United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

IN REPLY REFER TO:

L7617

MAY 22 2015

Mr. Will Stelle
National Marine Fisheries Service
PR Division
777 Sonoma Avenue Room 325
Santa Rosa, CA 95404

Re: NLAA Determination for the Drakes Estero Restoration Project, Point Reyes National Seashore

Dear Mr. Stelle:

We are requesting concurrence regarding the proposed Drakes Estero Restoration Project (Project). The location of the proposed project is within the main body of Drakes Estero, within Point Reyes National Seashore, Marin County, CA (see Project Description). Drakes Estero is part of the Phillip Burton Wilderness, and represents the only marine wilderness area on the Pacific coast south of Alaska. This project will remove the remaining non-historic and non-essential facilities including more than 5 miles of oyster racks (approximately 7 acres) and aquacultural debris associated with the Johnson Oyster Company and Drakes Bay Oyster Company (DBOC) from the subtidal lands of Drakes Estero. The removal of this nonconforming infrastructure will restore natural conditions and improve wilderness character within the marine waters of Drakes Estero.

The NPS has analyzed the following Endangered Species Act (ESA) listed species' Environmentally Significant Unit (ESU), Distinct Population Segment (DPS), or their designated critical habitats which may be affected by the proposed project are:

- **Central California Coast Coho Salmon ESU** (*Onchorynchus kisutch*)
  - Endangered listing determination (June 28, 2005; 70 FR 37160)
  - Critical Habitat designation (May 5, 1999; 64 FR 24049)
- **Central California Coast Steelhead DPS** (*Onchorynchus mykiss*)
  - Threatened listing determination (January 5, 2006; 71 FR 834)
  - Critical Habitat designation (September 2, 2005; 70 FR 52488)

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) Congress directed NMFS to promote the protection, conservation, and enhancement of designated Essential Fish Habitat (EFH) including "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (USC 16 1802(10)). The California Eelgrass (*Zostera marina*) beds within Drakes Estero and potentially affected by the project are

listed in the Pacific Groundfish, Coastal Pelagic, and Pacific Coast Salmon Fisheries Management Plans.

Project Purpose and Need

The project will remove more than 5 miles of abandoned and collapsed oyster racks, and 1.5 acres of aquaculture debris, including oyster tubes, bags, strings, mats, anchors and lines from subtidal habitat within Drakes Estero. This artificial and introduced debris precludes the expansion of eelgrass, supports invasive marine fouling organisms, poses an ongoing hazard to marine wildlife susceptible to ingestion or entanglement, and replaces the natural soft substrate benthic habitat with debris. The marine resources of Drakes Estero will be significantly enhanced through the removal of this infrastructure and debris. The removal of this nonconforming infrastructure will restore natural conditions and improve wilderness character within the marine waters of Drakes Estero.

Project Description

The National Park Service (NPS) has documented that the footprint of the removal activities is approximately 8.02 acres, including 7.07 acres in the footprint of the racks, 0.88 acres of debris areas on sand bars, and 0.07 acres for placement of a temporary dock facility to facilitate removal of debris from Drakes Estero. The NPS has documented areas of heavy/moderate debris accumulation over nearly 2.4 acres of bottomlands beneath the racks, including ~1 acre comprised of fallen PVC tubes, bags and strings. While all agencies were aware of the presence of some aquaculture debris below the racks, the areal extent (approximately 1 acre) was not fully understood until extensive reconnaissance surveys in late January 2015. The attached Project Description and Appendices provides more detail on the project approach, activities and impact analysis.

Vessel transit, anchoring and other essential operational activities will be conducted in a manner that avoids or minimizes to the greatest extent possible impacts to eelgrass (see anchoring plan discussion). However, it is anticipated that there will be some level of impact associated with these activities. Other activities integral to the removal operations include vessel transit and anchoring and upland development of a temporary transfer facility to support off-haul of the collected marine debris for disposal at an appropriate location. The NPS is evaluating the necessity of a temporary dock or if there are other smaller – lower impact measures that may be used to support offload of materials at the shore.

Overall, the NPS has calculated that within the 7.07 acre rack footprint, there are 2.9 acres that currently include some level of eelgrass growth, whether underneath collapsed racks or right at the edges of in-tact structures. It is anticipated that removal of the oyster racks will create approximately 1.8 acres of eelgrass habitat and removal of aquacultural debris will enhance an additional 1 acre of habitat. The NPS also proposes to implement in-situ treatment of accumulated shell on approximately 0.5 acres and to conduct experimental monitoring to determine effectiveness of this type of treatment.

Estimates from field reconnaissance surveys indicate that the rack removal and temporary dock installation will result in temporary impacts to approximately 0.59 acres of eelgrass. The restoration project, including complete removal of oyster racks and accumulated aquaculture debris (tubes, strings, and bags), will provide 4.5:1 eelgrass benefit. The sandbar treatment areas identified as part of the project are not within, and therefore are not anticipated to impact

eelgrass habitat or the impact calculation ratios presented above. Overall, for the purposes of planning, the removal activities would far exceed the eelgrass mitigation threshold of >1.2:1 and therefore no eelgrass mitigation is proposed.

The nature of the work (removal of infrastructure), the proximity of eelgrass to many of the structures (within and immediately adjacent), and the hydrodynamics of the estuary (high tidal flushing) make the design and evaluation of the project and its potential impacts unique. The removal of infrastructure that is unnatural to the system is beneficial both in the short and long-term. Eelgrass is immediately adjacent to many of the racks and removal of the racks necessitates access to and likely impacts to eelgrass adjacent to the racks. Removal of materials and debris associated with these linear structures will necessitate that the contractor moves along the line quickly. As a result, the duration of work at any one location will be minimal. This coupled with the energetic tidal dynamics and hydrologic turnover, the indirect impacts associated with rack removal and aquacultural debris removal will be minimal. The project will include long-term monitoring to evaluate multiple response, restoration, and research questions regarding removal of aquaculture infrastructure and debris from Drakes Estero.

The removal of racks and aquacultural debris, and potential temporary placement of a floating dock or other infrastructure at the shoreline to support debris removal operations below the Mean High Water (MHW) requires US Army Corps of Engineers (USACE) consultation under Clean Water Act Section 404 and Section 10 of the Rivers and Harbors Act of 1899. The project is consistent with Nationwide Permit 27, as the work will restore Drakes Estero through the removal of fill including racks and aquaculture debris from the subtidal lands, and enhance opportunity for eelgrass to expand within the 7.07 acre footprint of the existing racks. The park prepared a Notice of Intent for a 401 Certification under from the San Francisco Bay Regional Water Quality Control Board Nationwide Permit 27 Water Quality Waiver and has been informed that on May 31, 2015, the project will automatically be enrolled for coverage under the General 401 Water Quality Certification for Small Habitat Restoration Projects (Order No. SB12006GN). On May 14, 2015, the California Coastal Commission approved a Federal Coastal Consistency Determination conditional on the submittal of an Eelgrass Mitigation and Monitoring Plan. Additionally, the NPS has completed all consultation for this project under the NHPA Section 106. The NPS has determined that the project will not affect any USFWS managed endangered species (see below).

Species known to or with potential to occur in the Project Area

The NPS evaluated what special status species could occur within the 1,200 acre project planning area (including the onshore areas where previous permitting is already complete) as well as the offshore project area as part of the Environmental Impact Study for the Drakes Bay Oyster Company Special Use Permit (EIS). Pursuant to Section 7 of the ESA, the NPS requested a species list from USFWS to determine whether federally listed threatened or endangered species occur within the project area. USFWS Sacramento Fish and Wildlife Office provided a list of threatened and endangered species for the Drakes Bay U.S. Geological Survey 7.5 Minute Quadrangle Map dated 1976 (USFWS 2010). NOAA's NMFS Southwest Regional Office provided additional comments and recommendations regarding marine resources in Drakes Estero as part of comments on the draft EIS. In addition, NPS reviewed agency consultations (NMFS 2009; USFWS 2004, 2008) for recent NPS projects that address relevant natural resources and are located near Drakes Estero.

The NPS determined that seven of the federally listed animal species have potential to exist within the project area. Myrtle's silverspot butterfly, California red-legged frog, leatherback sea turtle, western snowy plover, and California least tern were dismissed from further analysis in the EIS due to a lack of designated critical habitat in the project/action area, unconfirmed presence of the species in the project/action area, or the potential for less than minor impacts on the species and/or their critical habitat. The NPS determined that none of the federally listed plant species identified for the Drakes Bay Quad have the potential to be affected by the proposed actions within the project area.

On January 27, 2015, the NPS initiated a new search on the USFWS Endangered Species site to update the list from 2010 used as part of the EIS. The NPS has reviewed the current endangered species list for the Drakes Bay USGS quad, which includes all of Drakes Estero. The San Bruno elfin butterfly (*Incisalia mossii bayensis*) and the Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)are the only additional species listed in the 2015 list that were not included in the endangered species list previously identified in the 2010 list. The park has no documentation of either of these additional species and has determined that the proposed actions will not affect these species.

Additionally, the NPS has reviewed a letter of August 18, 2014 from the NMFS to Federal Highways Administration concerning potential improvements to Sir Francis Drake Boulevard within Point Reyes National Seashore, the NMFS identified the potential for the project to affect the Southern DPS of Northern American green sturgeon (*Acipinser medirositris*) – Threatened listing determination (April 7, 2006; 71 FR 17757). The USFWS listing for the species identifies it a potentially present within Marin County but not within the Drakes Bay 7.5 minute Quad area. The NPS has no records or documentation of Northern American green sturgeon within the seashore or the project area.

Species that could be affected by activities in Drakes Estero include central California coho salmon Critical Habitat and Central California steelhead and central California steelhead Critical Habitat.

Central California Coho Salmon Critical Habitat (*Oncorhynchus kisutch*)
The central California Coho salmon was originally listed as federally threatened in 1996 (NOAA 1996) and then changed to federally endangered in 2005 (NMFS 2005b). The salmon was also state-listed as endangered in 2001 (CDFG 2004c). Critical habitat was designated for the Coho salmon in 1999 (NOAA 1999).

Coho salmon is an anadromous species, spending a portion of its life cycle in marine waters (including estuaries) and a portion—specifically spawning and rearing—in fresh waters. Coho salmon adults migrate from their marine environment into the freshwater streams and rivers where they were born, in order to mate and spawn (the release of eggs and sperm after mating). This process occurs once in the Coho salmon's life cycle, with death occurring after spawning. Upon successful reproduction, young salmon remain in fresh waters for rearing and then migrate to estuarine and marine waters to forage and mature to adulthood (NMFS 2011a).

The threats to the central California Coho salmon are numerous. West coast populations have experienced dramatic declines in abundance in the past several decades due to both human-induced and natural factors. Loss of habitat and habitat modification, two primary threats, occur

when natural watershed flow regimes are altered by human-induced factors such as diversions for agriculture, flood control, and hydropower, among others. In addition, human land use, such as logging, road construction, and urbanization, causes detrimental habitat modification within the watershed. Recreational and commercial fisheries also threaten the species by altering stock populations. Other threats result from increased predator populations in habitat where modification has caused shifts in nonnative species and predator abundance. Natural threats can include predation from piscivorous birds and pinnipeds, as well as environmental conditions such as flooding and climatic change that can intensify problems associated with riverine and estuarine habitat (NMFS 2011c).

In 2004, the *Recovery Strategy for California Coho Salmon* developed a guide for recovering Coho salmon populations on the north and central coasts of California (CDFG 2004c). For each Coho salmon Evolutionarily Significant Unit (including the central California Coho salmon), several smaller recovery units were created based on the characteristics of smaller drainages within watersheds. The Seashore is included in the Bodega-Marin Coastal Recovery Unit, which is further divided into seven hydrologic areas. Hydrologic areas within the Seashore include Tomales Bay, Point Reyes (which includes Drakes Estero), and Bolinas. Based on the 2004 report, CDFG determined that the Point Reyes hydrologic area does not have Coho salmon present, nor are Coho salmon suspected to be present. The other hydrologic areas within the Seashore have both historical and recently documented occurrences of the species (CDFG 2004c).

However, in association with the federally threatened listing in 1996, NMFS designated critical habitat for central California coast Coho salmon to include all accessible reaches of rivers, including estuarine areas and their tributaries, between Punta Gorda in northern California and the San Lorenzo River in central California (NOAA 1999). This critical habitat designation includes the Seashore, Drakes Estero, and its tributaries. Through this designation, NMFS considers the following requirements of the species: (1) space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, rearing of offspring; and (5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distribution of a species (NOAA 1999). The designation recognizes species' use of diverse habitats and accentuates the need to account for all of the species' freshwater and estuarine life stages, including small freshwater streams and estuarine rearing areas (NOAA 1999).

Impact Analysis

Coho salmon have not been documented in the Drakes Estero watershed. The proposed activities will result in short-term minor impacts to eelgrass habitat within the estuarine portions of Drakes Estero. The NPS estimates that while there will be some short-term direct impacts to eelgrass as part of the aquacultural debris and rack removal from Drakes Estero, it is estimated that the project benefits to eelgrass habitat will be 4.5:1, benefitting Critical Habitat for coho salmon.

Central California Steelhead (*Oncorhynchus mykiss*)

The central California steelhead was listed as federally threatened in 1996 (NOAA 1996). In addition, critical habitat was designated for the steelhead in 2005 (NMFS 2005a). Similar to the Coho salmon, the California steelhead is an anadromous fish species. They swim from freshwater habitat, through estuaries, and into the ocean where they may spend several years before returning to spawn. Monitoring data indicate that steelhead juveniles may reside within

freshwater environments for 18 months to 3 years. The steelhead may make several spawning migrations in its lifetime (NMFS 2011e).

The threats to the California steelhead are numerous, and west coast populations have experienced dramatic declines in abundance in the past several decades (NMFS 2011e). Loss of habitat and habitat modification, two primary threats, occur when natural watershed flow regimes are altered by human-induced factors such as diversions for agriculture, flood control, and hydropower, among others (NMFS 2011c, 2011e). In addition, human land use, such as logging, road construction, and urbanization, causes detrimental habitat modification within the watershed (Avocet Research Associates 2002). In addition, recreational and commercial fisheries also threaten the species by altering stock populations. Other threats result from increased predator populations in habitat where modification has caused shifts in nonnative species and predator abundance (NMFS 2011c, 2011e).

Within the Seashore, the California steelhead occurs in the Olema, Lagunitas, Pine Gulch Creek, Tomales Bay, Drakes Estero, and Bolinas watersheds. Data on steelhead populations have been gathered as part of the NPS *Coho and Steelhead Monitoring Program* (NPS 2001a), and since the mid-1990s, monitoring efforts show that populations of steelhead are generally stable. Within the Drakes Estero watershed, which also is recognized by NMFS as potential steelhead habitat, creeks known to support California steelhead include East and North Schooner, Glenbrook, Muddy Hollow, Home Ranch, and Laguna. As part of the 2008 Drakes Estero Coastal Watershed Restoration Project, the NPS, restored or enhanced fish passage at six sites within the Drakes Estero watershed (NPS 2009a).

In association with the federally threatened listing in 1997, NOAA designated critical habitat for central California coast steelhead in 2005 (NMFS 2005a). The critical habitat area includes portions of Marin County, the Seashore, and the Drakes Estero watershed. Drakes Estero itself is not included in the critical habitat designation; however, several tributary creeks feeding Drakes Estero have segments of critical habitat in the vicinity of the project area. These creeks include Creamery Bay, East Schooner, Home Ranch, Laguna, and Muddy Hollow (NMFS 2005a). While the designated critical habitat in these creeks is close to Drakes Estero, location coordinates of the upstream and downstream limits provided by NMFS show that they are not included in the project area (NMFS 2005a).

Impact Analysis

The project will occur entirely within the tidal portions of Drakes Estero. There are no potential effects to freshwater stream resources or steelhead critical habitat. While *O. mykiss* have been observed in these watersheds we have only a few reports of ocean run steelhead returning to the watershed to spawn. Surveys of the watersheds in the mid-2000s as part of the Coastal Watershed Restoration Project indicated *O. mykiss* were present above and below migration barriers (which were removed and replaced with bridge structures as part of the project).

Drakes Estero is an open tidal estuary that may provide some refuge and temporary habitat for steelhead as they outmigrate to the marine system or when they return to spawn as adults. As observed by the NMFS in a letter of August 18, 2014, Drakes Estero, a federally designated marine wilderness, comprises an estuarine tidal ecosystem. Estuarine tidal ecosystems are recognized as integral components of the juvenile salmon rearing “ecoscape” contributing to population abundance and species resilience (Jones et. al. 2014 and Koski 2009). The mouth of

Drakes Estero is constantly open with a daily tidal range from 4-6 feet. Salinities within much of the estero are similar to marine salinities. The watersheds feeding Drakes Estero are limited in area with most freshwater discharge limited to winter storms. Drainages west of Schooner Bay are intermittent, while most of the drainages from Schooner Bay to the east maintain limited perennial flow through the summer.

The project activities, including removal of aquaculture debris and more than 200,000 linear feet of lumber associated with the oyster racks have a very limited potential to affect steelhead (negligible). As documented in Supplemental Appendix 1, the nature of the work will be limited in duration at any one location, as the contractor removes debris and lumber along any single rack line. The work areas will be limited mostly to the footprint of the racks.. Debris transport vessels will use the main channel in upper Schooner Bay to access the onshore location for unloading.

Essential Fish Habitat

Eelgrass beds are classified as a type of "special aquatic site," a category of waters of the U.S. afforded additional consideration under the CWA section 404(b)(1) guidelines developed by EPA. USACE uses these guidelines as the environmental standards by which to evaluate dredge and fill activities regulated under section 404 of the CWA. The guidelines are also used to establish mitigation requirements for impacts to such resources. Under the 404(b)(1) guidelines, special aquatic sites are subject to greater protection because of their significant contribution to the overall environment. Special aquatic sites possess unique characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These sites are generally recognized as significantly influencing or positively contributing to the overall environmental health or vitality of the entire ecosystem of a region.

Eelgrass beds such as those found in Drakes Estero would be considered "vegetated shallows" under the possible special aquatic sites described in the Federal Register (40 CFR 230, section 404[b][1]).

Seagrasses (such as eelgrass beds in Drakes Estero) have been identified as essential fish habitat under the Groundfish Plan (PFMC 2008). Further, seagrasses are distinguished as habitat areas of particular concern, which is a subset of essential fish habitat that requires additional scrutiny during the consultation process under the Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (PL 104-267).

In recognizing the importance of maintaining healthy populations of eelgrass for habitat and ecosystem functions, the California eelgrass mitigation policy has been adopted by regulatory agencies. The policy is a set of guidelines and requirements for eelgrass mitigation in the coastal zone of California (NOAA 2014). The California Eelgrass Mitigation Policy provides standardized interagency guidance on mitigating adverse impacts to eelgrass resources.

Impact Analysis

As identified in the Project Description, many of the recently active racks have limited to no eelgrass within the footprint of the racks. In many cases, eelgrass is growing immediately adjacent to these areas, but not beneath the racks. In areas where racks have been abandoned for many years, often due to collapse or failure of stringers, the NPS observed established eelgrass within the rack footprint. The NPS has evaluated impacts to eelgrass as part of this debris

removal and restoration project. Based on extensive field analysis, the NPS anticipates that approximately 40% of the posts and buried cross-members occur within established eelgrass beds.

While rack removal will have some documented impacts, the NPS anticipates that the benefits will be far greater. The Project Description anticipates benefits to eelgrass in the ratio of 4.5:1, far greater than the 1.2:1 ratio. Additionally, with respect to impacts associated with the removal of posts, buried cross-members, and fallen stringers, these operations will impact very small individual areas dispersed throughout the Estero within the footprint of the racks.

The NPS has assumed for the project calculations that the removal of posts within eelgrass could result in impacts of 1.3 SF/post, and that removal of the buried cross-members could impact up to 1 SF of eelgrass per linear foot of the cross-member. Cumulatively post removal could affect up to 0.08 acres of eelgrass habitat, and cross-member removal could affect up to 0.29 acres. Additionally, the NPS has calculated that the removal of fallen stringers from the floor of the estuary within eelgrass beds could affect the estimated surface area of that lumber, cumulatively resulting in impacts on up to 0.14 acres of eelgrass.

For the purposes of the project description, the NPS anticipated impacts to eelgrass for the entire area of the temporary dock (up to 3,200 SF). Based on site visits, there are likely alignments, or smaller dock scenarios that would minimize or eliminate direct impact eelgrass. The temporary impact of the dock to eelgrass habitat is included in the project impact calculations.

The NPS has reviewed the California Eelgrass Mitigation Policy and prepared an Eelgrass Monitoring Plan for this project (please see "Drakes Estero Eelgrass Monitoring and Mitigation Plan"). The Plan identifies methods to document response of eelgrass to the removal activities. The NPS will continue to coordinate with NMFS and CCC staff on the implementation and reporting of the eelgrass monitoring program, in addition to the broader monitoring elements identified in Appendix B and C of the Project Description.

Harbor Seals

Drakes Estero supports a large breeding population of Pacific harbor seals (*Phoca vitulina richardsi*) due in part to the diversity and availability of exposed substrates such as intertidal sandbars, mudflats, and beaches, which are favorable locations for seal haul-out sites (NAS 2009; Becker, Press, and Allen 2011). Drakes Estero is one of the largest harbor seal colonies in the state (Lowry, Carretta, and Forney 2008), one of the largest in Marin County, and Marin County colonies account for around 20 percent of pups produced in central California from Sonoma to San Mateo Counties (Codde et al. 2011).

The Pacific harbor seal is the only year-round resident pinniped (seal or seal-like mammal) in the San Francisco Bay Area (Sydeman and Allen 1999; Truchinski et al. 2008). Seals use terrestrial sites (called haul-out sites) during the breeding season (March 1 to June 30) to give birth and suckle their young, and during the nonbreeding season for rest and to molt their fur (NAS 2009). Harbor seals reside almost exclusively in coastal habitats, spending approximately 33 to 92 percent of their time at onshore terrestrial sites depending on the season and time of day (Allen-Miller 1988; Burns 2002; NAS 2009). Seal abundance at haul-outs is influenced by multiple factors, including time of day, tide level, current direction, weather, season, year, disease outbreaks, disturbances from other wildlife, and human activities (Yochem et al. 1987;

Suryan and Harvey 1999; Thompson, Van Parijs, and Kovacs 2001; Grigg et al. 2004; Hayward et al. 2005; Seuront and Prinzivalli 2005; NAS 2009).

Drakes Estero is a site of ongoing pinniped monitoring studies conducted by NPS as part of the San Francisco Bay Area Network Inventory and Monitoring Program (e.g., NPS 2006c; Adams et al. 2009; Codde et al. 2011). Monitoring objectives of this program include: 1) determining long-term trends in annual population size and annual and seasonal distribution; 2) determining long-term trends in reproductive success through annual estimates of productivity; 3) identifying potential or existing threats (i.e. climate change, human disturbance, pollutants), and estimating degree of threat at known seal haul outs in order to guide management; and, 4) participating with the NMFS national stranding network to further document distribution, occurrence, and health of all pinnipeds (and other marine mammals). Monitoring protocols include twice weekly surveys of colony sites during breeding seasons, and twice monthly surveys at Point Reyes Headlands year-round.

Haul-out sites in Drakes Estero and adjacent Estero de Limantour have been divided into eight subsites based on habitat conditions. These subsites arise from a complex of eight sandbar sites where seals haul out at various times over the year. During a single day, seals can move from one subsite to another when crowding occurs or when rising tides limit the amount of available space. Seals also may float over submerged subsites during high tides, awaiting the reemergence of the sandbar when the tide recedes. The eight subsites in Drakes Estero and Estero de Limantour are used during breeding and molting seasons, and several also are used year-round. Females with pups frequent sandbars located in the upper and middle portions of Drakes Estero during low tide, which apparently provides the advantage of isolation from the mainland, as well as from humans and predators. Limantour Spit at the mouth of Drakes Estero is predominantly used by non-breeding seals during the breeding season (Becker, Press, and Allen 2011).

Impact Analysis

Consistent with Section 109h of the Marine Mammal Protection Act, the removal actions associated with the project will protect public health and enhance habitat for harbor seals within Drakes Estero. The abandoned structures and aquacultural debris within Drakes Estero represent both a risk to public health and wildlife. The 5 miles of racks and remaining vertical structures are exposed at low tides but lie just below the water surface at higher tides. Lumber from collapsed structures litter the subtidal lands and extend up into the water column. This artificial and introduced debris precludes the expansion of eelgrass, supports invasive marine fouling organisms, poses an ongoing hazard to marine wildlife susceptible to ingestion or entanglement, and replaces the natural soft substrate benthic habitat with debris. The marine resources of Drakes Estero will be significantly enhanced through the removal of this infrastructure and debris. The racks and vertical structures are riddled with nails and are a hazard to kayakers, swimmers, researchers, and the public visiting the waters of Drakes Estero.

Cumulatively the project will remove more than 500 tons of lumber and debris from these subtidal lands. The marine resources of Drakes Estero will be significantly enhanced through the removal of this infrastructure and debris.

The NPS anticipates that there will be minimal impacts to harbor seals during the project, due to a series of mitigations that will reduce the potential for harbor seal disturbance. These include:

- limiting work to outside the breeding/pupping season,
- not working on or approaching sandbars where seals are hauled out,
- implementing a vessel speed limit on 10knot/hour,
- briefing construction crews on avoidance measures,
- not entering the California Coastal Commission harbor seal protection areas, and
- not working within 100 yards of seals.

Despite these measures, inadvertent seal disturbances may occur, but since work will be outside the breeding season, this is likely to have minimal population impact. To assess any potential impacts during the project, NPS will continue its long-term Harbor Seal monitoring program on Drakes Estero monitoring distribution, counts, and behaviors of seals during the non-breeding season. The frequency of surveys will depend on the work schedule. Surveyors will be able to contact the project manager to redirect work away from areas where seals are hauled out.

Impact Avoidance and Mitigation Measures

The primary planning approach for this project is to maximize removal of aquacultural infrastructure and debris while minimizing impacts to existing eelgrass beds. The NPS intends to remove or treat as much unnatural hard structure as feasible to improve potential for eelgrass to expand, and to minimize potential habitat for the non-native invasive tunicate *Didemnum vexillum* (Dvex).

The NPS has observed that while eelgrass is present around the active racks, in many cases there is little to no eelgrass present beneath the racks. The factors influencing this include shading from the rack and the former hanging culture, as well as debris accumulation forming an oyster shell cap over the bed surface.

The nature of the work (removal of infrastructure), the proximity of eelgrass to many of the structures (within and immediately adjacent), and the hydrodynamics of the estuary (high tidal flushing) make the design and evaluation of the project and its potential impacts unique. The removal of infrastructure that is unnatural to the system is beneficial both in the short and longterm. Eelgrass is immediately adjacent to many of the racks and removal of the racks necessitates access to and likely impacts to eelgrass adjacent to the racks. Removal of materials and debris associated with these linear structures will necessitate that the contractor moves along the line quickly. As a result, the duration of work at any one location will be minimal. This coupled with the energetic tidal dynamics and hydrologic turnover, the indirect impacts associated with rack removal and aquacultural debris removal will be minimal. The project will include long-term monitoring to evaluate multiple response, restoration, and research questions regarding removal of aquaculture infrastructure and debris from Drakes Estero.

The Project Description and Appendices include detailed information related to the project activities, impacts, and mitigation measures. The Impact Analysis and avoidance measures are analyzed in detail in Supplemental Appendix 1. The Drakes Estero Eelgrass Monitoring and Mitigation Plan is included as a separate document.

General and resource specific impact avoidance and mitigation measures for the project are summarized below.

- The NPS has identified a number of general conditions and constraints to ensure protection of sensitive resources during the project (see Appendix D).
- The NPS will have an onsite inspector to oversee operations with the ability to identify and cease work as necessary to minimize impacts.
- The project will have post-treatment inspection surveys to document completed condition to ensure that removal requirements and restoration objectives are achieved (Drakes Estero Eelgrass Monitoring and Mitigation Plan).

Rack Removal Activities

The impacts identified with the removal of racks and aquacultural debris, and limited in-situ treatment is dependent on duration of work at any single location. Rack removal, including removal of posts and buried cross-beams will result in temporary intermittent sediment disturbance when the posts are pulled. Observations made during the method tests indicate that turbidity dissipated from the removal sites within a matter of 5 minutes or less. Three-post arrays are distributed in linear fashion at 12-foot intervals. The Preliminary Engineering Report estimates that it will take contractors between 15-20 minutes to complete removal of a 3-post bent, then moving on to the next bent. The only action that will disturb the bottom sediments is the actual removal of the posts and bottom cross member. Removal of racks and bents will have localized turbidity impacts on the order of minutes at each bent site. No additional BMPs are identified as necessary as part of rack removal activities.

Aquaculture Debris Removal and Experimental In-situ Treatment Activities

The NPS has evaluated methods and objectives described in the aquaculture debris removal section to identify what method can most effectively, efficiently, and safely remove the aquaculture debris while minimizing disturbance of Dvex, sediment and indirect impacts to eelgrass as part of the removal. Other bucket types, deployed from an excavator arm may be more effective at picking up the debris, and the NPS is also evaluating whether this scale of work could be achieved by divers removing the debris by hand. No part of the Drakes Estero Restoration project (post removal, debris removal via bucket, or in-situ shell treatment) will be on any particular site adjacent to a patch of eelgrass for more than 3-5 hours (since contractors plan to work at a 12' bent site only between 15-20 minutes), and certainly not more than 30 days. We therefore conclude that there is unlikely to be any detectable effect on eelgrass carbon budgets, survivorship, or density due to light attenuation from suspended sediment.

- In consultation with NMFS, we have determined that our BMP for sediment impacts to eelgrass is that if operations in the field exceed 5 hours at a single bent, operations must be modified to increase operational efficiency. Note that after performing test pulls, we currently estimate only 15-20 minutes per bent.

Marine Mammal Impact Avoidance Measures

The NPS anticipates that there will be minimal impacts to harbor seals during the project, due to a series of mitigations that will reduce the potential for harbor seal disturbance. These include:

- limiting work to outside the breeding/pupping season,
- not working on or approaching sandbars where seals are hauled out,
- implementing a vessel speed limit of 10 knot/hour,
- briefing construction crews on avoidance measures,
- not entering the California Coastal Commission harbor seal protection areas, and

- not working within 100 yards of seals.

Despite these measures, inadvertent seal disturbances may occur, but since work will be outside the breeding season, this is likely to have minimal population impact. To assess any potential impacts during the project, NPS will continue its long-term Harbor Seal monitoring program on Drakes Estero monitoring distribution, counts, and behaviors of seals during the non-breeding season. The frequency of surveys will depend on the work schedule. Surveyors will be able to contact the project manager to redirect work away from areas where seals are hauled out.

Didemnum vexillum (Dvex)

Marine Debris is often covered with extensive Dvex, however the scooping method or hand picking proposed will simply scoop up debris and place it into the debris boxes. This will agitate some of the tunicate and possibly induce release of larvae. However, these larvae would eventually be released if the tunicates were left in place, so while the removal effort may cause some release of larvae, the sum released will be lower than if the Dvex remained in place. During removal activities, Dvex colonies on aquaculture debris, posts, and shell will be occasionally disturbed. We will minimize this disturbance and the chance of fragmentation by including the following conditions in the project contract documents:

- No scraping or rubbing of lumber or debris so that tunicates are removed whole and no fragments are released into the water.
- No unnecessary agitation of tunicates (e.g. avoid grabbing posts where tunicates are present)

Therefore, while this project may change the timing that Dvex is released into the estuary, it should not add any additional Dvex to the estuary when considered over a full year time scale. It can be anticipated that most of the Dvex will be removed whole and without agitating larvae, and therefore, the project will be greatly reducing the amount of Dvex larvae and reproductive budding that occurs. While the NPS has documented that removal using mechanized equipment is reasonably acceptable, any decision to employ divers removing material by hand would further reduce the overall potential impact described above.

Oil Spill Prevention and Response Plan

A fuel or hydraulic oil spill in Drakes Estero could cause significant damage to eelgrass, fishes, fish eggs, waterbirds, infauna, and visitor enjoyment. The NPS will coordinate with the CCC and NMFS during the development of the project scoping documents to identify concerns that should be addressed as part of any Oil Spill Prevention and Response Plan. The NPS contract requires that the contractor submit a spill prevention/response plan to be reviewed and approved prior to issuing the notice to proceed. The NPS will review the contractor spill plan to ensure that the following topics are addressed adequately:

- Each vessel carrying fuel or hydraulics will carry absorbent boom and pads on board at all times for immediate deployment. Additional boom will be immediately available onshore if additional boom is needed.
- Contractors must be trained in spill prevention and response prior to commencement of work. All spills will be immediately reported to NPS, USCG, and CDFW-OSPR.

- Boats and hydraulic equipment must be inspected prior to work each day for leaks or potential spill hazards. Any issues must be corrected and approved by the site supervisor prior to work commencement.
- Bilges will not be pumped into the estero.
- Cleaners, solvents, paints, soaps or caustics will not be used on the water.

Additionally, the NPS will maintain a spill response plan for Drakes Estero that follows the following format (Adapted from California Marina and Yacht Club Spill Response Communication Packet: http://www.asmbyc.org/wp-content/uploads/2014/06/Final_Packet_May_2014.pdf).

Anchoring Plan

A specific anchoring plan will be developed prior to work by consulting with the contractor. However, the plan will have these general requirements.

- No use of anchors with chains in eelgrass.
- Anchors should be deployed only where the bottom can be sighted to ensure anchors are not placed in eelgrass.
- Long, narrow poles that can be placed into the sediment may be used to stabilize barges without impacting eelgrass.
- Anchoring may occur within the footprint of existing oyster racks.
- In the event of an emergency where there is risk to human safety, running aground on an eelgrass bed, or a fuel spill, anchors may be temporarily deployed in eelgrass. Any such events will be reported to NPS.

Wilderness

The wilderness designation and cessation of ongoing mechanized boating operations (with the exception of very limited administrative use for monitoring and patrol is expected), will eliminate potential prop damage to eelgrass resulting in expansive long-term benefits to eelgrass. Any remaining infrastructure could create areas of additional non-native species accumulation and further fouling of the area.

Effects of the Action

Overall the project will remove 5 miles of oyster racks (covering more than 7 acres), 1.5 acres of aquacultural debris (anchors and lines, mats, tubes, strings and bags), and treat approximately 0.5 acres of accumulated shell within the subtidal lands of Drakes Estero in a manner that best protects and preserves resources within this portion of the Phillip Burton Wilderness. Ultimately these discrete efforts will benefit the ecological condition and function of this 2,500 acre estuarine complex.

As documented, the project actions will result in short-term minor impacts associated with rack and debris removal but will provide improved conditions in the long-term. The NPS has documented anticipated direct impacts to eelgrass within Drakes Estero, as well as anticipated benefits of the project resulting in a 4.5:1 ratio of eelgrass habitat following completion of the debris removal project. The NPS has documented limited potential impacts to listed steelhead as well as critical habitat for coho salmon. All other listed species are not anticipated to be affected by the proposed activities.

As part of the planning process, the NPS coordinated with all appropriate regulatory agencies to identify potential planning issues and concerns early in the process. We appreciate participation and coordination with NMFS staff, including Rick Rogers, Korie Schaeffer, and Brian Meux on this project.

Conclusions

The project incorporates measures to avoid or minimize effects on listed species and their habitats. Effects on habitat would be minimized through the implementation of the project's avoidance and minimization measures identified above. Based on the information detailed above, the NPS has concluded that the proposed project actions may affect, but are not likely to adversely affect ESA listed species, Critical Habitat or Essential Fish Habitat and will not result in any take and would not jeopardize the continued existence of these species. Additionally, while some impacts are anticipated to eelgrass beds which provide habitat and Essential Fish Habitat, the overall project will result in benefits far in excess of the 1.2:1 mitigation required under the 2014 California Eelgrass Mitigation Policy and Implementing Guidelines.

Conditional to the approval of the California Coastal Commission (CCC) Coastal Consistency Determination is the submittal and approval of the Drakes Estero Eelgrass Monitoring and Mitigation Plan which is enclosed as part of this submittal. The NPS has coordinated with NMFS on the development of this plan and will continue to consult with both CCC and NMFS staff if there are any additional questions or adjustments necessary prior to approval of the plan by the CCC.

We appreciate your timely review of this request. If you should have any questions, please contact Brannon Ketcham, Management Assistant (415-464-5192 or brannon_ketcham@nps.gov) or Ben Becker, Scientist Coordinator and Marine Ecologist (415-464-5187 or ben_becker@nps.gov).

Sincerely,

Cicely A. Muldoon
Superintendent

Enclosures

References

Adams, D., D. Press, M. Hester, H. Nevis, D. Roberts, B. Becker, H. Jensen, E. Flynn, M. Koenen, and S. Allen 2009 *San Francisco Bay Area Network Pinniped Monitoring Protocol*, Version 3.02. Natural Resource Report. NPS/SFAN/NNR – 2009/170. National Park Service, Fort Collins, Colorado. December.

Allen Miller, S. 1988. The movement and activity patterns of harbor seals in Drakes Estero, California. M.S. Thesis, Univ. of California, Berkeley, 70 pp.

Avocet Research Associates 2002 *Giacomini Wetlands Restoration Site: Special-status Animal Species—Reconnaissance and Compliance*. Final Report to Point Reyes National Seashore, National Park Service, November 22.

Becker et al. 2011 "Evidence for Long-term Spatial Displacement of Breeding and Pupping Harbour Seals by Shellfish Aquaculture over Three Decades." *Aquatic Conservation: Marine and Freshwater Ecosystems*. Available at wileyonlinelibrary.com. DOI: 10.1002/aqc.1181. Accessed May 1, 2011.

Burns, J.J. 2002 "Harbor Seal and Spotted Seal." In *Encyclopedia of Marine Mammals*, edited by W.E. Perrin, B. Wursig, and J.G.M. Thewissen, 552–560. San Diego, California: Academic Press.

CDFG 2004c *Recovery Strategy for California Coho Salmon*. Report to the California Fish and Game Commission. Copies/CDs available upon request from California Department of Fish and Game, Native Anadromous Fish and Watershed Branch, 1416 9th Street, Sacramento, California, 95814. Available at http://www.dfg.ca.gov/nafwb.cohorecovery. Accessed February 1, 2011.

Codde et al. 2011. "Pacific Harbor Seal (*Phoca vitulina richardsi*) Monitoring at Point Reyes National Seashore and Golden Gate National Recreation Area: 2010 Annual Report." Natural Resource Technical Report NPS/SFAN/NRTR—2010/345. National Park Service, Fort Collins, Colorado.

Codde et al. 2012. "Pacific Harbor Seal (*Phoca vitulina richardsi*) Monitoring at Point Reyes National Seashore and Golden Gate National Recreation Area: 2011 Annual Report." Natural Resource Technical Report NPS/SFAN/NRTR—2012/611. National Park Service. Harbor Seal Inventory & Monitoring Program, Point Reyes National Seashore, Point Reyes Station, California.

Grigg, E.K., D.E. Green, S.G. Allen, and H. Markowitz 2004 "Harbor Seal, *Phoca vitulina richardsi*, Population Trends in the San Francisco Bay Estuary, 1970–2002." *California Fish and Game* 90:51–70.

Hayward, J.L., S.M. Henson, C.J. Logan, C.R. Parris, M.W. Meyer, and B. Dennis. 2005 "Predicting Numbers of Hauled-out Harbour Seals: A Mathematical Model." *Journal of Applied Ecology* 42(1):108–117.

Jones, K.K., T.J. Cornwell, D.L. Bottom, L.A. Campbell, and S. Stein. 2014. The contribution of Estuary-Resident Life Histories to the Return of Adult Oncorhynchus kisutsch. Journal of Fish Bilogy 2014.

Lowry, M.S., J.V. Carretta, and K.A. Forney. 2008 "Pacific Harbor Seal Census in California During May - July 2002 and 2004." *California Fish and Game* 94(4):180-193.

Koski, K.V., 2009. The fate of Coho Salmon nomads: The Story of an Estuarine Rearing Strategy Promoting Resilience. Ecology and Society 14(1):4.

NMFS 2005a "Designation of Critical Habitat for Seven Evolutionary Significant Units of Pacific Salmon and Steelhead in California." *Federal Register*. 70(179):52488–52627.

NMFS 2005b "Endangered and Threatened Species: Final Listed Determinations for 16 ESUs of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs." *Federal Register* 70(123):37160–37204.

NMFS 2009 Letter from National Marine Fisheries Service Regional Administrator to Point Reyes National Seashore Superintendent on March 24, regarding Glenbrook Project Section 7 consultation, Reference Number 2009/00127.

NMFS 2011a "Office of Protected Resources: Coho Salmon (*Oncorhynchus kisutch*)." Available at http://www.nmfs.noaa.gov/pr/species/fish/cohosalmon.htm. Accessed April 1, 2011.

NMFS 2011c "Pacific Salmonids: Major Threats and Impacts." Available at http://www.nmfs.noaa.gov/pr/species/fish/salmon.htm. Accessed April 1, 2011.

NMFS 2011e "Southwest Regional Office Protected Resources Division: Central California Coast Steelhead (*Oncorhynchus mykiss*)." *2007 Federal Recovery Outline for the Distinct Population Segment of Central California Coast Steelhead*. Available at http://www.swr.noaa.gov/recovery/Steelhead_CCCS.htm. Accessed April 1, 2011.

NMFS 2014 Letter from National Marine Fisheries Service Assistant Regional Administrator to the Federal Highways Administration on August 18, scoping comments regarding the Sir Francis Drake Boulevard crossing of Schooner Bay, Drakes Estero.

NOAA 1996 "Threatened Status for Central California Coast Evolutionarily Significant Unit—Final Rule." *Federal Register* 61(212):56138–56149. October 31.

NOAA 1999 "Designated Critical Habitat: Central California Coast and Southern Oregon/Northern California Coasts Coho Salmon." *Federal Register* 64(86):24049–24062.

NOAA 2014 California Eelgrass Mitigation Policy and Implementing Guidelines. NOAA Fisheries West Coast Region. October 2014.

NPS 2009a *Coastal Watershed Restoration Project: Restoring Tides in Estero de Limantour*. Available at http://www.nps.gov/pore/parkmgmt/upload/rps_restoring_limantourestero_090504.pdf.

NPS 2001a *Coho and Steelhead Restoration Project*. Annual Section 10 Permit Report. July 1–December 21, 2001. Point Reyes National Seashore, Golden Gate National Recreation Area, Muir Woods National Monument.

NPS 2006c *Harbor Seal Monitoring, San Francisco Bay Area, Annual Report*. Prepared by J. Manna, D. Roberts, D. Press, and S. Allen.

NAS 2009 National Research Council, National Academy of Sciences (NAS). *Shellfish Mariculture in Drakes Estero, Point Reyes National Seashore, California*. Washington, DC: The National Academies Press.

PFMC 2008 Pacific Coast Groundfish Fishery Management Plan for the California, Oregon, and Washington Groundfish Fishery, as amended through Amendment 19, including Amendment 15.

Seuront, L.J.J., and P. Prinzivalli. 2005 "Vulnerability of Harbor Seals, *Phoca vitulina*, to Transient Industrial Activities in the Strait of Dover." *Journal of the Marine Biological Association of the United Kingdom* 85:1015–1016.

Suryan, R.M., and J.T. Harvey 1999 "Variability in Reactions of Pacific Harbor Seals, *Phoca vitulina richardsi*, to Disturbance." *Fishery Bulletin* 97:332–339.

Sydeman, W., and S.G. Allen. 1999 "Pinnipeds in the Gulf of the Farallones; 25 Years of Monitoring." *Marine Mammal Science* 15:446–461.

Thompson, P.M., S. Van Parijs, and K.T. Kovacs. 2001 "Local Declines in the Abundance of Harbour Seals: Implications for the Designation and Monitoring of Protected Areas." J*ournal of Applied Ecology* 38:117–125.

Truchinski, K., E. Flynn, D. Press, D. Roberts, and S. Allen. 2008 *Pacific Harbor Seal* (Phoca vitulina richardsi) *Monitoring at Point Reyes National Seashore and Golden Gate National Recreation Area: 2007 Annual Report*. Natural Resource Technical Report NPS/SFAN/NRTR 2008/118. National Park Service, Fort Collins, Colorado.

USFWS 2010 Letter (with attachment) from Endangered Species Division to Point Reyes National Seashore Superintendent on November 17, regarding species list for Drakes Bay Oyster Company Special Use Permit Environmental Impact Statement.

USFWS 2004 *Biological Opinion on the Horseshoe Pond Restoration to Coastal Lagoon, Point Reyes National Seashore in Marin County, California*. Memorandum. From Sacramento Fish and Wildlife Office Acting Field Supervisor to Point Reyes National Seashore Superintendent on August 11, regarding Section 7 Consultation, 1-1-02-F-0221.

USFWS 2008 *Biological Opinion on the Restoration of the Lower Glenbrook Quarry and Dam Removal at Turney Point Project at Point Reyes National Seashore, Marin County, California*. Memorandum. From Sacramento Fish and Wildlife Office Acting Field Supervisor to Point Reyes National Seashore Superintendent on July 16, regarding Section 7 Consultation, 81420-2008-F-1503.

Drakes Estero Eelgrass Monitoring and Mitigation Plan

(Based on the 2014 California Eelgrass Mitigation Policy and Implementing Guidelines)

1. Introduction

In order to demonstrate that the Drakes Estero Restoration Project adheres to the National Marine Fisheries Service's (NMFS) policy of no net loss of eelgrass habitat function in California, the National Park Service will implement a comprehensive pre and post eelgrass survey program that targets four specific restoration responses. All sampling areas will also have paired reference plots.

- First, we will document the response (change in percent cover) of eelgrass in areas where oyster rack stringers have fallen to the estero floor and are precluding eelgrass growth
- Second, we will survey eelgrass cover around 15 random sets of "bents" defined as 3 posts and the attached cross members in sediment pre and post removal.
- Third, we will record eelgrass cover under a subset of 12 oyster racks that currently have little to no eelgrass under them, but do have eelgrass growing adjacent to the racks
- Finally, we will quantify eelgrass cover under and adjacent the proposed floating dock before installation and after removal

This suite of surveys will allow NPS to quantify:

- actual impacts to eelgrass from post and cross member removal, which may be different from the approved estimates.
- recovery of eelgrass from areas shaded/smothered by stringers on the estero floor.
- recovery of eelgrass impacted around post and cross member removal.
- additional eelgrass growing in restored habitat under racks.

This monitoring is not an attempt to document the total areal response of eelgrass to the restoration in the project area. Rather it is a targeted plan to assess the amount of eelgrass growth in the areas where eelgrass is most likely to grow within the footprint of the former racks (areas adjacent to existing eelgrass beds that have minimal oyster shell debris) and whether the restoration activities have achieved the 1.2:1 eelgrass mitigation requirement. Supplemental eelgrass monitoring by the California Department of Fish and Game (Appendix C) will provide additional insight into project and estero-wide eelgrass responses to restoration, but may not provide the specificity to determine if minimum eelgrass mitigation requirements have been met.

While eelgrass is widespread in Drakes Estero, the specific project area primarily occurs within the footprint of 12' wide oyster racks. Therefore, monitoring using aerial imagery

may be difficult to utilize to track fine scale changes in eelgrass cover (e.g., areas around individual posts). Furthermore, obtaining high quality aerial images with persistent winds, limited mid-day low tides, and generally low water clarity makes aerial imagery flights difficult to schedule and often result in poor visibility. We therefore propose to utilize underwater imagery (video and stills) to quantify the area and percent cover of eelgrass at posts, cross members, collapsed stringers, under racks that have little to no eelgrass underneath but are potential eelgrass habitat as indicated by eelgrass currently growing adjacent to the racks.

1.1 Description of the Project Area - See Project Description.
1.2 Results of Preliminary Eelgrass Surveys – See Project Description, Table 1.
1.3 Description of Projected Eelgrass Impacts - See Project Description, Table 1.

2. Monitoring Plan

2.1 General Field Methods

Surveys will be conducted by snorkelers via video and still images during the eelgrass growing season pre and post project. Percent cover of eelgrass will be estimated for quadrats (sizes below) and transects by placing random or systematic points on images (quadrats or transects) obtained in the field.

All sample types (stringer, rack, post & cross member, and dock) will be paired with reference quadrats or plots to assess Percent cover and density targets (Table 1). Reference quadrates/transects will be immediately adjacent to the

Table 1. Sampling schedule and milestones for assessing eelgrass regrowth. This follows the guidelines on P. 26 of the California Eelgrass plan, but is lagged by 6 months, since year 1 sampling will occur after only 6 months after project completion.

Sampling Period	Percent Coverage of Reference	Percent Density of Reference
Prior to Restoration	-	-
Year 1 - Summer	expansion	-
Year 2 - Summer	40	20
Year 3 - Summer	85	70
Year 4 - Summer	100	85
Year 5 - Summer	100	85

All surveys (except dock surveys) will be conducted during mid to high tides to maximize water clarity, minimize sediment entrained by tidal currents, and minimize potential disturbance to hauled-out harbor seals. Surveys will be conducted under an NPS research and collection permit and any use of motorized boats will be authorized under a National Park Service Minimum Tool Authorization.

2.2 Stringers on the Estero Floor

Stingers on the estero floor will be removed allowing eelgrass to grow into areas previously shaded and smothered by the wood. We estimate that there are 0.14 acres of bottom area covered by these stringers. We will randomly sample twenty-five 2x2 m quadrats for eelgrass cover in areas where stingers are on the estero floor. This will only be done in areas where eelgrass is already growing under the rack except for under the stringers. Follow up surveys at 12 and 24 months will be used to calculate percentage cover of eelgrass and the 15 sample areas will be extrapolated (with error) to the entire area or collapsed stringers that were in eelgrass to calculate the area of any change in eelgrass cover. The 15 samples will be considered as a single strata (similar habitat type) for purposes of calculating errors. Quadrat corners will be marked with short PVC posts that remain submerged at all tides. Fifteen additional reference quadrats will be placed adjacent to the sample sites.

2.3 Post and Cross Member Eelgrass Monitoring

Based on pilot field tests, we estimate that each post removal in eelgrass will impact 1.3sf, and each cross member buried in sediment will impact 1 sf per linear foot in eelgrass. To assess these assumptions and document regrowth of eelgrass after infrastructure removal, we will establish quadrats that are 1m x 5m around 15 random sets of "bents" defined as 3 posts and the attached cross member. The entire quadrat will be photographed and eelgrass cover calculated. See Figure 1 for a schematic. Quadrat corners will be marked with short PVC posts that remain submerged at all tides. Fifteen additional reference quadrats will be placed adjacent to the sample sites.

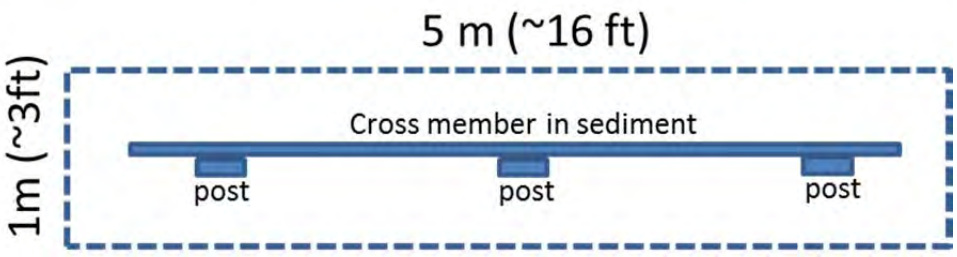

Figure 1. View from above of proposed eelgrass coverage quadrat. Cross member is a horizontal 2"x6" that is 12-14 ft long. Vertical posts are 2"x6" and generally 10' long based on a small sample.

2.4 Rack Removal and Bottom Treatment Areas

NPS staff will snorkel along the length of 6 racks that were recently active, have eelgrass growing adjacent, have little to no visible oyster shell or marine debris on the bottom. To revisit transects after rack removal, the start and end points for transects will be marked with PVC poles that remain submerged below the waterline at all tides. Twelve racks in the estero currently meet these guidelines, so results will be extrapolated up to the area under all 12 racks.

The surveys will report (as per the NMFS Eelgrass Mitigation Guidelines):

a) Spatial distribution of eelgrass under the 6 racks/transects.
b) Aerial extent in square meters in the 6 transects.
c) Percent vegetated cover in the 6 transects.

Turion (shoot) density will not be recorded, as we will use the percent vegetated cover to assess response.

Rack corners will be marked with short PVC posts that remain submerged at all tides. A meter tape will be placed along the axis of each rack footprint during surveys to guide swimmers and photopoints. Six additional reference transects will be monitored adjacent to the racks.

2.5 Temporary Floating Dock

The temporary floating dock may be placed over an area of eelgrass habitat with some existing eelgrass (currently estimated at about 50% cover, but assumed as 100% cover for purposes of permitting) (Figure 2). (An alternate site is also being assessed for suitability (deep water access) that would drastically reduce any eelgrass impact.) It is anticipated that eelgrass will rapidly recolonize the floating dock area after removal of the dock. To quantify eelgrass impacted and regrowth after dock removal, NPS will use a small skiff and GPS to map the 1) special distribution 2) aerial extent, and 3) percent cover of eelgrass prior to dock deployment (during the growing season), recovery after 12 months (Year 1), and after 24 months (Year 2). Mapping will be done within the footprint of the proposed dock area and an adjacent 5 m buffer. For percent cover, the planned survey technique will be to select 10 random 2x2 m quadrats within the footprint at the 3 sampling periods. For the 5 m buffer surrounding the dock will also have 10 random 2x2 m quadrats sampled at all three time periods. Both of these sampling regimes will be systematic random (starting

point is random, but then quadrats are equally spaced throughout the footprint or buffer) to ensure that the overall footprint of the dock is represented. Because it is not feasible to reliably mark permanent quadrats under a floating dock that would likely disturb the markers, these quadrats will be randomized for each new survey. The ten reference quadrats will be > 5 m from the dock

Table 2. Summary of sampling areas, methods, quantities, and estimated impacts and restoration of eelgrass. Estimated demonstrated mitigation ration is 2.26:1. This differs from the overall project estimate because we are monitoring only a subset of the entire treatment area. Those values may be calculated from complementary surveys by California Department of Fish and Wildlife.

Survey Area	Survey Type	Size	Sample Size (treatment\ reference)	Estimated eelgrass impact(ac)	Anticipated eelgrass restored (ac)
Stringers	quadrats	2x2m	15/15	0.14	0.14
Posts and Cross members	quadrats	1x5m	15/15	0.37	0.37
Racks	transects	Variable	6/6	0.00	0.73
Floating Dock	quadrats	2x2m	20/10	0.07	0.07
Total			**56/46**	**0.58**	**1.31**

Table 3. Estimated annual project days in field and office.

Type	Est. Field Dy/Yr	Office Dy/Yr
Stringer plots	3	1
Cross member/post plots	3	1
Rack plots	3	1
Dock plots	1	1
ANNUAL TOTAL	**10**	**4**

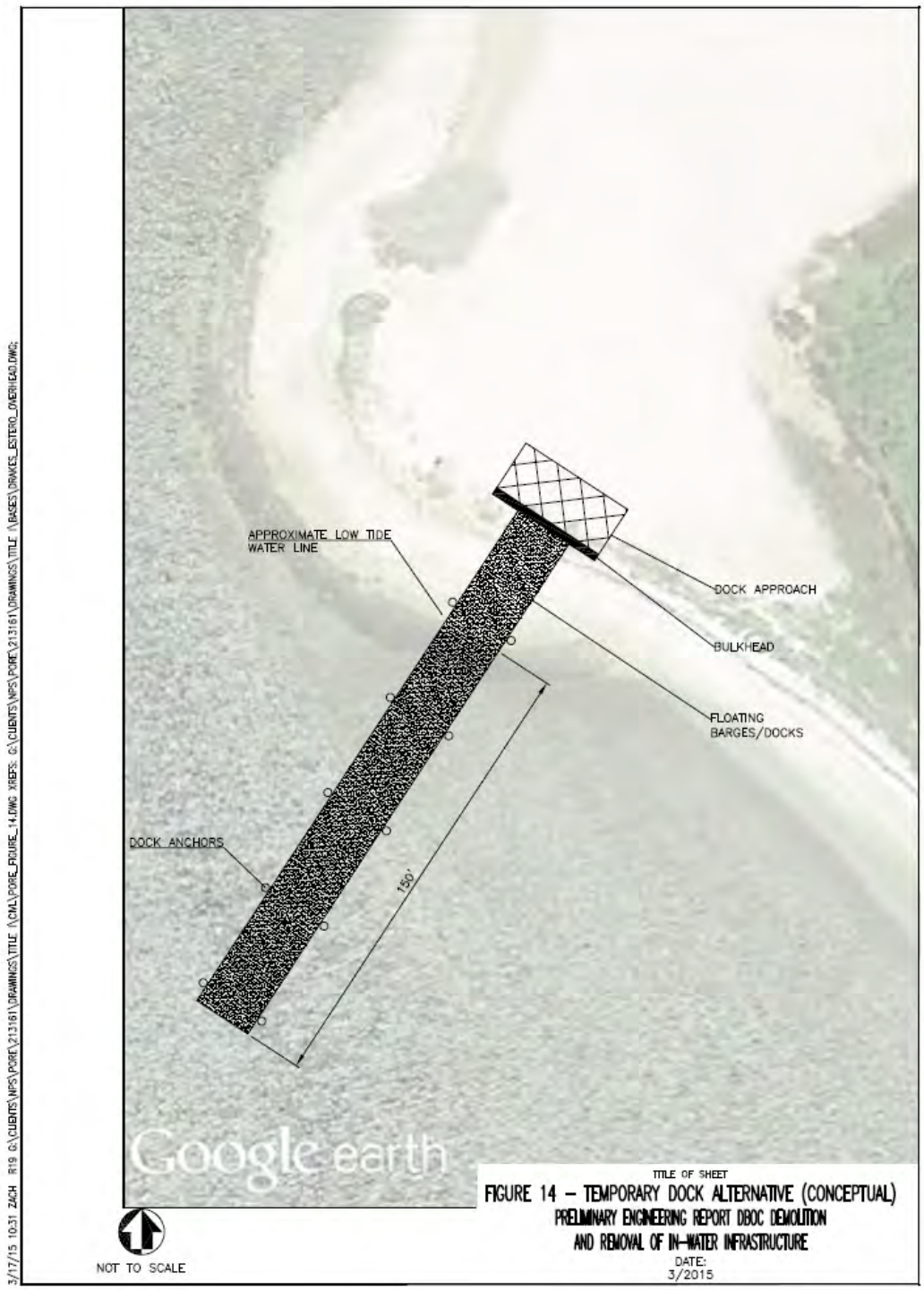

Figure 2. Conceptual design of temporary 150 ft x 20 ft floating dock. The plan also assumes 200 SF of impact associated the anchors for the dock. It is estimated that the entire dock area may affect eelgrass. Twenty-five 2x2 m random quadrats will be used to assess percent cover within the dock footprint and an additional 20 2x2m random quadrats will determine eelgrass density in the 5 m buffer around the dock.

3. **Restoration Schedule:** See Project Description.

4. **Analysis**

Determination of eelgrass area will be accomplished by converting sample (transects or quadrats) percent cover to a mean (± error) cover which is then converted to area of all treatment areas. For example, post and cross member samples will be extrapolated to the area of all post (0.08 acres) and cross members (0.29 acres,) that were removed from eelgrass. Similarly, the stringers on the estero floor in eelgrass will be extrapolated to the total area of stringers estimated to be within eelgrass (0.29 acres). Growth of eelgrass under the 12 racks will be calculated from extrapolating percent cover (with error) to the area under the racks. Last, the 25 quadrats in the temporary dock footprint and the 20 quadrats in the buffer will be distributed to represent the entire dock footprint and buffer area. For all survey types all cases, a direct comparison of eelgrass acreage at time 0 will be compared to 12 and/or 24 months to calculate change in eelgrass cover. This change in acreage will not represent the overall project impacts or change in eelgrass, but will rather demonstrate whether the mitigation requirements have been met.

The number of quadrats and transects chosen will have enough power to demonstrate significant differences in eelgrass cover since eelgrass under racks monitored will generally be low to no cover. Thus, this low variability in initial conditions will increase power to detect changes over time.

5. **Project Monitoring Schedule** - See Table 1

6. **NMFS and CCC Coordination** - NPS will coordinate with NMFS (and CCC) prior to and post field surveys each year. Reports summarizing eelgrass conditions and milestones in Table 1 will be provided by October 31 of each year.

   Pre survey and annual reports that detail eelgrass cover and evaluate performance milestones listed in Table 1.

7. **Alternative Mitigation Planning**

   We anticipate that the restoration component of this project will result in a mitigation ratio of greater than 1.2:1, and therefore are not developing a detailed mitigation plan at this time. However, if the monitoring surveys proposed here do not demonstrate at least a 1.2:1 net increase in eelgrass cover, NPS will consult with CCC and NMFS on development of additional mitigation strategies such as transplanting eelgrass into rack footprints. We anticipate that reporting after year two (see Table 1) will provide enough information on restoration trajectory and rate to determine if an additional mitigation program is warranted. Similarly, after consulting with NMFS, we have determined that

the specific patterns of any eelgrass regrowth (for example, around posts, but not under racks) would be needed to guide any mitigation plan. Therefore, it is premature to propose a mitigation plan at this point.

8. **Adjustment of estimates of eelgrass impact.**
   If follow up monitoring in Year 1 reveals that impacts under stringers, posts, cross members, and the dock were less than estimated in Table 1 of the project description, then the estimates for eelgrass impact (and required restoration ratios/areas) will also be reduced by the difference.