

BIOLOGICAL RESOURCES - ERRATA

Testimony of Richard Anderson and Michael Foster

INTRODUCTION

This section provides the California Energy Commission staff's analysis of potential impacts to biological resources from Duke Energy Moss Landing LLC's proposal to construct and operate the Moss Landing Power Plant Project (MLPPP). The focus of this analysis is directed toward impacts to state- and federally-listed species, fully protected species, species of special concern, wetlands, and other areas of critical biological concern. It describes the biological resources of the project site and ancillary facilities; determines the need for mitigation; determines the adequacy of mitigation proposed by the applicant and, where necessary, specifies additional mitigation measures to reduce identified impacts to less than significant levels; determines compliance with applicable laws, ordinances, regulations, and standards; and recommends conditions of certification.

Threatened or endangered species are those formally recognized and listed by the state or federal government. Fully protected species receive special legal protection from the state in the form of prohibition against take or unauthorized collecting and possession. Species of special concern are candidate threatened or endangered species or unique species that are protected through state and local permitting processes by requiring mitigation to minimize potential adverse effects resulting from project development. This particular category also includes, but is not limited to, those rare and endangered plant species recognized by the California Native Plant Society. Though endangered plant species recognized by the California Native Plant Society may not be formally listed by state or federal governments, the same species may be considered endangered under the California Environmental Quality Act (CEQA) (Cal. Code Regs., tit. 14, §15380 (d)). Recreational species are generally ones that are harvested by the public for sport or utilized for nonconsumptive purposes.

Areas of critical concern are special or unique habitats or biological communities. This category includes, but is not limited to, wildlife refuges and wetlands. Both species of special concern and areas of critical concern may be identified by the California Natural Diversity Data Base (CNDDDB) and other state, federal, and local agencies with responsibility within the project area or by educational institutions, museums, biological societies and special interest groups that might have specific knowledge of resources within the project area.

Terrestrial biological resource surveys conducted by consultants for the applicant provide information useful in determining the potential impacts related to the power plant and its ancillary facilities (Duke Energy 1999a and b). Surveys of the estuarine and marine environment that supports animal species subject to entrainment, impingement, and thermal discharge effects of the once-through cooling water system provides information useful in determining potential impacts to those systems and the Elkhorn Slough ecosystem (Elkhorn Slough National Estuarine Research Reserve). These surveys are required as part of the [National Pollutant](#)

Discharge Elimination System (NPDES) permitting process required under Section 402 of the Clean Water Act, which is administered by the Central Coast Regional Water Quality Control Board. The applicant is required to utilize best technology available to minimize potential once-through cooling water system impacts on biological resources. The 316(b) study results will assist in the determination of the best technology available for the proposed project, regarding entrainment and impingement losses, as well as the 316(a) thermal discharge studies to determine if the proposed project uses best technology available, and can meet the thermal discharge requirements. A complete assessment of the potential impacts, a determination of necessary mitigation, and/or best technology available alternatives will be considered for the once-through cooling water system. This assessment will be conducted in close coordination with the Central Coast Regional Water Quality Control Board.

Impacts to terrestrial biological resources are expected to be minimal because of the highly industrialized nature of the project site, and the location where impacts might occur. General mitigation approaches proposed by the applicant in combination with mitigation measures proposed by Energy Commission staff in consultation with the California Department of Fish and Game and the California Coastal Commission are expected to adequately mitigate any impacts to plants and animals that could utilize the project site and immediate vicinity.

The loss of biological resources resulting from the proposed once-through cooling water system is determined to be a significant biological resources impact. This significant impact can be mitigated to an acceptable level with sufficient enhancement and improvement (wetlands and other habitat restoration) in the Elkhorn Slough biological resources productivity to replace lost productivity due to the once-through cooling water system. The mitigation/compensation package ~~agreed to being developed~~ by the Energy Commission staff ~~and in cooperation with~~ the California Central Coast Regional Water Quality Control Board, California Department of Fish and Game, ~~and~~ the California Coastal Commission, ~~and the project applicant is are~~ expected to mitigate the significant impacts. ~~Without agreement on an acceptable- the implementation of the~~ mitigation/compensation package, Energy Commission staff ~~is unable to conclude~~ that there are not likely to be significant biological resources impacts will be mitigated to an acceptable level.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

FEDERAL

- The Endangered Species Act of 1973 (16 U.S.C., §1531 et seq.), and implementing regulations, (50 C.F.R. §17.1 et seq.), designate and provide for protection of threatened and endangered plants and animals and their critical habitat.
- Migratory Bird Treaty Act (16 U.S.C. §701-718) and implementing regulations (50 C.F.R.) Subchapter B (§10.1-24.12) provides protection for migratory birds.

- Marine Mammal Protection Act (16 U.S.C. Chapter 31 §1361-1375) provides protection for marine mammals.

STATE

- California Native Species Conservation and Enhancement Act, (Fish & Game Code, §1750 et seq.), mandates as state policy, maintenance of sufficient populations of all species of wildlife and native plants and the habitat necessary to ensure their continued existence at optimum levels.
- California Endangered Species Act, (Fish & Game Code, §2050 et seq.), protects California's endangered and threatened species. The implementing regulations, (Cal. Code Regs., tit.14, §670.5), lists animals of California declared to be threatened or endangered.
- Native Plant Protection Act (Fish & Game Code, §1900 et seq.), establishes criteria for determining if a species, subspecies, or variety of native plant is endangered or rare and regulates the taking, possession, propagation, transportation, exportation, importation, or sale of endangered or rare native plants.
- Fish and Game Code, section 1603 requires that any person planning to substantially divert or obstruct the natural flow or substantially change the bed, channel or bank of any river, stream or lake designated by the department, or use any material from the streambeds, must notify the department prior to such activity so that the department can carry out its mandate by proposing measures necessary to protect the fish and wildlife.
- Fish and Game Code sections 3511, 4700, 5050, and 5515 prohibit the taking of birds, mammals, reptiles and amphibians, and fish, respectively, listed as fully protected in California.
- Fish and Game Code, section 1900 et seq., gives CDFG authority to designate state endangered and rare plants and provides specific protection measures for identified populations.
- Fish and Game Code, section 3513 makes it unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act except as provided for under federal rules and regulations.

LOCAL

Monterey County Coastal Implementation Plan, Part 2, Regulations for Development in the North County Land Use Plan Area, Chapter 20.144.040 – Environmentally Sensitive Habitat (ESH) Development Standards.

- A. Biological Survey Requirement
 1. A biological survey (BS) shall be required for all proposed development that:
 - c. is or may be located within 100 feet of an ESH;
- B. General Development Standards

1. All development shall be prohibited in the following ESHs: riparian corridors, wetlands, dunes, sites of known rare and endangered species of plants and animals, rookeries, major roosting and haul-out sites, and other wildlife breeding or nursery areas identified as environmentally sensitive.
 2. Development containing or within 100 feet of ESH shall be modified to reduce adverse impacts to an insignificant level. Mitigation measures of the BS will be considered and incorporated into the conditions of approval.
 3. New land uses within 100 feet of ESH cannot adversely affect the habitat either on a project or cumulative basis. Projects will only be approved where the decision will not set a precedent for development which, on a cumulative basis, could degrade the habitat.
 6. Deed restrictions or conservation easement dedications over ESH areas shall be required as a condition of approval, even on previously developed parcels of land. Where the proposed project is to occur on an already-developed parcel, restrictions or easement dedications over the habitat area shall still be required.
 8. Removal of vegetation and land disturbance on parcels containing or adjacent to ESH areas must be limited to the extent necessary for structural improvements and driveway access. Modifications will be made to reduce habitat impacts.
 9. Use of native species found in the project area shall be required in the landscaping as a condition of approval.
 10. Construction activities and industrial uses affecting rare, threatened, and endangered birds must protect these birds during breeding and nesting seasons as a condition of approval. These regulations shall not prohibit emergency operation of public utilities.
- C. Specific Development Standards
2. Riparian, Wetland, and Aquatic Habitats
 - d. All development must be set back a minimum of 100 feet from the landward edge of vegetation associated with coastal wetlands (including Elkhorn Slough and Moro Cojo Slough).
 - e. Development with the potential to impact riparian, wetland, or aquatic habitat must be conducted to avoid breeding seasons and other critical phases in the life cycles of commercial fish and shellfish and rare, threatened or endangered indigenous species. Mitigation measures shall be made conditions of approval.
 - f. Development near harbor seal haul-out areas cannot adversely impact the viability or long-term maintenance of this habitat.
 3. Marine habitats
 - a. Development proposing wastewater discharge into Monterey Bay and coastal waters of Monterey County will be reviewed by the Health Department. Submission of these studies is a requirement of application completion.

SETTING

REGIONAL DESCRIPTION

The regional landscape includes a variety of habitats including broad beaches, dunes, mildly sloping dune terraces and hilly uplands. The uplands are composed of grasslands, oak woodlands, Monterey pine groves, and coastal scrub. There are also salt marshes, mudflats, and rocky intertidal substrates providing complex habitats for innumerable living organisms. The range in temperature extremes is somewhat moderated by offshore westerly breezes. These habitats are described in greater detail in the AFC (Duke Energy 1999a) and Supplemental Information filing (Duke Energy 1999j). Much of the land has been converted to agriculture – row crops and livestock grazing. Specific areas of critical biological concern are the Elkhorn Slough National Estuarine Research Reserve, which adjoins the much larger (5,300 square mile) Monterey Bay National Marine Sanctuary near Moss Landing Harbor about midway between the cities of Santa Cruz and Monterey.

The ocean shore, dunes, and undeveloped upland areas as well as wetlands in the region support many amphibians, reptiles, passerines, raptors, shore birds, waterfowl, and small to medium sized mammals. A list of plant and animal species recognized as being of special concern or protected under state and federal regulations are listed in Table 1. The following three informational items are notable: 1) On October 17, 1999 at least twenty tidewater gobies (*Eucyclogobius newberryi*) were collected in the upper reaches of Bennett Slough about one mile north of the proposed power plant (Swift 1999). Other investigators also collected them here in June of 1976 (Nybakken et al. 1977). Water from this slough can eventually make its way to the north arm of Moss Landing Harbor. 2) Mud flat and salt pond areas in Elkhorn Slough have recently been designated as Critical habitat for the Pacific coast population of the western snowy plover (*Charadrius alexandrinus nivosus*) because of its nesting value (USFWS 1999). 3) Leatherback turtles frequent waters of the western coast of the United States including Monterey Bay. They are the most common sea turtle in Californian waters. Surface feeding on jellyfish by the leatherback turtle has been reported in these U.S. waters, but no systematic studies have been done to determine the relative importance of various foraging habitats (NMFS 1998).

SITE AND VICINITY DESCRIPTION

Site-specific field surveys for biological resources were conducted at the project site and laydown area by the applicant's biologists in January, March, April and May of 1999 (DEML 1999c). Energy Commission staff visited the power plant site on May 20, 1999 in the company of the applicant's terrestrial biologists, a [biologist representative](#) from the California Department of Fish and Game, and a representative from the U.S. Army Corps of Engineers.

BIOLOGICAL RESOURCES Table 1
Sensitive Species

Sensitive Plants	Status*
Coastal dunes milk-vetch (<i>Astragalus tener</i> var. <i>titi</i>)	CNPS List 1B/SE /FE
Monterey spineflower (<i>Chorizanthe pungens</i> var. <i>pungens</i>)	CNPS List 1B/FT
Robust spineflower (<i>Chorizanthe pungens</i> var. <i>robusta</i>)	CNPS List 1B/FE
Coast wallflower (<i>Erysimum ammophilum</i>)	CNPS List 1B/SC
Sand gilia (<i>Gilia tenuiflora</i> ssp. <i>arenaris</i>)	CNPS List 1B/ST/FE
Santa Cruz tarplant (<i>Holocarpha macradenia</i>)	CNPS List 1B/SE/FPT
Beach layia (<i>Layia carnosa</i>)	CNPS List 1B/SE/FE
Tidestrom's lupine (<i>Lupinus tidestromii</i>)	CNPS List 1B/SE/FE
Yadon's rein orchid (<i>Piperia yadonii</i>)	CNPS List 1B/FE
Hickman's potentilla (<i>Potentilla hickmanii</i>)	CNPS List 1B/SE/FE

Sensitive Wildlife	Status
Black legless lizard (<i>Anniella pulchra nigra</i>)	CSC/SC/FP
San Francisco garter snake (<i>Thamnophis sirtalis tetrataenia</i>)	SE/FE/FP
Western burrowing owl (<i>Athene cunicularia</i>)	CSC/SC
Tricolored blackbird (<i>Agelaius tricolor</i>)	CSC/SC
Bank swallow (<i>Riparia riparia</i>)	ST
Short-eared owl (<i>Asio flammeus</i>)	CSC
Western snowy plover (<i>Charadrius alexandrinus nivosus</i>)	CSC/FT
Southwestern pond turtle (<i>Clemmys marmorata pallida</i>)	CSC/SC/FP
California tiger salamander (<i>Ambystoma californiense</i>)	CSC/C/FP
California red-legged frog (<i>Rana aurora draytonii</i>)	CSC/FT/FP
Santa Cruz long-toed salamander (<i>Ambystoma macrodactylum croceum</i>)	SE/FE/FP
California brackishwater snail (<i>Mimic tryonia</i>)	SC
Tidewater goby (<i>Eucyclogobius newberryi</i>)	CSC/FE
Southern sea otter (<i>Enhydra lutris nereis</i>)	FP/FT
California brown pelican (<i>Pelecanus occidentalis californicus</i>)	SE/FE/FP
California least tern (<i>Sterna antillarum browni</i>)	SE/FE/FP
Leatherback turtle (<i>Dermochelys coriacea</i>)	FE
California Clapper Rail (<i>Rallus longirostris obsoletus</i>)	SE/FE
American Peregrine Falcon (<i>Falco Peregrinus anatum</i>)	SE
Coho Salmon (<i>Oncorhynchus kisutch</i>)	SE/FT
Steelhead (<i>Oncorhynchus mykiss</i>)	FT

Status legend:

CNPS List 1B = Plants rare or endangered in California and elsewhere (California Native Plant Society 1994),
 FE = Federally listed Endangered, FT = Federally listed Threatened, SC = Federal species of concern,
 FPT = Federally Proposed (Threatened), C = Federal Candidate, CSC = CDFG species of special concern, FP = CDFG fully protected, ST = State listed Threatened, SCE = State Candidate (Endangered) SE = State listed Endangered.

Many common species of plants and animals were observed during surveys in the vicinity of the proposed power plant within the Duke property (Duke Energy 1999c). Sixty-five per cent of the plant species were non-native; indicating in general that disturbance and land modification at the site over time has not favored natives. Examples of common animals include Pacific chorus frog (*Pseudacris regilla*), Pacific slender salamander (*Batrachoseps pacificus*), American kestrel (*Falco*

sparverius), European starling (*Sturnus vulgaris*), mourning dove (*Zenaidura macroura*), Brewer's blackbird (*Euphagus cyanocephalus*), house finch (*Carpodacus mexicanus*), California ground squirrel (*Spermophilus beecheyi*), and mule deer (*Odocoileus hemionus*).

In contrast to the many common species observed during the surveys, tricolored blackbirds (*Agelaius tricolor*) were seen foraging over a wetland within an oil spill retention area on the extreme east side of the Duke property near oil tank 14 (Duke Energy 1999c). This is a species of special concern for the California Department of Fish and Game and is the only sensitive species listed in Table 1 observed during the terrestrial surveys of the site.

Marine and estuarine fauna inhabiting the waters and benthic habitats in close proximity to the proposed project, including Elkhorn Slough intertidal and Moss Landing Harbor and offshore subtidal has been described in considerable detail based on investigations done in July 1974 to June 1976 (Nybakken et al. 1977), and recently by Tenera Environmental Services for Duke Energy Moss Landing LLC (Duke 2000a). Additional studies done to meet previous NPDES permitting requirements or Central Coast Regional Water Quality Control Board information needs associated with the Moss Landing Power Plant identify a myriad of species that have potentially been subject to impacts associated with the once-through cooling water system that has operated at various levels since the first unit was brought on line in 1950 (PG&E 1973, 1978 and 1983).

Major modifications to the Salinas River mouth and its geophysical association with Elkhorn Slough in the early 20th century and the excavation of Moss Landing Harbor during the mid-20th century have significantly changed the hydrodynamics of the slough (Lindquist 1998). Further modifications in the watershed in the mid 1980's that were done to increase marsh acreage magnified the tidal currents and rates of channel scour and erosion in the slough. Lindquist (1998) has found that reduced trophic diversity has resulted from the increased erosion and that a shift in the diet of fish using the slough as a nursery is evident. ~~There is concern about whether~~ Elkhorn Slough and its associated tidal creeks ~~will~~ continue to function as a viable fish nursery. Due to ~~this concern and~~ the exceptional value of the Elkhorn Slough ecosystem, much attention has been focused on the slough and associated plans for improvements.

Elkhorn Slough is one of the few relatively large coastal wetlands remaining in California. The main channel of the slough, which winds inland seven miles, is flanked by a broad salt marsh second in size only to that which occurs around San Francisco Bay. Elkhorn Slough is a biological gem located on the edge of Monterey Bay. It supports one of California's most threatened ecosystems, the coastal estuary. Although not pristine, Elkhorn Slough is a biologically rich wetland system, providing habitat for hundreds of resident and migratory bird species. A great diversity of rare plants and animals are found in its natural communities. Elkhorn Slough serves as an important nursery and source of nutrients for Monterey Bay. Over 400 species of invertebrates, 80 species of fish, and 260 species of birds have been identified from Elkhorn Slough. Researchers and students from the Moss Landing Marine Laboratories, the University of California Santa Cruz, Stanford

University, California State University Monterey Bay and others have conducted studies on biology, ecology, geology, hydrology, restoration and landscape change. The State of California has designated Elkhorn Slough an ecological preserve, and the National Oceanic and Atmospheric Administration has included its tidal waters as part of the Monterey Bay National Marine Sanctuary, and established a National Estuarine Research Reserve on its shores (Elkhorn Slough National Estuarine Research Reserve). The California Department of Fish and Game, the Elkhorn Slough Foundation and The Nature Conservancy own land in the slough, ~~and The Elkhorn Slough Foundation in cooperation with the California Department of Fish and Game manage the property. They have~~ ~~has~~ extensive plans for the conservation of additional property on the slough and throughout the watershed and for improving and enhancing the quality and productivity of the slough ecosystem. The Elkhorn Slough is considered a significant biological resource.

Marine mammals such as harbor seals (*Phoca vitulina richardsi*), southern sea otters (*Enhydra lutris nereis*), and sea lions (*Zalophus californianus*) inhabit Elkhorn Slough, Moss Landing Harbor and nearby off shore waters (Duke Energy 1999i). Counts of harbor seals at a monitoring station 1.6 km east of the Highway 1 Bridge have steadily increased from 17 to 297 animals during the period from 1982 to 1995 (Fluharty 1999). Sea otter counts by the California Department of Fish and Game and the U. S. Fish and Wildlife Service in the Monterey Bay between the Capitola Pier and Seaside (north and south of Moss Landing respectively) indicate that observed numbers of sea otters here have shown an increasing trend from the mid-1980's to the mid-1990's. Declines in the sea otter population in the southern part of its range do not appear to be occurring in Capitola/Seaside area (Duke Energy 1999i). Southern sea otters are common inhabitants of Elkhorn Slough. Relative counts of sea lions in the Elkhorn Slough area have not been reviewed for this assessment.

Brown pelicans (*Pelecanus occidentalis californicus*) generally forage in offshore waters near Moss Landing and other parts of Monterey Bay but are also seen in Elkhorn Slough. A noteworthy incidental observation has been reported (Williams 1999) in which a pelican used a transmission line connected to the Moss Landing Power Plant as a perch to dive from while trying to catch fish. Western snowy plovers (*Charadrius alexandrinus nivosus*) are known to inhabit the Elkhorn Slough. The U.S. Fish and Wildlife Service has designated the Elkhorn Slough as critical habitat because of its nesting value for the western snowy plover (USFWS 1999).

PROJECT SPECIFIC IMPACTS

The site and laydown areas are in a highly disturbed industrialized area that, over time, has experienced the unassisted establishment of very small seasonal wetlands in the oil spill containment areas of some of the retired oil tanks (Duke Energy 1999c). Surveys were conducted for the Santa Cruz long-toed salamander (SCLTS) in one of the small seasonal wetlands that may be affected by the project, but no salamanders or larvae were observed. The field investigator, Mr. Bryan Mori, suggested that the habitat was marginal and relatively disconnected from known subpopulations nearby which could act as dispersal sites from which

breeding salamanders could emigrate to the location examined at the proposed project (Duke Energy 1999c). Although no salamanders were found, if actually present, he expected there would only be a few.

Soil erosion related to construction activities can impact aquatic biological resources if allowed to enter local waterways, but applying appropriate site-specific measures can mitigate potential erosion. A draft erosion control plan should be submitted to the Energy Commission for review and approval. Through implementation of an approved erosion control plan, that will be required in the Soil and Water Conditions of Certification for this project, it is anticipated that aquatic biological resources will not be significantly impacted by erosion impacts from the power plant site.

Low numbers of bird collisions with the project's new 145-foot tall turbine/HRSG stacks are estimated, because bird collision fatalities are more associated with relatively tall stacks ranging from 500 to 650 feet high (Goodwin 1975; Maehr et al. 1983; Weir 1974; Zimmerman 1975). The new stacks will be located close to the 500-foot stacks for Units 6&7 and the 180-foot tall boiler building suggesting that these existing tall and large structures would shield the smaller stacks to some degree. The new stacks are not expected to cause significant bird collisions.

In order to assess the affects of impingement, entrainment, and thermal discharge, and to determine best technology available (BTA) for the NPDES permit, the California Central Coast Regional Water Quality Control Board relies on the results of 316(a) and 316(b) studies. This information ~~was valuable is also crucial~~ for Energy Commission staff to estimate impacts to the marine and harbor/estuarine ecosystems. The data acquired by the 316(b) studies are critical in estimating impacts on species' populations and ecosystems that result from entrainment and impingement of organisms due to the once-through cooling water system. California Energy Commission staff and staff of the Central Coast Regional Water Quality Control Board work together and coordinate their review and impact determination and subsequent mitigation/compensation requirements. Generally a year of data is required to cover seasonal periods when distribution and abundance of marine and estuarine life forms can be significantly different. Important differences can occur between years also. In order to estimate the proportions of organisms that are being entrained in the power plant cooling system relative to the population from which they come; source water sampling must be done. This is usually done on a volumetric basis of organisms per cubic meter. Source water sampling was done only (a small number of nighttime samples was attempted but stopped due to safety reasons) during the day while the highest number of organisms have been entrained at night. To provide data for a valid comparison of the proportion of organisms entrained in relation to those in the source water, nighttime sampling is important. ~~Therefore, due to the uncertainty of the 316(b) fractional loss analysis, the following impact estimates should be considered a minimum. Two impact assessment methods are utilized below for entrainment losses. Both of these methods are very similar in concept and result in somewhat similar levels of mitigation/compensation.~~ Staff of the agencies ~~with permitting authority for assessing the effects of~~ this project are in agreement on the ~~eis~~ impact assessment approach ~~(described below)~~ as a reasonable way to determine mitigation/compensation levels. These agencies are the California Central Coast

Regional Water Quality Control Board, California Department of Fish and Game, California Coastal Commission, and the California Energy Commission. Estimates of proportional entrainment (fractional losses) of fish larvae to the source water of the harbor and slough, and the percent volume of cooling water entrained (contains biological resources that will be entrained) relative to the volume of source water in the harbor and slough are considered as a percentage of the slough's productivity and used to estimate equivalent habitat productivity losses. Fractional losses from the Elkhorn Slough are equivalent to a loss of habitat (wetland habitat for instance). ~~Determining reasonable and satisfactory mitigation amounts and costs for restoring wetland acres and other Elkhorn Slough enhancements is difficult, since there are a wide range of costs associated with these types of activities (see Table 5). Additionally, BTA alternatives will be considered, and balanced with environmental benefits and costs.~~

Impacts associated with the thermal discharge ~~and~~ impingement ~~are not considered to be significant, however, and~~ entrainment losses of marine and estuarine species due to the once-through cooling water system are considered to be significant. The new combined cycle power plant will ~~entrainsuck~~ through its cooling water intake system a minimum of six percent (6 percent to 28 percent with units 6&7 also operating) ~~(see Table 2)~~ of the water volume of the harbor and Elkhorn Slough on a daily, annual, and life-of-the-facility basis. Essentially all living material in this water volume will be lost. Additional losses of marine and estuarine biological resources will result from impingement and from thermal impacts due to the cooling water discharge influence. Impingement and thermal discharge losses are difficult to quantify ~~for this project, but will contribute to overall ecosystem losses.~~ Impingement will add to the harbor and Elkhorn Slough ecosystem losses, and the thermal discharge will result in some effects to the near-shore, soft benthos, sandy beach, and jetty (rocky substrate) biological resources. ~~Neither the thermal discharge or impingement are by itself is not~~ considered to be a significant impact, ~~but added to the entrainment losses, the overall losses will be significant, at this time.~~ The true extent of the thermal ~~influence effects~~ of the new combined cycle power plant ~~has been estimated but is unknown since the extent of the resulting thermal plume has not been determined adequately, and won't be known~~ until the new power plant operation begins. ~~Monitoring of these thermally affected systems in order to determine effects with any level of confidence is considered difficult due to the many confounding factors. Therefore, the unquantified impacts that will result due to the thermal discharge, will be considered along with other cumulative effects and mitigated/compensated by an additional increment of Elkhorn Slough wetland replacement acres, or associated enhancements.~~

~~Table 2 below shows the replacement wetland acres required to replace harbor and Elkhorn Slough ecosystem (biological resources values) losses. There are approximately 4000 wetted acres of surface water in Elkhorn slough. The percent of water volume and associated productivity losses are considered to require an acre-for-acre of wetlands restored to replace the productivity lost due to the cooling water system. In this case six percent of Elkhorn Slough surface volume (4000 acres) equals 240 acres of wetland needed to be restored in order to replace the lost productivity.~~

BIOLOGICAL RESOURCES Table 2
Daily Cooling Water Intake Volume as a Percent of Harbor and Elkhorn Slough Water Volume and Equivalent Replacement Wetland Acres.

	% of Volume ¹	Equivalent Wetland Ac. ²
Combined Cycle Units 1&2	6%	240 Acres
Units 1&2 and Units 6&7	28%	1135 Acres

1. Volume of daily maximum cooling water intake and the volume of the Harbor and Elkhorn Slough were used.
- 2.1. Elkhorn Slough has approximately 4000 surface (wetted area) acres. It is estimated that it will take an acre-for-acre replacement of new wetland to mitigate/compensate for the biological productivity lost due to the intake water volume as a percentage of the wetted area of the Elkhorn Slough. An example is 6% volume multiplied by 4000 acres of surface water area in the Elkhorn Slough equals 240 acres of wetlands that need to be replaced/restored to make up for the loss of biological resources.

Entrainment due to the Moss Landing Power Plant project (new combined cycle units 1&2) cooling water system will **result in the loss of** ~~carry~~ essentially all pelagic organisms in the volume of water entrained through the power plant **to their death**. ~~This is a similar way of assessing losses to the harbor and Elkhorn Slough ecosystem as discussed above.~~ In the case of the new combined cycle power plant this results in the loss of an average of 13 percent (see Table ~~23~~) of the fish larvae (other pelagic eggs and larvae are also lost, such as crabs and clams) in the Harbor and Elkhorn Slough. If all units (units 1&2 and 6&7) are operating the percentage would be several times greater. These pelagic organisms are important living material that provide food (primary productivity) for many creatures in the harbor and slough ecosystems. The loss of this amount of productivity is significant. The Elkhorn Slough covers about ~~43~~000 acres of wetted surface, and the loss of 13 percent of the fish larvae will require a ~~n-acre-for-acre~~ replacement of wetland in order to replace the lost productivity of the harbor and Elkhorn Slough ecosystem. In this case 13 percent of the ~~43~~000 acres of wetted surface equals ~~520~~**390** acres of needed wetland acres restored. Table ~~23~~ below illustrates these figures.

BIOLOGICAL RESOURCES Table 23
Percentage of Fish Larvae Lost Due to the Cooling Water Intake System
and Replacement Wetland Acres

SOURCE WATER

	Large Volume	Small Volume
Unidentified Gobies	3%	11%
Bay Goby	4%	21%
Blackeye Goby	4%	7%
Longjaw Mudsucker	5%	9%
Combtooth Blenny	11%	18%
Pacific Herring	5%	13%
White Croaker	?	?
Pacific Staghorn Sculpin	4%	12%
Average % loss (small volume) (From 316 (b) report)		13%

13% of 4,3000 surface acres in Elkhorn Slough equals¹ **520,390 wetland replacement acres**

1. It is estimated that an ~~acre-for-acre~~ ~~of~~ replacement/restoration ~~percentage-of~~ wetland is needed to make up for each average percent of fish larvae (and other biological resources) removed from Elkhorn Slough ecosystem. This loss in productivity can be replaced by improving the quality and productivity of the Elkhorn Slough through wetland restoration type actions. Thirteen percent of 4,3000 acres equals 520,390 acres of replacement wetland acres.

The above ~~two~~-assessment ~~methods are similar and~~ ~~rely~~ on the ~~same~~ concept of the operation of the once through cooling system resulting in loss of productivity to the harbor and Elkhorn Slough ecosystems and that in order to replace those losses, the productivity of the Elkhorn Slough ecosystem needs to be improved, thereby enhancing the ability of Elkhorn Slough to replace the primary productivity lost due to the combined cycle power plant operation. This requires restoration of wetland acres and other enhancement of the Elkhorn Slough ecosystem. As mentioned above, this approach to mitigating/compensating for the biological resources losses has been agreed to as reasonable and acceptable methods for determining mitigation/compensation, by staff of the state agencies involved in ~~assessing the effects of~~ ~~permitting~~ the Moss Landing Power Plant project. These agencies are the California Central Coast Regional Water Quality Control Board, California Department of Fish and Game, California Coastal Commission, and the

California Energy Commission. A reasonable wetland replacement amount was selected taken from the range of acres and costs displayed in Tables 3 2-6. will be considered along with BTA options that would eliminate or reduce biological resource impacts. A mitigation/compensation amount will be derived at a publically noticed workshop by the agencies and the project owner, prior to the Evidentiary Hearing. Those determinations will be presented at the Evidentiary Hearing.The agencies and the project applicant agreed to seven million dollars (\$7,000,000.) for mitigation/compensation for the biological resources losses of this project.

~~Table 4 displays the range of losses and the restored wetland acres needed. Table 5 displays a range of wetland restoration costs and cost estimates. Table 6 displays the range of wetland restoration costs to be applied to Moss Landing Power Plant project. Table 7 lists other BTA options that would significantly reduce biological resources losses due to impingement, entrainment, and thermal discharge. In some cases these BTA options eliminate the cooling water system impacts (dry cooling) and in other cases the cooling water system impacts are significantly reduced (cooling towers) and would be balanced with reduced mitigation/compensation requirements. The feasibility of the various BTAs are weighed against the effectiveness to reduce cooling water system adverse impacts to biological resources and the costs of wetlands restoration and other Elkhorn Slough enhancements. A specific mitigation/compensation amount for Elkhorn Slough enhancement (wetland acres to be restored and other enhancements) is yet to be determined.~~

**BIOLOGICAL RESOURCES Table 3
Range of wetland Restoration Costs¹**

390 acres at \$12,000/acre	\$4,680,000
390 acres at \$25,000/acre	\$9,750,000

1. Estimates of wetland restoration costs were provided by Dr. Peter Raimondi.

**BIOLOGICAL RESOURCES Table 4
Range of replacement Wetland Acres**

	% Loss	Restored Wetland Acres Needed
% volume of water (C-C units)	6%	240 Acres
% volume of water (All units)	28%	1135 Acres
% fish larvae lost (small volume)	13%	520 Acres

BIOLOGICAL RESOURCES Table 7
Best Technology Available: Intake and Discharge (CC only)

Cost over project life

Cooling Towers with Recirculating Cooling Water ¹	\$60M
Cooling Towers---Natural Draft	\$51M
Air Cooled Condenser (Drycooling) ²	\$114M
Offshore Intake	?????
Seasonal Operation Curtailment	\$59M
Gunderboom	?????
Thermal Discharge---Multiport Diffuser (CC)	\$29M
---Multiport Diffuser (Units 6&7)	\$20M

1. The last four near shore power plants that applied to the California Energy Commission for Certification (Delta, Pittsburgh, Contra Costa, and San Francisco Energy) proposed cooling towers.

2. Three recent power plant projects have proposed dry cooling (Otay Mesa, Crockett, and Sutter).

CUMULATIVE IMPACTS

Cumulative impacts refer to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.

Considering the level of industrial development within the existing power plant complex at Moss Landing, Energy Commission staff does not regard the potential incremental terrestrial biological resources impacts of the proposed project as significant. The recommended mitigation measures will reduce impacts to acceptable levels.

With respect to the marine, harbor and estuarine environment, Energy Commission staff does not find the cumulative impacts to be significant. If units 1 & 2 and units 6 & 7 operating at the same time were considered a cumulative effect, they would be considered significant, but this assessment does not consider all units operating together as meeting the definition of cumulative. ~~The cumulative estuarine and marine losses due to the operation of the new units, 1&2, and the existing units, 6&7, will cause significant chronic loss of biological resources productivity impacts to the harbor and Elkhorn Slough ecosystems. Although the power plant has been operating since 1950 and no substantive mitigation/compensation for biological resources losses have been offered or required, staff considers only the future~~

~~chronic losses of productivity in this assessment. Mitigation/compensation is necessary in order to reduce cumulative impacts below a significant level. The resulting mitigation/compensation measures will consider estimates of impingement losses and adult equivalent losses for entrained species as well as any primary productivity losses and will be intended to support ongoing and planned management practices being implemented in the Elkhorn Slough National Estuarine Research Reserve. The mitigation/compensation for cumulative impacts will be in addition to project specific impacts discussed above. A specific mitigation/compensation amount for cumulative impacts will be determined for Elkhorn Slough enhancement (wetland acres to be restored and other enhancements). This mitigation/compensation will be added to the project specific impacts mitigation/compensation for a total mitigation/compensation package, and then presented at the Evidentiary Hearing.~~

FACILITY CLOSURE

For the eventual permanent closure of the power plant project, the project owner must utilize methods and measures that protect the environment and public health and safety. To achieve this, the project owner will develop an “on-site contingency plan” for facility closure as required in General Conditions of Certification. Detailed measures specifically addressing biological resources, such as structure removal and habitat restoration, should be done according to Biological Resources Condition of Certification **BIO-6**. The plan should also include the anticipated measures that would be implemented in case of a temporary, but prolonged closure.

MITIGATION

~~Small wetlands that have become established in oil spill retention areas around oil tanks scheduled for removal due to project construction should be mitigated for in a manner specified by the California Department of Fish and Game.~~

~~To mitigate for potential impacts to Santa Cruz long-toed salamanders (SCLTS), that is, if the California Department of Fish and Game and the U. S. Fish and Wildlife Service are agreeable, it is suggested that the following be done:~~

~~A a salamander exclusion fence or perimeter fence addition shall be constructed at the new power plant project perimeter (perimeter fence) in order to exclude any salamanders (SCLTS) that may venture onto the site. The fence should encircle the entire new power plant project construction site and construction support areas to exclude any SCLTS from moving into the project site. The exclusion fence should be installed before the rainy season (October 15) of the year construction begins and be maintained for the life of the project to reduce the likelihood of a loss of a SCLTS. If the project construction begins during the rainy season, the fence should be in place prior to construction.~~

~~During the initial grading process, biological monitors should be present to search through the spoils to recover any remaining salamanders. All SCLTSs collected should be photographed, sexed and measured, then relocated to a suitable off-site location.~~

To ensure the likelihood of successful completion of required mitigation, the project owner should designate a qualified biologist to advise the project owner or its project manager on the implementation of the Conditions of Certification, for this project and to supervise or conduct mitigation, monitoring, and other biology compliance efforts.

To promote project personnel's general understanding of environmental concerns associated with the project and enhance the likelihood of their compliance with conditions of certification, the owner should institute an employee environmental awareness program in which each of its own employees, as well as employees of contractors and subcontractors who work on the project site during construction and operation are informed about biological resource sensitivities associated with the project.

To make sure required biological resources mitigation measures are successfully completed during construction and operation of the project, a Biological Resources Mitigation Implementation and Monitoring Plan should be developed by the project owner and reviewed and approved by the Energy Commission Compliance Project Manager.

In order to prevent animals from becoming trapped in any trenches excavated while installing natural gas pipelines or other underground project features, the project owner, at the end of the workday, should have any open portions of the trench covered if left unattended or by checking the trenches regularly and removing any animals appropriately.

~~Best technology available for reducing impacts associated with the once-through cooling water system should be considered for this project.~~ For significant marine and harbor and estuarine biological resource losses ~~that exceed the capabilities of best technology available, reasonable and satisfactory compensation needs to be provided.~~ seven million dollars (\$7M) will be provided by the project owner. The funds will be paid to the Elkhorn Slough Foundation. The total mitigation will be \$7 million paid as follows. The first payment of \$1.5 million will occur within 120 days after the start of construction for the new power generation units. The second and third payments of \$750,000 each will occur at the date of Commercial Operation of Units 1 and 2 respectively. Four remaining payments of \$1 million each will follow; the first two payments of \$1 million each will be due one year from the Commercial Operation dates of Units 1 and 2 (\$1 million each); the second two payments of \$1 million each will be due two years from the Commercial Operation dates of Units 1 and 2 (\$1 million each), ~~which is anticipated to be about June 2004.~~ These funds will be used for ~~include~~ wetland restoration in the Elkhorn Slough and can include other conservation efforts, improvements and enhancements to increase the productivity of the slough ecosystem. This compensation ~~will include~~ s an endowment to accomplish short-term and long-term administration, management, maintenance, monitoring, research, and annual operation expenses in perpetuity.

~~A monitoring program to determine the actual impingement and entrainment losses of the new project and the cumulative operations of the power plant (new units 1&2 and existing units 6&7), and to characterize the extent of the thermal plume during~~

~~operation of the new units 1&2 and the cumulative operation (including units 1&2 and 6&7) of the facility (thermal plume condition is in Water Resources Section). These monitoring efforts will be designed prior to the start of the new units 1&2 operation and be conducted as the new units come on line. The study objectives, protocols, and length of the monitoring for the impingement, entrainment, and thermal plume, will be established by a technical advisory group made up of representatives of the California Central Coast Regional Water Quality Control Board, California Department of Fish and Game, California Coastal Commission, the California Energy Commission, and the project owner.~~

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS AND STANDARDS

The U.S. Army Corps of Engineers has issued a "Letter of Permission" (Dated June 21, 1999) authorizing Duke Energy Power Services to make modifications to the Units 1-5 cooling water intake structure so it can be used for the new project. The U.S. Army Corps of Engineers has issued a determination (dated September 23, 1999) that the small wetlands in the some of the oil spill containment areas that will be affected by project construction are not waters of the U.S. As such, no permit is required under Section 404 of the Clean Water Act (33 U.S.C. 1344). The Central Coast Regional Water Quality Control Board has not issued an NPDES permit for the proposed project. The respective objectives of the 316(a) and 316(b) studies are to determine if Thermal Plan standards for new facilities can be met and that cooling water intake structures reflect the best technology available for minimizing adverse environmental impacts. The California Energy Commission staff are coordinating closely with Central Coast Regional Water Quality Control Board staff on NPDES permit requirements. It is anticipated that the NPDES permit and the California Energy Commissions certificate will include the same requirements where jurisdictions overlap.

The suitability of thermal plume data assessed in the 316(a) study is supposed to allow for a determination of whether or not the proposed discharge is able to meet required standards which prohibit a discharge that exceeds the receiving water ambient temperature by more that 20°F for a specified period or 4°F above natural water temperatures at the shoreline, the surface of any ocean substrate, or the ocean surface beyond 1,000 feet from the discharge for a specified period. The project owner has determined the 20° F standard cannot be met and has requested an exception to this standard and requested a variance. The Central Coast Regional Water Quality Control Board regulatory process will make this determination. ~~The 4° F standard may not be met either (see Water Resources Section) although the project owner has not yet requested an exception to this standard. Not meeting these standards may increase the biological resources impacts of the project.~~ Staff ~~has~~ is ~~work~~ ed ~~ing~~ with the Central Coast Regional Water Quality Control Board staff to assess ~~and mitigate~~ these ~~possible additional~~ impacts and has determined that the \$7M mitigation/compensation will mitigate impacts to an acceptable level.

Likewise, for the 316(b) studies, the California Energy Commission staff are working with the California Central Coast Regional Water Quality Control Board staff to assess the impacts due to impingement and entrainment on species' populations and harbor and Elkhorn Slough ecosystems, and weigh those impacts against BTA alternatives that would eliminate or reduce the impacts. The once-through cooling water system impacts are considered significant, but with ~~reasonable and satisfactory~~ the \$7M mitigation/compensation used to enhance Elkhorn Slough, measures or BTA alternative(s) it is anticipated impacts will be mitigated to an acceptable level.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Impacts associated with the project site and laydown area are likely to be insignificant, but where the potential for impacts to listed species exists, they can be mitigated to acceptable levels. ~~However, the~~ entrainment impacts from the once-through cooling water system (~~impingement, entrainment, and thermal~~) are considered to be ~~project specifically and cumulatively~~ significant. It is anticipated that with ~~sufficient~~ the mitigation/compensation ~~provided or the use of BTA alternatives~~ these impacts can be mitigated to an acceptable level.

RECOMMENDATIONS

~~Until the~~ the mitigation/compensation package for the once-through cooling system impacts ~~has been is determined and~~ agreed to by the staff of the agencies and the project applicant (California Central Coast Regional Water Quality Control Board, California Department of Fish and Game, California Coastal Commission, the California Energy Commission, and Duke Energy Moss Landing LLC), ~~the proposed project should not be approved. When~~ the mitigation/compensation amount ~~of \$7M is determined to the satisfaction of~~ acceptable to both the California Energy Commission staff and the Central Coast Regional Water Quality Board staff for their NPDES permit, ~~these mitigation/compensation measures should be incorporated~~ The following Biological Resources Conditions of Certification should be adopted by the Energy Commission into Energy Commission staff's proposed Conditions of Certification. It is anticipated this agreement will be reached by the Evidentiary Hearing. I recommend the project be approved.

CONDITIONS OF CERTIFICATION

BIO-1 Any ground disturbing activity (at the site and/or ancillary facilities) other than allowed geotechnical work shall not begin until an Energy Commission Compliance Project Manager (CPM) approved designated biologist is available to be on site.

The designated biologist must meet the following minimum qualifications:

- 1) a bachelor's degree in biological sciences, zoology, botany, ecology, or a closely related field,

- 2) three years of experience in field biology and current certification of a nationally recognized biological society, such as the Ecological Society of America or The Wildlife Society,
- 3) one year of field experience with biological resources found in or near the project area, and
- 4) ability to demonstrate to the satisfaction of the CPM the appropriate education and experience for the biological resource tasks that must be addressed during project construction and operation.

If the CPM determines the proposed designated biologist to be unacceptable, the project owner shall submit another individual's name and qualifications for consideration.

If the approved designated biologist needs to be replaced, the project owner shall obtain approval of a new designated biologist by submitting to the CPM the name, qualifications, address, and telephone number of the proposed replacement.

Verification: No disturbance will be allowed in any designated sensitive area(s) until the CPM approves a designated biologist and that designated biologist is on-site. At least 30 days prior to the start of surface disturbing activities at the project site and/or at ancillary facilities, the project owner shall submit to the CPM for approval, the name, qualifications, address, and telephone number of the individual selected by the project owner as the designated biologist.

The project owner must submit the information on a replacement designated biologist to the CPM for approval 10 days prior to the actual replacement.

~~For any necessary corrective action taken by the project owner, a determination of success or failure of such action will be made by the CPM after receipt of notice that corrective action is completed, or the project owner will be notified by the CPM that coordination with other agencies will require additional time before a determination can be made.~~

BIO-2 The CPM approved designated biologist shall perform the following duties:

- 1) advise the project owner's supervising construction or operations engineer on the implementation of the biological resource conditions of certification,
- 2) supervise or conduct mitigation, monitoring, and other biological resource compliance efforts, particularly in areas requiring avoidance or containing sensitive biological resources, such as, wetlands and special status species, and
- 3) notify the project owner and the CPM of any non-compliance with any condition.

Verification: The designated biologist shall maintain written records of the tasks described above, and summaries of these records shall be submitted along with the Monthly Compliance Reports to the CPM.

BIO-3 The project owner's supervising construction and operating engineer shall act on the advice of the designated biologist to ensure conformance with the biological resource conditions of certification.

Protocol: The project owner's supervising construction and operating engineer shall halt, if needed, all construction activities in areas specifically identified by the designated biologist as sensitive to ensure that potential significant biological resource impacts are avoided.

The designated biologist shall:

- 1) advise the project owner and the supervising construction and operating engineer when to resume construction, and
- 2) advise the CPM if any corrective actions are needed or have been instituted.

Verification: Within two working days of a designated biologist notification of non-compliance with a Biological Resources condition or a halt of construction, the project owner shall notify the CPM by telephone of the circumstances and actions being taken to resolve the problem or the non-compliance with a condition.

For any necessary corrective action taken by the project owner, a determination of success or failure will be made by the CPM within five working days after receipt of notice that corrective action is completed, or the project owner will be notified by the CPM that coordination with other agencies will require additional time before a determination can be made.

BIO-4 The project owner shall develop and implement a Worker Environmental Awareness Program. [A n environmental awareness program shall be developed for construction employees and employees of contractors and subcontractors that may work in close proximity to sensitive areas. This shall include work associated with the new power plant, linear facilities, access roads, and laydown areas. All site supervision shall also receive this training, in which each of its own employees, as well as employees of contractors and subcontractors who work on the project site or related facilities \(including any access roads, storage areas, transmission lines, water and gas lines\) during construction and operation, are informed about biological resource sensitivities associated with the project.](#)

Protocol: The Worker Environmental Awareness Program:

- a) shall be developed by the designated biologist and consist of an on-site or classroom presentation in which supporting written material is made available to all participants.; [This training can be part of the regular site](#)

orientation or a special training program based on employees task assignment;

- b) must discuss the locations and types of sensitive biological resources on the project site and adjacent areas;
- c) must present the reasons for protecting these resources;
- d) must present the meaning of various temporary and permanent habitat protection measures;
- e) must identify who to contact if there are further comments and questions about the material discussed in the program; and,
- f) shall inform workers of the potential biological resource impact risk associated with all construction and operational activities as is appropriate and emphasize protection of sensitive resources such as the Santa Cruz long-toed salamander.

~~The specific program can be administered by a competent individual(s) acceptable to the designated biologist.~~

Each participant in the on-site Worker Environmental Awareness Program shall sign a statement declaring that the y have received the training and will individual understands and shall abide by the guidelines provided set forth in the program material. The person administering the Worker Environmental Awareness Program shall also sign each statement. These statements will be maintained on site until commercial operation.

~~The signed statements for the construction phase shall be kept on file by the project owner and made available for examination by the CPM for a period of at least six (6) months after the start of commercial operation. The project owner shall keep signed statements for active operational personnel on file for the duration of their employment and for six months after their termination.~~

Verification: At least 30 days prior to the start of surface disturbing activities at the project site and/or at ancillary facilities, the project owner shall provide copies of the Worker Environmental Awareness Program and all supporting written materials prepared by the designated biologist and the name and qualifications of the person(s) administering the program to the CPM for approval. The project owner shall state in the Monthly Compliance Report the number of persons who have completed the training in the prior month and a running total of all persons who have completed the training to date.

BIO-5 The project owner shall submit to the CPM for review and approval a copy of the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) for this project.

Protocol: The BRMIMP shall:

- identify all sensitive biological resources to be impacted and avoided by project construction and operation;
- identify all mitigation, monitoring and compliance conditions included in the Commission's Final Decision;
- identify all conditions agreed to in any CDFG Streambed Alteration Agreement;
- ~~indicate the placement of transmission line towers so that wetland resources will be avoided, or if not avoided, constructed in such a way that impacts will be minimized to the extent practicable.~~
- design or apply insulation or use other measures on new above-ground ~~transmission lines and other~~ facilities such as substations to reduce the risk of electrocution for large birds;
- clearly delineate construction area boundaries with stakes, flagging, and/or rope to minimize inadvertent degradation or loss of wetland habitat during construction activities ~~associated with pipelines and transmission lines~~;
- show all locations requiring temporary protection/signs during construction on a map of suitable scale;
- indicate duration for each type of monitoring established for mitigation actions and include a description of the monitoring methodologies and frequency;
- describe performance standards to be used to help decide if/when proposed mitigation is or is not successful;
- identify all remedial measures to be implemented if performance standards are not met;
- reduce potential bird collisions with boiler stacks, cooling towers, turbine stacks and other structures by reducing exterior lighting on all structures to the minimum except for those required for power plant safety and aviation warning, while all other required exterior lighting on structures will be shielded to direct light downward;
- reduce soil erosion during construction and operation by applying measures identified in the proposed Soil Resources and Water Resources conditions of certification of the Energy Commission Decision for the project;
- include, with concurrence of the California Department of Fish and Game and the U. S. Fish and Wildlife Service mitigation for potential impacts to Santa Cruz long-toed salamanders (SCLTS), comprised of the following actions:

- ~~1. A salamander exclusion fence or fence addition shall be constructed at the project perimeter (perimeter fence) in order to exclude any salamanders (SCLTS) that may venture onto the site. The fence should encircle the entire project construction site and construction support areas to exclude any SCLTS from moving into the project site. The exclusion fence should be installed before October 15 of the year construction begins and be maintained for the life of the project to reduce the likelihood of a loss of a SCLTS.~~

a salamander exclusion fence or perimeter fence addition shall be constructed at the new power plant project perimeter (perimeter fence) in order to exclude any salamanders (SCLTS) that may venture onto the site. The fence should encircle the entire new power plant project construction site and construction support areas to exclude any SCLTS from moving into the project site. The exclusion fence should be installed before the rainy season (October 15) of the year construction begins and be maintained for the life of the project to reduce the likelihood of a loss of a SCLTS. If the project construction begins during the rainy season, the fence should be in place prior to construction.

4) _____

~~2) During the initial grading process, biological monitors should be present to search through the spoils to recover any remaining salamanders. All SCLTSs collected should be photographed, sexed and measured, then relocated to a suitable off-site location.~~

- reduce the potential for animal injury or deaths from falling into trenches or other excavated sites by covering them at the end of the workday if left unattended or by checking the trenches regularly and removing animals appropriately.

Verification: At least 60 days prior to the start of surface disturbing activities at the project site and/or at ancillary facilities, the project owner shall provide the CPM with the final version of the Biological Resources Mitigation Implementation and Monitoring Plan for this project, and the CPM will determine the plans acceptability within 15 days of receipt of the final plan. After the plan is approved, the project owner shall notify the CPM five working days before implementing any agreed to modifications to the Biological Resource Mitigation Implementation and Monitoring Plan.

Within ~~120~~ 30 days after completion of construction, the project owner shall provide to the CPM for review and approval, a written report identifying which items of the Biological Resources Mitigation Implementation and Monitoring Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which condition items are still outstanding.

BIO-6 The project owner shall incorporate into ~~a the~~ facility closure plan a Biological Resources Element that includes measures to address current local biological resource issues. ~~The biological resource facility closure measures shall also be incorporated into the Moss Landing Power Plant Project BRMIMP.~~

Protocol: For permanent closure, biological resource-related measures shall include:

- 1) The possible R removal of all power plant site facilities;
- 2) Measures to restore wildlife habitat to promote the re-establishment of native plant and wildlife species; and
- 3) Updating the plan to address current biological resources issues.

Protocol: For temporary, but prolonged closure, biological resource-related measures shall include:

- 1) Notifying the CPM within two weeks of the project owner's decision to initiate a temporary, but prolonged closure;
- 2) Turning off the once-through cooling water system pumps; and
- 3) Updating the plan to address current biological resources issues.

Verification: At least twelve months (or a mutually agreed upon time) prior to the commencement of permanent closure activities a Biological Resources Element will be incorporated into the Facility Closure Plan and the BRMIMP and submitted to the CPM for review and comment. The CPM will be notified within two weeks of the project owner's decision for a temporary, but prolonged closure and provide an updated plan of action.

BIO-7 Following the certification of the Moss Landing Power Plant project, the project owner will provide the ~~funds (amount TBD) the seven million dollars (\$7,000,000.)~~ for mitigation/compensation ~~for Elkhorn Slough National Estuarine Research Reserve enhancement~~ to the Elkhorn Slough Foundation ~~according to the following schedule:-~~ The total mitigation will be \$7 million paid as follows. The first payment of \$1.5 million will occur within 120 days after the start of construction for the new power generation units. The second and third payments of \$750,000 each will occur at the date of Commercial Operation of Units 1 and 2 respectively. Four remaining payments of \$1 million each will follow; the first two payments of \$1 million each will be due one year from the Commercial Operation dates of Units 1 and 2 (\$1 million each); the second two payments of \$1 million each will be due two years from the Commercial Operation dates of Units 1 and 2 (\$1 million each). These funds will be used for wetland restoration in the Elkhorn Slough and can include other improvements and enhancements to increase the productivity of the slough ecosystem. This compensation includes an endowment to accomplish short-term and long-term administration, management, maintenance, monitoring, research, and annual operation expenses in perpetuity. The funds shall include those monies for wetlands restoration and other improvements and include an endowment that will cover short- and long-term administration, maintenance, management, monitoring, research, and operation costs in perpetuity. It is anticipated these funds will represent satisfactory mitigation/compensation to satisfy the other agencies permits listed below.

An agreement Memorandum of Understanding (MOU) will be created between the California Energy Commission Staff, Staff of the Central Coast Regional Water Quality Control Board (NPDES Permit), and agencies and the Elkhorn Slough Foundation clearly identifying acceptable uses of the funds, including a requirement for accounting of how the funds are spent. This agreement will result in a plan being produced for use of the funds by the Elkhorn Slough Foundation. The plan will require approval by Energy Commission Staff and Regional Board Staff. The details of the agreement MOU will be worked out by representatives of the California Energy Commission, California Central Coast Regional Water Quality Control Board, and the Elkhorn Slough Foundation, in consultation with the California Department of Fish and Game, California Coastal

Commission, and the project owner (if they desire), within 180 420 days of the project certification.

Until the agreement MOU is signed and a plan approved, the Elkhorn Slough Foundation will not spend any of the funds. ~~Once the MOU is signed. The funds can be used for wetlands restoration, erosion control and property cleanup, and other actions that improve the quality and enhance the productivity of the Elkhorn Slough. It is intended that the funds can be used on Elkhorn Slough Foundation property, California Department of Fish and Game property in the slough and properties that may be improved, purchased or conserved as discussed in the Elkhorn Slough Conservation Plan (1999). The agreement and approved plan details will be worked out to the satisfaction of all agencies to the extent possible and~~ included in the BRMIMP when available.

Verification: The project owner will provide written verification to the CEC CPM and the Central Coast Regional Water Quality Control Board that the individual mitigation/compensation payments (seven payments in total) funds have been paid within 15 days of each payment certification. A copy of the check provided to the Elkhorn Slough Foundation shall be included with the written verification. The CPM will review the agreement MOU when it is in draft in order to ensure the wording is clear, meets the terms of the presiding member decision, and is enforceable. The CPM will ensure the agreement MOU is completed within 180 420 days of certification. The CPM will ensure the Elkhorn Slough Foundation complies with the terms of the agreement MOU. The CPM will review the draft plan produced by the Elkhorn Slough Foundation when it is in draft in order to ensure the wording is clear, and it meets the terms of the agreement.

If the project owner has not complied with any aspect of this condition, the CPM will notify the project owner of making this determination.

For any necessary corrective action taken by the project owner, a determination of success or failure of such action will be made by the CPM after receipt of notice that corrective action is completed, or the project owner will be notified by the CPM that coordination with other agencies will require additional time before a determination can be made.

~~**BIO-8** The project owner will conduct one year of monitoring to determine the actual impingement and entrainment losses resulting from the operation of the cooling water system for the new units 1&2 and the existing units 6&7 and the project owner will sample the source water to determine fractional losses relative to their abundance in the source water. The study objectives, sample design, metrics, and methods (protocols) will be developed by a technical advisory committee made up of representatives of the agencies (California Central Coast Regional Water Quality Control Board, California Department of Fish and Game, California Coastal Commission, California Energy Commission)(hereafter called the "agencies"), and the project owner. The study protocols will be developed and put into a study plan within twelve months of the certification. The project owner will commence the monitoring within one month of the start of operation of the new power plant. The methods, analysis, results, and conclusions of the monitoring study will be documented in a scientific style report and submitted to the CPM for review~~

and approval. The other agencies shall be included in the review of the draft report as they desire. A final report shall be completed within nine months of the completion of the field sampling.

Verification:—The project owner will submit a draft study plan (based on technical advisory committee direction) to the CEC CPM within nine months of certification for review and approval. Within twelve months of certification, an approved final study plan will be provided to the CPM. This study plan will be prepared by the project owner as guided by the technical advisory committee established by CEC biology staff and CEC CPM in consultation with the agencies. The CPM will ensure that the monitoring studies are conducted according to the study plan. The project owner will submit quarterly reports during the study sampling period, that are due two months following the completion date of that quarter of field sampling. The project owner will verify in writing that they are following the approved study plan protocols on a quarterly basis.

The project owner will submit a draft report that discusses the results of the impingement, entrainment and source water sampling studies, that is a scientific style report including methods, analysis, results, and conclusions within six months of the end of field sampling, and they will submit a final report within nine months from the end of field sampling. The CPM will ensure that a study results draft report is submitted within six months of the completion of the field sampling, and that a final report is completed within nine months from the completion of the field sampling.

Within 30 days following certification the CPM shall ensure that a technical advisory committee has been established and is progressing toward the creation of the study plan. Within 30 days following the start of operation of new units 1&2 of the Moss Landing Power Plant, the impingement, entrainment, and source water sampling studies will commence.

If the project owner has not complied with any aspect of this condition, the CPM will notify the project owner.

For any necessary corrective action taken by the project owner, a determination of success or failure of such action will be made by the CPM after receipt of notice that corrective action is completed, or the project owner will be notified by the CPM that coordination with other agencies will require additional time before a determination can be made.

REFERENCES

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