National Marine Sanctuaries
National Oceanic and Atmospheric Administration

MONTEREY BAY NATIONAL MARINE SANCTUARY

GUIDELINES FOR DESALINATION PLANTS IN THE MONTEREY BAY NATIONAL MARINE SANCTUARY

PREPARED BY NOAA'S
MONTEREY BAY NATIONAL MARINE SANCTUARY AND
NATIONAL MARINE FISHERIES SERVICE

http://montereybay.noaa.gov

GUIDELINES FOR DESALINATION PLANTS IN THE MONTEREY BAY NATIONAL MARINE SANCTUARY

Prepared by NOAA's
Monterey Bay National Marine Sanctuary and
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MAY 2010

Cover Photo: Brad Damitz, NOAA

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A. INTRODUCTION:

This *Guidelines for Desalination Plants in the Monterey Bay National Marine Sanctuary* document was developed by Monterey Bay National Marine Sanctuary (MBNMS) staff, in close collaboration with staff from the California Coastal Commission, the Central Coast Regional Water Quality Control Board, and NOAA's National Marine Fisheries Service (NMFS). These non-regulatory guidelines were developed to help ensure that any future desalination plants in the sanctuary will be properly sited, designed, and operated in a manner that results in minimal impacts to the marine environment. These guidelines address numerous issues associated with desalination including site selection, construction and operational impacts, plant discharges, and intake systems. **They are intended to assist regulatory agencies in reviewing proposed desalination projects and to help ensure that project proponents and designers address resource protection concerns.**

During the Joint Management Plan Review process to update the MBNMS Management Plan, the Sanctuary received a significant amount of feedback from the general public and regulatory agencies that desalination is an emerging regional issue, which should be addressed by the Sanctuary as part of the updated management plan. In response to this widespread public concern, the MBNMS convened a multi-stakeholder Desalination Working Group[1] to characterize the issues, and develop an action plan that would guide the Sanctuary's approach to this emerging issue. This *MBNMS Desalination Action Plan* is a component of the updated MBNMS Management Plan. It lays out a regional approach aimed at minimizing or eliminating impacts to marine resources in the Sanctuary through consideration of regional planning, facility siting, on-site mitigation measures, modeling and monitoring, and outreach and information exchange. One of the key strategies of this action plan is to develop, in collaboration with partners, these guidelines for construction and operation of desalination plants within the Sanctuary.

As part of the implementation of the *MBNMS Desalination Action Plan*, Sanctuary staff partnered with the Association of Monterey Bay Area Governments (AMBAG) in comprehensively identifying the potential environmental, economic, and social impacts, both positive and negative, associated with seawater desalination if conducted in the Monterey Bay area. These guidelines were developed to specifically address the potential impacts that were identified during the initial investigation.

B. BACKGROUND OF DESALINATION AND THE MBNMS:

Historically, desalination has not been used extensively in California due to the fact that the cost had always been significantly higher than traditional sources of freshwater. Recently, however, several factors have led decision makers to turn their attention to desalination as a new source of freshwater. The California Central Coast is faced with recurring droughts and an existing shortage of water that will become more severe as

[1] The members of this working group are listed in *Appendix 1* of this document.

populations continue to expand in the region. Current water sources are being overdrafted causing significant environmental impacts such as saltwater intrusion and damage to plant and animal habitat. As traditional sources of fresh water continue to be depleted or degraded, water agencies and local jurisdictions are increasingly looking toward desalination as a drought resistant water supply that could augment existing sources. This increased interest in desalination can also be traced in part to significant advances in desalination technology over the past decade, which have increased the efficiency and decreased the costs of desalinating seawater, making it more economically competitive with traditional water sources. With more efficient desalting technologies capable of producing water at cheaper prices, in conjunction with escalating costs of obtaining fresh water from traditional sources, along with declining freshwater sources, desalination is becoming a more viable option to many water purveyors.

C. NOAA'S ROLE AS A REGULATORY AGENCY:

The MBNMS is the largest of the thirteen sanctuaries administered by NOAA, spanning over 6,094 square miles of coastal waters off central California. The Sanctuary stretches from Marin County to Cambria, encompassing nearly 300 miles of shoreline and extending an average distance of twenty miles from shore. Its deepest point is 10,663 feet under the ocean's surface (more than two miles). In response to overwhelming public support to halt potential offshore oil and gas development, the Sanctuary was designated in 1992, for the purpose of resource protection, research, education and appropriate public use. The Sanctuary's mission is to understand and protect the ecosystem and cultural resources of central California.

To implement its mission of resource protection, the MBNMS prohibits or otherwise regulates a number of activities within its boundaries. Three of the Sanctuary's regulations relate directly to desalination. The first involves a prohibition on discharging or depositing any material within Sanctuary boundaries. Since the brine concentrate, and in some cases other materials associated with desalination, are usually disposed of in ocean waters, this activity would require Sanctuary authorization of relevant Regional Water Quality Control Board (RWQCB) permits. The second Sanctuary regulation pertains to discharging materials outside of the boundaries, which subsequently enter Sanctuary waters and negatively impact MBNMS resources. As with the previous regulation, Sanctuary approval through an authorization of a RWQCB-issued permit would be required. The third relevant regulation involves a prohibition on activities that cause alteration of the seabed. Consequently, installation of certain desalination facility structures such as intake/outfall pipelines on or beneath the ocean floor would require Sanctuary authorization of California Coastal Commission Coastal Development Permits that allow for seabed disturbance.

NMFS administers provisions of the Endangered Species Act (ESA), the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and the Marine Mammal Protection Act (MMPA), all of which must be considered in approval of any desalination project. The purpose of the ESA is to conserve endangered and threatened species ("listed species") so that they may recover to the point where they may be delisted.

Several stages of any desalination project will require federal permitting that will trigger the requirement to engage in inter-agency consultation under Section 7 of the ESA; this process is intended to ensure that the project is not likely to jeopardize listed species nor adversely modify or destroy designated critical habitats that may be affected by the project. Critical habitat for listed species consists of (1) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of Section 4 of the ESA, on which are found those physical or biological features (primary constituent elements) that are essential to the conservation of the species and may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provision of section 4 of the ESA, upon a determination by the Secretary that such areas are essential for the conservation of the species [ESA § 3 (5)(A)]. Designated critical habitats are described in 50 CFR § 17 and 226.

The essential fish habitat (EFH) provisions of the MSA also require consultation with federal agencies for proposed actions that may adversely affect EFH. The term "adverse effect" is defined as any impact that reduces quality and/or quantity of EFH. EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity. The components of this definition are interpreted as follows: "waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include historic areas used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding or growth to maturity" covers a species' full life cycle. In addition, estuaries, canopy kelp, seagrass, and rocky reefs are designated as EFH Habitat Areas of Particular Concern (HAPC) for various fish species within the Pacific Groundfish Fishery Management Plan. HAPCs are described in the regulations as subsets of EFH that are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. Designated HAPCs are not afforded additional regulatory protection under MSA; however, federal projects with potential adverse impacts to HAPCs are more carefully scrutinized during the consultation process.

All marine mammals are protected under the MMPA of 1972. Under the MMPA, it is illegal to "take" a marine mammal without prior authorization from NMFS. "Take" is defined as harassing, hunting, capturing, or killing, or attempting to harass, hunt, capture, or kill any marine mammal. "Harassment" is defined as any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal in the wild, or has the potential to disturb a marine mammal in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, and breeding. Based on the location of a proposed desalination plant, a MMPA permit may be necessary.

D. NOAA DESALINATION GUIDELINES

1. Regional Desalination Approach

NOAA encourages a regional approach to desalination in which local jurisdictions and agencies work together collaboratively to develop a regionally appropriate planning approach that considers multiple factors. These factors would include consideration of alternative water supply strategies, adjacent jurisdictions, potential for co-locating desalination discharges with discharges from other facilities to minimize impacts, as well as a comprehensive analysis of both site-specific impacts of each proposed plant, and the cumulative impacts associated with having multiple facilities in a region. These impacts would include both potential direct environmental impacts, as well as indirect impacts, such as increased population growth that would be facilitated by providing additional water supplies to a region.

NOAA GUIDELINE:

- Desalination plant proponents should pursue collaborations with other water suppliers and agencies currently considering water supply options in the area to evaluate the potential for an integrated regional water supply project. This should include an evaluation of other potential desalination locations and alternatives, as well as other forms of water supply.

2. Desalination Alternatives and Need

Since seawater desalination currently is an energy intensive and expensive water source, it should only be pursued when there is a clear and established need for a new water supply, and when other economically and environmentally preferable alternatives such as *increased conservation, brackish water desalination, and wastewater recycling* have been thoroughly evaluated, and pursued, if feasible. Alternatives, such as conservation and recycling, could reduce new desalination discharges to the MBNMS while also reducing the volume of existing wastewater discharges.

NOAA GUIDELINE:

- Desalination should only be considered when other preferable alternatives for meeting water needs, such as increased conservation and wastewater recycling are maximized or otherwise determined not feasible, and it is clear that desalination is a necessary component of the region's water supply portfolio.

- Project proponent should provide a complete evaluation of the need for a desalination plant. This should include a background of the water supply situation and discussion and evaluation of alternatives that have been considered to obtain the necessary volume of water; including the potential to use other economically and environmentally preferable alternatives including increased conservation, brackish water desalination, and wastewater recycling to meet some or all of the water needs of a proposed project.

3. Environmental Impacts of Desalination

Without careful planning and mitigation measures, desalination plants have the potential to harm the marine environment. One of the major concerns associated with desalination facilities are the impacts that result from the introduction to the ocean of concentrated saline brine that may kill or harm sensitive marine organisms. A second concern is that the intake of ocean water directly through desalination plant pipelines can result in the death of marine life through impingement (where marine organisms collide with and become trapped on screens at the intake pipe) or entrainment (where animals and plants are taken into the plant through the pipe and are killed during plant processes). A third contentious environmental issue associated with desalination is the potential for the additional water supply to induce additional coastal development, which could lead to significant indirect impacts such as degradation of water quality from increased urban runoff, and other pressures to the sensitive coastal environment resulting from increased population. A fourth concern is that desalination plants are also energy intensive facilities whose electricity use could result in significant volumes of greenhouse gas emissions, thereby contributing to climate change impacts of concern to NOAA such as ocean acidification and habitat loss due to sea level rise. A fifth concern is that new pipeline construction associated with desalination plants can disturb the seafloor, surf zone and dunes, and has the potential to change coastal hydrology. Finally, operations and maintenance activities for desalination plants can cause negative impacts to the marine environment. Permits for desalination related to discharges into the sanctuary, and certain construction activities must be authorized by the MBNMS.

NOAA recommends taking a precautionary approach since little is known about the site-specific and cumulative impacts of desalination plants and we have no experience with large-scale seawater desalination facilities in California.

NOAA GUIDELINES:

General Guidelines:

- Desalination plant proponents should provide a thorough analysis of the potential impacts to the coastal ecosystem for the proposed desalination plant and all project alternatives. Specific requirements are listed below by category.

Guidelines Regarding Cumulative Impacts:

- Desalination plants in the MBNMS should be designed, sited, and operated to avoid or minimize cumulative impacts. The project proponent should provide a detailed analysis on the potential cumulative effects of the proposed desalination plant discharges in combination with other existing and future point sources of pollution (i.e., wastewater discharges, power plant cooling water, and other desalination plants) as well as non-point sources of pollution (i.e., large rivers and outfalls) and other seawater intakes. Where it is feasible to combine the desalination discharge with another discharge, the project proponent should compare the likely effects of the combined discharges with the two separate discharges.

Guidelines for Entrainment and Impingement:

- All desalination plants in the MBNMS should be designed and sited to avoid and minimize impingement and entrainment to the extent feasible. Desalination project proponents should investigate the feasibility of using subsurface intakes as an alternative to traditional intake methods. Other options for consideration should include, but may not be limited to: vertical and radial beach wells, horizontal directionally drilled (HDD) and slant-drilled wells, seabed filtration systems and other sub-seafloor structures. Where feasible and beneficial, subsurface intakes should be used. It must be ensured however, that they will not cause saltwater intrusion to aquifers, negatively impact coastal wetlands that may be connected to the same aquifer being used by the intake, and they must address the likelihood of increased coastal erosion in the future. Subsurface intakes have the potential to minimize or eliminate impingement and entrainment impacts and improve the performance and efficiency of a desalination project by providing a certain level of pretreatment.

- In cases where it has clearly been determined that sub-surface intakes are not feasible and that an open ocean intake is necessary, the use of appropriately sited existing pipelines of acceptable structural integrity should be investigated and if feasible, pursued, to minimize impacts to the seafloor. If a new pipeline is necessary, sub-seafloor placement should be evaluated to minimize disturbances to biological resources and to recreational and commercial activities.

- When it is necessary to use an open ocean intake, other methods to minimize impingement and entrainment should be evaluated and pursued. These should include design alternatives such as placement of the intake structure to avoid sensitive habitat or highly productive areas, screening the intake ports, if feasible, increasing the number of intake ports, or decreasing the intake velocity. The project proponent should determine expected entrainment and impingement impacts associated with various intake velocities and screen mesh sizes, based upon long-term monitoring data from the area, including diurnal and seasonal variations in planktonic abundance and location.

- Any impacts to EFH and the biota it supports that cannot be avoided through project design or operations will require mitigation, as per NMFS' regulatory requirements. The necessary level of mitigation is to be determined through the use of a biologically based model, such as the habitat production foregone method, in order to account for all "non-use" impacts to affected biota. Mitigation projects should attempt to directly offset the impacted species or habitat (in-place, in-kind mitigation) although NOAA will work with the project proponent to identify appropriate mitigation if this is not possible.

Guidelines for Brine Discharge:

- All desalination plants should be designed to minimize impacts from the discharge. Desalination project proponents should investigate the feasibility of diluting brine

effluent by blending it with other existing discharges. The proponent should evaluate the use of measures to minimize the impacts from desalination plant discharges including discharging to an area with greater circulation or at a greater depth, increasing in the number of diffusers, increasing the velocity while minimizing the volume at each outlet, diluting the brine with seawater or another discharge, or use of a subsurface discharge structure.

- The project proponent should provide a detailed evaluation of the projected short-term and long-term impacts of the brine plume on marine organisms based on a variety of operational scenarios and oceanographic conditions. Modeling should address different types of seasonal ocean circulation patterns, including consideration of "worst case scenarios".

- Results of accepted plume models should be included, to illustrate how the plume will behave during variable oceanographic conditions. The plume model should estimate salinity concentrations at the discharge point, as well as where and when it would reach ambient ocean concentrations. The extent, location, and duration of the plume where the salinity is 10% above ambient salinity should also be provided.

- The project proponent should provide information on the physical and chemical parameters of the brine plume including salinity, temperature, metal concentrations, pH, and oxygen levels. These water quality characteristics of the discharge should conform to California Ocean Plan requirements and should be as close to ambient conditions of the receiving water as feasible.

- A continuous monitoring program should be implemented to verify the actual extent of the brine plume, when deemed necessary (see Monitoring on page 13) and to determine if the plume is impacting EFH, critical habitat, or sanctuary resources. If it is, then mitigation for the EFH impact will be required.

Guidelines for Energy Use and Greenhouse Gas Emissions:

- The project proponent should provide estimates of a facility's projected annual electricity use and the greenhouse gas emissions resulting from that use. Applicants should also identify measures available to reduce electricity use and related emissions (e.g., energy efficient pumps, low resistance pipes, use of sustainable electricity sources, etc.) and to mitigate for all remaining emissions (e.g., purchase of offsets and/or credits that are consistent with the policies and guidelines of the California Global Warming Solutions Act of 2006 (AB 32), etc.).

Guidelines for Co-location with Power Plant:

- Desalination plants proposing to co-locate with power plant once-through cooling systems should include an assessment, during the environmental documentation phase, of the impacts that would occur when the power plant cooling system does not operate, along with an analysis of alternative intake and outfall structures that would avoid or minimize these impacts.

- The decommissioning of once-through cooling systems may occur in the future. The project proponent should evaluate the continued availability and reliability of this feedwater source and include an assessment of the impacts that would occur from operating the intake and outfall structures without the use of the power plant once-through cooling structures.

Guidelines for Co-location with Sewage Treatment Facilities:

- In consideration of recent interest by many municipalities regarding water recycling projects, the project proponent should evaluate the continued availability and reliability of that discharge in the future due to the potential for additional wastewater recycling projects. Additionally, where treated wastewater is available for recycling, proponents should determine the feasibility of using it as the source water to be desalinated for use in groundwater recharge – i.e., indirect potable reuse.

- The project proponent should provide a thorough analysis of the potential impacts to marine organisms resulting from the combined properties of the discharge, as well as how the addition of brine effluent would affect the dispersal/dilution of the wastewater effluent.

- Sewage treatment plants do not discharge at a constant rate throughout the day, typically discharging a much higher volume during daytime hours versus nighttime. Desalination plants tend to operate during the night when power is cheaper. The project proponent should evaluate these diurnal fluctuations in operation. When modeling for dilution of the brine plume, it is crucial to include a "worst case scenario" analysis of the dilution properties of the combined wastewater effluent and brine plume, during lowest expected flow rates for the treated wastewater effluent.

- The project proponent should include an assessment, during the environmental documentation phase, of the impacts that would occur from brine discharge if the wastewater discharge were to cease.

Guidelines for Use of Chemicals for Treatment and Cleaning:

- The project proponent should provide a complete list of all chemicals that may be used for the desalination plant as well as how these will be stored and disposed. They should also include an evaluation of the potential for these chemicals to cause impacts to local marine organisms.

- The project proponent should identify and quantify all procedures and chemicals to be used for cleaning and maintaining the outfall and intake structures, filter membranes, and all other aspects of the plant. This should also include a detailed spill prevention and response plan for chemicals stored at project site.

- The project proponent should evaluate the feasibility of using alternative pretreatment techniques such as ozone pretreatment, subsurface intakes, and membrane filtration, aimed at reducing the use of chemicals.

Guidelines for other Environmental and Socioeconomic Impacts:

- Desalination plants should be designed and operated to minimize impacts to recreational and commercial activities that occur within the MBNMS. The project proponent should provide a thorough evaluation of the potential impacts of the proposed project and alternatives to recreation, public access and safety that result from the construction, operation, and maintenance of the facility. These should include but not be limited to potential impacts to SCUBA divers, kayakers, recreational boaters, and commercial and recreational fishermen.

- Desalination plants should not interfere with vertical or lateral public access to the shoreline or to coastal waters. The project proponent should provide an evaluation of how the construction and operation of the plant would affect coastal access at the sites.

- Desalination plants in the MBNMS should not contribute to coastal retreat and should not be designed to anticipate the possibility of installing coastal armoring at any time in the future to protect the plant or its infrastructure from the effects of coastal erosion, wave action, or sea level rise. The project proponent should provide a detailed evaluation of the potential for coastal erosion to affect the construction and operation of the plant, as well as the potential for the proposed project to require new coastal armoring structures in the future to protect related infrastructure including intake and outfall pipelines. The anticipated need for planned retreat of infrastructure due to coastal erosion should be considered.

- Desalination plants should be designed to minimize visual impacts to coastal resources.

- The project proponent should provide an analysis of the potential population growth-inducing impacts of the desalination project. This should be compared for consistency with projected development patterns in relevant planning documents such as Local Coastal Programs and the County's General Plan. NOAA recommends that the freshwater production capacity of all desalination projects be consistent with established local government land use policies in county and city general plans and local coastal programs.

Guidelines for Plant Site Selection and Structural and Engineering Considerations:

- Desalination plant intakes should be sited to avoid sensitive habitats. For open-water intakes, areas of high biological productivity, such as upwelling centers or kelp forests or other dense beds of submerged aquatic vegetation should be avoided, since the entrainment and impingement impacts of a desalination plant are in large part dictated by the biological productivity in the vicinity of that intake.

- Desalination plant discharges should not be located in or near ecologically sensitive areas, including *Areas of Special Biological Significance* as designated by the State Water Resources Control Board, EFH *Habitat Areas of Particular Concern* as designated by the Pacific Fishery Management Council, and Marine Protected Areas

designated under the *Marine Life Protection Act.* These areas include: Elkhorn and Pescadero Sloughs, James V. Fitzgerald Marine Reserve, Año Nuevo, Pacific Grove Marine Gardens, Edward F. Ricketts, Carmel Bay, Point Lobos, Point Sur and Big Creek State Marine Conservation Areas and Marine Reserves, Julia Pfeiffer Burns Underwater Park, and the Ocean Area Surrounding the Mouth of Salmon Creek.

- The oceanographic conditions that exist in the vicinity of the discharge also can greatly influence the resulting impacts from the brine plume. Areas with limited water circulation such as enclosed bays or estuaries, which can "trap" the brine discharge, should be avoided, as should EFH HAPC, such as rocky substrate and kelp forests, due to their high biological productivity. As a general rule, the stronger the hydrodynamic force, the better dilution is achieved due to faster dispersal from the natural mixing action of the ocean. Desalination plant discharges should be designed and sited to minimize impacts to marine resources of the sanctuary.

- The project proponent should provide complete plans, which include detailed information on: location, depth, engineering, and configuration of intake and outfall pipes; sizing and configuration of seabed structures; proposed depth and distance from shore of the intake and discharge points; local bathymetry; and dilution zones for each discharge pipeline alternative. The pipeline placement and configuration of intake and discharge structures should be designed as to avoid sensitive biological areas in the sanctuary.

- The project proponent should provide an analysis of the potential for co-location of desalination plants to make use of existing infrastructure should be required.

Guidelines for Desalination Plant Construction Phase:

- The project proponent should identify and provide a complete explanation of potential impacts from the construction process to the marine and coastal environment. They should also provide an evaluation of marine historical or archaeological resources that could be disturbed, and plans to mitigate any potential impacts, or recover any resources that may be disturbed during construction.

- All proposed projects should provide a stormwater pollution prevention plan (SWPPP). Stormwater runoff from the site should be managed to prevent any discharge of silt or chemical contaminants to the ocean or any other surface water body. The SWRCB General Construction Storm Water Permit for Construction Activities (General Permit) is required by the Central Coast Water Board for all construction activities that disturb at least one acre of soil, including grading and stockpiling. Local jurisdictions may require additional construction permits and SWPPPs at lower disturbance thresholds.

- Best Management Practices should be developed and adhered to in order to avoid or minimize impacts to the marine environment during the construction phase of a desalination project. This should include the use of materials and practices that minimize disturbances to the environment to the maximum extent practicable.

- In the case of any accidental spills or construction-related impacts to marine resources, MBNMS and NMFS management should be notified immediately and mitigation plans developed.

- The plant construction phase should include techniques and plans to avoid impacts to maritime heritage resources of the MBNMS. This includes submerged cultural and archeological resources including shipwrecks.

- Project proponents should adhere to the following conditions for all construction activities occurring on the beach:

    - No construction work or equipment operations may be conducted below the mean high water line unless tidal waters have receded from the authorized work area. Grading of intertidal areas is prohibited.

    - Construction materials and equipment are to be delivered to the beach area via an existing access point. When transiting to the worksite, vehicles shall remain as high on the upper beach as possible and avoid contact with ocean waters and intertidal areas.

    - Only natural rock material of the type and amount specified in the authorization may be discharged into the boundaries of the Sanctuary. No other material (e.g., sediment, concrete, asphalt) may be discharged into the Sanctuary at any time.

    - All forms and construction materials must be stored beyond the reach of tidal waters during the construction period and must be removed from the beach when no longer needed for construction purposes.

    - Equipment and construction methods that minimize noise in the marine environment should be used.

    - Discharge of pH balanced water from the construction site into the adjacent marine environment shall only be done in accordance with pH level standards specified by the California Ocean Plan.

    - The selected concrete grouting compound shall include accelerators that will catalyze the compound rapidly after pumping, producing a cure sufficient to avoid altering the pH level of ocean waters upon first contact. As described in the construction plan, biodegradable sand bags stuffed with straw or sand shall be positioned during grouting activities to prevent uncured concrete from migrating to adjacent waters. The sand bags shall be removed prior to contact with waters of the following flood tide.

    - Barriers or cofferdams may not extend seaward of the mean high water line.

- Disturbance of marine mammals or seabirds is not allowed. Authorization for incidental or direct harassment of species protected by these acts must be secured from the U.S. Fish and Wildlife Service and/or NMFS, depending upon the species affected.

- Mitigation should be provided for the loss of EFH from the placement of the intake structure, delivery pipeline, and outfall structure.

4. Monitoring:

For all desalination projects, the project proponent should develop an ongoing monitoring program to evaluate the extent of impacts from the plant's intake and discharge operations to marine resources. The monitoring program should focus on: a) developing a statistically acceptable baseline for the project area, b) monitoring source water for potential contaminants that may require additional treatment, c) monitoring the effluent prior to discharge to ensure it is in compliance with the California Ocean Plan d) monitoring the effects of the effluent on marine organisms within the plume, after the discharge begins, e) monitoring the impingement and entrainment effects on marine organisms, if applicable, and f) monitoring any required mitigation for unavoidable impacts to make sure the mitigation is performing as intended.

NOAA GUIDELINE:

The proposed monitoring system should be carried out for at least three years, with an evaluation report and cumulative impact evaluation generated each year. After the third year, the RWQCB and the MBNMS should determine the extent of additional water quality monitoring for the final two years of the NPDES permit, and National Marine Fisheries Service (NMFS) and MBNMS should determine the extent of additional biological monitoring that may be needed.

Minimum submittal information required for project application should include:

1. Initial evaluation of recreational, public use, and commercial impacts in vicinity of desalination facility.
2. Initial monitoring to determine currents, tides, water depth and similar parameters of receiving waters.
3. Pre-construction biological analysis with consideration of seasonal variability, of marine organisms in the affected area and control site to include ecological indices (e.g. species richness and abundance), along with evaluation of entrainment and impingement impacts.
4. Pre-construction estimation of expected brine composition, volumes, and dilution rates of the brine in the zone of initial dilution.
5. Plan for whole effluent toxicity (WET) testing as an ongoing monitoring requirement.
6. Studies to determine properties of combined discharges (cooling water or wastewater), and their effects and toxicity on local species.

7. Post-operational monitoring of salinity in zone of initial dilution and control site, as indicator for plume spreading and dispersal, to be compared with expected results from plume and circulation modeling. If not in compliance then identify and implement corrective actions.
8. Operational monitoring of quantities (biomass and species) of marine organisms entrained and impinged, if applicable.
9. Post-construction biological analysis to compare to baseline.
10. Mitigation plan including monitoring methodologies and success criteria.

E. CONCLUSION:

Compliance with the guidelines detailed above will assist agencies in review and assessment of impacts of proposed desalination plants, and will ensure that any future facilities within the boundaries of the MBNMS will be optimally sited, designed, and operated resulting in minimal impacts to the marine environment. The guidelines address numerous issues associated with desalination including site selection, construction impacts, plant discharges, and intake systems. They are based upon the precautionary principle and grounded in an adaptive management approach; as our understanding of desalination and its effect on the marine resources and ecosystems of central California coast continues to grow, the desalination guidelines may also continue to evolve to reflect new information and circumstances.

While the MBNMS does have regulatory authority over all new desalination plants within its boundaries, these guidelines are non-regulatory in nature, and were designed to address a comprehensive set of issues, reflecting the mandates of numerous agencies involved in review of desalination proposals. They were developed in partnership with several resource protection agencies using a collaborative and comprehensive process based on objective scientific information, and reflect the input of numerous people. Most of the information submittal requirements detailed in the above guidelines will be routinely required as part of the environmental review process for an Environmental Impact Report under the California Environmental Quality Act, or an Environmental Impact Statement under the National Environmental Policy Act.

APPENDIX 1 — AGENCY CONTACT INFORMATION

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APPENDIX 1 — AGENCY CONTACT INFORMATION

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Steve Saiz	State Water Resources Control Board
Matt Thompson	Central Coast Regional Water Quality Control Board

APPENDIX 3 — AMBAG MONTEREY BAY DESALINATION FEASIBILITY STUDY PARTNERS

Advisory Committee	
Nick Papadakis	AMBAG
Michael Stottlemeyre	AMBAG
Tom Luster	California Coastal Commission
Peter von Langen	Central Coast Regional Water Quality Control Board
Steven Leonard	California American Water Company
Mark Lucca	Marina Coast Water District
Bill Phillips	Monterey County Water Resources Agency
Robert Johnson	Monterey County Water Resources Agency
Andy Bell	Monterey Peninsula Water Management District
Peggy Shirrel	Moss Landing Harbor District
Kenneth Coale	Moss Landing Marine Laboratories
Joyce Ambrosius	NOAA Fisheries
Joe Rosa	Pajaro Sunny Mesa Community Services District
Linette Almond	Santa Cruz Water Department
Technical Advisory Team	
Brad Damitz	Monterey Bay National Marine Sanctuary
David Furukawa	Separation Consultants, Inc.
Jon Toal	Kinnetic Laboratories