antibiotic soap is not necessary as it may promote antibiotic resistance. The most important things are the volume of water used and the duration of hand washing (the 'contact time' for soap and water). All soap residue is rinsed off and the use of creams and lotions are discouraged while working – some contain water-soluble components that are toxic to larval fish. Special attention is given to fingernails as these are common sites of pathogen sequestration.

3.2.6.4 Quarantine

Quarantine is part of the first line of defense in the prevention of disease outbreaks at the hatchery. All new arrivals are assumed to carry lethal pathogens and are quarantined. Ideally, quarantine facilities should be completely separate from the main hatchery building. Whenever possible, the initial quarantine is conducted at another facility. For white seabass broodstock, holding facilities at SeaWorld and Santa Catalina Island offer some opportunities for an initial quarantine, although a secondary quarantine protocol is initiated at the hatchery to control for secondary infections that may be caused by handling stress.

Quarantine protocols at the hatchery require that the fish are isolated as much as possible, both physically and via systems with separate water sources. New fish are never placed on a recirculating system already serving resident hatchery fish. Whenever possible, quarantined pools have a "buffer zone" of empty pools, or dead space, between resident fish and the new arrivals. The desired buffer zone is large enough that established hatchery systems are not contaminated from any drips, overflows, or splashes. Quarantine pools are "flow-through" pools on ambient lagoon water, to prevent cross-contamination of existing systems.

Quarantine is set for a minimum of 3 weeks, but a 6 to 8 week quarantine period is more usual. Longer quarantine periods give diseases time to manifest themselves

before new fish are mixed with the general population. Examination of incoming fish suggests that most or all wild fish carry parasites, and, therefore, quarantined fish are treated immediately with hydrogen peroxide (H_2O_2), following guidelines established by the U.S. Food and Drug Administration's Center for Veterinary Medicine (FDA-CVM) for food fish and under veterinary supervision. Baseline treatment is a static bath of 75 parts per million (ppm) H_2O_2 for two hours; new arrivals are treated for three days in a row. Higher concentrations of peroxide (up to 200 ppm) may be needed for some metazoan parasites.

All fish in quarantine are observed daily for signs of disease (e.g., external lesions, abnormal behavior). Should new fish break out with disease, necropsy and appropriate diagnostics are performed to determine etiologic agents. Euthanasia of *all* new arrivals is an option if some new arrivals break with a novel disease or if the disease is known to be lethal and highly contagious.

3.2.7 Disease Management

The Department maintains constant disease surveillance of the OREHP, with surveillance occurring both at the hatchery and growout pens. A detailed description of this Best Management Program is contained in the OREHP Health Management, Disease Prevention and Fish Pathology Report (Okihiro 2004) and is summarized below.

To minimize disease impacts to both cultured and wild fish, the OREHP uses a four-pronged approach, including: 1) a variety of biosecurity protocols; 2) fish health inspections; 3) treatment of diseased fish; and 4) wild fish disease surveillance. Biosecurity protocols are geared towards disease prevention, and limiting the spread and impact of diseases when they occur. Biosecurity encompasses quarantine (initial isolation of broodstock animals at SeaWorld and separate tanks for incoming fish), disinfection (sodium hypochlorite sterilization of equipment and use of iodine-based footbaths), as well as disease treatment (judicial use of hydrogen peroxide, formalin, and antibiotic feeds) and proper personnel training. Compartmentalization (limiting different age groups of white seabass to separate recirculating systems) and ozone treatment of water used for recirculating systems have been shown to greatly reduce the occurrence and spread of disease within the Carlsbad Hatchery.

Health inspections are the second component of the OREHP's overall disease prevention program; all cultured fish are thoroughly evaluated prior to transfer or release. Currently, although rapid progress is being made with culture techniques for several other marine species, white seabass is the only species being produced in numbers and used for mitigation efforts. At a minimum, cultured white seabass are inspected twice. The initial health check is done at the hatchery, prior to transport to growout pens; the second check is done at the growout pens, just prior to fish being released. Additional health inspections are done as needed if fish are behaving abnormally or if there is an increase in daily mortality.

All health inspections involve inspection and necropsy of three to ten fish per tank, raceway, or net pen; wet mount exams for parasites on gills and skin; and a thorough external and internal screen for gross abnormalities, parasites, and lesions. New and/or unusual pathogens or lesions are documented with line drawings and photography, which are subsequently used for identification and classification. If necessary, tissues are fixed in 10 percent formalin or Karnovsky's fixative and followed with histopathology or electron microscopy. Confirmation of infectious disease (fungal, bacterial, or viral) is also made using pathogen isolation techniques: plate agar for bacteria and fungi and cell culture for viruses and rickettsia. Treatment of cultured white seabass is limited to a select few drugs approved by the FDA (Section 3.2.7.1). Fish that have been exposed to a lethal, highly contagious pathogen that is not known to occur in wild white seabass are euthanized to prevent the introduction of new disease.

The third arm of the health assessment/disease prevention program is an on-going effort to survey wild stocks of marine fish species – with special emphasis on those species targeted for mitigation. The goal of this disease assessment survey is to determine which pathogens and diseases are "naturally-occurring" among wild marine fish stocks. This baseline information is critical to avoid releasing lethal pathogens into potentially naïve populations of wild marine fish.

The wild fish disease surveillance program is a cooperative effort between the Department, HSWRI, and the University of California at Davis (UCD). HSWRI has provided support including ship-time (during broodstock collection trips and during tag recovery operations), personnel, supplies, and laboratory space (both at their Mission Bay facility and at the Carlsbad Hatchery) for sample collection and necropsies. UCD, via a separate contract with the Department, has previously provided expertise in virus and rickettsial isolation, polymerase chain reaction (PCR) assays, and enzyme-linked immunosorbent assay (ELISA) evaluations of serum samples (derived from whole blood) for pathogen exposure. UCD has also been contracted to perform experimental exposures with cultured marine fish to help in the assessment of pathology, pathogenesis, and the carrier status of recovered fish.

To date, over 100 wild white seabass, over 100 wild *Sebastes* rockfish, over 100 wild California halibut (*Paralichthys californicus*), over 50 wild California sheephead (*Semicossyphus pulcher*), and over 20 wild yellowtail have been sampled from various coastal and offshore sites in the Southern California Bight (SCB). Cell culture (for virus and rickettsial isolation), PCR, and ELISA assessments for these fish are ongoing. The main focus is on four major pathogens: viral nervous necrosis virus (VNN), viral hemorrhagic septicemia virus (VHS), *Piscirickettsia salmonis* (a rickettsial bacteria), and a recently discovered, but as yet uncharacterized, herpesvirus. To illustrate the value of disease assessment in wild fish, ELISA results of serum samples taken in 2002 revealed that some wild white seabass have been exposed to VNN. This information allowed HSWRI to release 50,000 cultured WSB that were clinically healthy but which had been exposed to VNN five months earlier. If ELISA results had determined that there was no VNN exposure in wild fish, then all 50,000 fish would have been euthanized to prevent introduction of VNN into wild populations of seabass.

Although VNN was a major cause of hatchery losses of white seabass from 1995 to 2003, there has not been a VNN outbreak at the Carlsbad Hatchery since 2003. The absence of VNN outbreaks can be attributed to improved biosecurity measures and the installation of an ozone treatment system for all "make-up water". The source of VNN outbreaks at the hatchery has never been identified, but adult broodstock white seabass may be serving as carriers of the disease without showing outward signs or symptoms; VNN was isolated from one adult broodstock fish in 2002.

VHS has not been diagnosed in any of the marine fish species that the OREHP or HSWRI has worked with. However, VHS is considered a significant threat to marine fish populations in southern California because it is a lethal disease, with no available treatment, and because the virus has been isolated from several baitfish species (sardines and herring) landed in Los Angeles ports in 2001. VHS has been established as a major cause of dramatic declines in wild Pacific herring (*Clupea pallasi*) populations in Alaskan water (Marty et al. 1998). Many of the white seabass broodstock maintained by the OREHP are fed a variety of frozen baitfish. Therefore, although VHS has never been diagnosed in a California fish species other than baitfish, there remains the potential for oral transmission. However, prevention of oral VHS transmission is largely accomplished by avoiding use of live or fresh dead bait fish. In general, the longer a fish is dead and the longer it has been frozen, the lower the risk of viral transmission.

A herpesvirus was detected (via transmission electron microscopy) in samples of intestinal mucosa taken from cultured white seabass in January of 2003. This pathogen is strongly suspected of being the causative agent of a lethal enteric infection which killed several thousand fish at the Carlsbad Hatchery in the fall of 2002. Unfortunately, attempts to culture the virus (in cell culture) have thus far been unsuccessful. The lack of a white seabass cell line with which to support this pathogen has complicated diagnostic procedures and has delayed assessment of exposure to wild fish. The ELISA assay, used by UCD to evaluate serum samples for pathogen exposure, is dependent on production of a large amount of viral antigen. Until the virus can be grown in cell culture in sufficient quantity, there is no way to develop an ELISA specific for herpesvirus. A PCR assay has been developed but is only able to detect an active virus. To date, no positive results have been found from wild fish assessment.

Currently, the Department is relying on histopathology (looking for characteristic epithelial necrosis and intranuclear inclusions) to diagnose herpes in white seabass, followed with transmission electron microscopy (TEM) to identify viral particles. Histopathologic assessment of tissues, from a 2004 necropsied broodstock white seabass, indicates that this adult fish may have been suffering from herpesvirus caused enteritis. If this is confirmed (via TEM), then as is suspected for VNN, some adult broodstock fish may also be serving as reservoirs for herpesvirus. UCD has been unable to culture the virus and cannot develop an ELISA to assess serum samples from broodstock or wild fish. Although it is believed that herpesvirus is a "normal" pathogen of white seabass, since there is no hard evidence either way, it must be assumed that this virus is a novel pathogen to wild white seabass. As such, the Department and the OREHP must continue their more conservative policy and euthanize all exposed and

infected cultured white seabass. If and when an ELISA is developed for white seabass herpesvirus, and if wild fish serum samples demonstrate herpesvirus exposure to wild WSB, the Department and the OREHP can go to the more permissive policy of euthanizing infected fish but releasing healthy exposed fish.

Piscirickettsia salmonis (*P. salmonis*) is the fourth major pathogen of concern for the OREHP. *P. salmonis* is one of two rickettsial pathogens found in cultured white seabass and is both highly contagious and lethal. Unlike other bacterial species, rickettsia have evolved as intracellular pathogens. The primary target organ for *P. salmonis* is the liver, but dissemination to other abdominal organs, as well as gills and skin, is not uncommon. The initial outbreak of *P. salmonis* was in 1999 (Chen et al. 2000). An ELISA specific to *P. salmonis* was developed by UCD, and blood samples from wild white seabass were assessed. None of the fish tested positive for presence of *P. salmonis* antibodies. As a result, any time there is an outbreak of *P. salmonis* all fish in the facility will be destroyed to prevent transmission to the wild population.

Two other major bacterial pathogens are *Flexibacter maritimus* and *Vibrio* spp. *Flexibacter* outbreaks are largely associated with cold water (<18ºC), temperature fluctuations, and stress in small, juvenile [<80 days post-hatch (dph)] white seabass; therefore, the main effort is directed at prevention via husbandry practices. *Vibrio* infections are also stress-related in smaller fish and may be related to poor water quality. In larger white seabass, *Vibrio* infections often develop secondary to heavy parasite loads. When severe, and associated with high mortality, *Flexibacter* and *Vibrio* infections have been treated with antibiotic feeds (Romet B®).

A wide range of parasites have been documented in cultured white seabass, including: ciliates, flagellates, sporozoans, and metazoan parasites. The majority of infestations are superficial (involving gills or skin), but a virulent form of *Uronema marinum* was observed a few times in 2002 and 2003. Most recently in 2010, *Miamiensis avidus*, a morphologically similar ciliate to *Uronema marinum*, was able to invade the eye and/or brain of cultured juvenile white seabass. *Uronema* and *Miamiensis*, even in a strictly cutaneous form, are the most lethal parasites encountered by captive white seabass. Fortunately, they are usually controllable with hydrogen peroxide or culling and euthanizing sick fish. Metazoan parasites (primarily monogenetic trematodes) have become increasingly more common, especially with the recent influx of adult white seabass broodstock, California sheephead, California halibut, and yellowtail. California sheephead alone have brought in three new species of gill and skin flukes, all of which have not been seen in cultured white seabass since their introduction to the hatchery. Biosecurity protocols (Section 3.2.6) are in place to prevent transfer of these and other pathogens from newly-arriving (quarantined) fish to established fish and to prevent transfer from one species to another.

Among the non-infectious diseases, two are of special concern: larval mass mortality syndrome (LMMS) and gas supersaturation (GSS) disease. LMMS is characterized by sudden, catastrophic loss of 80 to 100 percent of newly hatched larvae, usually 1 to 10 dph. LMMS was a major contributor to low hatchery production from 1995 to 2002, and severely limited production levels between 2007 and 2010. In 2010, LMMS was

corrected as the hatchery began instituting a series of new cleaning and fish transfer procedures in the incubation tanks. The hatchery focus was on eliminating an opportunistic marine bacterium (*Pseudomonas sp*.) and toxic "biofilm", which was growing on incubator tank and equipment surfaces. New protocols resulted in increased larval survival in December of 2010 and throughout 2011.

The other significant cause of hatchery losses of cultured white seabass, GSS, is not acutely lethal but does lead to severe ocular lesions (gas filling the interior of the eye) and progressive blindness. Ocular lesions associated with GSS are the primary reason why fish are culled prior to release. GSS has been a problem at the Carlsbad Hatchery since its construction in 1995. GSS has been identified both within the hatchery and the hatchery's main water source (Agua Hedionda Lagoon (AHL)). The root cause of GSS-related eye lesions for hatchery fish reared in the raceways is the lagoon. Agua Hedionda Lagoon is composed of three sections. The water in the large, shallow inner lagoon heats up during the day. In the afternoon, the outgoing tide pulls that warm water into the outer lagoon where it supersaturates as it hits the cold ocean water. The supersaturated water is pumped directly into hatchery raceways, so raceway fish have high prevalence of GSS. Inside the main hatchery building, fish are held in recirculating systems. GSS-related eye lesions can develop if: 1) large amounts of ozone "makeup" water are used; 2) fish are treated with hydrogen peroxide; 3) there are problems with protein skimmers; or 4) excessive amounts of pure oxygen are used. Experimental studies have given the Department a clear understanding of the pathology and pathogenesis of ocular lesions associated with GSS, and a variety of remediation efforts have been implemented. The hatchery has greatly reduced the use of the raceways. Reduction of raceway use was primarily done to avoid exposing fish to white seabass herpesvirus, but it has also reduced the number of GSS cases. Two of the raceways are also currently being retrofitted and reconfigured into recirculating systems, which should eliminate the GSS problems for those two raceways. Additionally, all the systems are recirculating, which eliminates the daily GSS flux associated with raw AHL water, within the hatchery main building.

In summary, disease impacts (from infectious and non-infectious sources) on the OREHP efforts to rear fish for enhancement purposes have been significant in terms of hatchery production. However, cooperative and coordinated efforts by the Department, HSWRI, and UCD have proven that these impacts are manageable and working safeguards are in place to protect wild stocks. Hatchery production of cultured white seabass has increased steadily in past years and has peaked at over 300,000 fish released per year. The OREHP has demonstrated that the combination of biosecurity measures (e.g., improved handling procedures and size-sorting to decrease stress), fish health inspections, and wild fish disease surveillance can be used to rear healthy white seabass in large enough numbers for enhancement purposes, and efforts can be designed to minimize the risk of potential disease impacts to wild fish stocks.

Currently, the OREHP is limited to white seabass. Should the OREHP expand to include several other marine fish species (California halibut, California sheephead, rockfishes, etc.), the goals will remain the same: 1) to produce large numbers of genetically diverse, healthy fish; and 2) to minimize the risk of transfer of disease to wild

fish populations. Until the OREHP knows which diseases are "naturally-occurring" among wild fish populations, the Department must assume that these new fish species are susceptible to the highly contagious and lethal diseases (i.e., VNN, herpesvirus, and *P. salmonis*) already known to occur in cultured white seabass. Continuation and completion of wild fish disease surveys will allow hatchery managers the flexibility to release healthy - but pathogen-exposed - cultured fish, without fear that fish with no outward signs or symptoms of disease will carry novel pathogens into susceptible wild stocks. Indeed releasing fish that have been exposed to diseases known to occur in the wild is desirable, as these fish will then have some degree of immunity to future infection, serving to improve stock health for the population as a whole.

The expansion of the OREHP efforts to include new marine fish species native to southern California will also bring with it new threats to existing hatchery programs. Each new species will have its own unique set of pathogens and non-infectious diseases. Some of these pathogens will be species specific, but many others may be capable of crossing species lines and infecting other fishes, including white seabass. In other words, these diseases may not be 'exotic' in that they are already present in marine fish populations in southern California but may be new to a particular species within southern California. The host species' distributions may overlap in nature, but in a hatchery setting, the risk is greater because densities are higher and proximities closer. Flukes and parasitic copepods are currently the most commonly encountered new pathogens, but when some of these newer species are produced in large numbers, high density and stress will inevitably result in manifestation of more dangerous pathogens (viral, bacterial, fungal, and protozoal) previously not encountered.

To minimize impacts on production and to avoid catastrophic outbreaks of disease in cultured and wild fish, each new species must be thoroughly studied in an effort to determine what constitutes normal behavior, development, physiology, anatomy, histology, and a "normal" pathogen and parasite load. Strict emphasis on current biosecurity measures will also help to minimize the spread of diseases to other hatchery fish when they occur and to prevent introduction into the wild populations.

3.2.7.1 Treatment

Treatment of cultured white seabass is limited to a select few drugs approved by the FDA, used under guidelines provided by the FDA-CVM and under the supervision of a veterinarian. All aspects of veterinary care for the OREHP are reviewed regularly (at least bi-annually) by the HSWRI FHMT and the HSWRI IACUC. The OREHP has been using hydrogen peroxide, as described above under the quarantine section, to treat a wide range of metazoan and protozoan parasites. Fortunately, this is an extremely effective agent and breaks down harmlessly in water. Buffered formalin has been used occasionally at the Carlsbad Hatchery for parasites that are less susceptible to hydrogen peroxide. Formalin use is limited to the hatchery because waste water has to be treated on site prior to disposal in the municipal drainage system.

All treatments follow guidelines established by the FDA-CVM and are administered under the direction of a veterinarian. Applications for antibiotic use at the hatchery

include primary and secondary bacterial infections. Antibiotics for use in food fish are limited to Romet B® (sulfadimethozine and ormetoprim) and ® (oxytetracycline). Both drugs have been used at the hatchery in the past, but experience has shown that Romet B® has much greater efficacy against organisms cultured from hatchery fish and is now used almost exclusively. The OREHP, along with many other fish hatcheries in the United States, participates in the FDA's Investigational New Animal Drug program.

When a bacterial disease is suspected, a sample of affected fish is examined grossly. Using wet mount cytology, samples are collected for culture, and antibiotic sensitivity tests are performed to determine susceptibility of the organism to one of the antibiotics approved for use in food fish.

If Romet B® is prescribed, it is incorporated into the diet, at 5 g/kg of feed, and fed at 3 percent of fish body weight (BW) for 10 days. Treated fish are usually held for another 2 weeks to assess efficacy before they are returned to the main population at the hatchery, transferred to net pens, or released. The average fish released from the OREHP takes two to three years before reaching the legal catch minimum of 711 mm (28 in.), well beyond the withdrawal time for Romet B® (42 days in salmon); therefore there is no danger of antibiotic residue exposure from human consumption of hatchery fish. Romet B® has a very short half-life (36 days) in seawater and sediment (Capone et al. 1996), as demonstrated with net pen-reared salmon. Terramycin® is poorly utilized by fish and has a longer half-life in seawater. Although Terramycin® is approved for use in food fish, the OREHP avoids it in favor of Romet B® whenever possible. Terramycin® has not been used at the hatchery since 2003, although it remains available for use as an investigative new animal drug (INAD). If it is used, procedures are similar to those outlined for Romet B® (e.g., holding times).

Antibiotics are used judiciously and rarely (e.g., in 2004 Romet B® was used in hatchery raceways on only one occasion), with primary emphasis given to continual improvements in husbandry and vigilance in biosecurity to prevent disease.

Due to improvements in fish husbandry (e.g., diet, handling procedures) and biosecurity (e.g., UV treatment of incoming water), primary bacterial infections among cultured white seabass are relatively uncommon. Secondary bacterial infections resulting from bacterial invasion of lesions caused by parasites are also largely prevented by treating primary parasitic infestations with hydrogen peroxide.

3.2.7.2 Personnel Training

Proper training of hatchery personnel is an essential component of biosecurity BMPs. Hatchery personnel are educated in all major facets of biosecurity so that they understand why specific quarantine, disinfection, and compartmentalization protocols are in place. Well-informed personnel are more likely to follow biosecurity measures once they understand that policies are geared towards disease prevention and increasing hatchery production. Periodic "refresher courses," along with a two-way dialog between hatchery personnel and the FHMT, allows for consistent compliance with existing protocols, as well as for making future improvements.

3.2.8 Genetics and Broodstock Best Management Practices

3.2.8.1 Wild Population Genetic Impacts

The potential impact of the OREHP on the genetic structure of wild, white seabass populations has been studied extensively since the late 1980s. This work is summarized in the CHP, WSEP, and provided in more detail in Bartley and Kent 1990; Bartley et al. 1995; Franklin 1997; Buonaccorsi et al., 2001. The results of Bartley and Kent's (1990) study were subsequently used to determine how many brood fish should be used as an effective population size to minimize any selection effects (Bartley et al. 1995) and has been summarized as a broodstock management plan in the CHP for the OREHP.

A subsequent study by Coykendall (2005) on the impact of the OREHP on wild, white seabass populations was based on statistical estimates of the hatchery broodstock size, the wild broodstock size, and the relative contribution of the hatchery fish to the wild stock. Coykendall provided a useful approach to analyzing the genetic impact of hatchery production on wild populations, but the analysis did not take into consideration the specific sampling, breeding, and release protocols used by the OREHP. As such, the genetic diversity of white seabass produced by the hatchery could be underestimated and therefore their impact on wild populations is overestimated. Further information on Coykendall's study can be found in the WSEP (See Appendix H).

3.2.8.2 Current Genetics and Broodstock Management

Concerns related to genetic quality assurance are being addressed by the OREHP's ongoing research with microsatellite DNA characterization of hatchery-produced fish. All white seabass raised at the growout pens originate from the hatchery parental stock and abide by the guidelines set forth in the CHP and the Broodstock and Production Run Management Plan[2]. These plans are aimed at avoiding or minimizing potential impacts to genetic diversity, as well as continuously evaluating the possible impacts on wild white seabass populations. The Broodstock and Production Run Management Plan incorporates the Carlsbad Hatchery's most recent genetic research and also their observances of broodstock reproductive behavior at the hatchery.

The basic elements of broodstock management are to: 1) maximize the diversity of parental stock by routinely adding new brood fish to the pools; 2) equalize sibling groups to the fullest extent possible; 3) monitor spawning success; and 4) facilitate ongoing adaptive management of the release program through modification as new information is developed. Currently, the hatchery maintains 140 to 200 brood fish with a sex ratio of 60:40 (female:male) in each of the four broodstock pools. Additionally, 25 percent of all broodstock are replaced with wild fish annually, resulting in a four-year residency time for each brood fish.

[2] The Broodstock and Production Run Management Plan was developed by HSWRI and is included as Appendix C.

The production run protocol for the hatchery is to produce cohorts from 24 to 32 female brood fish, independent of the release limit. Each cohort is established using eggs from one to four spawning events occurring over a seven-day period. Juvenile cohorts are then divided as equally as possible within the release limit (e.g. for a quota of 350,000 fish, approximately 12,000 juveniles would be released per female). This ensures that the offspring are not all from one or two parent fish and will maximize genetic diversity.

3.3 Growout Pen Operations and Best Management Practices

3.3.1 General Aquaculture System Characteristics and Operations

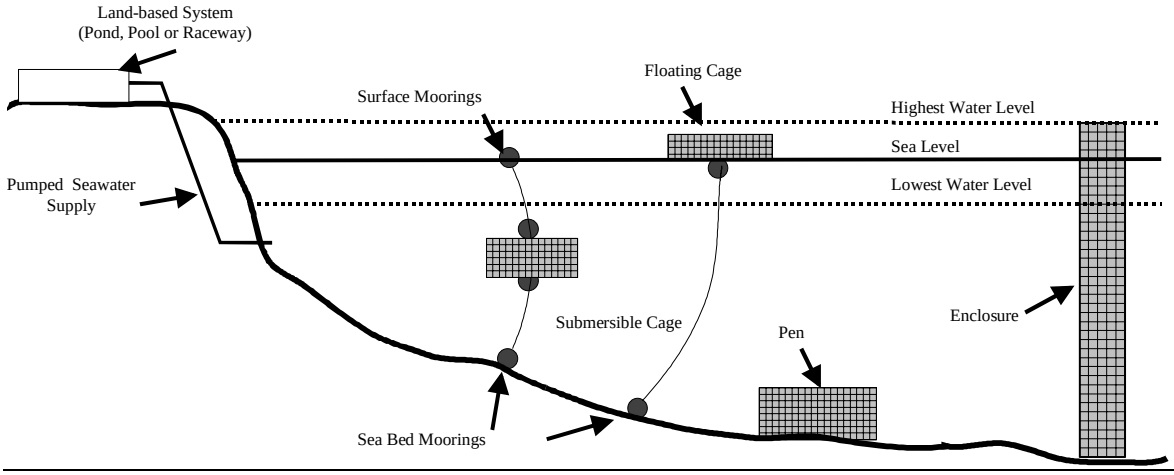
Aquaculture systems, including those used for growout, can either be land-based or water-based; the former represented by holding systems such as ponds, pools, tanks, and raceways, and the latter being represented by enclosures, pens, and cages (Figure 1). Earthen ponds excavated for aquaculture vary in size but are commonly 30.0 x 10.0 x 1.5 m (98.4 x 32.8 x 4.9 ft) deep, and capable of holding 500 m^3 (17,657 ft^3)of water (Shepherd and Bromage 1988). Pools used for aquaculture are usually circular or oval in shape and constructed of concrete, corrugated metal, or fiberglass, with holding capacities up to 200 m^3. A raceway is a long, narrow channel constructed of concrete or fiberglass. Raceways may extend 30.0 m (98.4 ft) in length, 3.0 to 10.0 m (9.8 to 32.8 ft) in width, and up to 1.0 m (3.3 ft) deep (Shepherd and Bromage 1988).

Water-based systems are generally more cost-effective than land-based systems and represent the most frequently used type of growout system by the OREHP. According to Beveridge (2004), an "enclosure" refers to a natural embayment with a man-made barrier at one end to prevent fish from escaping into the main body of water. The barrier is constructed of either a solid or a net material which prevents fish from escaping but does not inhibit the exchange of water. A "pen" system generally refers to a holding system that is almost entirely man-made, with the exception of the bottom, which consists of the sea floor. The pen usually consists of a framework made of wood or strong synthetic material, which is used to support side panels of wood or net screens. Unlike the other two systems, "cages" are completely man-made, including the bottom. Pens and enclosures also tend to be much larger (0.1-1,000 ha (0.2-2,471 ac)) than cages (1-1,000 m^2 (11-10,764 ft^2)) (Beveridge 2004).

Based on these definitions, all net pens and submerged raceways currently participating in the OREHP fall under the heading of cage culture, which are typically described as cages or cage systems. However, the OREHP has traditionally called all three types of systems (land-based, net pen, and submerged raceway) as “growout pens”.

Types of rearing systems available to the marine fish culturist (modified from Milne (1972)) are shown in Figure 3-5.

Figure 3-5. Types of rearing systems available to the marine fish culturist (modified from (Milne 1972)).



3.3.1.1 Fish Containment and Predator Control

To minimize abrasions to the fish, containment nets are made from knotless nylon netting. Different mesh sizes are used for the containment nets corresponding to the size of the fish being held. A mesh size of 2.5 cm (1.0 in.) stretch is used to accommodate small 10.0 cm (4.0 in.) fish at stocking and a larger mesh size of 6.4 cm stretch (2.5 in.) may be used for larger, 20.0 cm (8.0 in.) fish. The predator nets are constructed of 15.2 to 20.3 cm (6.0 to 8.0 in.) stretch mesh netting, made of heavy gauge nylon or polypropylene. Colorful polypropylene netting is preferred because it is more visible underwater.

Both fish containment nets and predator nets are suspended from the handrails of each net pen and are sufficiently weighted on the bottom to keep them taut, even in high currents. Taut nets are important to maintain a consistent rearing volume and to prevent predators from becoming entangled in the nets. Attachment rings are conveniently located along the perimeter of each net and in the center. The handrails extend around each net pen on either side of the walkways and are elevated approximately 1.0 m (3.3 ft) above the water line. The containment net is suspended on the inside handrail and the predator net is hung from the outside handrail. This configuration effectively eliminates the risk of fish jumping out or predators jumping in. Each predator net encompasses a single containment net so that each net pen can function independently from the others if there is ever a desire to move one or more of them to another location. The other benefit to this design is the low profile of the system, approximately 1.0 m (3.3 ft) off the waterline, which reduces wind shear and visual impacts. Bird-netting is stretched across the top of each net pen to prevent birds from preying upon fish from above.

Raceways are constructed of smooth fiberglass to minimize abrasions to the fish. At either end of each raceway is a removable, metal or plastic screen that allows for water exchange through the raceway while preventing fish escape. Different mesh sizes are

used for the end screens corresponding to the size of the fish being held. Mesh sizes range from 1.3 cm (0.5 in.) to accommodate small 10.0 cm (4.0 in.) fish at stocking, to a larger mesh size of 2.5 cm (2.5 in.) that may be used for 20.0 cm (8.0 in.) fish.

Water levels within the raceway system are maintained at a minimum of 30.0 cm (12.0 in.) below the lip of the raceway to prevent fish from jumping out of the raceway. Screens constructed of shade cloth or other fine mesh materials are placed on top of the raceway to provide protection from avian predators as well as shade from the sun. The solid raceway structure provides a strong barrier that prevents intrusion from predators below the water line. Hinged lids composed of chain link fencing secure the top of the raceway. The fencing is covered by a canvas shade that prevents predation and also provides shade from the sun.

3.3.1.2 Production Period

Growout pens generally receive two batches of juvenile white seabass for growout annually. The first batch is typically transported in late spring, coinciding with the increase of ambient water temperatures. These fish will be held at the facility for a period of 4 to 6 months prior to their release. Daily fish culture and facility maintenance is performed by HSWRI staff at the facility according to the GPM. After the first batch of fish is released the facility will be fallowed for 1 to 3 months. During the fallow, repairs and routine maintenance are performed as necessary. A second batch of fish for culture will be transported to the facility in late fall before ambient seawater temperatures decline and the winter storm season begins. This group will be held over winter at the facility until the following spring. Culture techniques during this cycle will be identical to those described previously.

3.3.1.3 Production Densities

Fish are typically maintained in modest densities of 12.0-18.0 kg/m^3 (0.7-1.1 lbs/ft^3) in order to minimize the effects of crowding on fish health and water quality. For modeling purposes HSWRI uses a typical time-at-release density of 15.0 kg/m^3 (0.9 lbs/ft^3). Table 3.1 presents the production densities, number of fish and biomass that can be produced at each facility.

Table 3.1 Growout Pen Production

Facility	Maximum Production (# of fish/yr)	Maximum Production (kg/yr)
San Diego Bay: Southwestern Yacht Club	5,730	430
San Diego Bay: Grape Street	35,000	5,280
Mission Bay: Quivera Basin	14,560	951
Agua Hedionda Lagoon	157,200	23,485
Catalina Harbor: CSF	104,800	7,765
Catalina Harbor: HSWRI	450,330	33,644

Table 3.1 Growout Pen Production

Facility	Maximum Production (# of fish/yr)	Maximum Production (kg/yr)
Dana Point Harbor	15,830	1,000
Newport Bay	20,380	1,520
Huntington Harbor	2,910	435
King Harbor	18,290	1,366
Marina del Rey	11,645	870
Channel Islands Harbor	69,870	5,185
Santa Barbara	18,422	1,410

3.3.1.4 Feeding Regime

Fish are handfed a high quality, dry, pelleted, marine finfish feed several times per day by automatic feeders. This feed contains 50 percent protein, 14 percent fat, and has Vitamin C incorporated into it. Fish are fed at a daily ration of approximately 1 to 3 percent BW per day depending on water temperature. The maximum daily feeding level can be calculated under conditions of maximum water temperature and associated metabolism (3 percent BW per day) and maximum biomass.

Daily supplemental hand feeding allows the volunteers monitoring the fish to observe the feeding response of the fish. This observation is a valuable tool in the management of the feed distributed to the fish. It provides a platform where if feeding rates diminish due to decreased water temperatures, or other changes in ambient water conditions, this change can be observed immediately, and a correlating reduction in the total amount of feed distributed daily through automatic feeders can be made, preventing waste feed that can be deposited on the bottom of the pool or raceway, or on the ocean bottom beneath the net pen. Concurrently, if an increase in fish appetite is observed, daily feeding rates can be increased accordingly, thus preventing weakened fish due to malnourishment. The daily supplemental feeding is utilized as a management tool and does not provide the complete daily ration provided to the fish, but rather a small fraction of that amount (<5 percent) and, moreover, functions as an active part of the process to maintain healthy, vigorous fish while minimizing any impact to the surrounding environment. Food usage is recorded daily for each pen and is ultimately stored in an electronic database maintained by HSWRI for the Department.

3.3.1.5 Maintenance

The growout pens are cleaned and maintained on an as-needed basis, with the frequency being determined by seasonal conditions related primarily to biofouling and storms. Cleaning of biofouling organisms is generally conducted every six weeks. Cleaning involves brushing the nets or replacing them with clean ones. Systems are inspected from the surface each day and subsurface inspections using scuba when needed. The frequency of subsurface inspections varies by growout pen, but typically

occur every six to eight weeks. Maintenance of nets, moorings, feeders, etc. is performed immediately as required.

The bottoms of the raceways are vacuumed daily to remove uneaten feed and feces using a small pool pump and siphon. Siphoned material is typically placed in a mesh filter bag or other filter device and disposed of in a landfill. The small amount of material siphoned each day has not been observed to accumulate on the bottom in significant mass as verified by dive surveys. The screens on either end of the raceway are scraped as biofouling accumulates, and may be removed and replaced with clean screens if the fouling significantly impedes water flow into the raceway. Cleaning of biofouling organisms (mussels, algae, and tunicates) from the interior wall of the raceway is performed on an as-needed basis, and involves scraping the organisms from the walls and then removing them via the pool siphon or net. Systems are inspected from the surface each day and subsurface inspections are performed using scuba every six to eight weeks or when needed. During fallow periods, scuba is utilized to scrape and clean biofouling that accumulates on the exterior walls of the raceway and on any submerged float structures.

3.3.1.6 Assessing Growth and Survival

A subsample of fish is weighed and measured every 6 to 8 weeks by the HSWRI Growout Pen Coordinator to assess growth and food conversion efficiency. Fish that die in the facility are removed immediately after being found and tallied to determine rates of survival. Dead fish are disposed of in an upland waste disposal facility. Fish mortality is recorded daily for each pen and is ultimately stored in an electronic database maintained by HSWRI for the Department. Often, a cumulative mortality of 5 percent occurs within the first 10 days after transfer to the facility, but a fish health inspection is sought if the mortality exceeds this amount or reaches 0.3 percent for three consecutive days.

3.3.1.7 Assessing Fish Health

HSWRI staff associated with this project has been given basic training in fish health screening by the Department's fish pathologist. This training is supported by the detailed documentation provided in the Fish Health section of the GPM. At the first sign of disease or abnormal behavior, volunteers notify the Department and the HSWRI Growout Pen Coordinator. At the end of the growout cycle, each batch of fish is certified as healthy by the Department’s pathologist prior to release. Batches of fish that do not pass the fish health inspection are not released until their health has improved.

3.3.1.8 Releasing Fish

At the end of the growout cycle, a final assessment of growth and tag retention is performed by the HSWRI Growout Pen Coordinator. The number of fish that died in culture is subtracted from the number delivered to get an expected number released. The yield of a typical growout over a 4 to 5 month period is greater than 85 percent survival. Whenever practical, fish are released from the growout pens late in the

afternoon or early evening to provide cover of darkness, limiting predation. Net pens also serve as acclimation facilities to help minimize stress to the fish at release.

At the time of release, all fish are counted by dip-netting them in small batches or allowing them to swim through a constricted opening in the net or raceway. Currently, HSWRI uses hand-counters to keep track of the fish counts when either release method is used. As the OREHP expands, however, electronic counters may be employed to reduce the labor and handling time. Invariably, there is a discrepancy between the actual number of fish released and the expected number. This discrepancy is generally attributed to cannibalism, escape, and predation by other organisms and generally accounts for 5 to 15 percent of the total number "lost".

Alternatively, with more experience and data, HSWRI anticipates the potential for estimating with adequate precision the number of fish released based on documented mortalities during the growout cycle. In order to facilitate release activities, it is the responsibility of each growout pen operator to schedule volunteers and assign them responsibilities. To avoid delays and confusion on the day of release, participants should be fully briefed on their responsibilities prior to any handling of the fish. The number of volunteers required to help release a batch of white seabass will depend largely on the numbers of fish being released, and the amount of time and space available to work. During the release, fish should be handled gently, using the methods describe in previous sections of this document. The Growout Pen Coordinator will demonstrate proper handling techniques to all volunteers attending the release event to ensure proper handling. Generally, only a few fish (less than six) should be netted at one time, quickly counted, and then released into the water.

3.3.1.9 Data Collection and Management

Growout staff is responsible for recording data on a daily basis. The data collected includes daily mortalities, amount of feed distributed, water temperature, and other observations including but not limited to fish activity levels and local water and weather conditions. All collected data is sent monthly to HSWRI where it is stored in a comprehensive database that includes all of the growout pens.

3.3.2 Growout Pen Site Locations and Descriptions

3.3.2.1 San Diego Bay: Southwestern Yacht Club Growout Pen

The Southwestern Yacht Club growout pen, owned and operated by Southwestern Yacht Club (SWYC), was constructed in 1996; however, this pen never obtained a coastal development permit (CDP). Since that time it has been actively involved in the OREHP and successfully reared and released 29,498 fish. As such, environmental conditions are known and culture protocols for this site are well-developed, including those related to receiving and releasing fish.

This growout pen is located in San Diego Bay, which is in San Diego County (See Figure 3-6 below). The coordinates are 32° 46.132’ N latitude and 117° 13.985’ W

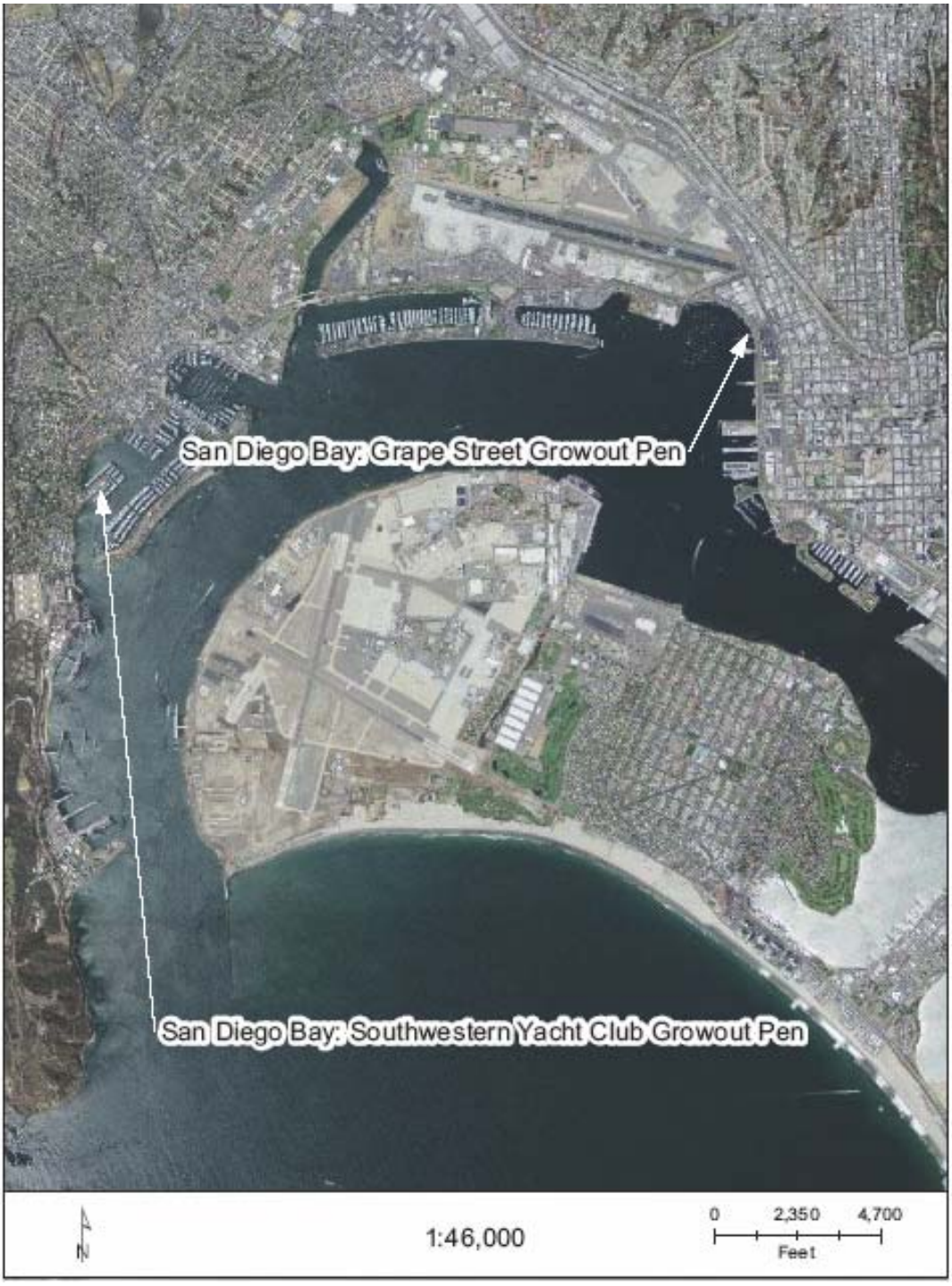
longitude. Water depth at this location is 1.8 m (6.0 ft). Site maps are provided in Figure 1-1. This growout pen is not located in close proximity to existing eelgrass beds. This facility is kept in position by attachments to the dock.

The SWYC growout pen employs a traditional method of finfish culture, whereby a raceway is used to enclose the fish being cultured. The raceway is attached to a dock. The raceway is supported by a fiberglass frame that is buoyed by pontoons. This frame also provides support for walkways that encircle the containment net and provides a sturdy platform to service the fish at the facility.

This growout pen consists of one raceway that is 7.2 x 1.8 x 1.5 m (24.0 x 6.0 x 5.0 ft). Based on these dimensions, the total growing volume is 19.6 m^3 (695.7 ft^3). Including walkways that are 0.9 m (3.0 ft) wide, the footprint of the system is 25.1 m^2 (270.0 ft^2).

A detailed listing of the special status species present within the area of this growout pen is included in Appendix E. (The presence of Appendix E-listed species within growout pen areas are often transitory in nature, and does not necessarily result in interaction between growout pen areas and the listed species.)

Figure 3-6 Aerial photograph of San Diego Bay: Southwestern Yacht Club and Grape Street Growout Pens



3.3.2.2 San Diego Bay: Grape Street Growout Pen

The Grape Street growout pen, owned and operated by San Diego Oceans Foundation (SDOF), described in this project was originally permitted and constructed in 2003.

Since that time it has been actively involved in the OREHP and successfully reared and released 107,266 fish. As such, environmental conditions are known and culture protocols for this site are well developed, including those related to receiving and releasing fish.

The Grape Street growout pen is located in San Diego Bay, which is in San Diego County (See Figure 3-6 above). The coordinates are 32° 43.290' N latitude and 117° 10.274' W longitude. Water depth at this location is 6.1 m (20.0 ft). This growout pen is kept in position by attachments to the dock.

The Grape Street growout pen employs a traditional method of finfish culture, whereby a net is used to enclose the fish being cultured. The net pen is attached to a dock. The net is supported by a frame constructed of high density polyethylene that is buoyed by pontoons. This frame also provides support for walkways 0.9 m (3.0 ft wide) that encircle the containment net and provides a sturdy platform to service the fish at the facility.

This growout pen consists of two net pens. Pen 1 is 5.5 x 5.5 x 3.7 m (18.0 x 18.0 x 12.0 ft), and Pen 2 is 5.5 x 5.5 x 2.1 m (18.0 x 18.0 x 7.0 ft). Based on these dimensions, the growing volume in Pen 1 is 112.0 m^3 (3,955.0 ft^3) and Pen 2 is 64.0 m^3 (2,260.0 ft^3); the total growing volume for the site is 176.0 m^3 (6,215.3 ft^3). Including walkways that are 0.9 m (3.0 ft) wide, the footprint of Pen 1 is 53.5 m^2 (576.0 ft^2) and Pen 2 is 53.5 m^2 (576.0 ft^2); the total system footprint is 107.0 m^2 (1,152.0 ft^2).

A detailed listing of the special status species present within the area of this growout pen is included in Appendix E. (The presence of Appendix E-listed species within growout pen areas are often transitory in nature, and does not necessarily result in interaction between growout pen areas and the listed species.)

3.3.2.3 Mission Bay: Quivera Basin Growout pen.

The Quivera Basin growout pen, owned and operated by SDOF, was originally permitted and constructed in 1997. Since that time, it has been actively involved in the OREHP and successfully reared and released 31,584 fish. As such, environmental conditions are known and culture protocols for this site are well developed, including those related to receiving and releasing fish.

The Quivera Basin growout pen employs a traditional method of finfish culture, whereby a net is used to enclose the fish being cultured. The net pen is attached to a dock. The net is supported by a frame constructed of polyvinyl chloride floats.

The Quivera Basin growout pen is located in Mission Bay, which is in San Diego County (See Figure 3-7 below). The coordinates are 32° 45.628' N latitude and 117° 14.225' W longitude. Water depth at this location is 5.5 m (18.0 ft). This facility is kept in position by attachments to the dock.

Figure 3-7 Aerial photograph of Mission Bay: Quivera Basin Growout pen

This growout pen consists of one net pen that is 5.5 x 2.3 x 2.3 m (18.0 x 8.0 x 8.0 ft). Based on these dimensions, the total growing volume for this site is 31.6 m^3 (1,119.5 ft^3). The total system footprint is 18.6 m^2 (200.0 ft^2).

A detailed listing of the special status species present within the area of this growout pen is included in Appendix E. (The presence of Appendix E-listed species within growout pen areas are often transitory in nature, and does not necessarily result in interaction between growout pen areas and the listed species.)

3.3.2.4 Agua Hedionda Growout Pen

The Agua Hedionda growout pen, owned and operated by HSWRI, was originally permitted and constructed in 2003. Since that time, it has been actively involved in the OREHP and successfully reared and released 111,267 fish. As such, environmental conditions are known and culture protocols for this site are well developed, including those related to receiving and releasing fish.

The Agua Hedionda growout pen is located in Agua Hedionda Lagoon, which is in San Diego County (See Figure 3-8 below). The coordinates are 33° 08.379' N latitude and 117° 20.224' W longitude. Water depth at this location is 6.1 m (20.0 ft).

A detailed listing of the special status species present within the area of this growout pen is included in Appendix E. (The presence of Appendix E-listed species within growout pen areas are often transitory in nature, and does not necessarily result in interaction between growout pen areas and the listed species.)

The net pens are moored using pairs of U.S. Navy stockless style anchors on each end of the system. The anchors are approximately 136.0 kg (299.9 lb) each. A combination of chain and heavy line extend from the anchors to a mooring buoy. A single line then extends from each mooring buoy to either side of the cage. The anchoring scope is 3-4:1. This mooring design ensures that if one point of the four-point mooring fails, a backup is in place. This design has been used successfully by HSWRI since 1997.

The growout pen used in this project employs a traditional method of finfish culture, whereby a net is used to enclose the fish being cultured. The net pen is moored in open water. The net is supported by a frame constructed of high density polyethylene that is buoyed by pontoons. This frame also provides support for walkways (1.0 m wide) that encircle the containment net and provide a sturdy platform to service the fish at the facility. This facility currently consists of two growout net pens that are each 7.2 x 7.2 x 3.7 m (24.0 x 24.0 x 12.0 ft); however, the addition of two more net pens of similar dimensions has been proposed through the Coastal Development Permit renewal process. The rationale for adding two new net pens at this location is to: 1) minimize the need to hold fish at Catalina Island where most of the OREHP's growout volume is sited, but a self-imposed release cap of 30,000 fish has been set, and 2) provide a research platform for HSWRI scientists that allow some degree of replication. Based on these dimensions, the growing volume in each pen is 197.2 m^3 (6,964.0 ft^3), and the total growing volume for the site would be 788.6 m^3 (27,849.0 ft^3). Including walkways that are 0.9 m (3.0 ft) wide, the footprint of each system is 83.6 m^2 (900.0 ft^2), and the total system footprint is 390.2 m^2 (4,200.0 ft^2).

Figure 3-8 Aerial photograph of Agua Hedionda Growout pen

3.3.2.5 Catalina Harbor: Catalina Seabass Fund (CSF) Growout pen

The Catalina Seabass Harbor Fund - CSF growout pen, owned and operated by Catalina Seabass Fund, was originally permitted and constructed in 1994. Since that time, it has been actively involved in the OREHP and successfully reared and released

80,442 fish. As such, environmental conditions are known and culture protocols for this site are well developed, including those related to receiving and releasing fish.

This growout pen is located in Catalina Harbor, which is in Los Angeles County (See Figure 3-9 below). The coordinates are: summer position 33° 25.738' N latitude and 118° 30.564' W longitude; winter position 33° 25.875' N latitude and 118° 30.428' W longitude. Water depth at this location is 9.0 m (30.0 ft).

The Catalina Harbor – CSF growout pen is kept in position by a two anchor mooring system. This pen is in a zoned mooring field during both winter and summer seasons. In the spring and summer months the facility is moored outside of Well's Beach in a semi exposed location, closer to the mouth of Catalina Harbor. During the storm-filled winter months, the facility is moved via flotation to an inner mooring that is more protected from the increased swell and wind present this time of year. In the spring, it is floated back to the mooring location outside Well's Beach.

The Catalina Harbor – CSF growout pen employs a traditional method of finfish culture, whereby a net is used to enclose the fish being cultured. The net pen is moored in open water. The net is supported by a frame constructed of wood that is buoyed by pontoons. This frame also provides support for walkways 0.9 m (3.0 ft) wide that encircle the containment net and provides a sturdy platform to service the fish at the facility.

This growout pen consists of four pens that are each 4.9 x 2.3 x 5.5 m (l6.0 x 8.0 x 18.0 ft). Based on these dimensions, the growing volume in each pen is 64.7 m^3 (2,285.0 ft^3) and the total growing volume for the site is 258.8 m^3 (9,139.3 ft^3). Including walkways that are 0.9 m (3.0 ft) wide, the footprint of each system is 22.3 m^2 (240.0 ft^2), and the total system footprint is 81.7 m^2 (880.0 ft^2).

A detailed listing of the special status species present within the area of this growout pen is included in Appendix E. (The presence of Appendix E-listed species within growout pen areas are often transitory in nature, and does not necessarily result in interaction between growout pen areas and the listed species.)

Figure 3-9 Aerial photograph of Catalina Seabass Fund and Catalina HSWRI Growout Pens

3.3.2.6 Catalina Harbor: HSWRI Growout Pen

The Catalina Harbor – HSWRI facility, owned and operated by HSWRI, was originally permitted and constructed in 1997. Since that time it, has been actively involved in the OREHP and successfully reared and released 72,392 fish. The growout pen has been

utilized in the past as a backup white seabass and yellowtail broodstock holding facility. Should the need arise, the site can be used to hold broodstock in the future. As such, environmental conditions are known and culture protocols for this site are well developed, including those related to receiving and releasing fish.

This growout pen is located in Catalina Harbor, which is in Los Angeles County (See Figure 3-9 above). The coordinates are 33° 25.549' N latitude and 118° 30.624' W longitude. Water depth at this location is 21.0 m (70.0 ft).

The growout pen is moored using two pairs of U.S. Navy stockless style anchors on each end of the system. The anchors range in weight from 136 to 227 kg (300 to 500 lbs) each. A combination of chain and heavy line extends from the anchors to a mooring buoy. A double line then extends from each mooring buoy to either side of the facility. The anchoring scope is 3-4:1. This mooring design ensures that if one point of the four-point mooring fails, a backup is in place. This design has been used successfully by HSWRI at this facility since 1997.

The Catalina Harbor – HSWRI facility employs a traditional method of finfish culture, whereby a net is used to enclose the fish being cultured. The net pen is moored in open water. The net is supported by a frame constructed of high density polyethylene that is buoyed by pontoons. This frame also provides support for walkways 0.9 m (3.0 ft) wide that encircle the containment net and provides a sturdy platform to service the fish at the facility.

This facility consists of four growout pens that are each 9.0 x 9.0 x 6.7 m (30.0 x 30.0 x 22.0 ft). Based on these dimensions, the growing volume in each pen is 554.7 m^3 (19,592.5 ft^3), and the total growing volume for the site is 1,691.5 m^3 (59,734.8 ft^3). Including walkways that are 0.9 m (3.0 ft) wide, the footprint of each system is 120.4 m^2 (1,296.0 ft^2), and the total system footprint is 548.5 m^2 (5,904.0 ft^2).

A detailed listing of the special status species present within the area of this growout pen is included in Appendix E. (The presence of Appendix E-listed species within growout pen areas are often transitory in nature, and does not necessarily result in interaction between growout pen areas and the listed species.)

3.3.2.7 Dana Point Harbor Growout Pen

The Dana Point Harbor facility, owned and operated by Dana Point Fisheries Enhancement Program (DPFEP), was originally permitted and constructed in 1995. Since that time it has been actively involved in the OREHP and successfully reared and released 60,643 fish. As such, environmental conditions are known and culture protocols for this site are well developed, including those related to receiving and releasing fish.

This growout pen is located in Dana Point Harbor, which is in Orange County (See Figure 3-10 below). The coordinates are 33° 27.450' N latitude and 117° 41.586' W longitude. Water depth at this location is 2.7 m (9.0 ft). The growout pen is kept in position by attachments to the dock.

Figure 3-10 Aerial photograph of Dana Point Harbor Growout Pen

The Dana Point growout pen employs a traditional method of finfish culture, whereby a net is used to enclose the fish being cultured. The net pen is attached to a dock. The net is supported by a frame constructed of wood that is buoyed by pontoons. This frame also provides support for walkways 0.6 m (2.0 ft) wide that encircle the containment net and provides a sturdy platform to service the fish at the facility.

This growout pen consists of two growout pens. Pen 1 measures 7.2 x 2.3 x 1.2 m (24.0 x 8.0 x 4.0 ft) and has a growing volume of 21.0 m^3 (742.5 ft^3). Pen 2 measures 5.4 x 1.8 x 1.2 m (18.0 x 6.0 x 4.0 ft) and has a growing volume of 12.1 m^3 (432.0 ft^3). The total growing volume for the site is 33.2 m^3 (1,381.0 ft^3). Including walkways that are 0.5 m (2.0 ft) wide, the footprint of Pen 1 is 26.0 m^2 (280.0 ft^2), and Pen 2 is 16.3 m^2 (176.0 ft^2); the total system footprint is 42.6 m^2 (456.0 ft^2).

A detailed listing of the special status species present within the area of this growout pen is included in Appendix E. (The presence of Appendix E-listed species within growout pen areas are often transitory in nature, and does not necessarily result in interaction between growout pen areas and the listed species.)

3.3.2.8 Newport Bay Growout Pen

The Newport Bay growout pen, owned and operated by Pacific Fisheries Enhancement Foundation (PFEF), was originally permitted and constructed in 1993. Since that time it has been actively involved in the OREHP and successfully reared and released 41,164 fish. As such, environmental conditions are known and culture protocols for this site are well developed, including those related to receiving and releasing fish.

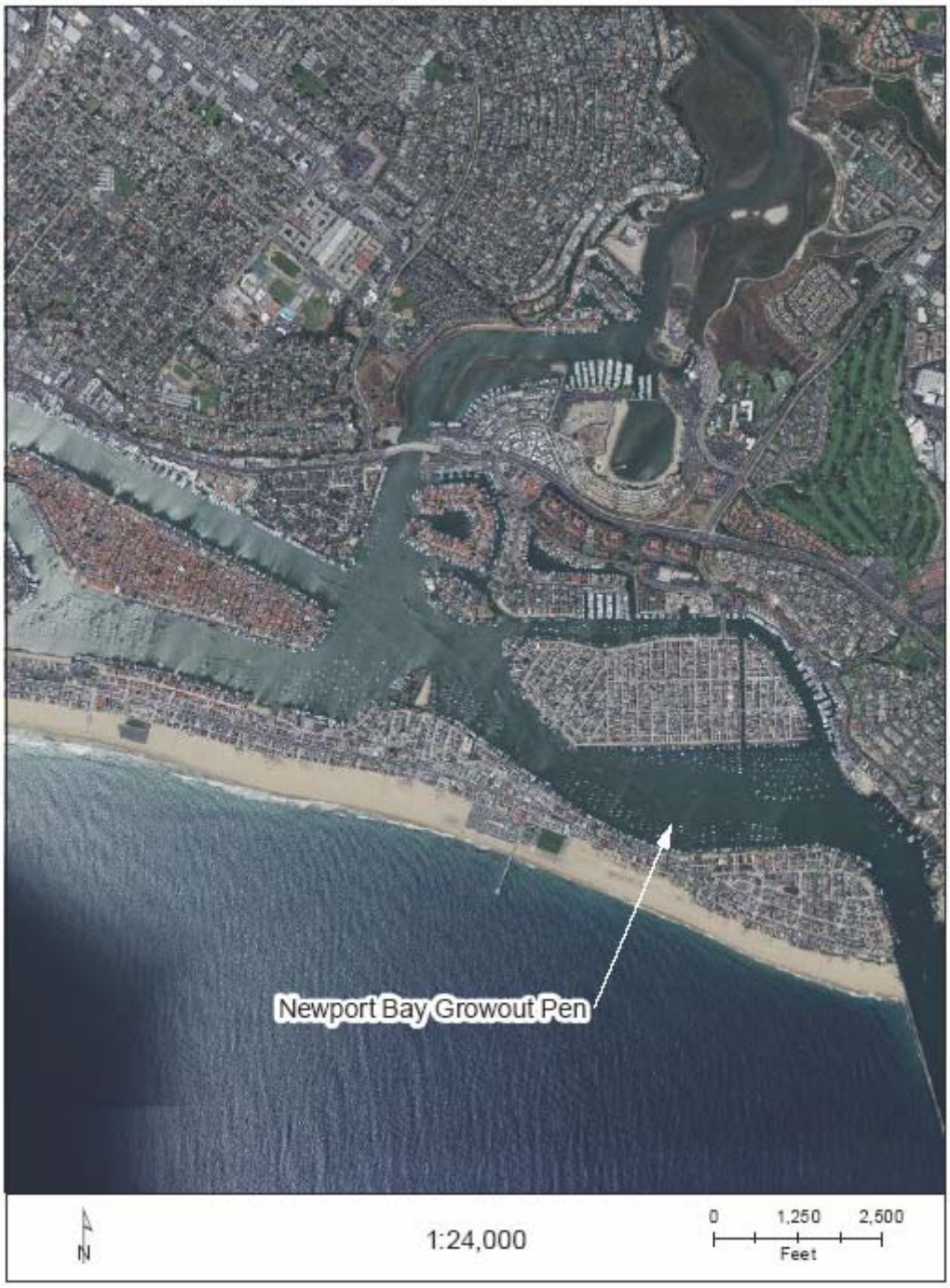
This growout pen is located in Newport Bay, which is in Orange County (See Figure 3-11 below). The coordinates are 33° 36.052' N latitude and 117° 53.411' W longitude. Water depth at this location is 3.7 m (12.0 ft). This raceway is not located in close proximity to eelgrass beds and is kept in position by a two anchor mooring system that exists as a part of a larger zoned mooring field A, located east of Balboa Island in Newport Bay.

The Newport Bay growout pen employs a traditional method of finfish culture, whereby a raceway is used to enclose the fish being cultured. The raceway is moored in open water. The raceway is supported by a frame constructed of fiberglass that is buoyed by pontoons. This frame also provides support for walkways that encircle the raceways and provides a sturdy platform to service the fish at the facility.

This growout pen consists of four raceways that are each 4.9 x 2.3 x 1.5 m (16.0 x 8.0 x 5.0 ft). Based on these dimensions, the growing volume in each raceway is 17.6 m^3 (623.0 ft^3) and the total growing volume for the site is 70.4 m^3 (2,486.2 ft^3). Including walkways that are 0.9 m (3.0 ft) wide, the footprint of each of the four systems is 20.4 m^2 (220.0 ft^2) and the total system footprint is 111.5 m^2 (1,200.0 ft^2).

A detailed listing of the special status species present within the area of this growout pen is included in Appendix E. (The presence of Appendix E-listed species within growout pen areas are often transitory in nature, and does not necessarily result in interaction between growout pen areas and the listed species.)

Figure 3-11 Aerial photograph of Newport Bay Growout Pen



3.3.2.9 Huntington Harbor Growout Pen

The Huntington Harbor facility, owned and operated by Harbor Ocean Preservation Enhancement (HOPE), was originally permitted and constructed in 1996. Since that time it has been actively involved in the OREHP and successfully reared and released

Figure 3-12 Aerial photograph of Huntington Harbor Growout Pen

32,121 fish. As such, environmental conditions are known and culture protocols for this site are well developed, including those related to receiving and releasing fish.

This growout pen is located in Huntington Harbor, which is in Orange County (See Figure 3-12 above). The coordinates are 33° 42.754' W latitude and 118° 03.629' N

longitude. Water depth at this location is 2.3 m (8.0 ft). This raceway is not located in close proximity to eelgrass beds and is kept in position by attachments to the dock.

The Huntington Harbor growout pen employs a traditional method of finfish culture, whereby a raceway is used to enclose the fish being cultured. The raceway is attached to a dock. The raceway is supported by a frame constructed of fiberglass that is buoyed by pontoons. This frame also provides support for walkways that encircle raceway and provides a sturdy platform to service the fish at the facility.

This site consists of one raceway that is 4.9 x 2.4 x 1.5 m (16.0 x 8.0 x 5.0 ft). Based on this dimension, the total growing volume for the facility is 17.6 m^3 (623.0 ft^3). Including walkways that are 0.9 m (3.0 ft) wide, the total system footprint is 28.6 m^2 (308.0 ft^2).

A detailed listing of the special status species present within the area of this growout pen is included in Appendix E. (The presence of Appendix E-listed species within growout pen areas are often transitory in nature, and does not necessarily result in interaction between growout pen areas and the listed species.)

3.3.2.10 King Harbor Growout Pen

The King Harbor growout pen, owned and operated by the King Harbor Ocean Enhancement Foundation (KHOEF), was one of the first growout pens to participate in the OREHP and received its first group of white seabass in June 1993. Since that time it has been actively involved in the OREHP and has successfully reared and released 78,767 juvenile seabass. This growout pen has been operating for nearly two decades, therefore culture methods and protocols for the receiving and releasing of fish are well established.

This facility is located in Redondo Beach, which is in Los Angeles County (See Figure 3-13 below). The coordinates are 33° 51.077 W latitude and 118° 23.826 N longitude. The growout operation is land-based and is located on grounds shared by the Los Angeles Conservation Corps Center's SEA Lab facility, adjacent to the AES Redondo Beach generating station at King Harbor.

The site's culture area consists of two circular pools that are filled to a depth of 1.2 m (4.0 ft). These two pools are located inside a canvas covered structure that is enclosed on all sides. Until recently, the facility also had an additional third pool that was also filled to a depth of 1.2 m (4.0 ft). These culture pools are soft sided, not unlike standard above-ground swimming pools. There is a raised wooden floor surrounding the pools and covering the entire interior of the structure that provides a sturdy area to work and walk.

Figure 3-14 Aerial photograph of King Harbor Growout Pen

This site consists of two circular pools with a diameter of 4.9 m (16.0 ft) that are filled to a depth of 1.2 m (4.0 ft). Based on this dimension, the total growing volume for the facility is 45.5 m^3 (1606.8 ft^3). The third pool, which was removed in 2007, measured 3.7 m (12.0 ft) and was filled to a depth of 1.2 m (4.0 ft). Total culture volume before the removal of this pool was 58.4 m^3 (2062.4 ft^3). Currently, the total system footprint is approximately 12.2 m (40.0 ft) by 6.1 m (20.0 ft).

3.3.2.11 Marina del Rey Growout Pen

The Marina del Rey growout pen, owned and operated by Marina del Rey Anglers (MDRA), was originally permitted and constructed in 1995. Since that time it has been actively involved in the OREHP and successfully reared and released 75,620 fish. As such, environmental conditions are known and culture protocols for this site are well developed, including those related to receiving and releasing fish.

This growout pen is located in Marina del Rey, which is in Los Angeles County (See Figure 3-14 below). The coordinates are 33° 58.764' N latitude and 118° 26.730' W longitude. Water depth at this location is 3.0 m (10.0 ft). This raceway is not located in close proximity to eelgrass beds and is kept in position by attachments to the dock.

The Marina del Rey growout pen employs a traditional method of finfish culture, whereby a raceway is used to enclose the fish being cultured. The raceway is attached to a dock. The raceway is supported by a frame constructed of fiberglass that is buoyed by pontoons. This frame also provides support for walkways that encircle the raceway and provides a sturdy platform to service the fish at the facility.

A detailed listing of the special status species present within the area of this growout pen is included in Appendix E. (The presence of Appendix E-listed species within growout pen areas are often transitory in nature, and does not necessarily result in interaction between growout pen areas and the listed species.)

This site consists of two raceways that are each 4.9 x 2.3 x 1.5 m (16.0 x 8.0 x 5.0 ft). Based on these dimensions, the growing volume in each raceway is 17.6 m^3 (623.0 ft^3) and the total growing volume for the site is 35.2 m^3 (1,243.0 ft^3). Including walkways that are 0.9 m (3.0 ft) wide, the footprint of each system is 28.6 m^2 (308.0 ft^2), and the total system footprint is 57.3 m^2 (616.0 ft^2).

Figure 3-14 Aerial photograph of Marina del Rey Growout pen

3.3.2.12 Channel Islands Harbor Growout Pen

The Channel Islands Harbor growout pen, owned and operated by the United Anglers of Southern California, Ventura Chapter (UASC-VA), was originally permitted and constructed in 1991. Since that time it has been actively involved in the OREHP and successfully reared and released 86,204 fish. As such, environmental conditions are

Figure 3-15 Aerial photograph of Channel Islands Harbor Growout Pen

known and culture protocols for this site are well developed, including those related to receiving and releasing fish.

This growout pen is located in Channel Island Harbor, which is in Ventura County (See Figure 3-15 above). The coordinates are 34° 09.826' N latitude and 119° 13.326' W

longitude. Water depth at this location is 3.7 m (12.0 ft). This pen is not located in close proximity to eelgrass beds and is kept in position by attachments to the dock.

The Channel Islands Harbor growout pen employs a traditional method of finfish culture, whereby a net is used to enclose the fish being cultured. The net pen is attached to a dock. The net is supported by a frame constructed of wood that is buoyed by pontoons. This frame also provides support for walkways 0.9 m (3.0 ft) wide that encircle the containment net and provides a sturdy platform to service the fish at the facility.

This site consists of three growout pens that are each 4.9 x 4.9 x 2.3 m (16.0 x 16.0 x 8.0 ft). Based on these dimensions, the growing volume in each pen is 57.6 m^3 (2,034.0 ft^3) and the total growing volume for the site is 172.8 m^3 (6,102.0 ft^3). Including walkways that are 0.9 m (3.0 ft) wide, the footprint of each system is 45.0 m^2 (484.0 ft^2), and the total system footprint is 122.5 m^2 (1,320.0 ft^2).

A detailed listing of the special status species present within the area of this growout pen is included in Appendix E. (The presence of Appendix E-listed species within growout pen areas are often transitory in nature, and does not necessarily result in interaction between growout pen areas and the listed species.)

3.3.2.13 Santa Barbara Growout Pen

The Santa Barbara facility, owned and operated by Santa Barbara Salmon Enhancement Association (SBSEA), was originally permitted and constructed in 1993. Since that time it has been actively involved in the OREHP and successfully reared and released 68,488 fish. As such, environmental conditions are known and culture protocols for this site are well developed, including those related to receiving and releasing fish.

This growout pen is located in Santa Barbara coastal waters south of Stearn's Wharf, which is in Santa Barbara County (See Figure 3-16 below). The coordinates are 34° 24.617’ N latitude and 119° 41.067’ W longitude. Water depth at this location is 6.1 m (20.0 ft). This pen is not located in close proximity to eelgrass beds.

This growout pen is kept in position by a two anchor mooring system within a larger zoned mooring area located south of Stearn's Wharf in Santa Barbara. This mooring field is seasonal, and therefore, the net pen facility is attached to its mooring system every spring, and detached and completely removed to an onshore site for storage every fall. The mooring itself is left in place.

The Santa Barbara growout pen employs a traditional method of finfish culture, whereby a net is used to enclose the fish being cultured. The net pen is moored in open water. The net is supported by a frame constructed of wood that is buoyed by pontoons. This frame also provides support for walkways (3.0 ft wide) that encircle the containment net and provides a sturdy platform to service the fish at the pen.

This site consists of one growout pen that is 5.5 x 5.5 x 3.1 m (18.0 x 18.0 x 10.0 ft). Based on these dimensions, the total growing volume of the facility is 93.7 m^3 (3,312.5

Figure 3-16 Aerial photograph of Santa Barbara Growout Pen

ft^3). Including walkways that are 0.9 m (3.0 ft) wide, the total system footprint is 53.5 m^2 (576.0 ft^2).

A detailed listing of the special status species present within the area of this growout pen is included in Appendix E. (The presence of Appendix E-listed species within

growout pen areas are often transitory in nature, and does not necessarily result in interaction between growout pen areas and the listed species.)

3.3.3 Growout Pens Best Management Practices

Potential negative impacts will be avoided by applying BMPs, specifically: 1) monitoring feeding levels closely so food conversion rates are maximized; 2) maintaining high rearing standards (e.g., frequent net cleanings, modest stocking densities) so the fish remain healthy and vigorous; and 3) utilizing fallow periods to prevent long-term changes to the benthic environment.

3.3.3.1 Environmental Monitoring (2004 – 2009)

Benthic surveys, as detailed in the GPM, were conducted at all of the growout pens at the initiation of the CDP process by HSWRI biologists in consultation with environmental specialist Dr. Kenneth Brooks of Aquatic Environmental Sciences in Seattle, Washington. The benthic surveys analyzed sediment grain size, sediment free sulfides, redox potential, total volatile solids, and copper and zinc levels. HSWRI undertook the voluntary monitoring program in the fall of 2004 and reported the results of monitoring at three sites (Brooks 2004). That report has been incorporated in its entirety herein followed by results for the fall 2005 monitoring at seven additional sites. The comprehensive benthic monitoring report has been included as Appendix D of the ND. The following discussion provides a summary of the benthic monitoring results from Brooks (2006a).

The three most productive of the 13 OREHP growout pens were surveyed between September 13 and 15, 2004. Seven additional facilities that were in production and near peak biomass were monitored between September 27 and November 7, 2005. Samples were collected at all sites within 30 days of peak biomass. The three remaining sites, Catalina Harbor – CSF, Huntington Beach Harbor, and Newport Bay were sampled between September 13 and November 29, 2006.

Seven of the ten growout pens surveyed in the Brooks (2006a) study were located in marinas. Reference stations within these marinas indicated that they tended to be depositional and that their sediments accumulated moderate amounts of organic detritus leading to increased biochemical oxygen demand (BOD); elevated concentrations of free sediment sulfides; and reduced redox potential. In addition, marina sediments accumulate biologically significant quantities of zinc. Metal source inventories were not completed as part of this study. However, it is hypothesized that zinc from steel structures and sacrificial anodes and copper from bottom paints are the likely sources of these metals. It is also likely that elevated sulfide concentrations associated with organic enrichment mediate the metal toxicity by binding both copper and zinc.

White seabass growout pens located in open environments like Santa Barbara and Catalina Harbor – HSWRI have created no observable changes in sediment chemistry (Brooks 2006a). While increases in sediment sulfides were not statistically significant at

any of these sites, the combination of small increases in total volatile solids (TVS) and sulfides together with small reductions in redox potential suggest some minor enrichment under the growout pens. These effects did not extend beyond 5 to 10 m (16 to 33 ft) from the perimeter of the facilities and the small degree of effect suggests that the decrease in TVS and sulfides and an increase in redox potential to background levels, would occur within a few months of fallow. There is no evidence in the comprehensive monitoring report that the growout pens are significantly exacerbating existing sediment metal contamination. However, the OREHP is encouraged to continue to require the use of proteinated zinc supplements in feed formulations. Currently, the use of copper treated nets has been discontinued. However, if copper treated nets are used in the future, those nets should be cleaned at an upland facility and the dislodged copper properly disposed of.

Food conversion ratios (FCR) estimated using a standardized feeding rate of 3 percent BW per day ranged from 2.0 to 9.0 in this study. As mentioned previously, fish are fed 1 to 3 percent BW depending on water temperature so these values are very conservative. Under controlled laboratory conditions, (López et al. 2006) reported FCR values of 0.7 to 1.0 for juvenile white seabass. Under field conditions at the growout pens where food was precisely measured, (Buhr et al. 2006) reported FCR values of 0.91 to 2.45. FCRs are valuable management tools for identifying overfeeding leading to wasted food (increased cost of production) and increased benthic loading.

As seen in the preceding site specific summaries, where effects have been discernable, they were generally restricted to the area inside the growout pen's perimeter and in all cases they did not extend beyond 5 to 10 m (16 to 33 ft) from the growout pen. Detailed remediation studies describing physicochemical and biological remediation at other facilities producing <20,000 to 100,000 lbs of fish have not been performed because monitoring in compliance with NPDES permits is not required at these sites. However, based on several detailed remediation studies reported by (Brooks et al. 2003) and (Brooks et al. 2004), it is likely that all of these sites would naturally return to baseline conditions after remaining fallow for 2 to 3 months. No adverse effects were observed at the two open sites (Santa Barbara and Catalina Harbor – HSWRI). Assessment of the potential for biological remediation at the other sites is complicated by the marina environment which appears to be inherently stressful. The old Catalina Harbor – HSWRI site is located adjacent to the new site in shallower water. If adverse benthic effects had occurred there when the site was in production, these effects had dissipated when the site was evaluated on September 15, 2004 after three months of lying fallow. The minor enrichment effects observed at the growout pens were restricted in their spatial extent, and they should dissipate to normal background levels during a few months of being fallow.

3.3.3.2 Growout Pen Benthic Monitoring Best Management Practices

Waste discharges from finfish culture operations in marine environments are regulated by the U.S. Environmental Protection Agency through the NPDES permit process when the annual cultured biomass exceeds 9,091 kg (20,000 lbs) in temperate environments and 45,455 kg (100,000 lbs) in warmer water, including those marine waters contiguous

with southern California. Typical salmon farms located in Washington State and British Columbia produce approximately 2.5 million kg (5.5 million lbs) of salmon during production cycles lasting 20 to 24 months. Maximum reported biomass at the OREHP sites has been as high as 33,600 kg (73,920 lbs) at HSWRI's Santa Catalina Island facility. However, the maximum production at the other 12 sites has ranged from 100 to 5,900 kg (220 to 13,000 lbs) with an arithmetic mean of 1,510 + 1,140 kg (3,330 + 2,510 lbs) (N = 12). None of these facilities would be issued NPDES permits.

Although current benthic survey data indicate that the growout pens are not impacting the benthos at this time, a benthic monitoring program has been established by the OREHP, and two interim benchmarks for free sulfides have been set as future safeguards to provide for remediation of potential significant enrichment. These benchmarks were based on Dr. Brooks' recommendations (see Appendix N) and were agreed upon by all parties within the OREHP.

The study design relies on a regression approach to identify trends in sediment free sulfides, TVS, redox potential, zinc, and copper as a function of distance from the growout facility perimeter and at the reference station allowing for an inferential test of the significance of differences.

Each growout pen is sampled on a three-year cycle. Sampling is completed within 30 days of a fish release when the facility is at its peak biomass. The survey uses a stainless steel bottom grab to collect samples of the sediment. Various qualitative and quantitative parameters are analyzed for each sample. A detailed description of the sample collection and various analyses is available in Brooks (2006b). The benthic surveys have been conducted at the growout pens as follows:

Table 3.2 Growout Pen Benthic Survey Schedule

Growout Pen	Startup Date	Most Recent Survey
San Diego Bay (SW Yacht Club)	1996	2008
San Diego Bay (Grape Street)	2003	2007
Mission Bay (Quivira Basin)	1997	2008
Agua Hedionda Lagoon	2003	2009
Catalina Harbor - CSF	1994	2009
Catalina Harbor - HSWRI	1998	2008
Dana Point Harbor	1994	2009
Newport Bay	1993	2009
Huntington Harbor	1996	2009
Marina del Rey	1995	2008
Channel Islands Harbor	1991	2005
Santa Barbara	1993	2009

The OREHP has developed an interim benchmark for sediment sulfide concentration of 1000 micrometer (µM) $S^{=}$ at 10 m (33 ft) from the facility perimeter for growout pens with

reference station sulfide concentrations less than the benchmark. Should the mean concentration at 10 m (33 ft) from the facility perimeter exceed this benchmark, the facility will have to lie fallow for a minimum of three months. After three months, sampling for sulfides will be repeated monthly until the mean value at 10 m (33 ft) is less than 750 µM $S^{=}$ or to reference station levels, whichever is higher. Once sulfide levels subside, the facility can be restocked. To date, sulfide levels at these growout pens have not exceeded the benchmark.

Since there are three growout pens with high perimeter and reference station sulfide concentrations, a separate benchmark for those sites has been developed. Should the mean concentration at 10 m (33 ft) from the facility perimeter exceed 1300 µM $S^{=}$, the facility will have to lie fallow for a minimum of three months. After three months, sampling for sulfides will be repeated monthly until the mean value at 10 m (33 ft) is less than 1000 µM $S^{=}$ or to reference station levels, whichever is higher. Once sulfide levels subside, the facility can be restocked. To date, sulfide levels have not exceeded the benchmark at these three growout facilities.

While adverse benthic enrichment effects would not be expected for facilities with such a small footprint and producing such low weights of fish annually, benthic surveys have indicated that the different growout pen environments (e.g., open sites versus marinas), may warrant different management scenarios in light of expected increases in hatchery production and growout pen stocking levels.

3.3.3.3 Disease Management and Biosecurity Best Management Practices

Fish are fed, monitored, and treated for disease according to the guidelines specified in the GPM. Fish diseases that are known to affect juvenile white seabass are listed and described in the GPM and the WSEP, and include viral, rickettsial, bacterial, fungal, and parasitic diseases. Outbreaks of infectious viral and rickettsial disease among cultured white seabass in growout pens are rare. For example, although there have been three outbreaks of white seabass herpesvirus at the hatchery (2002, 2005, and 2009), there have been none at the 13 growout pens. *Piscirickettsia salmonis* (a lethal rickettsial disease) has occurred only twice, once at the hatchery, in 1998, and once at the King Harbor growout pen in 2005. Viral nervous necrosis was a common (>10 epizootics) disease at the hatchery in the late 1990s and early 2000s, but has never been confirmed among net pen fish and has not occurred at the hatchery since 2002 or 2003.

Bacterial and fungal diseases are relatively uncommon among net pen facilities, but certainly more prevalent than viral or rickettsial diseases. Bacterial infections usually involve *Vibrio* or *Flexibacter* species and often present as skin ulcers. Occasionally, *Vibrio* will present as a disseminated disease with abscesses in the kidneys. Bacterial epizootics, among net pen facilities, occur at the rate of three to four per year. In 2011, there has been only one significant epizootic of bacterial skin infection among net pen fish. This occurred in the Aqua Hedionda Lagoon net pen in June 2011. *Vibrio* and *Flexibacter* outbreaks are controlled with antibiotics (i.e., Romet-medicated feed). Fungal diseases used to be rare, but have become more common among net pen fish

over the last three years. There have been four large epizootics among fish at the Marina del Rey growout pen; one in 2009, two in 2010, and one in 2011. Fungal ulcers among Marina del Rey fish have resulted in the loss of hundreds to thousands of fish and can only be controlled by culling affected fish.

Parasitic diseases (e.g., protozoan or metazoan pathogens) are fairly common among net pen fish, as a consequence of close proximity to wild fish. The number and severity of parasitic epizootics is dependent on the growout pen site. For example, epiozootics involving the gill fluke, *Anchoromicrocotyle guaymensis*, used to be an annual event among the Catalina growout pens, from 2002 to 2006, but has not been seen for several years. The same gill parasites occasionally turn up at the SWYC and Dana Point. Parasitic copepods have been a problem at only two growout pens, Channel Islands Harbor and San Diego Bay (Grape Street). Other parasites, like *Uronema*/ *Miamiensis* and *Ichthyobodo* have been found at almost all of the 13 net pen sites, and their appearance is highly dependent on the condition and size of the fish when transported from the hatchery, and on how stressful the transport was. There are probably three to five epizootics involving *Uronema* or *Ichthyobodo*, per year, among the 13 net pen sites.

Compounds used to treat disease are approved by the FDA-CVM and administered according to HSWRI staff or veterinary recommendation (depending on the compound and associated regulations). Currently, the only compounds used are: 1) hydrogen peroxide (H_2O_2) administered as a bath at 100 ppm for one hour for treating trematodes (flukes), *Costia*, and *Uronema/Miamiensis*; and 2) feed medicated with Romet B® for treating outbreaks of the bacteria *Flexibacter* and *Vibrio spp*. The laws governing the use of therapeutants in aquaculture is a dynamic process as the FDA reclassifies therapeutants and approves new ones. Recognizing this, and the need to treat disease outbreaks immediately, the OREHP reserves the right to use any therapeutant that is lawfully available following guidance from the Department and the HSWRI FHMT, and under the supervision of a veterinarian. Likewise, the OREHP will alter the use of any existing therapeutant as necessary to remain in compliance with FDA-CVM regulations. The FDA-CVM Office of New Animal Drug Evaluation (ONADE) is working with various government agencies and aquaculture associations to increase the number of safe and effective drugs that can be used by the aquaculture industry. The Minor Use and Minor Species Animal Health Act of 2004 continues to identify more medications that are available for use in commercial aquaculture.

The OREHP's approach to aquaculture health management begins with disease prevention. Disease prevention requires understanding of, and accommodation for culture requirements of each species, and employment of species-specific and site-specific BMPs. Fish health is dictated by a complex interaction among host-specific (e.g., age), pathogen-specific (e.g., virulence), and environment-specific (e.g., temperature) factors. BMPs require treating not only the disease itself but also the underlying factors that may have contributed to its appearance.

Fish in the hatchery and in growout pens are maintained under good environmental conditions (e.g., clean facilities, moderate stocking densities). Project staff members

are trained to recognize the early warning signs of a disease outbreak. The proximity of the growout pens to the hatchery allows an immediate response for thorough diagnosis and treatment. For further information on diagnosis and treatment, see the WSEP (Appendix H).

All fish grown are endemic to southern California. Potential vectors for disease are identified and mitigated to every extent possible. When new fish are brought into the hatchery or net pens, they are inspected by a certified health professional, quarantined, and treated as necessary. At the hatchery, incoming water is sterilized using ultraviolet light in recirculating systems each time the water recycles. The volume of new water added is relatively small, and it is ozonated prior to entering the recirculating systems. Employing these procedures minimizes the risk of introducing diseases from other culture facilities or wild fish. Similar safeguards are employed with regard to feeds, where only fresh, high quality fish food is used. At the hatchery and at the growout pens, good hygiene practices are employed with regard to culture systems, equipment, and personnel. All nets, siphon hoses, feed containers, and any other equipment used for operations are cleaned and disinfected after use. Each rearing system has its own cleaning and feeding supplies. Mortalities are removed and disposed of immediately, so they do not provide an additional vector for disease.

3.3.3.4 Marine Mammal and Predator Best Management Practices

3.3.3.4.1 Marine Mammals

Interactions with marine mammals can be avoided by proper siting, care, and maintenance of the growout pen. Each growout pen takes precautions to prevent the take of ESA listed species and other non-listed species as well. In areas where sea lions are a problem, growout pens utilize raceway systems to provide rigid protection for the white seabass and prevent intrusion of marine mammals. Net pens typically utilize brightly colored, large mesh nets to surround the smaller containment net. Generally, there is a one meter space between containment net and predator barrier. The predator barrier is held taut by anchors to prevent any entanglement. Above the water, chain link fence surrounding the walkways prevents the haul-out of marine mammals.

Any injury or mortality of a marine mammal is reported by the net pen operator within 48 hours of occurrence as required by the Marine Mammal Protection Act. In the case of an incident, the Marine Mammal Authorization Program Mortality/Injury Reporting Form (OMB 0648-0292) is filled out and faxed to the following individuals:

- The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) -- fax: (301) 713-4060
- Growout Pen Coordinator -- fax: (760) 434-9502
- OREHP Coordinator -- fax: (562) 342-7139

NOAA Fisheries has defined a marine mammal injury as a wound or other physical harm. Signs of injury include, but are not limited to:

- visible blood flow
- loss of or damage to an appendage or jaw
- inability to use one or more appendages
- asymmetry in the shape of body or body position
- noticeable swelling or hemorrhage
- laceration
- puncture or rupture of eyeball
- listless appearance or inability to defend itself
- inability to swim or dive upon release from fishing gear
- signs of equilibrium imbalance

Any animal that ingests fishing gear, or any animal that is released with fishing gear entangling, trailing, or perforating any part of the body will be considered injured regardless of the absence of any wound or other evidence of injury.

Since the first growout pen became operational in 1992, there have been only three incidents that resulted in the lethal take of nine marine mammals (California sea lions). Two of these incidents occurred at the Santa Barbara net pen while the other death occurred at the Channel Islands Harbor net pen. At the Channel Islands Harbor net pen, one death was reported in 2005 and was likely due to moving the net pen closer to the bait barge temporarily so the dock could be repaired. The situation was corrected, and there have been no other deaths reported at this pen. At the Santa Barbara net pen, one death was reported in 2004, while in 2009 seven malnourished sea lion pups became entangled in the predator net. This was during a period when a high rate of malnourished sea lion pups were reported off the Santa Barbara coast and was considered a rare occurrence. To correct this problem, the predator net was temporarily removed, and there were no other entanglements or mortalities reported during the remainder of the growout season.

3.3.3.4.2 Deterrence Measures

Individuals are strictly prohibited from intentionally lethally taking (killing) marine mammals. An exception is provided for an intentional lethal take imminently necessary in self-defense or to save the life of another person. If a marine mammal is killed in self-defense or to save the life of another person a report (see above) must be filed within 48 hours of the mortality.

Deterrence measures should not separate a female from her offspring; break the skin of an animal; result in dislocation of or fracture of bones, limbs, or other appendages; be directed at the head or eyes of an animal; or be used on seals and sea lions hauled out on unimproved property.

NOAA Fisheries has published a guideline of safe deterrence methods of marine mammals (NOAA 2008). They include the following:

- Passive deterrence measures – fencing, closely spaced posts, nets, or other types of physical barriers provided the potential for marine mammal entanglement is not increased.

- Active deterrence measures - mechanical or electrical noisemakers, water spray from a hose, sprinklers, blunt objects to prod animals, or crowder boards to herd animals.

Currently, all the above deterrence measures are approved for OREHP use; however, only passive deterrence measures (chain link fencing that surrounds some facilities and barrier nets used below the water) have been used to date by the program.

3.3.3.4.3 Birds

Like marine mammals, fish-eating marine birds are protected under federal law and therefore they must be excluded from the growout pens by passive measures. Netting or shade cloth affixed over the pen is the most common means of keeping birds out. When netting is used on top of the pen, it is kept taught and suspended sufficiently high off the water line to prevent birds such as herons from perching on the netting and stabbing fish with their long, narrow beaks. Colorful streamers can be tied to the netting of the pens make it more visible to diving birds. Shade cloth can serve a dual role by keeping birds out and also reducing sunlight in the water, which is preferred by white seabass. This is especially true of submerged raceway systems, which are generally shallow and often reflective in color.

The U.S. Fish and Wildlife Service is responsible for the protection of marine birds. Interactions with birds are noted in each of the growout pens' daily logs. There are no reporting requirements or any guidelines for the safe deterrence of marine birds. However, the deterrence measures for marine mammals listed above can also safely be applied to marine birds.

3.3.4 Water Quality Monitoring

Water quality monitoring is usually required by the Regional Water Boards through the NPDES permit. Since none of the growout facilities are required to obtain NPDES permits, water quality monitoring for most facilities has not been required. The Los Angeles Regional Water Quality Control Board (LARWQCB), however, has requested water quality sampling for facilities within their jurisdiction (Channel Islands Harbor, Marina del Rey, Catalina Harbor - HSWRI, and Catalina Harbor - CSF). Water quality monitoring includes biannual collection of water temperature, ammonia, and dissolved oxygen levels inside the facility and just outside the facility perimeter. Additionally, each year divers shall make a visual inspection of the bottom to look for adverse conditions. Since 2008, the Department has submitted an annual report to the LARWQCB summarizing the results of the water quality monitoring.

Although the hatchery does not operate under a NPDES permit, the San Diego Regional Water Quality Control Board (SDRWQCB) does require water quality monitoring. Influent sampling includes monthly sampling for salinity, pH, temperature, settleable solids, total suspended solids, total Kjeldahl nitrogen, organic nitrogen, ammonia, unionized ammonia, nitrate, nitrite, phosphorus, orthophosphate; quarterly sampling for zinc and copper; annual sampling for acute toxicity; and one-time sampling for chronic toxicity and California Toxics Rule (CTR) priority organic and inorganic pollutants. Effluent sampling includes daily sampling for flow rate; monthly sampling for salinity, pH, temperature, settleable solids, total suspended solids, total Kjeldahl nitrogen, organic nitrogen, ammonia, unionized ammonia, nitrate, nitrite, phosphorus, orthophosphate; quarterly sampling for zinc and copper; annual sampling for acute toxicity; and one-time sampling for chronic toxicity and CTR priority organic and inorganic pollutants. Sand filter backwash is sampled weekly for total suspended solids. Hatchery staff is required to maintain self-monitoring reports and to submit annual reports to the SDRWQCB.

3.4 Program Evaluation

If sufficient funding is available, the Department intends to evaluate the OREHP during the next CDP cycle to determine if the legislatively established goals and objectives of the program are being met. A Scientific Advisory Committee will be established to review the findings of ongoing and future scientific research and monitoring that includes a white seabass stock assessment, an update of the bioeconomic model, juvenile gill net sampling, adult sampling, genetic management, and benthic monitoring programs (see Appendix H). An Adaptive Management Plan may also be developed so that the OREHP is prepared to modify operations in a timely manner when critical research and monitoring studies show it is necessary to improve the program.

4.0 Environmental Setting

This section of the Initial Study Negative Declaration (ND) presents information on the existing (baseline) environmental conditions at the hatchery and growout pens. All facilities associated with the Ocean Resources Enhancement and Hatchery Program (OREHP) currently exist and are expected to continue existing operations.

4.1 White Seabass Fishery Management and Aquaculture

As noted in the White Seabass Fishery Management Plan (WSFMP), white seabass, which are targeted by both recreational and commercial fisheries, have great economic and intrinsic value to the people of California. White seabass are migratory fish that are common in Mexican waters and in the Southern California Bight (SCB). The fisheries for white seabass have existed since the late 1800s, but increased fishing pressure, oceanographic fluctuations, and habitat degradation have resulted in reductions of the white seabass catch.

The overall trend in commercial and recreational landings of white seabass from 1960 to 1997 was one of decline. During the late 1980s and early 1990s, concern over the decline in white seabass landings and conflicts between recreational and commercial fishermen over this resource led concerned citizens to ask the Legislature for management improvements. The resulting legislation required the development of the WSFMP, which was developed in 1995 through the cooperative efforts of academic and federal fishery scientists, consultants, and fishery constituents. The plan was adopted by the California Fish and Game Commission (Commission) in 1996; however, no regulations were adopted at that time.

In 1998, the Marine Life Management Act (MLMA) created a comprehensive ecosystem approach with the goal of sustainable fisheries management (Fish and Game Code [FGC] Section 7050). Under the MLMA, the Commission was delegated management authority over the nearshore finfish fishery, the white seabass fishery, emerging fisheries, and fisheries for which there was existing regulatory authority prior to January 1, 1999. The existing WSFMP remained in effect until amended pursuant to the MLMA in 2002 (CDFG 2002).

The most recent annual review of the WSFMP (2009-2010 season), utilizes fishery-dependent (sport and commercial landings and length-frequencies) along with information about the harvest of white seabass in Mexico. The annual review process, designed to prevent overfishing and other resource damage, is conducted by the California Department of Fish and Game (Department) and an advisory group using a set of criteria referred to as the "Points of Concern". The Department and the advisory group determined that none of the Points of Concern were met during the review of the 2009-2010 season, thus the Department did not recommend any changes to the management of white seabass to the Commission (CDFG 2011).

California has the most diverse aquaculture industry in the United States. The state's size, combined with its particular geology and topography, provide a multitude of climatic and water conditions suitable for commercial production of a large variety of species. In recent years, about 50 to 75 percent of the state industry value has come from the production of freshwater food fish, including catfish, tilapia and trout; and anadromous species including striped bass, hybrid striped bass, and sturgeon. About 10 percent of the value is derived from marine shellfish, primarily oysters and abalone. Most of the remaining value comes from a variety of non-food fish products such as baitfish, ornamental fish, and algae developed for use as a nutritional supplement or food additive. While a vast majority of California production involves common aquaculture products, it is worth noting that numerous other species are currently cultured to a lesser extent or have strong candidate status based on successful culture in other parts of the world (CDFG 2003).

Floating net pens, as used in the OREHP, is predominantly used for the growout of finfish from a juvenile stage to market size, or in the case of white seabass, to release size. Some of the most prominent uses of floating cage culture worldwide are in the production of various species of farmed grouper, seabass, flounder, snapper, and salmon. The use of floating cages in marine aquaculture in California is currently limited to a few research installations located in power plant discharge canals and to enhancement projects, such as the OREHP, where fish are released into the wild upon reaching the desired size (CDFG 2003).

Mariculture in state waters is governed by the provisions in the FGC (§15000 et. seq.) and the Chapter Three Policies of the California Coastal Act. In 2006, California passed the Sustainable Oceans Act (SB 201) which amended existing aquaculture regulations to require persons engaging in marine finfish aquaculture to obtain a lease from the Commission. The bill requires leases and regulations adopted by the Commission to meet certain standards, establishes the terms for those leases, and outlines culpability for restoration should the Commission determine that a negative environmental impact occurs. The bill also establishes standards for a programmatic environmental impact report (PEIR) that the Department is required, under existing law, to prepare for marine finfish aquaculture that will provide a framework for managing marine finfish aquaculture in a sustainable manner. Public review for the PEIR will begin in 2011; the Commission will review and certify the document late 2011.

In addition, SB 201 requires the preparation of an enhancement plan for any artificial

propagation, rearing or stocking project for the purpose of recovery, restoration, or enhancement of native fish stocks carried out under either a scientific collecting permit, research permit, or the OREHP [FGC §15400(b)(10)(c)]. The plan shall provide for, among other things, monitoring and protecting of benthic habitat, the prevention of pollution, and the prevention of adverse impacts on wild fish stocks from disease, parasites, and genetic alterations. The legislation also designated the Commission as the authority to approve an enhancement plan.

For the OREHP, the White Seabass Enhancement Plan (WSEP) was approved by the Commission in October 2010 (See Appendix H). The WSEP is a comprehensive plan that provides a framework for managing the OREHP in an environmentally sustainable manner. To avoid any significant environmental impacts resulting from the operation of the hatchery and growout pens, the WSEP includes Best Management Practices (BMP) for hatchery and growout operations, fish health, genetics, and benthic monitoring. It also outlines methods on which to evaluate the OREHP. These methods include a white seabass stock assessment and a review of the OREHP's on-going monitoring and research programs.

4.2 Marine Habitats and Communities

The mainland coast of the SCB consists of rocky shores, sandy beaches, and embayments of different types while offshore areas exceed depths of several hundred meters. The offshore islands provide additional habitats for marine organisms. They also serve as breeding grounds for populations of marine birds and offer weather-protected shores for marine mammals. Since the offshore islands are situated some distance from a heavily populated coastline in southern California, they represent the best examples of pristine environments in the SCB. Distributed between the mainland and the offshore islands are a series of submarine canyons, ridges, and basins that provide some of the most unique habitats in the SCB. Provided below are descriptions of the marine flora and fauna that reside in the proposed project area in the SCB.

4.2.1 Benthos

Benthic habitats are generally classified according to substrate type. Benthic habitats consisting of unconsolidated sediments (e.g., gravel, sand, or mud) are referred to as soft bottom and habitats consisting of rock are generally referred to as hard bottom or rocky substrate. Both soft and hard-bottom habitats support distinctive types of biological communities.

In addition to substrate type, water depth and temperature play an important role in the distribution of benthic organisms. Distance from shore, food availability, and water quality are also important factors that influence the distribution of benthic organisms. Benthic organisms can be epifaunal (attached or motile species that inhabit rock or sediment surfaces) or infaunal (live in rock or soft sediments) (Thompson et al. 1993). Generally, more is known about intertidal and shallow subtidal benthic species (<30 m; 98 ft) than those of deeper areas (>30 m; 98 ft).

4.2.2 Soft-Bottom

Compared to the soft sediments located on the mainland continental shelf (30.0 to 150.0 m; 98.0 to 492.0 ft), the macrofauna found on the shelves offshore the islands are fairly unique (Thompson et al. 1993). Unlike the macrofauna found on the mainland shelf, the assemblages found on the island shelves extend down to the basin upper slope (approximately 500 m; 1,640 ft). Generally, the species found on the shelves located surrounding the islands also occur on the mainland shelf. However, their abundances around the islands tend to be more localized and in higher numbers. The localized assemblages are thought to be due to differences in sediment type (Fauchald and Jones 1978).

Species diversity is high on the shelves surrounding the islands compared to the mainland shelf. The high diversity is probably due to factors such as persistent upwelling and the wide range of sediment types available for benthic organisms (Thompson et al. 1993). Also, possibly because of strong currents and coarser sediments, more tubicolous species and fewer burrowing organisms occur around the islands (Thompson et al. 1993). A high proportion (approximately 72 percent) of the benthic organisms are either suspension or surface detrital feeding species (Fauchald and Jones 1983). Deposit feeders such as the bristle worm *Chloeia pinnata* and the urchin *Allocentrotus fragilis* ingest large amounts of particulate organic material and are common species in the project area. Particulate organic material, animal remains, and Foraminifera constitute the primary food source for benthic organisms in the region (Thompson 1982).

4.2.3 Hard Bottom

The hard-bottom areas in the project area are interspersed with soft substrate, and are mainly of base rock and rocky outcrops that may be covered with a thin veneer of sediments (Thompson et al. 1993). Very little information is available for deep, hard-bottom assemblages because they cannot be easily sampled with grab, coring devices, or trawls. In the SCB, species composition and abundances change with increased water depth and relief of the rock substrate (KLI 1983, 1984). At depths equivalent to the project area (1.8 to 21.0 m; 3.0 to 70.0 ft), three different hard-bottom assemblages have been described in the SCB. Ophiuroids, brachiopods, and anemones dominate at low relief structures while anemones such as *Corynactis californica* and corals such as *Lophelia californica* dominate at medium relief structures. The third assemblage, consisting of the crinoid *Florometra serratissima*, the anemone *Metridium senile*, and cup corals, is generally distributed throughout the area (Thompson et al. 1993). The differences in distribution of these assemblages were attributed to tolerances of the taxa to high suspended sediment levels and sediment scour.

In other studies, two hard-bottom assemblages that were depth-related were reported in the SCB. The dominant taxon was composed of a Komokoiacean-hydroid mat that encrusted more than 70 percent of rock surfaces. Other widely occurring species consisted of the ophiuroid *Ophiacantha diplasia*, the crinoid *Florometra*, and an unidentified anemone.

Very few feeding studies have been conducted on deepwater hard bottom species. However, studies by Hardin concluded that most species are suspension feeders because of the strong currents that can carry high suspended food levels at the deeper depths (Hardin et al. 1988). Several types of disturbances can affect the distribution and abundance of deepwater species. The sources of disturbances include anchoring effects and sedimentation effects.

4.2.4 Estuaries and Lagoons

Estuaries form at the mouths of rivers and streams where freshwater and saltwater meet. Specific characteristics of estuaries vary based on salinity. This salinity may change seasonally and over longer timeframes depending upon freshwater inputs and creation or removal of barriers between the estuary and the open coast. Two kinds of estuaries exist within the SCB: bodies of water that are permanently or semi-permanently open to the ocean and bodies of water that are seasonally separated from the sea by sand bars. The latter of these types, known as “bar-built estuaries,” generally have a low level of freshwater inputs and are referred to as “lagoons”. Estuaries in the SCB contain open water and soft-bottom habitats, as well as coastal marsh and tidal flats and eelgrass beds (CDFG 2009).

The SCB contains at least a portion of nearly 40 estuaries and lagoons. The largest estuaries within the project area include Newport Bay and San Diego Bay, which are large systems with significant habitat diversity, including mudflats, shallow areas, and deeper channels. Several other estuaries, such as the Bolsa Chica Ecological Reserve, are relatively large, while most other estuaries and lagoons are under 1.3 km² (0.5 mi.²) in area. Many of these smaller estuaries are seasonally closed to tidal influence by sand bars (CDFG 2009).

Estuaries and lagoons are productive coastal ecosystems that play a key role as nursery habitat for many coastal invertebrates and fish. Estuaries in southern California tend to have low freshwater inputs, and generally lack freshwater and anadromous species, such as salmon. Exceptions include small runs of federally endangered southern steelhead. In addition, some estuaries host striped mullet, which is the only species in California to live mostly in freshwater, but return to the ocean to breed. Key species that spend most of their lives in southern California estuaries include Pacific staghorn sculpin, bay blenny, bay pipefish, and gobies (arrow, cheekspot, and shadow), as well as California killifish, basses (spotted and barred), and several species of anchovy and the federally endangered tidewater goby. Species that utilize estuaries seasonally or for part of their life cycle include topsmelt, California halibut, yellowfin croaker, stingray, sharks, and several species of perch and turbot. In addition, coastal bays and estuaries in the project area, such as San Diego Bay, Bolsa Chica Ecological Reserve, and Mission Bay, are an important part of the Pacific Flyway and host thousands of shorebirds and waterfowl on their migrations (CDFG 2009).

Since estuaries and lagoons provide important habitat linkages between marine, aquatic, and terrestrial habitats, their condition is closely tied to the condition of the surrounding watershed. Estuaries provide critical ecosystem services such as filtering

sediments and nutrients from the watershed, stabilizing shorelines, and providing flood and storm protection. Estuaries are also utilized for many recreational activities such as fishing, boating, kayaking, wildlife viewing, and interpretation/education activities. The following are brief descriptions of some of the major estuaries and lagoons within the project area (CDFG 2009):

4.2.4.1 Huntington Harbor.

The following information was taken from the California Wetlands Information System (CWIS 2007); measurements have been converted to metric units by Department staff for consistency purposes in this document.

The Huntington Harbor is approximately 89 ha (221 ac). Studies have been conducted listing the marine resources of Anaheim Bay, which is contiguous with Huntington Harbor, and the following is a summary the results of these studies. There are 51 species of marsh plants and algae reported. The invertebrates are noted in annotated checklists, with most attention being centered on the polychaetes and parasitic crustaceans. Comparisons are given of polychaete populations in pristine Anaheim Bay and developed Huntington Harbor. Forty-five species of fish are recorded from the inner portion of the bay and 42 species from the outer harbor. Information is given on the abundances, food, and capture of these species. These include the arrow goby, *Clevelandia ios*; shiner surfperch, *Cymatogaster aggregata*; California killifish, *Fundulus parvipinnis*; Pacific staghorn sculpin, *Leptocottus armatus*; California halibut, *Paralichthys californicus*; and diamond turbot, *Hypsopsetta guttulata*.[3] Special status species are present within the Huntington Harbor including California sea lion, California Least Terns, and brown pelican. A detailed listing of the special status species present within the area of the Huntington Harbor growout pen is included in Appendix E.

The Anaheim Bay/Huntington Harbor complex is located on the northern edge of the Orange County coast, approximately 32 km (20 mi.) southeast of Los Angeles. The complex consists of inner and outer Anaheim Bay, Huntington Harbor, and several ecologically significant wetlands such as the Anaheim Bay National Wildlife Refuge and Bolsa Chica Ecological Reserve. The U.S. Navy controls access through the outer bay which serves as the main entrance to the U.S. Naval Weapons Station in Seal Beach. The Navy also operates and manages the National Wildlife Refuge, which is located on their property. Besides the Naval property, the only developed area is a 22-ha (55-ac) partially developed parcel called Sunset Aquatic Regional Park. The area surrounding Huntington Harbor area is primarily residential with small boat marina activity. Huntington Harbor has one boatyard facility located in the harbor. The Santa Ana Regional Water Quality Control Board currently regulates boatyard dischargers under a general Boatyard National Pollution Discharge Elimination System (NPDES) permit. Land use around the Bolsa Chica Ecological Reserve is primarily oil production with some residential areas. The inner section of Anaheim Bay and Huntington Harbor receive very little tidal flushing because of the 183-m (600-ft) wide shipping channel

[3] Lane, E.D. and C.W. Hill. 1975. The marine resources of Anaheim Bay. California Department of Fish and Game, Fish Bulletin 165.

connecting the outer and inner bays and the constriction at the Pacific Coast Highway Bridge. Culverts and tide gates further restrict tidal flow into the wildlife refuge (Marcus 1989, CWIS 2007).

Outer Bolsa Bay is connected directly to Huntington Harbor and is the only section of the Bolsa Chica Reserve directly open to tidal influence. Inner Bolsa Bay and the rest of the reserve have a tidal regime controlled by flood gates. Because of the muted tidal flow, freshwater inputs have significant impacts on water quality. Two major storm drains enter the Anaheim Bay/Huntington Harbor complex. The Bolsa Chica flood control channel enters lower Huntington Harbor, and the East Garden Grove Wintersburg flood control channel enters outer Bolsa Bay. These channels, as well as their tributaries, convey runoff from the northern portion of the heavily urbanized Orange County into Huntington Harbor. Inputs of stormwater and urban nuisance flows via these channels are potentially significant sources of pollutant loadings and are being addressed through the county's urban runoff/stormwater permit. Because of metals and pesticide input from urban runoff, and nonpoint source pollutants, water quality in this area is categorized as impaired by the Regional Water Quality Control Board of Newport Bay.[4] Huntington Harbor has been identified as having elevated levels of toxic metals, pesticides, and bacterial pathogens from urban runoff. Huntington Harbor is slated to implement total maximum daily loads (TMDL) in 2019.

4.2.4.2 Ballona Wetlands

The following information was taken from the California Wetlands Information System (CWIS 2007); measurements have been converted to metric units by Department staff for consistency purposes in this document.

The Ballona Wetlands are adjacent to Marine del Rey in Los Angeles County. The Ballona Wetlands are divided into three areas totaling 220 ha (543 ac) in size, although historically the wetlands covered over 800 ha (2,000 ac). The Ballona Wetlands are divided by Ballona Creek and several major roads. There is also Freshwater Marsh, built between 2001 and 2003, on the southeastern edge of the wetlands. Ballona Creek is channelized through the wetlands; the sides are lined with concrete, paving stones and riprap, although the channel bottom is not armored. Ballona Creek watershed drains 337 km² (130 mi.²). Approximately 170 species of plants, 44 species of fish, and numerous bird species are found in and around the wetlands. California Least Terns and Peregrine Falcons, both endangered species, forage at Ballona Wetlands, while many other species of bird make their home there as well. Extensive restoration efforts have taken place in the wetlands in recent years and continue today. Much of the area was recently designated the Ballona Wetlands Ecological Reserve by the California Fish and Game Commission. Public access to the wetlands includes bike and walking trails (Marcus 1989, CWIS 2007).

[4] SEDIMENT CHEMISTRY, TOXICITY, AND BENTHIC COMMUNITY CONDITIONS IN SELECTED WATER BODIES OF THE SANTA ANA REGION, FINAL REPORT, California State Water Resources Control Board, Division of Water Quality, Bay Protection and Toxic Cleanup Program, National Oceanic and Atmospheric Administration, Coastal Monitoring and Bioeffects Assessment Division, Bioeffects Assessment Branch. August 1998.

4.2.4.3 Newport Bay

The following information was taken from the California Wetlands Information System (CWIS 2007); measurements have been converted to metric units by Department staff for consistency purposes in this document.

Several species of marine mammals may be present within the Newport Bay. These include: California sea lion, harbor seal, California gray whale, killer whale, common dolphin, Pacific white sided dolphin, and Dall's porpoise. The Newport Bay is utilized by several special status species including: California Least Tern, California brackish water snail, tidewater goby, California black rail, light-footed clapper rail, Western snowy plover, Belding's Savannah sparrow, common loon, American white pelican, northern harrier, white-tailed kite, merlin, long-billed curlew, and the black skimmer. A complete list of special Status Species Present within the general area of the Newport Harbor growout pen is included in Appendix E.[5] (Marcus 1989, CWIS 2007)

The Newport Bay is one of the largest small craft harbors in southern California. Containing approximately 10,000 small craft, the bay is split into upper and lower bays. Upper Newport Bay is owned and managed by the Department as a State Ecological Reserve. The lower Newport Bay is approximately 310 ha (767 ac) and is heavily developed with housing, hotels, restaurants, marinas, and light marine industry such as boatyards and fuel docks. The Newport Bay watershed encompasses 399 km² (154 mi.²) with San Diego Creek being the largest tributary. Included among several smaller tributaries draining into the system are the Santa Ana-Delhi Channel and Big Canyon Wash.[6]

Newport Bay is designated as "water quality-limited" for four impairments under the Federal Clean Water Act's (CWA) Section 303(d) List, meaning that it is "not reasonably expected to attain or maintain water quality standards" due to these impairments without additional regulation. The pollutants of concern that have resulted in the water quality limited designation include: sediment, nitrogen and phosphorus, fecal coliform, heavy metals (chromium, copper, lead, cadmium, zinc), and organics such as endosulfan, dichloro-diphenyl-trichloroethane (DDT), Chlordane, polychlorinated biphenyls (PCB), Toxaphene, diazinon, and chlorpyriphos. Newport Bay receives water input from the Santa Ana/Delhi Channel, San Diego Creek and numerous storm drains.[7] At the current time the City of Newport Beach and other interested stakeholders are undertaking water

[5] Biological Resources Addendum, City of Newport Beach, Local Coastal Plan and General Plan. Prepared for: City of Newport Beach by EIP Associates December 2003.

[6] Information for this section derived from the City of Newport Beach, Harbor Management Plan, and the http://www.newportbeachca.gov/index.aspx?page=1697, and the City of Newport Beach General Plan, Environmental Impact Report, http://www.city.newport-beach.ca.us/PLN/General_Plan/GP_EIR/Volume_1/05_Ch4_Environmental_Analysis.pdf , and the City of Newport Beach, Coastal Land Use Plan, http://www.newportbeachca.gov/index.aspx?page=177

[7] See http://www.city.newport-beach.ca.us/PLN/General_Plan/GP_EIR/Volume_1/12_Sec4.7_Hydrology.pdf

quality planning and monitoring activities in the Newport Bay to implement reforms necessary address the impaired water quality.

4.2.4.4 Upper Newport Bay

The following information was taken from the California Wetlands Information System (CWIS 2007); measurements have been converted to metric units by Department staff for consistency purposes in this document.

Upper Newport Bay is located in the town of Newport Beach and receives water from a 248-km (154-mi.) watershed with San Diego Creek and Santa Ana-Delhi Channel draining into the bay. Many different habitat types exist in Upper Newport Bay, including brackish marshes, riparian zones, upland, open water, and mud flats. The diversity of these habitat types help support a broad and diverse group of species. Upper Newport Bay is considered one of the most important birding sites in North America. Approximately 200 resident birds inhabit the bay and another 30,000 birds may rest there during migratory season. In the mid-1900's, interest arose in developing hotels in tideland areas of the bay. To block the development, a local couple purchased and preserved much of the Upper Newport Bay. In 1975, the Upper Newport Bay Ecological Reserve was established and, over the years, the acreage has grown to 62 ha (752 ac) of open space. The reserve is managed by the Department (California Code of Regulations [CCR] Title 14 §630). The Community-Based Restoration and Education Program has been established in Upper Newport Bay to address environmental degradation within the estuary, including pollution from nonpoint and point sources and siltation. This program has initiated water quality monitoring, annual clean-up events, exotic weed eradication, and habitat restoration efforts (Marcus 1989, CWIS 2007).

4.2.4.5 Bolsa Chica Wetlands

The following information was taken from the California Wetlands Information System (CWIS 2007); measurements have been converted to metric units by Department staff for consistency purposes in this document.

Bolsa Chica historically encompassed 930 ha (2,300 ac) of tidally influenced wetlands and large expanses of freshwater wetlands, but this area has been greatly altered over the last 100 years. The Bolsa Chica Wetlands are located in the unincorporated portion of Orange County, surrounded by the City of Huntington Beach, and bordered to the west by the Pacific Coast Highway. Beginning in 1899, much of the historical marsh area had been removed from tidal influence through the construction of a dam, duck hunting ponds, oil drilling pads and attendant access roads. However, in 2006 nearly 240 ha (600 ac) of Bolsa Chica were returned to tidal flow as the result of the construction of a new ocean inlet. The new inlet was part of a $148 million restoration project begun in 2004. Inner and Outer Bolsa Bays are not connected to the newly restored wetland. However, Outer Bolsa Bay is directly connected to Huntington Harbor. A portion of these wetlands is owned by the Department and designated an ecological reserve (CCR §630). Both the Bolsa Chica Ecological Reserve and the Inner

Bolsa Bay have a controlled tidal regime (through the use of flood gates to Outer Bolsa Bay), which fluctuates around mean sea level. A total of 18 different species of fish have been identified in the Outer Bolsa Bay, with topsmelt and arrow gobies being the most abundant. California killifish, bay pipefish, Pacific staghorn sculpin, longjaw mudsuckers, diamond turbot, grunion, and California halibut are also present. Forty-one fish species have been identified in the newly restored full tidal basin. Special status bird species include: the Common Loon, American White Pelican, California Brown Pelican, Double-crested Cormorant, Reddish Egret, Elegant Tern, White-face Ibis, Light-footed Clapper Rail, Western Snowy Plover, Long-billed Curlew, California Gull, California Least Tern, Black Tern, Elegant Tern, Black Skimmer, and Northern Harrier. A state marine conservation area, in addition to the Bolsa Chica Ecological Reserve, is also designated within this wetland (Marcus 1989, CWIS 2007).

4.2.4.6 Agua Hedionda Lagoon

The following information was taken from The Coastal Wetlands of San Diego County (Marcus 1989) and the California Wetlands Information System (CWIS 2007); measurements have been converted to metric units by Department staff for consistency purposes in this document.

Agua Hedionda Lagoon is 157 ha (388 ac) and is located in the City of Carlsbad. The associated watershed, which is 75 km² (29 mi.²), drains into the lagoon via Aqua Hedionda Creek and Buena Creek. The lagoon hosts a number of species, including 81 species of birds, 91 species of fish, and at least 76 benthic invertebrate taxa. The lagoon has been divided into three sections due to transportation infrastructure (e.g., Interstate 5). Culverts connect the three sections of the lagoon. The Encina Power Plant, owned by NRG Energy, is situated along the southern edge of the two outermost lagoon sections. The power plant is permitted to withdraw up to 3 billion L (860 million gal) of seawater per day from the lagoon for once through cooling. There is also a commercial aquaculture facility, Carlsbad Aquafarm, which uses the outer lagoon for growing oysters, mussels, clams, and other seafood. A portion of the inner lagoon is considered an impaired water body, as it exceeds standards for coliform bacteria and sediment. The mouth of the lagoon is periodically dredged to maintain tidal flow.

Eelgrass (*zostera marina*) occurs in all basins of the lagoon. Patches of salt marsh can be found along the shore of the middle and inner lagoons. Common salt marsh species included pickleweed, saltgrass, fleshy jaumea, and alkali heath. Abundant marine fish species seen at Agua Hedionda include, silversides, gobies and diamond turbot were most abundant. Benthic invertebrate surveys were conducted in July 1994, and April 1995;143 taxa were collected by beam trawls and 76 taxa were collected by hand cores. Cockles, mussels, crustaceans, amphipods, isopods Nematodes, phoronids, oligochaetes, polychaete worms, and speckled scallops (*argopectin circularis*) are also found in the lagoon.[8] Bird species noted at the lagoon include: Belding's Savannah

[8] Personal observation Thomas Napoli, Staff Environmental Scientist, Marine Region, California Department of Fish and Game. Also see The Speckled Scallop, Argopecten circularis in Agua Hedionda Lagoon, San Diego County, California, by Peter L. Haaker, John M. Duffy, Kristine C.

sparrow, California least tern, western snowy plover, brown pelican, white-faced ibis, California gull, osprey, cooper's hawk, long billed curlew, loggerhead shrike, northern harrier, and black skimmer (Marcus 1989, CWIS 2007).

4.2.4.7 Mission Bay

The following information was taken from the Mission Bay Master Plan, Mission Bay Natural Resource Management Plan;[9] measurements have been converted to metric units by Department staff for consistency purposes in this document.

Mission Bay is an approximately 1,860-ha (4,600-ac) recreational park in southern California. Biological resources in Mission Bay include a wide range of marine habitats, a prime example of coastal salt marsh, and a variety of birds including endangered species. Five different marine communities occur in Mission Bay: sand bottom, mud bottom, hard bottom, eelgrass meadows, and open water.

Sand Bottom: Sand bottom habitat is found along shoreline intertidal zones (area between extreme high and low tides) and in high energy water movement areas, such as the Entrance Channel, the Bay Bridge channels, and at the mouth of the Flood Control Channel. Dominant invertebrates in this habitat include polycheate worms, armored sand stars (*Astropecten armatus*), swimming crabs (*Portunus xantusii*), sea pansy (*Renilla kollikeri*), and sea pen (*Stylatula elongata*). The population of sea-pansy (*Dendraster excentricus*) in Mission Bay has fluctuated in the past but is currently 15 dense in the Entrance Channel. Fish associated with sand bottoms in the bay are California halibut (*Paralichthys californicus*), diamond turbot (*Hypsopsetta guttulata*), barred sand bass (*Paralabrax nebulifer*), and spotted sand bass (*Paralabrax maculatofasciatus*).

The dominant subtidal (below the area of tidal fluctuation) habitat in Mission Bay is mud bottom. Mud bottom habitat, however, also occurs from intertidal mudflats in the Northern Wildlife Preserve to the deepest part of the bay and in the Southern Wildlife Preserve. This habitat is a more stable substrate and has a higher organic content than sand. It is present in areas of slow water movement and seasonal sediment deposition. Typical species found in this habitat are moon snails (*Polinices and Natica spp.),* California bubble snail (*Bulla gouldiana*), polycheate worms, swimming crabs, ghost shrimp (Callianassa spp.), mud shrimp (*Upogebia pugettensis*), a tubicolous anemone (*Pachycerianthus spp*.), and light-bulb tunicate (*Clavelina hunstsmani*). Fleshy stalked bryozoan (*Zoobotryon verticillatum*) densely populate some areas during the summer. Fish frequenting mud bottom habitat include California halibut, diamond turbot, bat ray. (*Myliobatis californica*), butterfly ray (*Gymnura marmorata*), and long-jawed mudsucker (*Gillchthys mirabilis*). Round rays (*Urolophus halleri*) are abundant in this habitat.

Henderson and David O. Parker.. MARINE RESOURCES TECHNIC~L REPORT NO. 57. California Department of Fish and Game. 1988

[9] MISSION BAY NATURAL RESOURCE MANAGEMENT PIAN, Development and Environmental Planning, Planning Department, City ofSan Diego. See http://www.sandiego.gov/planning/programs/parkplanning/pdf/mbpmasterplan8.pdf

Shallow (less than three feet), protected subtidal areas with either mud or sand bottoms are important as nursery habitat for juvenile California halibut.

Hard bottom habitat in Mission Bay is associated with manmade hard substrate, such as riprap, bridge and pier pilings, docks, and concrete storm drains. Organisms in the Entrance Channel, west of West Mission Bay Drive Bridge, are found in greater numbers than in other hard substrate areas of the bay. This is due to the preference for the cooler less turbid water, the more intense water motion, and the less variable saline conditions found in the Entrance Channel. Species commonly occurring in this habitat include: low-growing coralline algae (*Corallina vancouverinsis, Bossiella orbignina, Gigartina spp.*); giant kelp (*Macrocycstis pyrifera*); sea fans (*Muricea californica* and *M. frutfcosa*); sea stars (*Pisaster giganteus ochraceus*); Sea urchins (*Strongylocentrotus franciscarius* and *S. purpuratus*); and mollusks (*Astraea undosa, Aplysiavaccaria spp., Haliotis spp.*). Fish associated with the entrance channel riprap are garibaldi (*Hypsypops rubicundus*) kelpfish (*Gibbonsia spp*.), giant kelpfish (*Heterostichus rostratus*) and kelp surfperch (*Brachyistius frenatus*). Other hard substrate habitat in the bay is dominated by bay mussel (*Mytilus edulis*), rock scallop (*Hinnites multlrugosus*), barnacles (*Tetriclita squamosa* and *Balanus amphitrite*) algae (*Egregia laevigata* and *Gigartina, spp*.) and macroalgae (*Sargassummuticum* and *Codium fragile*). Fish associated with hard substrate in the bay include kelpbass (*Paralabrax clathratus*), barred sand bass (*Paralabrax nebulifer*), California scorpionfish (*Scorpaena guttata*), and opaleye (*Girelle nigricans*).

Eelgrass (*Zostera marina*) is an aquatic grass which grows on the low intertidal to high subtidal slopes in Mission Bay and the Flood Control Channel. Eelgrass plays a particularly important role in the marine ecology of bay and channel waters. Eelgrass is a direct food source for some fish and bird species. Invertebrates attached to eelgrass serve as a food source for many fish species inhabiting eelgrass beds. Eelgrass supports amphypods and phyloplankton populations which are sources of food for fish in the water column. In addition to being a primary and secondary food producer, eelgrass plays an important role by providing a structural component to bay and channel bottoms. Eelgrass beds also provide protection for shrimps, crabs, scallops, and juvenile fish. Substantial eelgrass habitat is present in Mission Bay and the Flood Control Channel, second in area only to mud bottom habitat. Eelgrass meadows graduate into mud bottom.

4.2.4.8 San Diego Bay

The following information was taken from the San Diego Bay Integrated Natural Resources Management Plan (USDoN 1999); measurements have been converted to metric units by Department staff for consistency purposes in this document.

San Diego Bay encompasses 57 km² (22 mi.²) and is the third-largest bay-estuary system in the state of California, after San Francisco Bay and Humboldt Bay. San Diego Bay contains a number of diverse habitats, including tidal flats, salt marsh, and eelgrass beds, especially in the southern portion of the bay. These habitats support many fish species, including anchovy, topsmelt, stingray, bat ray, sand bass, and

grunion. Eelgrass beds in San Diego Bay also support the threatened Pacific seahorse (*Hippocampus ingens*) and endangered threatened green sea turtle (*Chelonia mydas*). Several federally listed bird species also utilize the bay, including California least tern, light-footed clapper rail, California brown pelican, least Bell's vireo, and the western snowy plover. Sweetwater Marsh, located adjacent to the southern portion of San Diego Bay, encompasses 128 ha (316 ac) of habitat and is designated as a National Wildlife Refuge. The marsh is one of very few locations where salt marsh bird's beak grows (USDoN 1999).

The San Diego Bay is home to: 280 species of dependent marine and coastal birds, 102 species of marine fish and one marine reptile, 621 species of marine invertebrates, 109 species of marine algae and plants, 9 species listed federal or state threatened or endangered species. Within the San Diego Bay are: 333 ha (823 ac) of salt marsh, 396 ha (978 ac) of tidal flats, 431 ha (1,065 ac) of eelgrass beds, 73 km (45 mi.) of hard substrate and fouling communities, 3,776 ha (9,331 ac) of mud and sand bottom assemblages in shallow to deep water. Based on sampling conducted within the San Diego Bay the northern anchovy was the most abundant species, followed in abundance by the topsmelt, the slough anchovy, the Pacific, and the shiner surfperch, with all other species accounting for only 10 percent of the total numbers of fish identified. In terms of biomass, the round stingray was the dominant form, followed by the spotted sand bass, the northern anchovy, the bat ray, the topsmelt, and the slough anchovy, with the biomass of all other species identified accounting for 27 percent. Certain species generally associated with eelgrass habitat includes: shiner surfperch, dwarf surfperch, black surfperch, kelp bass, spotted kelpfish, reef finspot, giant kelpfish, barred pipefish, Pacific seahorse, bay pipefish, and the bay blenny. White seabass has also been identified in samples take both within areas of eelgrass and other portions of the bay (USDoN 1999).

The bay is a part of the Pacific Flyway used by millions of birds traveling between northern breeding grounds and southern wintering sites. It is one of a dwindling number of stopover sites used by migrants to replenish their energy during their long journey. It supports large populations of over-wintering birds that depend on its resources for food, shelter, resting, and staging before migration. Some of the most abundant birds include: Western sandpiper, Red-necked phalarope, least sandpipers, Marbled godwit, Willet, Black-bellied plover, Dowitchers (long-billed and short-billed), Black-necked stilt, Dunlin, Red knot, American avocet, Semipalmated plover, Killdeer, Sanderling, Brown pelican, Elegant tern, Heerman's gull, Double-crested cormorant, Brandt's cormorant, Forster's tern, Western gull, Black skimmer, Caspian tern, California gull, California least tern, Bonaparte's gull, and Gulls (undifferentiated). It is likely that most of the marine mammals that are present in the nearshore areas of the SCB use or have transited the San Diego Bay. Marine mammals that are known to enter the San Diego Bay on a regular basis include: California sea lion, coastal bottlenose dolphin, Pacific harbor seal, and occasionally both adult and juvenile gray whale (USDoN 1999).

Lastly, the shallow areas of the southern San Diego Bay are home to green sea turtles. (USDoN 1999).

4.2.5 Seagrass Beds[10]

Seagrasses, a group of about sixty species, are unique amongst flowering plants in that they have adapted to live immersed in seawater. Seagrasses grow in shallow marine bays and estuaries around the world and form the basis of a specialized coastal and estuarine habitat of great ecological value. One of the seagrasses that is widely distributed throughout temperate estuaries of both coasts is the native eelgrass, *Zostera marina*. Along the west coast, eelgrass is found from southeastern Alaska to southern Baja California, Mexico.

Eelgrass beds are important ecological communities of shallow bays and estuaries because of the multiple ecosystem values that they provide. Eelgrass is a major source of primary production in nearshore marine systems, supplying detrital based food chains. In addition, several organisms directly graze upon it, thus contributing to the system at multiple trophic levels. For example, certain waterbirds feed directly on the eelgrass plants, such as brant geese that use eelgrass almost exclusively as a food resource. Eelgrass meadows are also of vital importance as habitat and have an important role in the life cycle of many ecologically and economically important aquatic species by serving as nursery areas. In California bays and estuaries north of Monterey, eelgrass provides spawning habitat for Pacific herring.

Eelgrass beds provide habitat for juvenile fish including Pacific salmonids, lingcod, and rockfish, and invertebrate species such as Dungeness crab.

In addition to the habitat and resource values that eelgrass provides, it also functions to trap and remove suspended particles, thus improving water clarity, reduces erosion by providing sediment stabilization, adds oxygen to the surrounding water, and cycles nutrients. Extensive eelgrass canopies absorb wave shock, thereby protecting adjacent shorelines.

Worldwide there has been a decline in eelgrass abundance over the past 20 to 30 years, which concerns natural resource managers. These changes have been attributed to increased anthropogenic effects, such as coastal development, dredging, pollution, fishing practices and boating activities. Besides human disturbances, declines in eelgrass communities have been caused by outbreaks of disease, particularly by the eelgrass wasting disease during the 1930s on the Atlantic coasts of both Europe and the United States. The disease resulted in the loss of over 90 percent of the North Atlantic eelgrass population, which had a catastrophic effect on estuarine productivity. There was a drastic reduction in brant geese populations, as well as the disappearance of the scallop fishery. In addition, it resulted in the only known case of extinction of a marine gastropod, the eelgrass limpet. Wasting disease continues to affect eelgrass beds in North America and Europe with variable degrees of loss; however, none to date have been as catastrophic as the outbreak in the 1930s.

In response to the decline, the importance of eelgrass communities has been realized, and they have received increasing attention from scientists and natural resource

[10] California Department of Fish and Game, Status Of The Fisheries Report And Update Through 2008

managers. There has been an increase in protection through management practices throughout the world. In the United States, eelgrass habitat is protected by federal and state law under their respective CWAs; the Magnuson-Stevens Fishery Conservation and Management Act; the California Coastal Act; and Title 14, CCR. According to these laws and regulations, any activities which may potentially impact eelgrass habitat must mitigate for those impacts. This requires mitigation for harmful impacts to existing eelgrass beds as well as potential eelgrass habitat.

The distribution of eelgrass within bay and estuarine systems is defined by several variables, including light, temperature, salinity, substrate, wave exposure, currents and nutrient availability. Eelgrass forms extensive meadows in soft-bottom habitats from the low intertidal to depths of about 6 m (20 ft), and from sheltered areas to exposed coasts. In southern California, eelgrass has been reported to occur as deep as 30 m (98 ft). Optimum temperatures for eelgrass growth seem to lie between 10 and 20°C (50 and 68°F). However, eelgrass is known to survive with a lower tolerance level of -6°C (21°F) and an upper level of 41°C (105°F). Eelgrass is a euryhaline species (able to live in a wide range of salinities) that is capable of growing near stream mouths when the water is fresh at low tide, but does not grow in persistent fresh water. A salinity range of 10 to 30 parts per thousand is optimum for growth. Eelgrass morphology consists of horizontal rhizomes that are buried in substrate and long leafy shoots that extend vertically in the water column. Shoots typically consist of three to five ribbon-like leaves. Leaf lengths can vary from less than 0.5 m (1.5 ft) to nearly 4.0 m (13.1 ft) and leaf width ranges from 1.5 to 12.0 mm (0.1 to 0.5 in.). Eelgrass colonizes substrate ranging from firm sand to soft mud.

Leaf growth is very rapid—typically 5.0 mm/day (0.2 in./day) and in some circumstances growth can reach 10.2 mm/day (0.4 in./day). This high productivity results in large biomass input into the ecosystem, fueling dynamic energy systems.

Not only does eelgrass provide high ecosystem value, but it also is used as an indicator of estuarine health because it responds to environmental factors by changing in distribution and abundance. Because of the susceptibility of eelgrass to stresses such as pollution, it is used as one of the five sensitive indicators of pollution in the National Oceanic and Atmospheric Administration (NOAA) National Estuarine Eutrophication Assessment. Eelgrass requires some of the highest light levels of any plant group worldwide which means it is acutely responsive to water clarity changes.

Eelgrass beds are known to be located in protected estuaries and bays throughout the SCB. Eelgrass beds are located in the vicinity of the following proposed project facilities: San Diego Bay: Southwestern Yacht Club, Mission Bay: Quivera Basin, Aqua Hedionda Lagoon, Catalina Harbor: Catalina Seabass Fund (CSF) and Hubbs-SeaWorld Research Institute (HSWRI), Dana Point Harbor, Newport Bay, Huntington Harbor, Marina Del Rey, Channel Islands Harbor, and Santa Barbara. Eelgrass beds are also located along the mainland coast. For example, eelgrass has been found at six of the eight Channel Islands (Santa Rosa, Santa Cruz, Anacapa, San Nicolas, Santa Catalina, and San Clemente islands) and along the Santa Barbara coast (CDFG 2009).

Removal of eelgrass without authorization from the Department is prohibited under State law and regulation.[11]

4.2.6 Oceanographic Currents

The proposed project area is within the SCB, which is part of the west-coastwide California Current System. Although the core of the California Current passes the SCB west of the Channel Islands, the SCB is still influenced by a part of the larger California Current System. The SCB exhibits a counter-clockwise circulation comprising the southward California Current along the outer edge of the SCB and the northward Southern California Countercurrent closer to the mainland. This Southern California Countercurrent brings warmer, low-chlorophyll waters into the SCB, but also entrains recently upwelled waters from the Ensenada upwelling center (about 80 km [50 mi.] south of the U.S.-Mexico border). Recent observations suggest that there are two branches to the Southern California Countercurrent, most likely due to topographic passages east and west of the Catalina-Clemente island pair. An eastward flow has often been inferred in the southern SCB, joining the southward California Current and the northward Southern California Countercurrent. Together these currents make up the Southern California Eddy. However, there is little direct evidence of surface drifters following this route, and the position and strength of this eastward flow is unclear (CDFG 2009).

The circulation of the SCB is largely driven by offshore winds. In spring, winds are found closer to the coast leading to a tendency for southward flow through the SCB and coastal upwelling. As spring turns to summer, winds in the SCB weaken but remain strong offshore, leading to a westward (offshore) migration of upwelling that is due to the wind-driven Ekman divergence now found mid-Bight (CDFG 2009).

There is a surface divergence in the SCB due to the strong offshore Ekman transport associated with northerly winds over the outer SCB. An upward flux of deeper waters is expected, which is evident in the shallow thermocline found throughout the SCB and a variety of features in which sub-thermocline waters are observed breaking the surface. Cold surface temperatures are observed in the wakes of many islands, as well as in headland wakes at Point Dume, Palos Verdes, and Point Loma. While a subsurface chlorophyll maximum characterizes much of the SCB, surface chlorophyll plumes are visible nearshore, specifically downstream of upwelling sites (e.g., Point Loma). Circulation at depth is dominated by the California Undercurrent, which flows northward along the continental slope. The California Undercurrent is strongest in summer and fall and can be seen breaking the surface where the shelf is narrow (e.g., Palos Verdes Peninsula) (CDFG 2009).

The northern end of the SCB is characterized by intense upwelling at Point Conception, a major upwelling center at the end of the wind-driven coastal upwelling region that characterizes the central and northern California coast. Not only is upwelling active along the mainland coast at Point Conception and to the north, but these cold waters

[11] See Title 14 California Code of Regulations §30.10 and §165.

are transported south into the proposed project area by the strong southward coastal current. This current separates from the mainland at Point Conception and flows past the westernmost Channel Islands, immersing San Miguel and Santa Rosa islands in cold nutrient-rich waters. At times this current will curve into the Santa Barbara Channel, transporting cold water along the northern shores of San Miguel, Santa Rosa and Santa Cruz islands. Thus, the Santa Barbara Channel and northern Channel Islands represent a dynamic region where two oceanographic regimes meet—cold northern waters mixing with warm southern waters—and the western end of the Channel is characterized by strong fronts. The mainland coast is characterized by a warm westward flow, leading to a cross-channel shear in currents. In summer, one will often see the persistent Santa Barbara Channel Eddy (CDFG 2009).

Over the shelf along the mainland south of the Channel, water tends to flow southward, in contrast to the up-coast currents offshore and in the Channel. However, these coastal currents exhibit strong synoptic variability associated partly with local winds but more so with remote forcing due to coastal trapped waves generated by synoptic variability in wind forcing off the coast of the Baja peninsula. These features propagate up-coast, resulting in weakening or reversal of southward shelf currents (and upwelling of colder waters) on time scales of several days (CDFG 2009).

Given the topographic complexity of the SCB, one can expect topographic flow features such as island wakes and headland wakes. Although observations are incomplete, it is clear that wind and current wakes are associated with the numerous islands and headlands in the region. Specific features that have received attention are the Catalina Eddy, recirculation over the San Pedro shelf south of Palos Verdes, the Santa Barbara Channel Eddy and recirculation in Santa Monica Bay. Santa Monica Bay exhibits clockwise mean circulation, with northward flows along the shelf edge and southward currents nearshore. Wind shadows can yield areas of warmer surface temperatures and stronger stratification, e.g., west of Santa Catalina Island. In contrast, the dynamics of current wakes can yield localized upwelling of cold waters, as discussed above (e.g., southwest of Palos Verdes) (CDFG 2009).

This general SCB circulation is not constant. Seasonal fluctuations have been described above, generally increasing in intensity through the summer. During winter, the region experiences southerly wind events and downwelling during the passage of cold fronts, although winds turn to westerly behind the cold front and this results in down-coast (southward) transport of runoff plumes. During the fall, the relaxation of winds along the coast north of Point Conception is more frequent and one observes westward flow through the Santa Barbara Channel and up the mainland coast past Point Conception. The strongest northward flow around Point Conception is observed in El Niño years, when SCB waters may be transported north to San Francisco. In fact, during El Niño there is a general northward transport SCB-wide, and warmer southern waters are imported into the region. Also during fall, nearshore oceanography may be locally influenced by strong offshore Santa Ana winds. This higher frequency variability, superimposed on the seasonal circulation, includes synoptic wind-driven flow features as described above, and also eddies that are shed from islands or that develop on the sheared flow (particularly in the fall). At higher frequencies, currents vary with the tide

and tidal currents over the shelf often exceed the mean current, so that flow reverses twice a day. Internal tides are also important, given the shallow thermal stratification in this region. Over the inner shelf, this internal tidal energy is typically seen as packets of higher frequency internal waves that lead to cold sub-thermocline waters swashing shoreward and breaking the surface nearshore. This process has been shown to be important in nearshore larval dispersal, nearshore productivity, and nearshore water quality (CDFG 2009).

Surface waves in the SCB are typically small, but they can be large at specific places and times. While much of the SCB is sheltered from northerly swell generated in the storms in the northern Pacific, large swells generated at lower latitudes or during storms in the austral winter in the southern Pacific may enter and influence much of the SCB. The Santa Barbara coast is well sheltered, owing to the Channel Islands offshore, and, likewise, the island coasts facing the mainland are characterized by low wave forcing.

Land runoff to the SCB is very low most of the year, but large episodic events may affect significant areas and much of the nearshore water and shoreline in the SCB, contributing freshwater, sediments, nutrients, and pollutants to nearshore ecosystems. Depending on storm magnitude, watershed size and land uses, freshwater plumes in southern California can cover hundreds of square kilometers over a period of 1-2 days and persist for days or even weeks. These acute events carry high particle loads and significant toxic pollutants. Chronic effects, due to more persistent low-level runoff, are confined to nearshore and shoreline environments near to creeks and storm-drains, as has been observed through beach monitoring for fecal indicator bacteria. However, during the dry seasons, tidal outflow from bays and harbors continues and larger plumes are observed, which may impact larger areas (CDFG 2009).

Circulation within harbors, bays and lagoons is important in shaping habitat and in the dispersal of larvae, eggs, and spores. The larger bays in the region are best classed as low-inflow estuaries throughout the long dry season, with long-residence inner waters. The outer bays are typically well flushed by tides and enhanced by thermal exchange in some bays. The smaller bar-built estuaries are typically closed in the dry season, with minimal hydrological links to the ocean via groundwater fluxes through the sand bar. However, the first outflow of these lagoon waters in the fall poses a significant concern for water quality in nearshore ocean waters and along nearby coastlines (CDFG 2009).

4.3 Special-Status Species

Several laws and policies provide protections for selected species within the SCB. Both the California Endangered Species Act (CESA) and Federal Endangered Species Act (ESA) provide for special protections for a variety of fish, marine mammals, birds, and plants. For the purposes of this ND a Special Status Species is one that is protected or proposed for protection under any of the following law regulations or policies: ESA, Federal Marine Mammal Protection Act, Federal Migratory Bird Treaty Act, California Endangered Species Act, Fully Protected Species listed under the California Fish and Game Code, Species that have been prohibited from being taken under the California

Fish and Game Code, and the species present on Department's listings of species of special concern. The list of "species of special concern" includes those taxa considered to be of greatest conservation need. A Species of Special Concern (SSC) is a species, subspecies, or distinct population of an animal (which includes fish, amphibian, reptile, bird and mammal) native to California that currently satisfies one or more of the following (not necessarily mutually exclusive) criteria: is extirpated from the State or, in the case of birds, in its primary seasonal or breeding role; is listed as Federally, but not State, threatened or endangered; meets the State definition of threatened or endangered but has not formally been listed; is experiencing, or formerly experienced, serious (noncyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it for State threatened or endangered status; has naturally small populations exhibiting high susceptibility to risk from any factor(s), that if realized, could lead to declines that would qualify it for State threatened or endangered status.

The Department believes that SSCs should be considered during the environmental review process. The California Environmental Quality Act (CEQA; California Public Resources Code §§ 21000-21177) requires State agencies, local governments, and special districts to evaluate and disclose impacts from "projects" in the State. Section 15380 of the CEQA Guidelines clearly indicates that species of special concern should be included in an analysis of project impacts if they can be shown to meet the criteria of sensitivity outlined therein.[12]

Sections 15063 and 15065 of the CEQA Guidelines, which address how an impact is identified as significant, are particularly relevant to SSCs. Project-level impacts to listed (rare, threatened, or endangered species) species are generally considered significant thus requiring lead agencies to prepare an Environmental Impact Report to fully analyze and evaluate the impacts. In assigning "impact significance" to populations of non-listed species, analysts usually consider factors such as population-level effects, proportion of the taxon's range affected by a project, regional effects, and impacts to habitat features.

The section below includes descriptions of several special-status species that exist within the project area. A more comprehensive list of those special status species identified in the areas of the growout pens and hatchery is included in Appendix E.

4.3.1 Fish

4.3.1.1 Tidewater Goby

The tidewater goby (*Eucyclogobius newberryi*), which is endemic to California, is distributed in brackish-water habitats along the California coast from Cockleburr Canyon in San Diego County to the Tillas Slough in Del Norte County. Historical ranges spread farther south to Agua Hedionda Lagoon within San Diego County. Tidewater goby is federally listed as an endangered species, although the 5-year review by the Ventura

[12] http://www.nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=3778

Fish and Wildlife Office recommended changing the listing to threatened. Tidewater goby feed on invertebrates and generally live one year. They reproduce throughout the year resulting in constant variability in local abundance and making accurate population estimates difficult. They are threatened by habitat loss or degradation, and predation by native and exotic predators (CDFG 2009).

4.3.1.2 White Shark

The white shark (*Carcharodon carcharias*) is protected by the Department in all California waters since January 1, 1994, through Assembly Bill 522 (AB 522). This bill makes legislative findings and declarations regarding the importance of white sharks in maintaining the overall health and stability of California's marine ecosystem, and prohibits the take of white sharks for commercial or recreational purposes. AB 522 allows the take of white sharks for scientific research or live display under permits issued by the Department that includes a provision for white sharks taken incidentally by commercial fishing operations using set gill nets, drift gill nets, or roundhaul nets. The bill prohibits the severing of the pelvic fin from the carcass until after the shark is brought ashore. This law was extended and amplified in 1997 (SB-144) to outlaw all directed efforts to lure white sharks by any means in state waters (CDFG 2010a). Signed into law on January 4, 2011, the Shark Conservation Act of 2010 includes measures to prohibit fin removal and disposal of shark carcasses at sea. White sharks are further protected by Assembly Bill 376, which bans the possession, sale or distribution of shark fins in California as of January 1, 2012.

4.3.1.3 Southern Steelhead

Steelhead (*Oncorhynchus mykiss*) are an anadromous form of rainbow trout and a historically popular gamefish in California. Steelhead migrate to the ocean where they usually spend 2 to 6 years before returning to freshwater to spawn. Though the age at first migration varies, and can be as young as less than one year, some steelhead never migrate to the ocean. Known spawning populations of steelhead are found in coastal rivers and streams from San Mateo Creek in north San Diego County to the Smith River near the Oregon border. The present distribution of steelhead in California has been greatly reduced from historical levels. The decline of California's steelhead appears to be part of a more prevalent west coast steelhead decline. This decline prompted NOAA's National Marine Fisheries Service (NOAA Fisheries) to list nearly all of California's steelhead populations under the ESA. Statewide, the major factors contributing to steelhead decline in California include freshwater habitat loss and degradation, which has resulted mainly from three factors: inadequate stream flows, dams that block access to historic spawning and rearing areas, and human activities that discharge sediment and debris into watercourses (CDFG 2009).

Southern steelhead, the evolutionarily significant unit located within the SCB, are listed as an endangered species by the ESA. In addition, they are listed as a California SSC by the Department. Southern steelhead were formerly found in coastal drainages as far south as the Santo Domingo River in northern Baja California and were present in many streams and rivers of southern California including San Mateo Creek, Malibu Creek (Los

Angeles County), and Ventura River (Ventura County). As of 2005, the anadromous form of southern steelhead appears to be completely extirpated between the Santa Monica Mountains and the Mexican border except for a small population in San Mateo Creek in northern San Diego County. Major adverse impacts to southern steelhead include fish migration barriers (dams and culverts, such as the Rindge Dam and Crag's Road crossing in Malibu Creek), urbanization, water impoundment and diversion, and invasive plant species (CDFG 2009).

4.3.1.4 Giant Sea Bass (Black Sea Bass)

Within California, giant sea bass (*Stereolepis gigas*), or black sea bass are rarely found north of Point Conception. Adult giant sea bass seem to prefer the edges of nearshore rocky reefs at depths of 11 to 40 m (35 to 130 ft). Giant sea bass reach a maximum size of 2 m (7 ft) and 255 kg (563 lb). Estimated growth rates suggest that they take six years to reach 14 kg (30 lb), 10 years to reach 45 kg (100 lb), and 15 years to reach 68 kg (150 lb). Male fish have been observed to be mature at 18 kg (40 lb), and females at 23 to 27 kg (50 to 60 lb). Giant sea bass are susceptible to overfishing and suffered serious decline in numbers because they grow slowly and mature at a relatively old age (CDFG 2009).

A 1981 law prohibited the take of giant sea bass for any purpose, with the exception that commercial fishermen could retain and sell two fish per trip. This law was amended to one fish per trip in 1988, and only if incidentally caught by gill or trammel net. Incidental mortality of giant sea bass was probably further reduced with the banning of inshore gillnets from state waters in 1994. All fish taken incidentally by recreational fishing activities must be immediately returned to the waters where taken (CDFG 2009). Although they maintain no formal federal or state sensitivity designation, giant sea bass are a prohibited species in the State of California and have been labeled critically endangered by the International Union for the Conservation of Nature (CDFG 2010a).

4.3.1.5 Garibaldi

The garibaldi (*Hypsypops rubicundus*), California's official state marine fish, ranges from Monterey Bay to Guadalupe Island, Baja California. Garibaldi are territorial, sometimes using the same nest site for several years, and do not migrate. Their diet consists mainly of invertebrates. Garibaldi can range from shallow subtidal areas to depths of 95 ft. No commercial or recreational take of garibaldi is allowed (See 14 CCR 28.05), and current populations are in good condition (CDFG 2009). Although the species maintains no formal federal or state sensitivity designation, Garibaldi is a prohibited species in the State of California (CDFG 2010a).

4.3.2 Reptiles

4.3.2.1 Sea Turtles

Although uncommon, sea turtles have occasionally been reported in the SCB. Four species, all of which are protected under the ESA, can occur in the project area. They

are the green turtle, *Chelonia mydas*; the olive ridley turtle, *Lepidochelys olivacea*; the leatherback turtle, *Dermochelys coriacea*; and the loggerhead turtle, *Caretta caretta* (Table 4.1) (Hubbs 1977).

Of the four species, three of them (green, olive ridley, and loggerhead) are listed as federally threatened, while the leatherback is listed as endangered. Sea turtles are circumglobal, occurring throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian oceans. Although none of the species are known to nest off the California coast, the southern portion of San Diego Bay supports a year-round population of approximately 60 green turtles.

Table 4.1 Marine Turtles That May Occur in the Proposed Project Area

Species	Common Name	Protected Status
Chelonia mydas	Green turtle	Threatened
Lepidochelys olivacea	Olive ridley turtle	Threatened
Dermochelys coriacea	Leatherback turtle	Endangered
Caretta caretta	Loggerhead turtle	Threatened

Source: Adapted from Hubbs (1977) .

While marine turtles are seldom seen at sea in the project area, strandings do occur locally on occasion (NOAA 1997, 2005, 2007). Statewide, between 1995 and 2005, 134 strandings were reported to the California Sea Turtle Stranding Network operated by NOAA Fisheries (NOAA 2007). Of these, almost half (64) were green turtles, which are generally the most common marine turtle encountered in the SCB.

In contrast, leatherback sightings and strandings within the SCB are far rarer, and are generally restricted to Santa Barbara County. DNA tracking has demonstrated that most of the leatherbacks encountered off the California coast originate from nesting grounds in the western Pacific. These pelagic turtles appear to undertake a trans-Pacific migration, appearing seasonally along the central and northern California coast where upwelling conditions generally provide a rich smorgasbord of their favorite food, jellyfish.

Except for the green turtle, all of the turtles that can occur in the project area are omnivorous, feeding on wide variety marine life including shellfish, jellyfish, squid, sea urchins, fish, and algae (Carr 1952, Mager 1984). The green turtle is a benthic herbivore and feeds primarily on algae and sea grasses (Eckert 1993). All four species of turtles can dive to several hundred feet during feeding activities (Eckert 1993).

4.3.3 Birds

4.3.3.1 American Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) has historically nested on the Channel Islands, but disappeared completely by the 1960s. In 1980, a program to reintroduce bald eagles to Santa Catalina Island began through a partnership between federal and state agencies and nonprofit organizations. Those efforts have translocated dozens of bald eagles to Santa Catalina Island as chicks or eggs from wild nests on the mainland or from captive breeding. In 2002, the Channel Islands National Park and The Nature Conservancy began a successful reestablishment program for bald eagles. Sixty-one juvenile eagles were introduced to the park between 2002 and 2006. The first successful bald eagle nests occurred in 2006 on Santa Cruz Island. American bald eagles nest near bodies of open water and have a diverse diet consisting of fish, small mammals, birds, mollusks, and crustaceans. In 2007 they were delisted from the ESA and their current federal protection comes from the Bald and Golden Eagle Protection Act. They remain listed as endangered by the CESA and fully protected under FGC §3511. On the west coast, they can be found from Baja California to Alaska. Within southern California, bald eagle prey includes rockfish, surfperch, cabezon, midshipman, California sheephead, bocaccio, gulls, California mussels, limpets, and other bivalves. On the Channel Islands, adults bring bocaccio and other rockfish, halfmoon, white seabass, California sheephead, topsmelt, other fish, gulls, and mammals back to the nest for juvenile eagles (CDFG 2009).

4.3.3.2 Belding's Savannah Sparrow

Belding's savannah sparrow (*Passerculus sandwichensis beldingi*) is found from Goleta, and south to El Rosario, Baja California. They were listed by the Department as endangered in 1974. They occupy coastal saltmarshes and estuaries where pickleweed (*Salicornia spp.*) is dominant. They eat a variety of crustaceans as well as seeds of pickleweed and may forage in other nearby habitats, including along rock jetties. This species breeds at Point Mugu, the Ballona Wetlands, Upper Newport Bay, and Bolsa Chica Wetlands, among other locations (CDFG 2009).

4.3.3.3 California Brown Pelican

The California brown pelican (*Pelecanus occidentalis californicus*) was formerly listed as endangered under the ESA and CESA but was removed from the lists in 2009. This species is fully protected under §3511 of the FGC, and also receives protection under the Migratory Bird Treaty Act. In California, the California brown pelican usually nests on two of the Channel Islands in Southern California: West Anacapa and Santa Barbara islands. Nest sites generally occur on the ground or in low shrubbery of steep coastal slopes on small islands, isolated from ground predators and human disturbance. California brown pelicans utilize local vegetation to build nests of sticks, grasses, and other debris each year. The majority of their diet is fish, primarily captured by plunge diving. California brown pelicans feed close to shore, primarily in shallow (less than 150 m [492 ft] depth) waters of estuaries and the continental shelf, usually within 20 km (13 mi.) of shore. Their diet in the Channel Islands consists almost exclusively of small

schooling fish, in particular, northern anchovy and Pacific sardine. They also roost in groups during the day, on sand bars or jetties, or on manmade structures such as piers and docks. North American populations underwent dramatic declines during the 1960s and early 1970s due to eggshell thinning induced by dichloro-diphenyl-dichloroethylene (DDE), the primary metabolic breakdown product of the pesticide dichloro-diphenyl-trichloroethane (DDT). Although populations have recovered substantially from these declines, there is considerable interannual variation in productivity as related to prey availability, disturbance at colonies, and disease outbreaks. Breeding effort, productivity, and survival are lower during El Niño events. Nesting success on Santa Barbara and Sutil islands has been very high, with over 2,000 young chicks fledged from 2001 to 2003 (CDFG 2009).

4.3.3.4 California Least Tern

The California least tern (*Sternula antillarum browni*) is the subspecies of least terns nesting along the west coast of North America, from Baja California, Mexico, to San Francisco Bay. California least terns establish nesting colonies on sandy soils with little vegetation along the ocean, lagoons, and bays. Their nests are shallow depressions lined with shells or other debris. California least terns are generally present at nesting areas between mid-April and late September, often with two waves of nesting during this time period. California least terns feed on California killifish, sculpins, surfperch, silverside smelt, anchovy, Northern anchovy, Pacific saury (although not in years when other food is abundant), cabezon, and rockfish. Beach-nesting adults feed juvenile grunion and other small fish to their chicks. This species was listed as endangered by the U.S. Secretary of the Interior in 1970 and the Commission in 1971 due to a population decline resulting from loss of habitat, and is fully protected under FGC §3511. It is also listed as endangered by the ESA. A survey in 2007 estimated 6,744 to 6,989 California least tern breeding pairs, which established nests, and produced 2,293 to 2,639 fledglings at 48 documented locations. Numbers of nesting California least terns were not uniformly distributed across all sites. Camp Pendleton, Naval Base Coronado, Los Angeles Harbor, and Batiquitos Lagoon represented 55 percent of the breeding pairs while Venice Beach, Camp Pendleton, Huntington Beach and Naval Base Coronado produced 52 percent of the fledglings (CDFG 2009).

4.3.3.5 Elegant Tern

Although thousands of elegant terns (*Thalasseus [Sterna] elegans*) from Mexico spend the summer and fall along the California coast, the only breeding colonies in the United States are at Bolsa Chica, Pier 400 at Terminal Island, and the salt work dikes at the south end of San Diego Bay. A limited breeding colony in the United States makes the elegant tern highly vulnerable to extirpation in this part of its range. Human disturbance at nesting sites also threatens the population. Elegant terns feed primarily on fish, such as topsmelt and anchovy, and forage in bays and protected areas (CDFG 2009). This species is listed on the Department's "Taxa to Watch" list for bird species that have recently recovered from documented population declines, and is federally listed as a species of concern.

4.3.3.6 Double-crested Cormorant

Double-crested cormorants (*Phalacrocorax auritus*) are found throughout the SCB, although in Southern California they breed only on the Channel Islands. The Channel Islands' populations declined due to eggshell thinning from DDE contamination and, to some extent, human disturbance at nest sites, but the population is currently considered stable-to-increasing in California. They live in both fresh and saltwater environments and eat primarily fish such as sardines and herring (CDFG 2009). Double-crested cormorants are on the Department's "Taxa to Watch" list for birds species that have recently recovered from documented population declines.

4.3.3.7 Golden Eagle

In North America, the golden eagle (*Aquila chrysaetos*) breeds locally from northern Alaska eastward to Labrador and southward to northern Baja California and northern Mexico. Golden eagles breed from late January through August with peak breeding occurring in March through July. Nest construction in Southern California occurs in fall and continues through winter. The species winters from southern Alaska and southern Canada southward through the breeding range. The golden eagle requires rolling foothills, mountain terrain, and wide arid plateaus deeply cut by streams and canyons, open mountain slopes and cliffs, and rock outcrops. The food supply for this species includes medium to large mammals such as rabbits, hares, and squirrels, and it will also feed on reptiles, birds, and sometimes carrion. A major threat to this species is human disturbance in the form of habitat loss as well as human development and activity adjacent to golden eagle habitat. Accidental deaths attributed to increased development include collisions with vehicles, power lines, and other structures; electrocution; hunting; and poisoning. The golden eagle is fully protected by FGC §3511, and also receives protection under the Bald and Golden Eagle Protection Act (CDFG 2009).

4.3.3.8 Light-footed Clapper Rail

The light-footed clapper rail (*Rallus longirostris levipes*) is distributed throughout coastal salt marsh habitat from Santa Barbara County, California to San Quintín Bay, Baja California, Mexico. They occur in approximately 24 California marshes where they are usually year-long residents, usually nesting in pickleweed (*Salicornia spp.*). They are omnivorous and opportunistic foragers that have a diet that includes insects, spiders, and isopods. Within its historical range the amount of suitable habitat has been severely reduced by conversion of its preferred saltmarsh habitat for other uses. This species is listed as endangered by the ESA and CESA and is also listed as a fully protected species by FGC §3511 (CDFG 2009).

4.3.3.9 Osprey

Although ospreys (*Pandion haliaetus*) are found within southern California, few nesting locations exist in the area. Ospreys have been seen through the summer months at such former or potential nesting areas as Newport Bay (Orange County) and Buena Vista Lagoon (San Diego County). The removal of nesting trees, degradation of river

and lake environmental quality, boating, and shooting may have contributed toward the decline of ospreys, which disappeared from southern California before pesticides were introduced. Ospreys have a large global range, including every continent but Antarctica. They feed almost exclusively on fish, and nest near bodies of water. Some ospreys migrate to South America for the winter but do not nest there. Ospreys are protected under the Migratory Bird Treaty Act and are listed on the Department's "Taxa to Watch" list for bird species that have recently recovered from documented population declines, but are not currently listed as a species of special concern in California (CDFG 2009).

4.3.3.10 Western Snowy Plover

The western snowy plover (*Charadrius alexandrinus nivosus*) occurs throughout the southern California, and its breeding range extends from Baja California, Mexico, to southern Washington State. During the winter, western snowy plovers are found on beaches, estuarine sand, and mud flats, and in manmade salt ponds; during the breeding season (March through September) they nest on beaches. Western snowy plovers feed on invertebrates in the wet sand and surf-cast kelp, and occasionally on insects from low-growing plants. The May 2006 coastal U.S. range-wide breeding season survey estimated 1,879 individuals with 1,719 of those birds seen in California. Human harassment and direct destruction of nest sites and breeding habitat, expanding predator populations, and introduced species contributed to the decline of western snowy plovers(CDFG 2009). Poor reproductive success resulting from human disturbance, predation, and inclement weather, combined with permanent or long-term loss of nesting habitat to urban development and the encroachment of introduced beach grass, has led to the decline in active nesting colonies as well as an overall decline in the breeding and wintering population of the western snowy plover along the Pacific coast of the United States. In southern California, the very large human population and the resultant beach recreation activities by humans have precluded the western snowy plover from breeding on historically used beach strand habitat. As a result of these factors, the Pacific coast population of the western snowy plover was federally listed as a species threatened with extinction on March 5, 1993 (58 Federal Register 12864). In addition, the western snowy plover is a California Species of Special Concern (CDFG 2009).

4.3.3.11 Xantus's Murrelet

Xantus's murrelet (*Synthliboramphus hypoleucus*) consists of two races. The northern race (*S. h. scrippsi*) is a fairly common breeder on the Channel Islands, while the southern race (*S. h. hypoleucus*) is a rare visitor to the southern offshore waters of California. For successful breeding Xantus's murrelet requires rocky, undisturbed islands with productive marine waters nearby. Larval fish are an important part of their diet, particularly northern anchovies. This species is a federal species of concern and is listed as threatened by CESA (CDFG 2009).

4.3.3.12 American Peregrine Falcon

The American peregrine falcon (*Falco peregrinus anatum*) breeds from Alaska to Labrador, southward to Baja California and other parts of northern Mexico, and east across central Arizona through Alabama. In California, the American peregrine falcon is an uncommon breeder or winter migrant throughout much of the state. Active nests have been documented along the coast north of Santa Barbara, in the Sierra Nevada, and in other mountains of northern California. As a transient species, the American peregrine falcon may occur almost anywhere that suitable habitat is present. In the Americas, the species winters from southern Alaska to Tierra del Fuego in southernmost South America. Peregrine falcons in general use a large variety of open habitats for foraging, including tundra, marshes, seacoasts, savannahs, grasslands, meadows, open woodlands, and agricultural areas. Sites are often located near rivers or lakes. The diet of the American peregrine falcon primarily consists of birds that, while most are pigeon-sized, can be as small as hummingbirds or as large as small geese. The principal cause of the American peregrine falcon population decline was the use of organochlorine pesticides, especially DDT and its metabolite, DDE, which interfered with their calcium metabolism and resulted in eggs with thin shells that were easily broken. This species is listed as fully protected under FGC §3511 (CDFG 2009).

4.3.3.13 Ashy Storm-petrel

The total population size of the ashy storm-petrel (*Oceanodroma homochroa*) is less than 10,000 pairs and declining. Ashy storm-petrels feed on larval fish, squid, and zooplankton, and forage on the edges of upwelling zones and in waters just seaward of the continental slope. They generally nest in rocky crevices, such as those found around sea caves in the Channel Islands (CDFG 2009). This species is currently considered a California Bird Species of Special Concern (breeding)—priority 2 due to its population or range size being greatly reduced or its population or range size is moderately reduced and threats are projected to greatly reduce the taxon's population in California in the next 20 years. It is also considered a federal species of concern (CDFG 2010a).

4.3.3.14 Black Storm-petrel

The only known breeding site for black storm-petrel (*Oceanodroma melania*) in the United States is on Sutil Island, an islet off Santa Barbara Island, in 1976. Only one nest was found, but an estimated 10 birds were heard in the vicinity, and the maximum number of breeding pairs was thought to be 10–15. The population may have been present previous to the discovery, and was estimated at 25 breeding pairs in later surveys. Black storm-petrels are most common in the warm coastal waters of the SCB over the continental shelf off central California. They forage in surface waters near shore at thermal fronts adjacent to upwellings, tide rips, shelf-break fronts, and other areas of high ocean productivity. Their diet probably consists of small fish, crustaceans, and squid (CDFG 2009). This species is listed as a California Bird Species of Special Concern (breeding) (CDFG 2010a).

4.3.3.15 Coastal California Gnatcatcher

The coastal California gnatcatcher (*Polioptila californica californica*) occurs in coastal Southern California and Baja California year-round. The coastal California gnatcatcher typically occurs in or near sage scrub habitat which is composed of relatively lowgrowing, dryseason deciduous and succulent plants. Their diet is primarily composed of spiders but is also composed of wasps, bees, and ants. Their population has declined due to widespread destruction of its coastal scrub habitat. The coastal California gnatcatcher is listed as threatened by the ESA and as a Species of Special Concern by the Department (CDFG 2010a).

4.3.3.16 Willow Flycatcher

The willow flycatcher (*Empidonax traillii*) consists of four or five subspecies. The different subspecies of willow flycatcher each occupy distinct breeding ranges, have subtle differences in color and morphology, and possibly vocalizations. The southwestern willow flycatcher (*E. t. extimus*) is the subspecies present within the SCB. In California, its breeding range extends from the Mexican border north and inland to the City of Independence in the Owens Valley east of the Sierra Nevada, to the South Fork Kern River in the San Joaquin Valley and coastally to the Santa Ynez River in Santa Barbara County. The number of southwestern willow flycatchers in California has been estimated at approximately 200, recorded at 22 locations within 13 drainages. The southwestern willow flycatcher is a riparian-obligate species restricted to complex streamside vegetation. Native broadleaf-dominated and mixed native/exotic are the primary habitats used by southwestern willow flycatcher in California. Willow flycatchers are insectivores and forage by aerially gleaning prey (capturing insects, for example, while hovering) from trees, shrubs, and herbaceous vegetation or by hawking (capturing in flight) larger insects. The decline of southwestern willow flycatchers is primarily due to loss, fragmentation, and degradation of suitable riparian habitat resulting from urbanization, recreation, water diversion and impoundments, channelization, invasive plant species, overgrazing by livestock, and conversion of riparian habitat to agricultural land. The willow flycatcher is listed as endangered by the CESA, while the southwestern willow flycatcher is additionally listed as endangered by the ESA (CDFG 2010a).

4.3.4 Pinnipeds

At least seven species of pinnipeds historically occur within the SCB, including the Channel Islands. Pacific harbor seals, California sea lions, and northern elephant seals are the three most common species. Guadalupe fur seals are less commonly found within the region and northern fur seals are rarely seen. Steller sea lions and ribbon seals are extremely rare within the study region (CDFG 2009).

4.3.4.1 Harbor Seals

Harbor seals (*Phoca vitulina*) are widely distributed in the coastal areas of the northern Pacific and northern Atlantic. Harbor seals in the eastern Pacific range from the Pribilof

Islands in Alaska to Isla San Martin off Baja California. Between the Mexican and Canadian borders, harbor seals have been managed as three separate stocks, one of which is the stock off California. After passage of the Marine Mammal Protection Act in 1972, harbor seal abundance grew rapidly until 1990, when stocks leveled off. There has been no net population growth in California since 1990. In 2002 the population was estimated at 27,863 animals. The southern Channel Islands have the largest concentration of harbor seals in California. The seals are year-round residents at many haulout sites, but their abundance varies seasonally, the highest numbers of seals being present during the breeding season (March-June) and the molt (June-July). San Nicolas Island, Point Conception, Mugu Lagoon and Point Mugu are home to some of the largest haulout sites. Harbor seals also haul out on buoys, jetties, floating docks, and in harbors. Harbor seals eat a wide variety of pelagic and benthic prey, including small schooling fishes such as northern anchovy, many species of flatfishes, bivalves, and cephalopods. In southern California, harbor seals were found to eat mostly rockfish, octopus, spotted cusk-eel, and plain midshipman (CDFG 2009).

4.3.4.2 California Sea Lion

The range of the California sea lion (*Zalophus californianus*) extends from the Pacific coast of Baja California to southern British Columbia. These animals breed primarily on offshore islands in the southern part of their range from the Gulf of California to San Miguel Island. California sea lions can be seen around Santa Cruz, Anacapa, San Miguel, and Santa Rosa islands, and Seal Rocks at Santa Catalina Island. California sea lions also haul out on buoys, jetties, floating docks, and in harbors. In the late 1920s, only 1000–1500 California sea lions were counted on the shores of California. Since a general moratorium on hunting marine mammals was imposed with passage of the Marine Mammal Protection Act in 1972, the population has grown substantially to a current estimate of 237,000–244,000 animals. California sea lions are opportunistic feeders on a variety of prey, especially seasonally abundant schooling species such as Pacific hake, northern anchovy, Pacific sardine, spiny dogfish, and squid. They tend to feed in cool upwelling waters of the continental shelf (CDFG 2009).

4.3.4.3 Northern Elephant Seal

Elephant seals (*Mirounga angustirostris*) are found from Baja California to the Gulf of Alaska and Aleutian Islands, and the current population is over 150,000 animals. Elephant seals haul out two times per year, during the breeding season, December through March, and during the molt, April through August. They migrate north to feeding grounds twice a year. Most breeding sites are also molting haulout sites. In the study region, Northern elephant seal haulout sites are on San Miguel, San Clemente, Santa Rosa, Santa Barbara, and San Nicolas islands. Juvenile seals also haul out in high numbers at these traditional sites during the fall preceding the breeding season. When not on land, northern elephant seals spend most of their time under water, and probably feed on deep-water, bottom-dwelling marine species such as rockfish, squid, swell sharks, and ratfish. Pups feed on fish, squid and small sharks (CDFG 2009).

4.3.4.4 Guadalupe Fur Seal

Guadalupe fur seals (*Arctocephalus townsendi*) are listed as threatened under the CESA and depleted under the Marine Mammal Protection Act. The Guadalupe fur seal is a pelagic species throughout most of the year, occurring in Pacific Ocean waters from Isla de Guadalupe, Mexico, to the Channel Islands of southern California. When ashore, this seal occupies rocky caves and crevices and sandy beaches. Breeding occurs solely on Isla Guadalupe from May to July. Male seals are occasionally observed on rocky beaches of the southern Channel Islands. It is believed that Guadalupe fur seals feed in deep waters on species of krill, squid, and small schooling fish. The most recent population estimate of 7,408 fur seals was made in 1994. Counts taken between 1954 and 1994 suggest that the rate of population growth as of 1994 was approximately 14 percent (CDFG 2009).

4.3.5 Fissipeds

4.3.5.1 Southern Sea Otter

The southern sea otter (*Enhydra lutris nereis*) is the lone fissiped species occurring in the project area. Sea otters are classified as threatened under the ESA, depleted under the Marine Mammal Protection Act, and as a "fully protected mammal" under California State law. Southern sea otters off California feed almost entirely on macroinvertebrates such as abalone, crab, and sea urchin. However, in certain areas, they have been reported to feed on fish (Ebert 1968, Estes et al. 1981).

In California, otters live in waters less than 20 m (65 ft) deep and rarely move more than two kilometers (one mile) offshore. Sea otters once ranged along shallow coastal waters from northern Japan across the Aleutians to Alaska, and down the west coast of Canada and the U.S. all the way to Baja California, Mexico. Demand for the otter's pelt led to intensive hunting and the near extinction of the species by the early 1900s. However, a small remnant population of approximately 50 animals from central California has since repopulated much of the California coast from Point Conception north (USFWS 2003).

A major concern raised when sea otters were first listed on the endangered species list in 1977 was the risk they faced from a major oil spill occurring along the mainland coast, which would decimate the population. In 1987, in response to this concern, the U.S. Fish and Wildlife Service (USFWS) proposed a sea otter translocation program. The purpose of the program was to establish a colony of southern sea otters outside their existing range to boost recovery of the species and to protect against the possibility that a natural or human-caused event, such as an oil spill, would devastate the main population. As part of this program, a number of otters were periodically translocated to San Nicolas Island over the coming years (USFWS 2003). Unfortunately, an independent population of sea otters failed to become established at this location. Despite the importation of 140 otters, and more than 70 successful births, the island population has remained small. For example, in 2010, the translocated colony at San Nicolas Island contained approximately 46 individuals. In September 2011, the USFWS

released a Revised Supplemental Environmental Impact Statement, which proposed to formally end the sea otter translocation program (USFWS 2011).

The southern sea otter (*Enhydra lutris nereis*) population is currently estimated at approximately 2,719 individuals (USGS 2010). Substantial changes have occurred in the distribution and density of sea otters within the California range in the last 20 years (USGS 2007). These changes have generally been shifts in population distribution, and indicate increases in the use of some areas and declines in the use of others (Bonnell et al. 1983). Although otters still primarily occur north of Point Conception, over the past decade their range has extended south of the Point and into southern California (Jameson and Hatfield 1999). In spring 2007, over one hundred otters were spotted east of Point Conception. Of these, 39 were spotted east of Gaviota, with 29 in the Naples Reef area, approximately 7 km (4 mi.) west of Coal Oil Point (USGS 2007). Occasionally lone otters are seen as far south as Ventura. The spread of otters back into the southerly portions of their historic range could eventually lead to conflicts with fisheries and other recreational resource uses.

4.3.6 Cetaceans

The SCB hosts a rich diversity of cetacean species (order *Cetacea*), with at least 33 species occurring within the SCB. Blue whales (*Balaenoptera musculus*), humpback whales (*Megaptera novaeangliae*), and gray whales (*Eschrichtus robustus*) enter the SCB following migration routes between warm southern waters and cold northern waters. Blue whales can be spotted from June to December as they migrate north. Gray whale northward and southward migrations overlap and these animals can be seen heading both north and south off Southern California in January and February. Humpback whales (*Megaptera novaeangliae*; federally endangered) can be seen from spring until early fall, and their total United States west coast population is estimated at 597 individuals. Several other species vary seasonally in their abundance, with Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), Risso's dolphin (*Grampus griseus*), and northern right whale dolphins (*Lissodelphis borealis*) more common in winter, and finback whales (*Balaenoptera physalus*) occurring more in the summer. Bottlenose dolphins (*Tursiops truncatus*) forage for bottom fish year-round in Santa Monica Bay. Common cetaceans found in the SCB include gray whale, humpback whale, blue whale, finback whale (*Balaenoptera physalus*), sperm whale (*Physeter macrocephalus*), Baird's beaked whale (*Berardius bairdii*), and Minke whale (*Balaenoptera acutorostrata*), bottlenose dolphins, shortbeaked common dolphins (*Delphinus delphis*), and long-beaked common dolphins (*D. capensis*) (CDFG 2009). Special-status cetacean species whose ranges extend into the SCB include the North Pacific right whale *(Eubalaena japonica*; federally endangered), sei whale (*Balaenoptera borealis*; federally endangered), sperm whale (*Physeter catadon* [*P. macrocephalus*]; federally endangered), killer whale (*Orcinus orca*; federally endangered), and the above-mentioned blue whale (federally endangered, "threatened" under the Marine Mammal Protection Act). All cetaceans are protected under the Marine Mammal Protection Act, and many are also protected under the ESA (CDFG 2009).

4.3.7 Gastropods

4.3.7.1 Black Abalone

Found from Oregon to southern Baja California, the black abalone (*Haliotis cracherodii*) inhabits rocky intertidal areas (to depths of 6 m [20 ft] in Southern California), often within the high-energy surf zone. Adult black abalones congregate on rocks and in tidepools. Black abalone populations in Southern California remain severely depressed since the closure of the fishery in 1993. Black abalone density around San Clemente Island is approximately one abalone per 2,790 m^2 (30,020 ft^2), or less than 0.1 percent of historic levels, with no evidence of recruitment. Black abalones have been observed at ten locations on the western side of San Clemente Island. However, recent evidence shows some recruitment at San Nicolas and Santa Cruz islands. Current restoration research efforts have been focused on finding some sort of genetic-based disease resistance to withering syndrome, a disease that has devastated once-abundant black abalone populations, and successful captive propagation of the species for recovery out-planting. Black abalone is currently listed as a species of concern by the NOAA Fisheries. A draft black abalone status review report released by NOAA stated that black abalone is in danger of extinction throughout its range unless effective measures to counter the effects of withering syndrome are found. Black abalone was listed as an endangered species under the ESA as of February 13, 2009 (74 FR 1937) (CDFG 2009). Commission regulations prohibit the take of all abalone south of San Francisco Bay (14 CCR 29.15(a)), and take of this species within the SCB is therefore prohibited (CDFG 2010a).

4.3.7.2 White Abalone

Ranging from Point Conception to central Baja California, Mexico, white abalone (*Haliotis sorenseni*) usually inhabit depths greater than 23 m (75 ft). They prefer deep rocky bottoms from 18 to 60 m (60 to 200 ft) often associated with deep living kelp beds, such as *Pelagophycus porra* or elk kelp beds. They feed on bacteria, diatoms, and kelp. Baby abalone recruitment trackers deployed at Santa Cruz Island have been monitored at least once a year since their deployment in 2004, but no white abalone have yet been seen. A 2007 research cruise around Anacapa Island, Santa Barbara Island, and the east end of Santa Cruz Island found no live white abalone. White abalone is the first marine invertebrate to receive federal protection under the ESA. Commission regulations prohibit the take of all abalone south of San Francisco Bay (14 CCR 29.15(a)), and take of this species within the SCB is therefore prohibited (CDFG 2010a).

4.3.8 Plants

4.3.8.1 Salt Marsh Bird's Beak

Salt marsh bird's beak (*Cordylanthus maritimus* ssp. *maritimus*) grows in the higher reaches of coastal salt marshes to intertidal and brackish areas influenced by freshwater input. The interaction between tidal flows and local surface and subsurface

freshwater flows is complex and important to the species' survival. It is designated as an endangered species at both the state and federal levels. The population of this species has declined due to loss of habitat and non-native plant competitors. Historically, salt marsh bird's beak was widespread in coastal salt marshes from Morro Bay in San Luis Obispo County to San Diego County and northern Baja California. Presently, it occurs only in scattered sites at fewer than 10 salt marshes. Half of the original occurrences are now extirpated. In California, the species is currently found at the Tijuana River Estuary and Sweetwater Marsh in San Diego County, Upper Newport Bay and Anaheim Bay in Orange County, Ormond Beach and Mugu Lagoon in Ventura County, Carpinteria Marsh in Santa Barbara County, and Morro Bay in San Luis Obispo County. Salt marsh bird's beak is found in the Department's Upper Newport Bay Ecological Reserve (CDFG 2009). It is both a federally and state-listed endangered species. Additionally, it is included in the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants on list 1B.2 (fairly endangered in California).

4.3.8.2 Ventura Marsh Milk-vetch

Ventura marsh milk-vetch (*Astragalus pycnostachys* var. *lanosissimus*) is a short-lived, herbaceous perennial in the pea family (*Fabaceae*). It is both a state and federally listed endangered species. Historically, Ventura marsh milk-vetch occurred in back dune habitat, coastal meadows, and near coastal salt marshes from Ventura County to Orange County. Over the last century six historical occurrences have been known to exist. Ventura marsh milk-vetch was extirpated from these sites and was, therefore, thought to be extinct until USFWS biologist rediscovered it in June 1997 at a proposed development site near the city of Oxnard in Ventura County. Today, this single population of Ventura marsh milk-vetch is the only known population to exist. However, one source has reported Ventura marsh milk-vetch in the Ballona Wetlands (CDFG 2009). It is listed by the state of California and the federal government as endangered. Additionally, it is included in the CNPS Inventory of Rare and Endangered Plants on list 1B.1 (seriously endangered in California).

4.3.8.3 Gambel's Water Cress

Gambel's water cress (*Nasturtium gambelii*) is a rhizomatous herb in the mustard family (*Brassicaceae*). It is both a state and federally listed endangered species. Additionally, it is included in the CNPS Inventory of Rare and Endangered Plants on list 1B.1 (seriously endangered in California). Gambel's water cress is threatened by habitat loss and erosion. It occurs in freshwater and brackish marshes in Santa Barbara, Los Angeles, and Orange counties. Species accounts exist from the late 1800s and early 1900s in close proximity to the southern California coastal region in Cienega in the Los Angeles basin, Huntington Beach, and near the City of Santa Barbara where all previously existing populations are extirpated (CDFG 2010a).

4.4 Marine Water and Sediment Quality

4.4.1 Impaired Water Bodies in the Southern California Bight

When a water body does not meet established water quality standards, it is placed on an impaired waters list mandated by §303(d) of the CWA. For this reason, this list is often called the 303(d) list, and waters on this list are referred to as "impaired" waters. States are required to update this list every two years and work towards resolving problems associated with the listed water bodies. Typically, a TMDL is developed for each impaired water body. A TMDL determines the total amount of the pollutant/stressor (e.g., pathogens, sediment, nutrients) that the water body can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. An implicit or explicit margin of safety is also factored into this analysis. The TMDL then allocates the allowable loading to all point and nonpoint sources to the water body and establishes an implementation plan to ensure that the allocations and water quality standards are achieved (CDFG 2009).

There are 21 impaired water bodies and one TMDL in the South Coast Hydrologic Unit, which is the only unit within its State Water Resources Control Board (SWRCB) region (Region 3) located in the SCB. The Los Angeles Regional Water Quality Control Board has the most impaired water bodies in the study region with one hundred and sixty-one waterbodies deemed impaired; however, it also has the most TMDLs in the study region with a total of thirty-six TMDLs. Santa Ana Region Water Quality Control Board has 33 impaired water bodies and fourteen TMDLs. The San Diego Regional Water Quality Control Board has the second highest number of impaired water bodies, with 99 listed on the 303(d) list and 29 TMDLs in place.

4.4.1.1 Newport Bay

Newport Bay, which has two areas separately identified on the State's CWA §303(d) list, is one of the major impaired water bodies in the Santa Ana Hydrologic Unit. Pollution problems in Newport Bay include pesticides/herbicides entering the system from urban runoff and agriculture runoff into the tributary creeks. High levels of trace metals have been detected in San Diego Creek and at certain locations in the bay. Toxicants associated with sedimentation from urban erosion and tributary creeks have also been identified (Santa Ana Regional Water Quality Control Board). Other toxicant sources include boatyard and fueling operations, small craft discharges and stormwater runoff.[13]

[13] SEDIMENT CHEMISTRY, TOXICITY, AND BENTHIC COMMUNITY CONDITIONS IN SELECTED WATER BODIES OF THE SANTA ANA REGION, FINAL REPORT, California State Water Resources Control Board, Division of Water Quality, Bay Protection and Toxic Cleanup Program, National Oceanic and Atmospheric Administration, Coastal Monitoring and Bioeffects Assessment Division, Bioeffects Assessment Branch. August 1998.

4.4.1.2 Agua Hedionda Lagoon[14]

Agua Hedionda Lagoon is located within the City of Carlsbad off Carlsbad Boulevard. The lagoon is approximately 157 ha (388 ac). The current lagoon configuration was created in 1954 when approximately 93 ha (230 ac) of salt marsh underwent significant dredging. The original slough was only occasionally open to the sea. An inlet channel of rip rap jetties, which keeps the mouth permanently open, was built in 1954. The power plant draws water from the lagoon and discharges the cooling water into a second discharge channel that empties directly into the ocean. This lagoon consists of three basins that are connected via openings under I-5 and the railroad. The berms for these crossings limit the reach of tidal action. The total watershed, which empties into the ocean through the lagoon, is approximately 75 km² (29 mi.²). Flows from the watershed enter the Agua Hedionda Creek and the Buena Creek which then flow into the lagoon which empties into the Pacific Ocean. There are also 23 storm drains which channel urban runoff along the northern shore, and agricultural runoff along the southern shore. The lagoon – or portions thereof – are included in the list of impaired water bodies due to bacterial, sediment and invasive species issues. An estimated 91,745 m³ (120,000 yd³) of beach sand enters the outer lagoon due to the process of longshore drift; this is dredged periodically. Agua Hedionda Creek also contributes sediment and pollutants to the lagoon.

4.4.1.3 Mission Bay

The following information was taken from the Mission Bay Master Plan, Mission Bay Natural Resource Management Plan.[15]

The bay is irregularly shaped, with two large islands and depths ranging 2-6 m (7-20 ft). Circulation is poor in the eastern portion of the Mission Bay. The bay's watershed is 137 km² (53 mi.²). Rose Canyon Creek and Tecolate Creek flow into and are tributaries of the Mission Bay. Rose Canyon Creek is west of I-5, is concrete, and has estimate of flows for the 100-year peak of 283 m³/sec (10,000 ft³/sec). Tecolote Creek is mostly west of I-5, is concrete, and has estimated for the 100-year peak of 139 m³/sec (4,900 ft³/sec). Approximately 25 km² (10 mi.²) of the watershed is conveyed to the bay over the shoreline and through 69 storm drains that enter the Mission Bay.

A 1994 report characterized the bay's primary water quality problem as bacteriological contamination from urban runoff combined with poor tidal flushing; the eastern portion of the bay was closed to body contact 76 times in 1993. A 1983 study of bay water and sediments found elevated levels of heavy metals only in sediments in the southern portions of the bay. The bay is listed an impaired water body do to the bay exceeding lead, coliform, and eutrophication state and regional water quality standards for selected uses.

[14] http://ceres.ca.gov/wetlands/geo_info/so_cal/agua_hedionda.html.
[15] MISSION BAY NATURAL RESOURCE MANAGEMENT PIAN, Development and Environmental Planning, Planning Department, City of San Diego. See http://www.sandiego.gov/planning/programs/parkplanning/pdf/mbpmasterplan8.pdf

4.4.1.4 San Diego Bay

San Diego bay is approximately 4,364 ha (10,783 ac). The San Diego Bay is 24 km (15 mi.) long and varies from 0.4 to 5.8 km (0.2 to 3.6 mi.) in width. It is about 44 km^2 (17 mi^2) in area at mean lower low water. With a water volume of about 6,513 m^3 (230,000 ft^3), the bay's depth ranges from 18 m (59 ft) near the mouth to less than 1 m (3 ft) at the south end. It has an average depth of 21 ft (6.5 m) measured from mean sea level. The watershed for the bay is approximately 1,122 km^2 (433 $mi.^2$). With its large watershed, the bay receives drainage from the cities of San Diego, National City, Chula Vista, Lemon Grove, El Cajon, Bonita, Imperial Beach, and Coronado, and from surrounding communities as far east as the Cuyamaca Mountains. Storm drains and streams deliver pollution from many nonpoint sources: automobile oil and grease that build up on roads and parking lots, fertilizer runoff from lawns, illegal dumping of chemicals, yard debris, garbage, and soil erosion. San Diego Bay's watershed was identified as an Area of Probable Concern by the National Sediment Quality Survey in 1997 because 32 sampling stations showed sediment contamination where associated adverse effects to aquatic life were probable (Tier 1). The entire San Diego Bay is listed as an impaired water body (CWA Sec. 303[d]) by the SWRCB due to contamination with metals, chlorinated hydrocarbons and pathogens and due to benthic community degradation and toxicity.[16] Contaminants that are currently of concern in San Diego Bay include: chlordane (total), chromium, copper, mercury, Tributyltin, zinc, polycyclic aromatic hydrocarbon compounds, PCBs (total). However, contaminant levels are being reduced through sediment remediation projects at priority sites. Coliform contamination of the bay can become a problem near stormwater outfalls and streams following rain storms. Sources of this contamination most likely include leaking or broken sewer lines, illegal dumping of sewage, and domestic animal feces (USDoN 1999).

[16] http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml?wbid=CAB91010000019990210132422.

5.0 Evaluation of Environmental Impacts

The checklist used for this environmental evaluation was adapted from the environmental checklist form presented in Appendix G of the CEQA Guidelines (CCR Title 14, Division 6.0, Chapter 3.0 Article 20, Appendix G). The checklist form was used to help frame the investigation of potential significant adverse direct and indirect physical impacts from the funding and implementation of the OREHP. CEQA requires that adverse impacts attributable to a proposed project be identified and addressed. CEQA impacts analysis is typically done by identifying the baseline or existing condition against which impacts from the proposed project will be calculated. For the current ND, the CEQA impacts would be only those attributable to any planned or foreseeable *changes* in the existing operations and not impacts that may be related to the existing operations. However, the Department, as the trustee for the State's natural resources, is under a duty to try and minimize impacts regardless of whether these would be considered significant under CEQA.[17]

An impact discussion follows each environmental issue identified in the checklist. It should be noted that the Department has mitigated several adverse impacts to the environment through the implementation of the BMP's described in the WSEP, and other documents. However, this effort to mitigate impacts should not be construed as evidence that these impacts should be considered significant. The Department, as the resource trustee, is obligated to conserve all state trust resources from adverse impacts including those which would be deemed less than significant under CEQA.

For this checklist, the following designations are used:

Potentially Significant Impact: An impact that could be significant, and for which no mitigation has been identified. If any potentially significant impacts are identified and cannot be mitigated, an EIR must be prepared.

Less Than Significant with Mitigation Incorporated: An impact that requires mitigation to reduce the impact to a less-than-significant level.

Less Than Significant Impact: Any impact that would be adverse, but not considered significant.

No Impact: The project would not have any impact.

In examining the significance of the potential project impacts, a two-step evaluation was conducted. The first step was to quantify the change in the environment that could occur in each issue area as a result of the proposed project. The second step was to determine the level of severity associated with change in the environment.

[17] See California Fish and Game Code §1802 and §2014.

5.1 Geology/Soils

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:			X	
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist - Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.			X	
ii) Strong seismic ground shaking?			X	
iii) Seismic-related ground failure, including liquefaction?			X	
iv) Landslides?			X	
b. Substantial soil erosion or the loss of topsoil?				X
c. On- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse due to the project being located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project?				X
d. Substantial risks to life or property due to the project being located on expansive soils, as defined in Table 18-1-13 of the Uniform Building Code (1994)?				X
e. Inadequate soils for supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?				X

5.1.1 Impact Discussion:

The proposed project does not involve construction of new facilities or major expansion of the existing facilities or operations, but merely involves the continued operation of the existing ORHEP program and existing hatchery and growout pens. As such no impacts have been identified as occurring or expected from the proposed project. Nevertheless, a review of possible impacts from continued operation of the existing facility was completed in order to try and minimize possible environmental impacts due to the existing operation.

a (i, ii). Several of the proposed project facilities are located within seismically active zones. However, these facilities are not vulnerable to seismic events given their water locations. King Harbor is the only land-based growout pen, but is not part of this CEQA review. The only other onshore facility that would be vulnerable to a large seismic event is the Carlsbad Hatchery, but potential consequences would be minimal. The Carlsbad Hatchery is relatively new and built to current seismic codes. Given that the project has been engineered and designed to anticipate such events, an impact due to a seismic event would be considered ***less than significant***.

a (iii). Depth to groundwater in the proposed project area is approximately 20 feet below ground surface at the Carlsbad Hatchery. Depth to groundwater is not an issue for the growout pens, which are all located in an aquatic environment. The consequences related to any potential liquefaction at the Carlsbad Hatchery would be minor and limited to the facilities without impacting surrounding land uses. Therefore, potential impacts associated with liquefaction would be considered ***less than significant***.

a (iv). The Carlsbad Hatchery is located at the base of a hill that is well terraced and vegetated. Therefore, the likelihood of a landslide affecting the facility is low. The facility does not create any new landslide hazards. Since all of the growout pens are located in an aquatic environment (i.e., bay, estuary, or open ocean), the potential for a landslide is not an issue. Therefore, potential impacts associated with a landslide would be considered ***less than significant***.

b. The existing onshore facilities would have ***no impact*** on erosion of the loss of topsoil since no onshore improvements are proposed.

c. The existing onshore facilities are located on a stable geologic unit and would not create a situation where a geologic unit of soils would become unstable. Therefore, there would be ***no impact***.

d. The existing Carlsbad Hatchery was designed and constructed to accommodate expansive soils in the area and would not pose a risk to life or property. Therefore, there would be ***no impact***.

e. The proposed project would not involve the construction of any septic tank nor other alternative wastewater disposal systems. Therefore, there would be ***no impact***.

Mitigation Measures:

No mitigation measures are required for geology/soils since the impacts would be less than significant.

5.2 Hydrology/Water Quality

Would the project result in:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. A violation of any water quality standards or waste discharge requirements?			X	
b. A substantial depletion of groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (i.e., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?				X
c. A substantial alteration of the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?				X
d. A substantial alteration of the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?				X
e. The creation or contribution of				X

Would the project result in:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?				
f. A substantial degradation of water quality?			X	
g. Placing housing within a 100-year flood hazard area, as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?				X
h. Placing within a 100-year floodplain structures which would impede or redirect flood flows?				X
i. Exposing people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?			X	
j. Inundation by seiche, tsunami, or mudflow?			X	

5.2.1 Impact Discussion:

a, f. The U.S. Army Corps of Engineers (USACE) determined that the Carlsbad Hatchery's outflow structures and associated intake structures comply with the terms and conditions of Nationwide Permit 7. Nationwide Permit 7 covers outfall structures and associated intake structures where the effluent from that outfall is authorized, conditionally authorized, specifically exempted, or is otherwise in compliance with regulations issued under the National Pollution Discharge Elimination System (NPDES) program (Section 402 of the CWA). Neither the Carlsbad Hatchery nor growout pens are required to obtain NPDES permit coverage because the quantity of fish they produce is less than the biomass limit that would require a NPDES permit for a concentrated aquatic animal production (CAAP) facility. Nevertheless, the Carlsbad Hatchery and growout pens have implemented a series of best management practices (BMP) regarding water quality which include monitoring intake and effluent flow volumes and pollutant levels.

Under Section 401 of the CWA (refer to Section 2.1.1.2 of this document), no water quality certification is required because the growout pens are too small to warrant certification. Instead, eight of the growout pens were issued individual Letters of Permission (LOPs) when the pens were built. In accordance with the Code of Federal Regulations (CFR; 33 CFR 625.2(e)(1); http://www.usace.army.mil/CECW/Documents/cecwo/reg/materials/33cfr325.pdf), LOPs are a type of permit authorized by USACE when the proposed work would be minor, would not have significant individual or cumulative impacts on environmental values, and should encounter no appreciable opposition. A provisional group LOP, dated April 3, 2006, has been granted for the five growout pens that did not previously obtain an LOP. The provisional LOP will be finalized once the coastal development permits (CDP) have been renewed.

Benthic monitoring has shown that potential impacts associated with growout pen operations are negligible and temporary in nature (see discussion below). Therefore, because the project is operating under appropriate permitting authorities, and because the proposed project includes measures to reduce impacts of the growout pens to the local marine environment, potential project-related impacts would be considered ***less than significant*** under CEQA.

Growout Pen Benthic Effects

Section 4.4, Marine Water and Sediment Quality, discussed the current status of the benthic environment in the vicinity of the proposed project facilities. As noted in this section, where effects have been discernable, they were generally restricted to the area inside the growout pen's perimeter and in all cases they did not extend beyond 5 to 10 m (16 to 33 ft) from the growout pen. Detailed remediation studies describing physicochemical and biological remediation at facilities annually producing <9,072 to 45,359 kg (<20,000 to 100,000 lb) of fish have not been performed because monitoring in compliance with NPDES permits is not required at these sites. However, based on several detailed remediation studies reported by Brooks et al. 2003 and Brooks et. al. 2004, it is likely that all of these sites would naturally revert back to baseline conditions after remaining fallow for a few months. No adverse effects were observed at the two open sites (Santa Barbara and Catalina Harbor - HSWRI). Assessment of the potential for natural biological remediation or for the areas to naturally return to baseline conditions at the other sites is complicated by the marina environment which appears to be inherently "stressed" in an environmental sense (See Section 4.4). The old Catalina Harbor - HSWRI site is located adjacent to the new site in shallower water. If adverse benthic effects had occurred there when the site was in production, they had naturally returned to baseline or normal by the time the site was evaluated on September 15, 2004, after three months of remaining fallow. In summary, the minor enrichment effects observed at the growout pens were restricted in their spatial extent and chemically remediated during a few months of fallow.

However, the possibility does exist for the OREHP to have a negative impact if it is not managed correctly in the future (i.e., if larger numbers of fish are held for growout). While benthic survey data indicate that the growout pens currently are not significantly impacting the benthos at this time, benchmarks should be considered for implementation as a future safeguard to provide for remediation of potential significant enrichment. These should be considered interim measures until more benthic monitoring data is collected. During the next CDP cycle, the Department may develop an adaptive management plan which may include these benchmarks. The benchmarks include:

1. *Reference Station Mean Sulfide Concentration Less Than 1000 micrometer (µM) $S^{=}$*
   The OREHP has developed an interim benchmark for sediment sulfide concentration of 1000 µM $S^{=}$ at 10 m (33 ft) from the facility perimeter for growout pens with reference station sulfide concentrations less than the benchmark. Should the mean concentration at 10 m (33 ft) from the facility perimeter exceed this benchmark, the facility will have to lie fallow for a minimum of three months. After three months, sampling for sulfides will be repeated monthly until the mean value at 10 m (33 ft) is less than 750 µM $S^{=}$ or to reference station levels, whichever is higher. Once sulfide levels subside, the facility can be restocked.

2. *Reference Station Mean Sulfide Concentration Greater Than 1000 µM $S^{=}$*
   Since there are three growout pens with high perimeter and reference station sulfide concentrations, a separate benchmark for those sites has been developed. Should the mean concentration at 10 m (33 ft) from the facility perimeter exceed 1300 µM $S^{=}$, the facility will have to lie fallow for a minimum of three months. After three months, sampling for sulfides will be repeated monthly until the mean value at 10 m (33 ft) is less than 1000 µM $S^{=}$ or to reference station levels, whichever is higher. Once sulfide levels subside, the facility can be restocked.

While adverse benthic enrichment effects would not be expected for pens producing such low weights of fish annually and with such a small footprint, benthic surveys conducted by HSWRI have indicated that the different growout pen environments (e.g., open sites versus marinas), may warrant different management scenarios if hatchery production and growout pen stocking levels increase due to an increase in the release limit.

b. The proposed project does not utilize groundwater and would not impact groundwater supplies or recharge. Therefore, there would be ***no impact***.

c, d. The only onshore facilities – Carlsbad Hatchery and King Harbor Growout Pen – would not result in any changes to the course of a stream, river or surface runoff, in a manner which would result in substantial erosion, siltation or flooding. Therefore, there would be ***no impact***.

e. The proposed project would not contribute to runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff. Therefore, there would be ***no impact***.

g, h. The proposed project does not place any housing or structures within a 100-year floodplain. Therefore, there would be ***no impact***.

i. The Carlsbad Hatchery would not expose people to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam. However, three growout pens (Catalina Harbor – HSWRI, Catalina Harbor – Catalina Seabass Fund [CSF], and Santa Barbara) are located in exposed coastal locations and subject to significant sea state events. Since these growout pens would not be occupied during unsafe conditions, the potential for injury or death are minor and would be considered ***less than significant.***

j. As is the case with all developed areas along the coast, the project-related facilities are vulnerable to inundation by a tsunami. The ten growout facilities located in harbors or estuaries could sustain damage during a moderate tsunami, and many would likely break free of their moorings. The three exposed coastal locations could also break free of their moorings but would not impact adjacent facilities. All project-related facilities (Carlsbad Hatchery and 13 growout pens) would be vulnerable to a large tsunami, however the proposed project is not expected to result in significant increased exposure of the public or the project facilities to impacts from tsunamis. In addition the frequency of a significant tsunami event is very low. Potential impacts are considered ***less than significant***.

Mitigation Measures:

No mitigation measures are required for hydrology/water quality since the impacts would be less than significant.

5.3 Transportation/Traffic

Would the project result in:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized			X	

Would the project result in:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?				
b. Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?			X	
c. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?				X
d. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				X
e. Result in inadequate emergency access?				X
f. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?				X

5.3.1 Impact Discussion:

a, b. Guidelines prepared by the Institute of Transportation Engineers indicate that a detailed traffic impact analysis would be warranted whenever a proposed project would generate 100 or more additional peak-hour trips in the peak direction (ITE 1988). In addition, any increase in peak-hour trips that would result in the reduction of the existing level of service for a road would be considered significant.

The proposed project growout pens are located in navigable waters of the U.S. Since the project involves structures that might be an aid or obstruction to navigation, the project was required to submit a permit application to the U.S. Coast Guard using the form titled Private Aids to Navigation Application (CG-2554) when originally constructed. Review of this form by the U.S. Coast Guard determined what requirements were placed on the proposed structures

The U.S. Coast Guard determined that because seven of growout facilities are attached to a dock, they do not require any navigational aids to warn vessels of their presence. The other five facilities are not attached to a dock (Agua Hedionda Lagoon, Newport Bay, Santa Barbara, and the two Catalina Harbor facilities). The growout facility located in Agua Hedionda Lagoon does not require any navigational aids because vessels are not allowed within the lagoon. The Newport Bay and Santa Barbara growout facilities are located within permanent mooring fields that are well documented on navigation charts, thus no navigational aids are needed. The Catalina Harbor growout facility operated by Catalina Seabass Fund is located in a temporary mooring field in Catalina Harbor with the facility moving between two mooring sites seasonally. The U.S. Coast Guard determined that the facility needed one white light located amidships, flashing at a four second interval. The larger Catalina Harbor growout facility operated by HSWRI is moored near the mouth of Catalina Harbor, and the U.S. Coast Guard determined that the facility needed four white flashing lights, one on each corner of the facility, flashing at a four second interval.

Since these facilities all exist as the current baseline environment, no additional U.S. Coast Guard review would be required beyond the navigation lights that were required at the Catalina Harbor facilities.

Trucks carrying supplies and equipment use public roads to access the Carlsbad Hatchery and growout pens, as well as employees of the proposed project who use roads to travel to and from work. However, the low volume of deliveries and employment levels associated with the Carlsbad Hatchery and growout pens are minor and place no measurable demand on public transit. Therefore, the proposed project will have ***less than significant impacts*** to any applicable plans, ordinances, or policies related to land-based traffic. Offshore traffic associated with the Catalina Harbor, Santa Barbara, and Newport Harbor growout pens are incorporated into existing mooring fields and would not have any measurable impact on marine vessel traffic or safety.

c. There are no project design features that would interfere with air traffic patterns. Therefore, there would be ***no impact.***

d. There are no project design features that would create dangerous conditions or incompatible uses. Therefore, there would be ***no impact***.

e. Emergency access to the Carlsbad Hatchery is adequate as approved by the Carlsbad Fire Department. Access to the growout pens located in or adjacent to

marinas is also adequate and consistent with local requirements. The Catalina Harbor – HSWRI, Catalina Harbor – CSF, Newport Harbor, and Santa Barbara growout pens are located offshore and (except for Newport Harbor) in exposed coastal locations. These facilities are obviously not accessible by land-based emergency response personnel but are easily accessible by Harbor Patrol and U.S. Coast Guard vessels. Therefore, the proposed project would have ***no impact*** to emergency access.

f. The proposed project does not include proposals for the construction, demolition, or modification of any public roads, bicycle paths, or pedestrian facilities. Therefore, there would be **no impact.**

Mitigation Measures:

No mitigation measures are required for transportation/traffic since the impacts would be less than significant.

5.4 Air Quality

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Conflict with or obstruct implementation of the applicable air quality plan?			X	
b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?			X	
c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?			X	

5.4.1 Impact Discussion:

a, c. The proposed project generates small emissions of air pollutants, mainly associated with employee vehicle traffic, white seabass transportation between the Carlsbad Hatchery and growout pens, and emissions associated with onsite heaters. The project is also responsible for secondary emissions associated with hatchery electricity use. The project also generates small amounts of dust

emissions associated with routine hatchery operations and waste solids management. Given the small nature of project-related air pollutant emissions, potential impacts would be considered ***less than significant***.

b. The proposed project will also result in indirect air emissions as a result of the use of electrical power. The facility uses electrical power that is generated from local power plants. These plants emit both toxic pollutants as well as greenhouse gases. An estimate of the local power plant emission attributable to the electrical usage of the proposed project, has been calculated and compared to the San Diego Country Air Pollution Control District (SDAPC) screening levels for determining significant air impacts under CEQA.[18,19,20] The results of this analysis indicate that emissions attributable to the proposed project electrical usage are substantially less than levels considered significant by the SDAPC. As such, these emissions are ***less than significant***. In addition, the emission calculations were based on total power usage at the Carlsbad Hatchery. The use of total existing power usage to determine indirect air emissions impacts models the baseline or existing condition. This facility is not expected to significantly increase its existing electric usage, and any incremental increase attributed to the proposed project would be trivial.

Mitigation Measures:

No mitigation measures are required for air quality since the impacts would be less than significant.

5.5 Biological Resources

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?			X	
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community			X	

[18] http://www.co.san-diego.ca.us/dplu/docs/AQ-Guidelines.pdf
[19] Emissions calculations website used: http://www.abraxasenergy.com/emissions/index.html
[20] Emissions factors used taken from : http://www.metrixcentral.com/EmissionsCalculator/Emissions%20Factors%202004.pdf

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?				
c. Have a substantial adverse effect on federally protected wetlands as defined by section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?			X	
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of wildlife nursery sites?				X
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				X
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or State habitat conservation plan?				X

5.5.1 Impact Discussion:

a. CEQA requires an analysis of impacts to "species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service". White seabass have not been identified by the Department or the U.S. Fish and Wildlife Service (USFWS), or through other agency regional plans, policies or regulations as a candidate, sensitive or special status species. As such, potential impacts to white seabass populations from the release of artificially-reared juveniles is expected to result in ***less than significant impacts*** under CEQA. Impacts to other species that have been identified as candidate,

sensitive, or special status are also not expected to result in significant impacts under CEQA. Nevertheless, the Department has responsibility under State law to take efforts to reduce all impacts to the States public resource to the extent practicable and BMPs intended to protect wild stock of white seabass have been incorporated into the proposed project.

Wild Population Genetic Impacts and Fish Health

Impacts to the current population of wild white seabass do not meet the criteria for significance impact under CEQA. Culture and release of white seabass may have an effect on the genetic profiles of the wild population of white seabass, however, the proposed project includes measures (See Section 3.2.8.2 and Appendices A and C) to ensure the genetic health of the wild population.

Culture and release of white seabass may also have an effect on the health of wild white seabass and other finfish. The Carlsbad Hatchery and growout pens are potential sources of infection for wild white seabass and other finfish when disease is present. Bacteria, viruses, and parasites can disperse between fish via direct contact or contaminated water. The proposed project, however, maintains a fish health management program (See Section 3.2.7 and Appendices A and H) to minimize potential negative health impacts to wild white seabass and other finfish. Additionally, there have been no known instances where wild fish or white seabass in the Aqua Hedionda Lagoon net pen have become diseased with a pathogen that was simultaneously causing disease at the hatchery. Therefore, **less than significant impacts** under CEQA are not expected to occur.

Growout Pen Fish, Marine Mammal and Bird Impacts

A wide variety of fish, marine mammals, and bird species are attracted to fish farming operations because they are a potential food source for those animals (BCEAO 1997). The farmed fish are the main attractant for seals, sea lions, predatory fish, and some birds. Uneaten fish food, fouling plants and animals that grow on farming equipment, and lighting used on fish farms also attract birds, fishes, and other marine life (BCEAO 1997).

The number of seabird mortalities due to entanglement with fish-pen nets is not available. However, studies conducted in British Columbia indicate that great blue herons, kingfishers, and diving ducks were the most frequently reported species found tangled in various covering nets (Rueggeberg and Booth 1989b). For diving birds, cormorants and mergansers were the most frequent species to die from drowning due to entanglement with fish-pen nets (Rueggeberg and Booth 1989b, Krohn et al. 1995).

The Government of British Columbia Environmental Assessment Office conducted an extensive review of salmon aquaculture. An important conclusion was that the location or placement of fish farms was an important criteria for

avoiding conflicts with wildlife. Their recommendation was that fish-pen placement should be at least 1.0 km (0.6 mi.) away from locations having seal and sea lion rookeries, haul-out and wintering areas, and locations having marine bird colonies or concentrations (Iwama et al. 1997). The proposed project does not meet this recommendation since the Catalina Island growout pens are located at distances of less than 1.0 km (0.6 mi.) from these sensitive resources (Catalina Island is considered a sensitive area for marine birds). In addition, most southern California harbors experience seal and sea lion haul-out activity. However, measures (see Section 3.3.3.4) are in place at these growout pens to minimize net pen-sensitive species interactions.

Because of entanglement conflicts between certain types of commercial fishing nets and wildlife such as seabirds and marine mammals, net mesh sizes and locations where commercial fishing nets may be placed have been regulated by the Commission (CDFG 2001). Entangling nets (gill and trammel) used by commercial fishers differ from fish farm nets in that they are designed to not be seen and are hung loosely in order to capture target species. Fish farm nets are made of heavy, colored nylon that is designed to be seen and hung taut with weights to prevent entanglements. Containment nets are designed to contain and grow fish while predator nets are designed to keep predators away from the containment nets. The containment nets for this project range in mesh size from 2.5 to 10.0 cm (1.0 to 4.0 in. stretch), depending on the size of the fish, and the predator nets range in mesh size from 15.0 to 20.0 cm (6.0 to 8.0 in. stretch), depending on the netting used. The smaller mesh size nets (containment nets) are placed inside the bigger mesh size nets (predator nets). Regardless, seabirds and marine mammals that have legal protection status may potentially become entangled in the nets and drown. To date, no adverse interactions between net pen facilities and sensitive species (e.g., listed birds, sea turtles, cetaceans) have occurred. However, as noted in Section 3.3.3.4.1, there have been nine reported sea lion deaths.

NOAA Fisheries published a proposed List of Fisheries (LOF) for 2006, as required by the Marine Mammal Protection Act. The proposed LOF for 2006 reflects new information on interactions between commercial fisheries and marine mammals. NOAA Fisheries must categorize each commercial fishery on the LOF into one of three categories under the Marine Mammal Protection Act based upon the level of serious injury and mortality of marine mammals that occurs incidental to each fishery. The categorization of a fishery in the LOF determines whether participants in that fishery are subject to certain provisions of the Marine Mammal Protection Act, such as registration, observer coverage, and take reduction plan requirements.

NOAA Fisheries added the “California white seabass enhancement net pen fishery" (i.e., OREHP) to the LOF as a Category III fishery[21]. As noted by NOAA Fisheries,

> *“…the fishery consists of a total of 13 enhancement net pens from Santa Barbara to San Diego, CA that are used as growout pens for juvenile white seabass before release. The pens consist of large, supported nets or fiberglass raceways. The raceways are large rectangular fiberglass structures with open ends covered by steel mesh and steel predator barriers. The pens vary in depth from 4-5 ft (1.22-1.52 m) and accommodate 2,000 to 5,000 fish. There have been two observed mortalities of the U.S. stock of California sea lions in this fishery. There are 13 participants in this fishery as each pen represents a participant.”*

Over the years of operation of the OREHP program, nine sub-adult California sea lion mortalities have occurred at two of the OREHP growout pens (see Section 3.3.3.4.1). As a result of these mortalities the OREHP has incorporated BMPs that are intended to or eliminate potential predator entanglement impacts (See Section 3.3.3.4). As such the proposed project is expected to result in impacts that are ***less than significant***.

b. Several of the growout pens are located in areas of present or suitable eelgrass habitat. Shading of the bay bottom may affect the growth or persistence of eelgrass directly underneath the growout pens. However, due to the small size of the growout pens any impacts to eelgrass beds are expected to be not significant. In addition, the Department routinely finds that such small impacts from placement of private dock structures is de minimus and would not require mitigation.

c. The proposed project would not have a substantial adverse effect on federally protected wetlands as defined by section 404 of the CWA (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means. The proposed project involves the operation of net pens located within deepwater areas along the coast (Cowardin et al. 1979). Studies of the growout pens effects on benthic marine communities have been completed. (See cite reference to prior section where benthic studies have occurred). These studies and the operation of the growout pens of the project indicate that possible effect would be limited in duration and would not be considered significant under CEQA. Further, the OREHP has implemented BMPs to monitor and reduce benthic impacts to the lowest level possible. Therefore, impacts on wetlands and other sensitive habitats would be reduced to ***less than significant***.

[21] Category III: Annual mortality and serious injury of a stock in a given fishery is less than or equal to 1 percent of the Potential Biological Removal (PBR) level.

d. The project facilities include growout pens and a shore-side developed facility. These facilities are very limited in size and are located in areas where they will not impede or interfere substantially with the movement of any native, resident, or migratory fish or wildlife species, or with established native, resident, or migratory wildlife corridors, or impede the use of wildlife nursery sites. All project-related facilities exist as part of the current environmental baseline and are located in previously disturbed environments. Therefore, there would be ***no impact***.

e, f. The proposed project would not conflict with any local policies or ordinances protecting biological resources, or with the provisions of an adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or State habitat conservation plan. The proposed project is intended to supplement the White Seabass Fishery Management Plan (WSFMP) and enhance the regional white seabass population. Future studies may demonstrate beneficial impacts from the proposed project, however, at this time, there would be ***no impact***.

Mitigation Measures:

No mitigation measures are required for biological resources since the impacts would be less than significant.

5.6 Cultural Resources

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?				X
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?				X
c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				X
d. Disturb any human remains, including those interred outside of formal cemeteries?				X

5.6.1 Impact Discussion:

a, b, c, d. The proposed project does not propose construction, demolition, or other modification activities to the Carlsbad Hatchery, growout pens, or other facilities in use. Practices associated with the hatchery and offshore growout pens will not disturb soils below the surface. Therefore, there would be ***no impact*** to significant archaeological, historical or other cultural resources.

Mitigation Measures:

No mitigation measures are required for archaeological resources since there would be no impact.

5.7 Noise

Would the project result in:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?			X	
b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?			X	
c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?			X	
d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?			X	
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				X
f. For a project within the vicinity of a private airstrip, would the project				X

Would the project result in:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
expose people residing or working in the project area to excessive noise levels?				

5.7.1 Impact Discussion:

a, b, c, d. Noise is typically defined as unwanted sound. Typically, noise in any environment consists of a base of steady "background" noise made up of many distant and indistinguishable noise sources. Superimposed on this background noise is the sound from individual local sources. Noise levels from a particular source decline as distance to a receptor increases. Other factors, such as the weather and reflecting or shielding, also help intensify or reduce noise levels at any given location.

Noise operations associated with the growout pens are limited to the operation of delivery trucks, feeding activities, automatic feeders, raceway vacuuming, and in the case of the three coastal locations, marine vessels. These impacts all occur during the daytime and are consistent with the land use in the respective locations.

The Carlsbad Hatchery is located adjacent to numerous homes, the Encina Power Generating Station, and sits next to the main north south rail corridor and train tracks. There are a wide variety of noise sources at the hatchery, including: pumps, compressors, water jets, employee traffic, and operational and maintenance activities. With the exception of the continuously operating pumps and compressors, noise sources are limited to daytime hours. All pumps and compressors are located within one of the two hatchery buildings or in an underground pump vault. The total enclosure of this equipment has a substantial attenuating effect on facility noise emissions. A site walk of the Carlsbad Hatchery and surrounding area was completed on April 6, 2011. Noise levels emitting from the facility were substantially attenuated in areas outside of the facility. Given the effectiveness of the enclosures, increases in offsite noise levels are imperceptible. Therefore the impact would be a ***less than significant impact***.

e, f. The Carlsbad Hatchery and growout pens are located along the coast and distant from airport locations. In addition, airports must be in compliance with existing local, state, and federal ordinances and statutes requiring noise abatement. Therefore, the proposed project would not expose people residing or working in the area to excessive noise levels from airports and would have ***no impact***.

Mitigation Measures:

No mitigation measures are required for noise impacts since there would be no impact.

5.8 Land Use

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Physically divide an established community?				X
b. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?				X
c. Conflict with any applicable habitat conservation plan or natural community conservation plan?				X

5.8.1 Impact Discussion:

a. The proposed project locations are small and limited in extent and do not physically divide an established community. Therefore, ***no impact*** would occur.

b. The existing Carlsbad Hatchery and growout pens of the proposed project comply with all applicable land use plans, policies, and regulations with jurisdiction (See Section 3.0 of this document) and there are no reports of any conflicts. Therefore, the project has ***no impact***.

c. The proposed project would not require the construction of any new sewer truck lines or access roads with the capacity to serve new developments. Therefore, there would be ***no impact***.

Mitigation Measures:

No mitigation measures are required for land use since there would be no impact.

5.9 Public Services

Will the proposal result in:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				X
i) Fire protection?				X
ii) Police protection?				X
iii) Schools?				X
iv) Parks?				x
v) Other public facilities?				x

5.9.1 Impact Discussion:

a (i, ii). The proposed project would involve only minor improvements of existing infrastructure, and would not create the need for new or altered fire or police protection, nor health care services. Therefore, there would be ***no impact*** to fire and police or health care services.

a (iii, iv, v). The proposed project would not result in any new student generation, nor would it impact population growth in a way that would affect the use of public resources and facilities such as parks. Additionally, the proposed project generates only minor volumes of waste which are facilitated through existing operating systems for sewage and waste disposal. Therefore there would be ***no impact*** to school capacity, parks, or other public service facilities.

Mitigation Measures:

No mitigation measures are required for public facilities since the impacts would be less than significant.

5.10 Recreation

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?			X	
b. Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				X

5.10.1 Impact Discussion:

a. The growout pens are placed out of the way of recreational activities and are relatively obscure. For example, three facilities (Marina del Rey, San Diego Bay: Southwestern Yacht Club, and Mission Bay: Quivera Basin) are in boat slips, while one is in a privately-owned yacht club. Three additional facilities (Santa Barbara, Newport Harbor, and Catalina – CSF) are moored in designated mooring fields. For those growout pens that are located in open areas, they cover a very small footprint and do not interfere with recreational activities. The remaining facilities are located adjacent to docks, but not in actual slips, so that recreational and commercial impacts are minimal. Lastly the growout pens are moveable and can be repositioned should conflicts with recreational users or facilities occur. Therefore, ***less than significant impacts*** are expected to occur.

Additionally, while the proposed project is intended to augment the current populations of white seabass in the wild to increase catch of white seabass by both commercial and recreational users, increases in catch will be spread among all recreational and commercial users and is not expected to result in conflicts with existing recreational facilities.

b. The proposed project would have no impact on the quality or quantity of existing recreational opportunities (e.g., over-use of an area with constraints on numbers of people, vehicles, animals, etc., that might safely use the area). The project footprint is minor at each location and does not obstruct access to the shoreline or water areas. The proposed project would not require the construction or expansion of recreational facilities. Therefore, the proposed project would have ***no impact*** to these types of resources.

Mitigation Measures:

No mitigation measures are required for recreation since there would be no impact.

5.11 Aesthetic

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Have a substantial adverse effect on a scenic vista?			X	
b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?				X
c. Substantially degrade the existing visual character or quality of the site and its surroundings?			X	
d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?				X

5.11.1 Impact Discussion:

Preservation of California's scenic coastal areas is a clearly defined objective in the California Coastal Act and is also implemented at the local government level. Any person or public agency planning development within the coastal zone must obtain a CDP from either the California Coastal Commission (Coastal Commission) or the city or county if a certified Local Coastal Program (LCP) or Port Master Plan exists. In general, the coastal zone extends three miles seaward to approximately 1,000 yards inland from mean high tide. Whenever development is undertaken, it must be in compliance with the California Coastal Act and specifically with Section 30251. If the development is reviewed by a local government under its LCP, different standards apply.].

The California Coastal Act, Section 30251, states that:

> *"The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas.*

New development in highly scenic areas such as those designated in the California Coastline Preservation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting."

LCPs may also specify local scenic areas and development criteria. When reviewing CDP applications, local governments will consider the visual impacts associated with aquaculture facilities on a case-by-case and site-specific basis. However, due to the location of most aquaculture and the location of the Coastal Commission's retained permit jurisdiction, it is unlikely that local governments would review many CDP applications for aquaculture facilities.

a, c. The proposed project facilities all exist and are part of the environmental baseline. The Carlsbad Hatchery is located adjacent to a coastal dependent land use (power plant) and consistent with local the land use designation. All of the growout pens are located in existing harbors or anchorages, and in many cases, are not distinguishable from other marina operations. Therefore, visual impacts are considered ***less than significant.***

b. The existing facilities would not cause substantial damage to scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway. Therefore, the proposed project would have ***no impact*** on these resources.

d. The proposed project would not create any new light or glare. Therefore, the project would have ***no impact*** in this area.

Mitigation Measures:

No mitigation measures are required for aesthetic/visual resources since there would be no impact.

5.12 Population/Housing

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?				X
b. Displace substantial numbers of existing housing, necessitating the construction of replacement				X

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
housing elsewhere?				
c. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				X

5.12.1 Impact Discussion:

a. Project-related personnel are spread over a wide geographic area (Santa Barbara to San Diego), with the largest concentration at the Carlsbad Hatchery. However, project-related employment is so small that population growth would be imperceptible. Therefore, the proposed project would have ***no impact*** on population growth.

b, c. The proposed project would not result in the displacement of any residences and would not affect any current housing. Therefore, the proposed project would have ***no impact***.

Mitigation Measures:

No mitigation measures are required for housing/population since there would be no impact.

5.13 Hazards/Hazardous Materials

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?			X	
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?			X	
c. Emit hazardous emissions or handling of hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of				X

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
an existing or proposed school?				
d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5, and, as a result, would it create a significant hazard to the public or environment?				X
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?				X
f. For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				X
g. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?			X	
h. Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				X

5.13.1 Impact Discussion:

a, b. The inventory of chemical use is provided in Appendix F. All onsite chemicals are stored in compliance with local ordinance, and state or federal law. The majority of chemicals used onsite are non-volatile. The amounts of chemicals used are small, and the chemicals are stored in appropriate secondary containment and are not likely to be released to public areas; therefore, they would pose no hazard to the public or environment. Hydrogen peroxide is

occasionally used to treat diseases that the white seabass being reared in the growout pens may acquire from the wild. These treatments are conducted under the direction of the Department's Fish Pathologist. Hydrogen peroxide is transported in small quantities to the pen locations and is used to treat the broodstock. Hydrogen peroxide rapidly breaks down in the aquatic environment and would affect only the white seabass contained in the growout pens and the areas direct underneath the pens. Any impacts to the areas under the pens would be limited in scope and duration. Therefore, potential hazards associated with chemical storage are considered ***less than significant***.

c. There are no schools within one-quarter mile of any project-related facility that utilizes hazardous materials. Therefore, there is ***no impact***.

d. No project facilities are located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5. Therefore, there is ***no impact***.

e. No project facilities are located within an airport land use planning areas or within 2 miles of a public airport and as such would have ***no impact*** under this criteria

f. No projects are within the vicinity of a private airstrip and the proposed project would have ***no impact*** under this criteria

g. The Carlsbad Hatchery and growout pens have their own emergency and evacuation plans. The Carlsbad Hatchery and growout pens are built in areas that would not impact to local and regional evacuation or emergency response. Further, the local United States Coast Guard Area Contingency Plan, San Diego, has plans to boom off the portion of the Agua Hedionda Lagoon adjacent to the Carlsbad Hatchery, and the hatchery facility and personnel would be able to assist in the placement of required booms and help maintain the exclusion booms to prevent contamination of the lagoon. Therefore, potential impacts to emergency response or evacuation plans are considered ***less than significant***.

h. None of the proposed project sites are located in areas of significant wildfire risk. Operation of these facilities is expected to result in ***no impact*** under this criteria.

Mitigation Measures:

No mitigation measures are required for hazardous materials since potential impact are less than significant.

5.14 Mandatory Findings of Significance

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?			X	
b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?			X	
c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?			X	

5.14.1 Impact Discussion:

a. Impacts on biological resources could occur through the development of the proposed project. These impacts have been discussed in the Section on the proposed project (Section 3.0), and the other parts of this section. Any such impacts that may occur are limited to species not relevant to CEQA criteria (generally, special status species), and impacts to other species are not expected to be significant. Impacts to marine mammals have been addressed through the implementation of BMPs (See Section 3.3.3.4). Furthermore, the

agency with jurisdiction over marine mammals has found that any take that may occur would not affect the status of these populations. Birds from species relevant to this section have been observed in the project areas, but based on the life history and uses of the project areas by these birds, no interaction with the growout pens or Carlsbad Hatchery are likely. Listed fish species found in the areas of the proposed project are motile and not expected to be adversely impacted by the proposed project. Sessile marine species that may occur under the marine growout pens may be affected but such impacts are not likely to be significant or not likely to affect CESA, ESA or species that would qualify are rare threatened or endangered under CEQA. Impacts to other sessile species are expected to be limited in duration and extent. Therefore, impacts from the proposed project to the species relevant to this criteria or to their habitats is expected to be ***less than significant impacts***.

b. Because the size of the proposed project operations are very small and no other projects are likely to occur within the area analyzed, cumulative impacts would be considered ***less than significant***.

c. The proposed project involves the culture, rearing and release of white seabass. These fish are not treated or altered in any way which could pose a health risk to human beings. The release of white seabass is intended to reverse downward decline in natural white seabass populations. The proposed project does not have environmental effects which would cause substantial adverse effects on human beings, either directly or indirectly. Most importantly, fish have known health benefits and increasing the availability of quality fish for human consumption is likely to have a beneficial impact to human populations. The proposed project is not anticipated to result in substantial effects on humans and therefore, this impact is considered to be ***less than significant***.

5.15 Aquaculture, Kelp Harvest, and Commercial Fishing Resource Availability

Would the project:	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Result in a significant reduction in the quality or availability of marine biological products or convert biologically productive areas to non-productive areas?				X
b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as				X

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?				
d. Result in the loss of marine aquaculture areas or conversion of marine aquaculture areas to non-productive use?				X
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of marine aquaculture areas, to non-agriculture use or result in the conversion of aquiculture areas to areas not suitable for aquaculture?				X

5.15.1 Impact Discussion

a. The proposed project has been designed to result in the increase in the wild population of white seabass through the outplanting of hatchery-raised white seabass. White seabass is a commercially and recreationally important marine species and the proposed project is expected to result in a beneficial impact to white seabass stocks with concurrent increases in commercial and recreational catch of this species. The OREHP fixed facilities, the Carlsbad Hatchery, and the growout pens have a very limited marine environmental footprint and are not expected to result in the conversion of productive aquaculture areas to non-productive areas. Therefore, there would be ***no impacts***.

b, c, d, e. All growout pens and the Carlsbad hatchery have been developed to be consistent with the zoning requirements at each site. From the marine-equivalent perspective: the operation of the water intakes at Agua Hedionda Lagoon and the operation of the growout pens within the Southern California Bight (SCB) are not expected to impact existing marine aquaculture areas. The Carlsbad Hatchery has coexisted with co-located aquaculture operations without conflict for many years. Also, BMPs are in place in order to minimize the release of chemicals that may otherwise impact the natural growth of marine consumable products. Therefore, there would be ***no impacts*** expected.

5.16 Greenhouse Gas Emissions

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?			X	
b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?			X	

5.16.1 Impact Discussion

a, b. State CEQA Guidelines do not specifically identify a numeric threshold of significance for greenhouse gas impacts. However, the Guidelines (Section 15064.4(b)(2)) direct the lead agency to consider whether a project's emissions exceed a standard of significance that the lead agency determines and finds applicable to the project. Greenhouse gases are emitted from the proposed project use of automobiles and trucks. The numbers of car trips attributed to the proposed project have been deemed to be negligible relative to baseline condition within the relevant air basing and California. Further, the greenhouse gases are indirectly emitted as a result of propped project uses of electricity which comes from greenhouse gas emitting power stations. Emissions estimate for this indirect emission of greenhouse gases were made and indicate that 534 tons of CO_2-equivalent gases attributable to existing uses are released each year.[22,23,24]

For industrial projects that are not exempt from CEQA under existing statutory or categorical exemptions, greenhouse gas impacts are presumed to be less than significant if the project meets CARB performance standards for transportation and construction-related emissions and the project, with mitigation, will emit no more than approximately 7,000 metric tons (MT) of CO_2 equivalent per year (CO_2e/yr) for operational emissions (excluding transportation) including the following sources: combustion-related components/equipment; process losses; purchased electricity; water usage; and wastewater discharge. The proposed project obtains its process water from the Aqua Hedonda Lagoon via pipes and electrical pumps, and not from the local water authority. The hatchery's freshwater use is similar to business office types uses and is de minimus. In

[22] http://www.co.san-diego.ca.us/dplu/docs/AQ-Guidelines.pdf
[23] Emissions calculations website used: http://www.abraxasenergy.com/emissions/index.html
[24] Emissions factors used taken from : http://www.metrixcentral.com/EmissionsCalculator/Emissions%20Factors%202004.pdf

addition, the hatchery's motor vehicle uses are limited to a few trips a year to the growout pens and the personal vehicles used by staff to commute to the hatchery or the growout pens. This increased number of trips would be considered de minimus under the air quality analysis section (See Section 5.4.1) and would be de minimus in term of greenhouse gas emissions. The only substantial greenhouse gas emission attributable to the hatchery is the emission from use of electricity at the facility. Emission estimates were made based on electrical usage and the amount emitted from all existing uses is less than the threshold for significance or 7,000 MT per year and is not expected to change under the proposed project, which is the continuation of hatchery baseline operations. (See Appendix K for calculations.) Therefore the proposed project is expected to produce ***less than significant*** greenhouse gases emission impacts.

5.17 Mineral Resources

Would the project:	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				X
b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?				X

5.17.1 Impact Discussion

a, b. No known mineral resources sites are located in the vicinity of the Carlsbad Hatchery or growout pens and the proposed project would result in ***no impacts*** to mineral resources.

Mitigation Measures:

No mitigation measures are required for land use since there would be no impact.

5.18 Utilities and Service Systems

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?			X	
b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?			X	
c. Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?			X	
d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?			X	
e. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?			X	
f. Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?			X	
g. Comply with federal, state, and local statutes and regulations related to solid waste			X	

5.18.1 Impact Discussion:

a, b d, e. The facility operates a water treatment system to ensure that the Carlsbad hatchery water is free from pathogens and unwanted substances. The

hatchery does discharge small amount of water and solids to the Encina Wastewater Authority (EWA) under permit or waiver to the local waster water treatment facility. However, the EWA has determined that the Carlsbad Hatchery's discharge will not result in the facility exceeding its wastewater treatment limits. The operation of the Carlsbad Hatchery is not expected to significantly impact the operation of EWA facilities and would not result in the need for construction of additional or newer wastewater treatment facilities. Therefore, potential impacts to these systems are expected to be ***less than significant***.

c. The Carlsbad Hatchery operation occupies 1.3 ha (3.2 ac) and stormwater runoff is adequately handled by the existing stormwater drains and channels located onsite. Therefore, potential impacts are expected to be ***less than significant***.

f, g. Solid waste (mainly natural organic wastes) is discarded via the local municipal waste authority. The facility has one solid waste bin that is emptied weekly. These wastes are deposited at the local landfill and are not expected to result in the need for additional landfill capacity. The material disposed at the local landfills complies with federal, state, and local statutes and regulations related to solid waste, and disposal is conducted under contract with the local waste authority. Therefore, potential impacts are expected to be ***less than significant***.

Mitigation Measures:

No mitigation measures are required for utilities and service systems since there would be no impact.

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