UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

ENVIRONMENTAL ASSESSMENT FOR ISSUANCE OF PERMIT NO. 14400 FOR TAKES OF WILD BLACK ABALONE DURING BLACK ABALONE MONITORING AND RESEARCH ACTIVITIES IN CALIFORNIA

November 2010

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Location: California, USA locations including offshore California islands

Abstract: The National Marine Fisheries Service (NMFS) proposes to issue a scientific research permit for takes of black abalone (*Haliotis cracherodii*) in the wild, pursuant to the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 *et seq.*). The permit would be valid for five years from the date of issuance and would authorize the take of black abalone in the course of research activities to monitor the population status of the endangered black abalone and to identify population trends through population counts and size distribution measurements. Research would consist of non-lethal take in order to count and measure all individuals at established monitoring sites and to tag a subset of individuals with Passive Integrated Transponder (PIT) tags at selected sites. Dead or obviously dying black abalone would also be collected for pathological and histological studies. The purpose of the proposed research activities are to monitor black abalone abundance and size distribution, estimate survival and growth rates, track the spread of disease, and further understand habitat preferences and changes associated with competition and reduced population size following disease mortality in wild black abalone populations. The information generated by the research activities would be used to inform the management and recovery of the species. Work would be conducted by the Multi-Agency Rocky Intertidal Network (MARINe), a consortium of federal, state, and local government agencies, universities, and private firms that are cooperatively conducting monitoring of intertidal resources at over 80 sites in California.

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CHAPTER 1 PURPOSE OF AND NEED FOR ACTION

1.1 DESCRIPTION OF ACTION

In response to receipt of a request from the Channel Islands National Park (Dan Richards; Principal Investigator) (File No. 14400), NMFS proposes to issue a scientific research permit that authorizes "takes"[1] of black abalone (*Haliotis cracherodii*) in the wild, pursuant to the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 *et seq*.), and the regulations governing the taking, importing, and exporting of endangered and threatened species (50 CFR Parts 222-226). These takes would occur as a result of black abalone research activities to be conducted under the permit at rocky intertidal sites throughout the California coast.

1.1.1 Background

The Minerals Management Service (renamed the Bureau of Ocean Energy Management, Regulation and Enforcement, or "Bureau of Ocean Energy", in June 2010) has coordinated with several federal, state, and local agencies to form the Multi-Agency Rocky Intertidal Network (MARINe). MARINe partners use standardized methods to monitor population trends of rocky intertidal species at survey sites throughout the U.S. West Coast, including over 80 sites throughout California (www.marine.gov). The MARINe includes the National Park Service, which has conducted rocky intertidal monitoring as part of its Inventory and Monitoring Program since 1982.

Black abalone are one of several rocky intertidal species monitored by the MARINe. Black abalone were at one time a spatially dominant invertebrate whose physical presence affected other sessile organisms in the rocky intertidal zone and shaped the local community in many intertidal areas of Southern California. Black abalone were also once an important commercially harvested species and subject to varying degrees of recreational fishing. For these reasons, black abalone have been a component of rocky intertidal monitoring programs since the early 1980s. Information from these monitoring programs has in the past and will continue to add to the understanding of the ecology of black abalone. The broad baseline of information includes many sites throughout California with continuous data collections since the 1980s. These monitoring programs were responsible for documenting the appearance of the disease called withering-syndrome and the subsequent decline of black abalone populations. Continued monitoring of black abalone populations is important for understanding the current status and trends of black abalone and informing the management and recovery of this important component of the rocky intertidal system.

1.1.2 Purpose and Need

The primary purpose of the permit is to provide an exemption from the prohibitions under the ESA to allow "takes" of the endangered black abalone for bona fide scientific research. The need for issuance of the permit is related to NMFS's mandates under the ESA. Specifically,

[1] The ESA defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." The term "harm" is further defined by regulations (50 CFR §222.102) as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns including breeding, spawning, rearing, migrating, feeding, or sheltering."

NMFS has a responsibility to implement the ESA to protect, conserve, and recover threatened and endangered species under its jurisdiction. The ESA prohibits takes of threatened and endangered species with only a few very specific exceptions, including for scientific research and enhancement purposes. Permit issuance criteria require that research activities are consistent with the purposes and policies of these federal laws and will not have a significant adverse impact on the species.

The primary purpose of the proposed research is to continue monitoring the trends in abundance, distribution, and habitat parameters of wild black abalone throughout the species' range in California and gain fundamental knowledge necessary for addressing threats and recovering the species. The applicant's general approach would be to conduct standardized counts, collect size frequency measurements, and note general health of the abalone. Tagging studies that have been conducted on several populations would continue, and temperature data from abalone habitats would continue to be collected. Because the proposed research could involve contact with black abalone shells and tissues in order to measure and tag individuals, there is a need to authorize these non-lethal takes. In addition, if the investigators encounter dead or obviously dying black abalone, there is a need to authorize the collection of these individuals for pathological and histological analysis so that the cause of death can be determined, disease or toxic outbreaks can be identified early, and a plan for alleviating the threats imposed by disease or toxic outbreaks can be implemented.

1.1.3 Research Objectives

The proposed research would support development and implementation of an effective restoration program by continuing and enhancing the collection of essential ecological data. The objectives of the proposed research are to: (1) develop a better understanding of the ecology of black abalone and their habitat; (2) document the population status of black abalone throughout California; (3) identify population trends over time at fixed sites; and (4) examine individual black abalone growth, survival, habitat selection, and movement. These research objectives would provide fundamental information on several aspects of black abalone ecology and habitat preference, as well as baseline data to assess current population status and trends.

1.2 SCOPING SUMMARY

The purpose of scoping is to identify the issues to be addressed and the significant issues related to the proposed action, as well as to identify and eliminate from detailed study the issues that are not significant or that have been covered by prior environmental review. An additional purpose of the scoping process is to identify the concerns of the affected public and Federal agencies, states, and Indian tribes. The Council on Environmental Quality's (CEQ) regulations implementing the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq*.) do not require that a draft environmental assessment (EA) be made available for public comment as part of the scoping process. This draft EA was not made available for public comment, but the permit application was made available for public comment (as described below in Section 1.2.1 of this EA). No public comments were received on the application. Thus, the scope of this EA was determined based on the information provided in the application and an assessment of the issues addressed in previous NEPA analyses for similar actions.

1.2.1 Comments on application

A Notice of Receipt of the permit application was published in the *Federal Register*, announcing the availability of the application for public comment (74 FR 43679, 27 August 2009). No public comments were received.

1.2.2 Issues within the scope of this EA

The major issues within the scope of this EA include impacts of the proposed action on the physical environment and the biological environment. The physical environment includes rocky intertidal habitat along the California coast where the proposed research activities are to be conducted. This includes habitats located within National Marine Sanctuaries, National Parks, state parks, and designated critical habitat. The biological environment includes the endangered black abalone and other marine invertebrates, marine algae, marine mammals, and seabirds. Chapter 2 of this EA provides a description of the alternatives considered by NMFS in this EA. Chapter 3 of this EA provides a description of the physical and biological environment. Chapter 4 of this EA provides an assessment of the impacts of the alternatives on the physical and biological environment. No impacts on the social and economic environment were identified.

1.3 APPLICABLE LAWS AND NECESSARY FEDERAL PERMITS, LICENSES, AND ENTITLEMENTS

This section summarizes federal, state, and local permits, licenses, approvals, and consultation requirements necessary to implement the proposed action, as well as who is responsible for obtaining them. Even when it is the applicant's responsibility to obtain such permissions, NMFS is obligated under NEPA to ascertain whether the applicant is seeking other federal, state, or local approvals for their action.

1.3.1 National Environmental Policy Act (NEPA)

The NEPA was enacted in 1969 and is applicable to all "major" federal actions significantly affecting the quality of the human environment. A major federal action is an activity that is fully or partially funded, regulated, conducted, or approved by a federal agency. NMFS issuance of permits for research represents approval and regulation of activities. While NEPA does not dictate substantive requirements for permits, licenses, etc., it requires consideration of environmental issues in federal agency planning and decision making. The procedural provisions outlining federal agency responsibilities under NEPA are provided in the CEQ's implementing regulations (40 CFR Parts 1500-1508).

NOAA has, through NOAA Administrative Order (NAO) 216-6, established agency procedures for complying with NEPA and the implementing regulations issued by the CEQ. NAO 216-6 specifies that issuance of scientific research permits under the MMPA and ESA is among a category of actions that are generally exempted (categorically excluded) from further environmental review, except under extraordinary circumstances. When a proposed action that would otherwise be categorically excluded is the subject of public controversy based on potential environmental consequences, has uncertain environmental impacts or unknown risks, establishes a precedent or decision in principle about future proposals, may result in cumulatively significant impacts, or may have an adverse effect upon endangered or threatened species or their habitats, preparation of an EA or environmental impact statement is required.

While issuance of scientific research permits is typically subject to a categorical exclusion, as described in NAO 216-6, NMFS is preparing an EA for this action because the proposed action may have an adverse effect on endangered black abalone. This EA is prepared in accordance with NEPA, its implementing regulations, and NAO 216-6.

1.3.2 Endangered Species Act

Section 9 of the ESA, as amended, and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption such as by a permit. Permits to take ESA-listed species for scientific purposes, or for the purpose of enhancing the propagation or survival of the species, may be granted pursuant to section 10(a)(1)(A) of the ESA.

NMFS has promulgated regulations to implement the permit provisions of the ESA (50 CFR Part 222) and has produced OMB-approved application instructions that prescribe the procedures necessary to apply for permits. All applicants must comply with these regulations and application instructions in addition to the provisions of the ESA.

Section 10(d) of the ESA stipulates that, for NMFS to issue permits under section 10(a)(1)(A) of the ESA, the Agency must find that the permit: was applied for in good faith; if granted and exercised will not operate to the disadvantage of the species; and will be consistent with the purposes and policy set forth in section 2 of the ESA.

Section 2 of the ESA sets forth the purposes and policy of the Act. The purposes of the ESA are to provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved, to provide a program for the conservation of such endangered and threatened species, and to take such steps as may be appropriate to achieve the purposes of the treaties and conventions set forth in section 2(a) of the ESA. It is the policy of the ESA that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of the ESA. In consideration of the ESA's definition of conserve, which indicates an ultimate goal of bringing a species to the point where listing under the ESA is no longer necessary for its continued existence (i.e., the species is recovered), exemption permits issued pursuant to section 10 of the ESA are for activities that are likely to further the conservation of the affected species.

Section 7 of the ESA requires consultation with the appropriate federal agency (either NMFS or the U.S. Fish and Wildlife Service) for federal actions that "may affect" a listed species or that may result in the destruction or adverse modification of critical habitat. NMFS issuance of a permit affecting ESA-listed species or designated critical habitat, directly or indirectly, is a federal action subject to the section 7 consultation requirements. Section 7 requires federal agencies to use their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of endangered and threatened species. NMFS is further required to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any threatened or endangered species or result in destruction or adverse modification of habitat for such species. Regulations specify the procedural requirements for these consultations (50 CFR Part 402).

1.3.3 Marine Mammal Protection Act

The MMPA prohibits takes of all marine mammals in the U.S. (including territorial seas) with a few exceptions. One such exception is the issuance of permits pursuant to section 101 of the MMPA for the incidental take of small numbers of marine mammals in a specified activity (other than commercial fishing) within a specified geographic region. Incidental take may be covered under an incidental take authorization (also known as a Letter of Authorization or LOA) or under an incidental harassment authorization (IHA). An LOA may be issued if the following conditions are met: (a) the takings would be of small numbers of marine mammals; (b) the takings would have no more than a negligible impact on affected marine mammal species; and (c) the takings would not have an unmitigable adverse impact on subsistence harvest of marine mammal species. Regulations must be promulgated for LOAs, to establish permissible methods and the specified geographic region of taking, the means of affecting the least practicable adverse impact on the species or stock and its habitat and the availability of the species or stock for subsistence uses, and the requirements for monitoring and reporting. If the action involves incidental take of small numbers of marine mammals only by harassment, the taking may be covered by an IHA. Unlike an LOA, an IHA does not require promulgation of specific regulations on the incidental taking. Thus, the IHA provides an expedited process for authorizing incidental take, allowing authorizations to be issued in about 4 to 8 months, compared to the 8 to18 months typically needed for an LOA. Entities must apply for LOAs or IHAs by providing detailed information about the specific activity, including the specific geographic region where the activity will occur, the species and numbers of marine mammals likely to be encountered, and the anticipated impact of the activity on the species or stock and its habitat. Obtaining an LOA or IHA is the responsibility of individual researchers.

1.3.4 Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (MBTA; 16 U.S.C. 703-712) was enacted to ensure the protection of shared migratory bird resources. The MBTA prohibits the take, possession, import, export, transport, selling, purchase, barter, or offering for sale, purchase, or barter, of any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit. The U.S. Fish and Wildlife Service (USFWS) regulations authorize permits for takes of migratory birds for activities such as scientific research, education, and depredation control. It is the responsibility of the researcher to seek and secure permits under the MBTA.

1.3.5 National Marine Sanctuaries Act

The National Marine Sanctuaries Act (NMSA) (32 U.S.C. 1431 *et seq*.) authorizes the Secretary of Commerce to designate and manage areas of the marine environment with special national significance. The National Marine Sanctuary Program is operated under the NMSA and administered by NOAA's National Ocean Service (NOS) and has the authority to issue special use permits for research activities that would occur within a National Marine Sanctuary. As a courtesy, the Office of Protected Resources consults with NOS when proposed research would occur in or near a National Marine Sanctuary, however, this does not alleviate the permit holder from obtaining any necessary permits the sanctuary may require.

1.3.6 Magnuson-Stevens Fishery Conservation and Management Act

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Congress defined Essential Fish Habitat (EFH) as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity” (16 U.S.C. 1802(10)). The EFH provisions of the MSFCMA offer resource managers means to accomplish the goal of giving heightened consideration to fish habitat in resource management. NMFS Office of Protected Resources is required to consult with NMFS Office of Habitat Conservation for any action it authorizes (e.g., research permits), funds, or undertakes, or proposes to authorize, fund, or undertake, that may adversely affect EFH. This includes renewals, reviews, or substantial revisions of actions.

CHAPTER 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes the range of potential actions (alternatives) determined reasonable with respect to achieving the stated objective and also summarizes the expected outputs and any related mitigation measures under each alternative. One alternative is the "No Action" alternative under which the proposed permit would not be issued. The No Action alternative is the baseline for the rest of the analyses. The other alternative is the Proposed Action (the preferred alternative) under which the proposed permit would be issued to allow takes of endangered black abalone in the course of the research activities as described in the permit application, with standard permit terms and conditions specified by NMFS. No other alternatives were considered in this analysis.

2.1 ALTERNATIVE 1 – NO ACTION

Under the No Action alternative, no permit would be issued to allow the take of black abalone in the course of the research activities proposed in the permit application. Thus, the take of black abalone as a result of the proposed research activities would continue to be prohibited. The proposed research activities would need to be modified to avoid take of black abalone. For example, MARINe monitoring surveys of black abalone could continue but would be limited to visual counts of black abalone and visual estimates of shell length that do not result in any contact with or disturbance to the abalone. Additional tagging of abalone would be prohibited, although monitoring of previously tagged abalone could continue as long as the abalone are not disturbed. The collection of dead or obviously dying black abalone would also be prohibited.

2.2 ALTERNATIVE 2 – PROPOSED ACTION (ISSUANCE OF PERMIT WITH STANDARD CONDITIONS)

Under Alternative 2 (the Proposed Action), a permit would be issued for research activities as proposed in the permit application, with the permit terms and conditions standard to such permits as issued by NMFS. The proposed black abalone research activities would be conducted by trained MARINe field biologists at rocky intertidal monitoring sites along the California coast. The three main components of the proposed research activities are: (1) black abalone population monitoring surveys; (2) black abalone tagging studies; and (3) collection of dead or dying black abalone for laboratory analysis. Each of these components is described in more detail below. Non-lethal take of black abalone would be expected to occur as part of the proposed research and would be necessary to effectively assess the population status and trends, ecology, and habitat of black abalone, as well as to monitor the impacts and spread of withering syndrome. The permit would authorize the take of black abalone up to a certain level (see Table 1) in the course of the research activities, allowing these activities to be conducted as proposed in the permit application.

2.2.1 Black abalone population monitoring surveys

The applicant proposes to continue monitoring black abalone populations at all of the long-term MARINe monitoring sites along the California coast. Monitoring surveys would be conducted according to established protocols, and standardized count data, size frequency measurements, and notes on general abalone health would be recorded. Standardized counts would be

conducted by searching for all black abalone in the area using non-destructive search methods (i.e., no boulders are rolled, nor are rocks broken or organisms removed). Counts would be conducted either as timed counts (typically 30 minutes) or within fixed plots (ranging from one square meter to tens of square meters, and marked with stainless steel bolts placed on the rocky reef and outlined by a line or measuring tape).

The shell length of each black abalone encountered would be measured using adjustable calipers or rulers. Generally, the shell length of observed black abalone ranges from 15 to 190 mm, although it is rare to encounter individuals smaller than 20 mm or larger than 180 mm. Black abalone may be temporarily marked using a lumber crayon on the shell to indicate the abalone was previously measured. The health of the abalone would also be assessed by observing whether the mantle is visible below the shell or whether the abalone appears active by moving or clamping down on the substrate in response to a person's presence or light touch. Contact with or disturbance of black abalone while conducting counts, shell length measurements, or health assessments would be minimized and limited to less than one minute per animal.

Monitoring surveys would be conducted during low tides when abalone are exposed to air. Thus, monitoring may be conducted any time of the year, but would typically be conducted during the fall through spring months when the best daytime low tides occur. Monitoring would typically occur once or twice per year at sites where black abalone are found. In recent surveys, black abalone have been observed at 13 sites on the Central California coast, 11 sites on the Northern Channel Islands, and 9 sites on San Nicolas Island.

The following activities may require contact with or disturbance of black abalone and thus would constitute a taking: touching or disturbing abalone when laying out the line for fixed plot surveys and when conducting standardized counts; touching individual abalone to measure the shell length; marking the shell with a lumber crayon; and causing abalone to move or clamp down on the substrate by touching the shell or by the person's presence. Each of these takes would be considered non-lethal.

It is possible, but unlikely, that black abalone may be accidentally stepped on during the surveys. Some trampling of the habitat may also occur while conducting the surveys. Researchers would minimize trampling effects by wearing soft-soled shoes and taking care to not walk on vulnerable species, such as mussels and abalone. Researchers would also approach the survey sites cautiously and quietly, to minimize disturbance to pinnipeds and seabirds that may be at or near the sites.

2.2.2 Black abalone tagging studies

Over 300 black abalone have been tagged with Passive Integrated Transponder (PIT) tags and visual tags at three sites on the Northern Channel Islands and one site on San Nicolas Island since 2006. The applicant proposes to increase black abalone tagging efforts by tagging up to 100 black abalone at these four sites each year over the five-year permit period. To apply the tags, the shell would first be cleaned with a small brush or cloth to remove diatoms and algae. The PIT tag would be glued to the shell using Z-spar epoxy. A visual tag (usually a numbered plastic fish tag) would also be glued to the shell using epoxy. The size of the epoxy would be approximately 2 cm wide and 0.5 cm high for PIT tags and approximately 1 to 1.5 cm wide and

1 to 2 mm high for visual tags. Care would be taken to avoid covering the respiratory pores and shell edges with the epoxy. Researchers would also smooth the edges of the epoxy to minimize any drag on the shell. Care would be taken to avoid contact with mantle tissues and to minimize the time spent on each individual abalone. Application of the tags would take approximately one to five minutes per abalone. The shell length of each tagged black abalone would be measured as described in the previous section. Black abalone ranging from 40 to 150 mm in shell length would be targeted for tagging. The PIT tags have the potential to last 20 years or longer, while the visual tags would last the life of the individual as long as the epoxy remains in place.

Tagging activities would likely be conducted in conjunction with monitoring surveys at the four sites. Additional surveys to find and re-measure tagged black abalone would be conducted up to three times per year, though in most years monitoring may only occur twice per year. PIT tags would be read using a hand-held PIT tag reader and visual tags would be read visually. Take of black abalone would occur when applying the tags to the shell and measuring the shell length. Some trampling of the habitat may occur during the surveys. Again, it is possible, but unlikely, that black abalone may be stepped on during the surveys.

2.2.3 Collection of dead or dying abalone for laboratory analysis

The applicant proposes to collect dead or obviously dying black abalone, for use in pathology and histology studies. When a dead or obviously dying black abalone is encountered during monitoring surveys, the animal would be collected and placed in a plastic bag (one individual per bag), properly labeled, immediately frozen or preserved as instructed by pathologists, and shipped to laboratories that are permitted to receive these samples. A black abalone would be considered dead or obviously dying if the individual is no longer attached to the rock, or the individual is extremely lethargic and unable to resist any pressure (i.e., the abalone does not move or clamp down on the rock in response to a person's presence or light touch on the shell, or is unable to withstand gentle pulling on the shell). Often, the body will be withered or shrunken and discolored. The collection of dead or obviously dying black abalone would constitute a take. The permit would not cover the take of black abalone by the laboratories receiving the specimens or conducting the pathology and histology studies. These activities would need to be covered under a separate ESA section 10(a)(1)(A) permit.

Table 1. A summary of the permitted take of black abalone under Alternative 2 (Proposed Action), including the research procedures resulting in take, the type of take (i.e., take action), the number of animals per year, the number of takes per animal per year, and the life stage and sex of black abalone allowed to be taken.

Procedures	Take Action	Number of animals per year	Takes per animal per year	Life Stage	Sex
Count/survey; measure shell length, observation, monitoring (including monitoring of tagged individuals)	Harass/ Sampling	5,300	Four	Adult and juvenile	Male and female
Count/survey; Mark (e.g., with an external PIT tag and/or visual tag); measure shell length	Harass/ Sampling	100	One	Adult and juvenile	Male and female
Collection and transfer/transport of dead or dying black abalone for analysis	Removal from wild (permanent)	10	One	Adult and juvenile	Male and female

CHAPTER 3 AFFECTED ENVIRONMENT

This chapter presents baseline information necessary for consideration of the alternatives and describes the resources that may be affected by the alternatives. The effects of the alternatives on the environment are discussed in Chapter 4 of this EA. The affected environment includes all of the MARINe rocky intertidal monitoring sites within California that are within the range of black abalone, from Point Arena in Northern California (Mendocino County) to the Cabrillo National Monument in Southern California (San Diego County), and including the Farallon Islands, Año Nuevo Island, and the Channel Islands. The proposed research activities could be conducted any time of the year when there are low tides, but would typically occur during the fall through spring months. Sites would typically be monitored once or twice per year, except for the four tagging sites, which may be monitored up to four times per year.

3.1 SOCIAL AND ECONOMIC ENVIRONMENT

Economic and social factors are listed in the definition of effects in the NEPA regulations. However, the definition of human environment states that "economic and social effects are not intended by themselves to require preparation of an EIS." An EA must include a discussion of a proposed action's economic and social effects when these effects are related to effects on the natural or physical environment. The social and economic effects of the proposed action mainly involve the effects on the people involved in the research, as well as any industries that support the research, such as charter vessels, and suppliers of equipment needed to accomplish the research. There are no significant social or economic impacts of the proposed action related to significant natural or physical environmental effects, so no further analyses were completed.

3.2 PHYSICAL ENVIRONMENT

The proposed research activities would be conducted in rocky intertidal habitats at the MARINe survey sites along the California coast and offshore islands. The proposed research would occur within and may affect resources within the National Marine Sanctuaries, National Parks, state parks, and designated critical habitat described in the following sections. None of the proposed research activities would be directed at or likely to impact any designated essential fish habitat. The proposed research activities also would not occur in or be likely to affect entities listed in, or eligible for listing in, the National Register of Historic Places, and would not cause loss or destruction of scientific, cultural, or historic resources.

3.2.1 National Marine Sanctuaries, National Parks, and state parks

The MARINe monitoring sites that would be surveyed under the proposed research occur within the Redwood National Park, Point Reyes National Seashore, Golden Gate National Recreation Area, Channel Islands National Park, and Cabrillo National Monument, as well as within the Gulf of the Farallones, Monterey, and Channel Islands National Marine Sanctuaries and various state parks. These areas under the National Park, National Marine Sanctuary, and state park systems contain rocky intertidal habitats important to black abalone and other intertidal species. A Scientific Research and Collection Permit would be required to carry out the proposed

research in the National Park areas. A National Marine Sanctuary Permit is required to conduct activities that would otherwise be prohibited or restricted within the National Marine Sanctuary areas. A scientific collecting permit from the California Department of Parks and Recreation is required to conduct most scientific activities regarding natural resources that involve field work, specimen collection, and the potential to disturb resources or visitors within the California state parks.

3.2.2 Essential Fish Habitat

EFH has been designated for many of the fish species within the action area. Details of the designations and descriptions of the habitats are available in the Pacific Fishery Management Plans. Activities that have been shown to affect EFH include disturbance or destruction of habitat from stationary fishing gear, dredging and filling, agricultural and urban runoff, direct discharge, and the introduction of exotic species. None of the activities in the Proposed Action are directed at or likely to adversely affect any designated EFH.

3.2.3 Designated Critical Habitat

The MARINe monitoring sites to be surveyed under the proposed research include designated critical habitat areas for the Steller sea lion (*Eumetopias jubatus*) in California (i.e., Steller sea lion rookeries on Southeast Farallon Island, Año Nuevo Island, Sugarloaf Island, and Cape Mendocino; FR 45269, 27 August 1993; 50 CFR §226.12). The potential effects of the proposed research activities on Steller sea lion critical habitat, as well as on Steller sea lions, must be evaluated under section 7 of the ESA.

On 28 September 2010, NMFS proposed the designation of critical habitat for black abalone in rocky intertidal habitats along the California coast from the Del Mar Landing Ecological Reserve to the Palos Verdes Peninsula and along the coasts of the Farallon Islands, Año Nuevo Island, and the Channel Islands (75 FR 59900). The proposed critical habitat designation includes a large portion of the MARINe survey sites within which the proposed research activities would be conducted. The potential effects of the proposed research activities on proposed black abalone critical habitat, as well as on black abalone, must be evaluated under section 7 of the ESA.

3.3 BIOLOGICAL ENVIRONMENT

In addition to the species that is the subject of the permit (the target species), a wide variety of non-target species could be found within the affected environment, including other marine invertebrates, marine algae, marine mammals, and seabirds. Because merely being present within the affected environment does not necessarily mean a marine organism will be affected by the proposed action, the following discussion focuses not only on the distribution and abundance of various species with respect to the timing of the action, but also on whether and by what means the proposed research activities may affect the non-target species.

3.3.1 Target Species – Endangered Black Abalone

Black abalone are the subject of the proposed action. The black abalone is a marine gastropod, characterized by a soft body, a univalve shell, and a large muscular foot, which the animal uses to move as well as to clamp down on hard substrates to avoid being dislodged by wave action or predators. Black abalone can grow as large as 220 mm in shell length (*Glenn VanBlaricom*

(USGS), Melissa Neuman (NMFS), and David Witting (NMFS), unpublished observations cited in VanBlaricom et al. 2009), although the asymptotic size appears to be about 140 mm (*Leighton 2005*). The life expectancy of black abalone is unknown, but may range anywhere from 25 to 75 years (*Smith et al. 2003*). Black abalone occur in coastal and offshore rocky intertidal habitats to about six meters depth, with most individuals observed in mid to low intertidal habitats with complex surfaces and deep crevices (*Leighton 1959; Leighton and Boolootian 1963; Douros 1985, 1987; Miller and Lawrenz-Miller 1993; VanBlaricom 1993; Haaker et al. 1995; Leighton 2005*). Black abalone are broadcast spawners, with a peak spawning season generally occurring between spring and early autumn (*Leighton 1959; Leighton and Boolootian 1963; Webber and Giese 1969; Lafferty et al. 2004; Leighton 2005*). Abalone larvae have limited dispersal capacity, remaining in the plankton for only about three to ten days before settlement and metamorphosis (*McShane 1992*). Early (post-larval) life stages are believed to settle in rocky intertidal habitats with crustose coralline algae (*Douros 1985; Morse 1992*) and to feed on epilithic microbial and possibly diatom films, shifting to macrophytes as they grow (*Leighton 1959; Leighton and Boolootian 1963; Bergen 1971*). Drift fragments of macroalgae are the primary food sources for adult black abalone (*Webber and Giese 1969; Bergen 1971; Hines and Pearse 1982; Douros 1987*), with the primary species being *Macrocystis pyrifera* and *Egregia menziesii* in Southern California (i.e., south of Point Conception) and *Nereocystis leutkeana* in Central and Northern California.

Long-term black abalone monitoring surveys have been conducted throughout the Central and Southern California coasts since the 1980s, providing valuable data on black abalone population status and trends. Black abalone are one of several "target species" specifically selected for long-term monitoring under the MARINe program. Black abalone have been found at 33 of the MARINe sites in California, including 13 sites on the Central California coast ranging from Point Arena to Government Point, 11 sites on the Northern Channel Islands, and 9 sites on San Nicolas Island.

NMFS listed black abalone as endangered under the ESA on 14 January 2009 (74 FR 1937). The primary threat to the species was identified to be the disease called withering syndrome, which has caused mass mortalities and dramatic declines (most often greater than 90%) in all populations south of Cayucos and is moving progressively northward along the California coast (*Tissot 2007*). Withering syndrome is caused by a Rickettsiales-like prokaryote (RLP) (*Gardner et al. 1995; Friedman et al. 1997a; Friedman et al. 2000; Friedman et al. 2002*). The main symptoms of the disease include pedal atrophy, epipodial and mantle discoloration, lack of response to tactile stimulation, and diminished ability to maintain a grip on rocky substrata (*Haaker et al. 1992; Lafferty and Kuris 1993; Richards and Davis 1993*). Often, the appearance of symptomatic individuals at a site is followed by rapid and dramatic declines in population size (*Tissot 2007*). Most populations that have been affected by the disease remain at very low densities compared to pre-disease levels, or have gone locally extinct (*Tissot 2007*). However, post-disease recruitment has been observed at two long-term monitoring sites, one on Santa Cruz Island and one on San Nicolas Island, indicating the potential for localized resilience and recovery (*Tissot 2007*).

Black abalone populations have also been affected by historical fishing. Evidence from middens indicates human exploitation of black abalone at the Southern California Channel Islands and

along Central California beginning about 10,500 years ago and 5,000 years ago, respectively (*VanBlaricom et al. 2009*). An intertidal fishery for red abalone (*Haliotis rufescens*), green abalone (*H. fulgens*), and black abalone began in California in the 1850s, peaking in 1879 (*Cox 1962*), but eventually closing in 1913 due to concerns regarding overfishing (*Bonnot 1930*). From 1913 to 1928, commercial and recreational dive fisheries developed, but black abalone were not documented prior to 1940. Black abalone were not intensively harvested until after other more marketable species were depleted. Due to concerns regarding severe population declines, both the commercial and recreational fisheries for black abalone were closed in 1993, followed by the closure of all abalone fisheries south of San Francisco in 1997. Rogers-Bennett *et al.* (*2002*) estimated that approximately 3.5 million black abalone were harvested during the peak decade of black abalone commercial fishing from 1972 to 1981, with an additional 6,729 black abalone harvested in the recreational fishery during that period. Assuming that the population was at least as large as the number harvested in the fishery, Rogers-Bennett *et al*. (*2002*) estimated a baseline minimum abundance of 3.54 million black abalone prior to overexploitation and withering syndrome. However, this estimate was based on data from a period when black abalone populations were at extraordinarily high abundances (most likely due to the elimination of subsistence harvests by indigenous peoples and predation by sea otters) and may not accurately represent baseline population levels. Other factors that may be affecting black abalone populations include predation and competition, illegal harvest, habitat alterations following the decline or local extinction of black abalone, discharge of contaminants into nearshore marine waters, and increased water temperatures (which is believed to increase the virulence of withering syndrome; *Friedman et al. 1997b; Raimondi et al. 2002; Harley and Rogers-Bennett 2004; Vilchis et al. 2005*).

3.3.2 Non-Target Species

Several other species of marine invertebrates, algae, marine mammals, and seabirds occur within or near the survey areas and may be affected by the proposed research activities. The species and their status, distribution, and habitat use are described in the following sections.

3.3.2.1 Marine Invertebrates and Algae

Rocky intertidal habitats along the California coast support diverse marine invertebrate and algal communities. In addition to monitoring black abalone populations within the affected environment, the MARINe program has monitored the presence and abundance of specific *targeted species* (species or species groups specifically chosen for long-term monitoring), *core species* (species that are important in understanding abundance trends of targeted species), and *optional species* (species that have a limited range or may only be important for specific conditions at a few MARINe sites). These species are listed in Tables 2 and 3. These species co-occur with black abalone at the MARINe survey sites and may be affected by the proposed research activities.

Table 2. Marine invertebrate species monitored at MARINe sites, in addition to black abalone. Targeted species are in bold font and marked with an asterisk (*).

CATEGORY	SCIENTIFIC NAME
ANEMONES	***Anthopleura elegantissima/sola* (Green anemone) ***
POLYCHAETE WORMS	*Phragmatopoma californica*
MOLLUSKS	*Acanthina spp.*
	Fissurella volcano
	Katharina tunicate
	Lepidochitona hartwegii
	Littorina spp.
	Lottia gigantea (Owl limpet) *
	Mopalia spp.
	Mytilus californianus (California mussel) *
	Nucella emarginata
	Nucella canaliculata
	Nuttalina spp.
	Ocenebra circumtexta
	Septifer/Brachydontes
	Tegula brunnea
	Tegula funebralis
	Tegula gallina
	Tegula spp.
	Limpets
	Chitons
BARNACLES	***Balanus glandula* (Northern barnacle) ***
	***Chthamalus dalli/fissus* & *Balanus glandula* (White barnacle) ***
	***Pollicipes polymerus* (Goose barnacle) ***
	***Semibalanus cariosus* (Thatched barnacle) ***
	***Tetraclita rubescens* (Pink barnacle) ***
	Other barnacles
ECHINODERMS	*Asterina miniata*
	Henricia spp.
	Pisaster giganteus
	***Pisaster ochraceus* (Ochre star) ***
	Pycnopodia helianthoides
	Strongylocentrotus purpuratus
CRUSTACEANS	*Ligia occidentalis*
	Pachygrapsis crassipes
	Pagurus spp.

Table 3. Marine algal species monitored at MARINe sites. Targeted species are in bold font and marked with an asterisk (*).

CATEGORY	SCIENTIFIC NAME
GREEN ALGAE	*Cladophora columbiana*
	Ulva/Enteromorpha
	Other green algae
BROWN ALGAE	*Colpomenia peregrine*
	Dictyota spp/Pachydictyon coreacium
	***Egregia menziezii* (Boa kelp) ***
	Eisenia arborea
	Endarachne/Petalonia
	***Fucus gardneri* (= *F. distichus*) (Northern rockweed)** *
	Halidrys dioica/Cystoseira spp.
	***Hedophyllum sessile* (Sea cabbage) ***
	***Hesperophycus californicus* (= *H. harveyanus*) (Olive rockweed) ***
	***Pelvetiopsis limitata* (Dwarf rockweed) ***
	***Postelsia palmaeformis* (Northern sea palm) ***
	Sargassum muticum
	Scytosiphon spp.
	***Silvetia compressa* (= *Pelvetia fastigiata*) (Golden rockweed) ***
	Taonia lennebackeriae
	Zonaria farlowii
	Zonaria spp.
RED ALGAE	*Chondracanthus canaliculatus* (= *Gigartina canaliculata*)
	***Endocladia muricata* (Turfweed) ***
	Gastroclonium subarticulatum
	Gelidium coulteri/pusillum/Pterocladiella spp.
	Gelidium spp.
	***Mastocarpus papillatus* (blade)(Turkish washcloth) ***
	Mazzaella affinis (= *Rhodoglossum affine*)
	***Mazzaella spp.* (= *Iridaea spp.*) (Iridescent weed) ***
	***Neorhodomella larix* (Black pine) ***
	Plocamium cartilagineum
	Porphyra sp.
	Prionitis
	Articulated corallines (erect corallines)
	Crustose corallines (encrusting corallines)
	Filamentous red algae
OTHER ALGAE/PLANTS	***Phyllospadix scouleri/torreyi* (Surfgrass) ***
	Non-coralline crusts (reds and browns)
	Other plants/algae

3.3.2.2 Marine Mammals

Several species of marine mammals may occur at or near the MARINe survey sites and may be affected by the proposed research activities, including: Northern elephant seals (*Mirounga angustirostris*), Pacific harbor seals (*Phoca vitulina*), Northern fur seals (*Callorhinus ursinus*; San Miguel Island stock), Guadalupe fur seals (*Arctocephalus townsendi*), Steller sea lions (*Eumetopias jubatus*; eastern Distinct Population Segment (DPS)), California sea lions (*Zalophus californianus*), and Southern sea otters (*Enhydra lutris nereis*). As described in Chapter 1 of this draft EA, all marine mammals are protected under the MMPA and some may be listed as threatened or endangered under the ESA.

Steller sea lions (eastern DPS) are listed as threatened under the ESA and depleted throughout their range under the MMPA. Steller sea lions occur throughout California as far south as Point Conception. Breeding occurs in late June at locations ranging from the Pribilof Islands, Alaska, to Año Nuevo Island, California (*Leet et al. 2001*). Steller sea lions have been observed at haulout and rookery sites along the California coast from June through August (*NMFS 2007*). Haulout and rookery sites consist of beaches (gravel, rocky, or sandy), ledges, and rocky reefs.

Guadalupe fur seals are listed as threatened under the ESA and depleted throughout their range under the MMPA. Guadalupe fur seals are considered rare in California waters. Populations primarily occupy Guadalupe Island, Mexico, with small populations on San Benito Island, Baja California, and on San Miguel Island, California. Some have also been sighted on San Nicolas Island (*Stewart and Yochem 1984*). The species mainly breeds on Guadalupe Island and San Benito Island from June through August.

Southern sea otters are also listed as threatened under the ESA and depleted under the MMPA. Southern sea otters occur in offshore coastal waters from Half Moon Bay to Point Conception along the central and southern California coast (*U. S. Fish and Wildlife Service 2003*). Some sightings of Southern sea otters have been reported off Baja California. The species historically occurred throughout the Channel Islands and was recently reintroduced to San Nicolas Island.

Northern elephant seals, Pacific harbor seals, Northern fur seals, and California sea lions are protected under the MMPA. Each of these species occurs throughout the California coast except for Northern fur seals, which occur on San Miguel Island. Northern elephant seals spend about nine months of the year out at sea. Breeding occurs from December through March on San Miguel Island, Santa Barbara Island, San Nicolas Island, San Simeon Island, Año Nuevo Island, Southeast Farallon Island, and Point Reyes Peninsula (*Leet et al. 2001*). Sandy beaches are the preferred habitat for hauling out. Pacific harbor seals haul out and pup on rocks, reefs, and beaches. Pacific harbor seals breed from March to May at the Channel Islands and at locations along the U.S. West Coast (*Leet et al. 2001*). California sea lions breed from May to August in areas from the Channel Islands to Central Mexico. California sea lions prefer to haul out on sandy beaches. The San Miguel Island Northern fur seal stock occurs only on San Miguel Island from about May through November. Pupping occurs from May to June and breeding takes place shortly after.

3.3.2.3 Seabirds

Several species of seabirds may be encountered when conducting the proposed research activities. The most common seabirds that may be encountered on the reefs are black oystercatchers (*Haematopus bachmani*) and black turnstones (*Arenaria melanocephala*). Some species of seabirds nest near or on rocky intertidal habitats, or on cliffs or bluffs along the shoreline, including Black oystercatchers, Brandt's cormorants (*Phalacrocorax penicillatus*), pelagic cormorants (*Phalacrocorax pelagicus*), and western gulls (*Larus occidentalis*). The proposed research activities are generally not conducted during the nesting season for these species.

Western snowy plovers (*Charadrius alexandrinus nivosus*), an ESA threatened species, nests on sandy beaches and could be encountered by researchers when accessing a site. Their presence is usually known, however, and can be avoided (e.g., by taking a different route to the site or only conducting monitoring activities when snowy plovers are not present). The marbled murrelet (*Brachyramphus marmoratus marmoratus*), a threatened species under the ESA, could also potentially be encountered; however, effects on the species would not be expected, because the proposed research activities would not occur in habitats typically used for nesting or feeding.

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

This chapter presents the scientific and analytic basis for comparison of the direct, indirect, and cumulative effects of the alternatives. The CEQ's regulations for implementing the provisions of NEPA require consideration of both the context and intensity of a proposed action (40 CFR Parts 1500-1508). As stated in section 3.1 of this EA, the alternatives are not expected to result in effects on the social or economic environment. Thus, this chapter does not discuss any social or economic effects, but focuses on the potential effects of the alternatives on the physical and biological environment.

4.1 EFFECTS OF ALTERNATIVE 1: No Action Alternative

Under the No Action alternative, no permit would be issued for the take of black abalone in the course of the research activities proposed in the permit application. Under this alternative, ongoing rocky intertidal surveys could continue under the MARINe program, resulting in effects on the physical and biological environment. The effects would not be expected to be significant. The black abalone monitoring components of the surveys would need to be modified, as described below, to avoid take of black abalone. These modifications to the black abalone research and monitoring activities may limit the ability of researchers to monitor and assess the status and recovery of black abalone populations as well as the spread of withering syndrome. Thus, over the long-term, the No Action alternative may result in negative effects on the recovery of black abalone populations.

4.1.1 Effects on the Physical Environment

Under the No Action alternative, MARINe researchers would be required to modify their activities concerning black abalone to avoid take, but would be able to continue their ongoing rocky intertidal monitoring programs. Research activities associated with the MARINe program that may affect the physical environment include walking on rocky intertidal substrates, installing bolts to mark survey sites, and installing research and monitoring equipment (e.g., temperature loggers, settlement substrates for invertebrates) to the rocky substrate. These activities may result in some trampling and disturbance of the rocky reefs. Studies have shown that although rocky intertidal communities are resilient, human trampling can result in reduced species richness and diversity, as well as an increased proportion of bare rock (*Smith and Murray 2005; Van De Werfhorst and Pearse 2007*). The level of trampling and disturbance associated with the monitoring programs is expected to be low, however, based on the infrequency of monitoring surveys per year and the small area needed for installation of bolts and equipment (ranging from one square inch to a few square inches). Thus, the No Action alternative would not be expected to result in significant effects on the physical environment. MARINe researchers must continue to comply with existing regulations and obtain applicable permits, such as National Marine Sanctuary permits and state permits.

4.1.2 Effects on the Biological Environment

Under the No Action alternative, the take of black abalone in the course of the proposed research activities would continue to be prohibited. The proposed research activities would need to be modified to avoid that take. First, MARINe researchers would still be able to conduct black

abalone surveys, but would be limited to visual counts and visual estimates of shell length. Due to the cryptic nature of black abalone, some black abalone may not be counted. In addition, visual estimates of shell length are likely to be less accurate than direct measurements. Second, researchers would no longer be able to conduct tagging studies, hindering the ability to monitor the movement, growth, habitat selection, and survival of individual black abalone. Finally, researchers would not be able to collect dead or dying black abalone, limiting studies on withering syndrome and its effects on black abalone in the wild, as well as allowing the dead or dying abalone to continue spreading the disease. Although take of black abalone would be avoided, over the long-term, the inability to conduct black abalone research and monitoring activities as proposed in the permit application may hinder further understanding of the biology and population status of black abalone and reduce NMFS' ability to recover the species.

MARINe activities conducted under the No Action alternative may affect other species in the affected environment. Of the seven marine mammal species that may occur in and around the rocky intertidal monitoring sites, MARINe researchers are most likely to encounter California sea lions and Pacific harbor seals. Northern elephant seals may be encountered at the islands and at some sites along Central California. These pinnipeds are usually found on sandy beaches adjacent to rocky intertidal habitats. The presence of people in the area during survey activities may disturb these species by causing those that have hauled-out on the reef or on nearby beaches to move into the water. Pacific harbor seals would be the first to flee, followed by California sea lions. Some Northern elephant seals may move into the water, but many are undisturbed by human presence. Where possible, care would be taken to avoid disturbing pinnipeds, particularly Pacific harbor seals. At sites where disturbance is necessary (i.e., pinnipeds are hauled-out on the reef or on adjacent shoreline habitats), MARINe researchers would minimize disturbance by approaching the animals cautiously to avoid surprising them and causing a stampede. Researchers would also avoid disturbing California sea lions and Pacific harbor seals during pupping seasons. Mother and pup pairs of Northern elephant seals may be encountered at some sites, particularly on San Nicolas Island, from January through March. The numbers encountered are few, however, and harassment can be avoided by approaching the study sites cautiously, given the Northern elephant seals' higher tolerance for human presence compared to California sea lions and Pacific harbor seals.

Harassment of Pacific harbor seals, California sea lions, and Northern elephant seals as a result of black abalone research activities at San Nicolas Island have been covered under an Incidental Harassment Authorization (IHA) issued under the MMPA (IHA issued to Glenn VanBlaricom, U.S. Geological Survey, on 18 January 2008). The IHA included several mitigation measures, such as selecting pathways of approach to study sites to minimize the number of marine mammals harassed and avoiding visits to sites with resident pinnipeds during breeding and lactation periods from mid-February through October. Any harassment of these pinniped species as a result of black abalone research activities at other sites must also be covered under an IHA.

Steller sea lions, Guadalupe fur seals, and Northern fur seals are not likely to be encountered at the sites because monitoring activities would not be conducted during times of year when these species are typically present. Southern sea otters may be observed in offshore waters at some sites, but are not expected to come ashore when research activities are being conducted. However, if any ESA-listed species (i.e., Steller sea lions, Guadalupe fur seals, or Southern sea

otters) are sighted ashore at or near the monitoring sites, the researchers would suspend all research activities and immediately vacate the site occupied by the species, in order to avoid harassment of the animals. Based on this information, the No Action alternative is not expected to result in effects on Steller sea lions, Guadalupe fur seals, Northern fur seals, or Southern sea otters.

As described in Chapter 3 of this EA, several species of seabirds may be encountered at the monitoring sites. The presence of people at the sites may disturb these seabird species. The level of disturbance to seabirds is expected to be low, however, because monitoring activities are generally not conducted during the nesting season for these species and these species typically reside outside of the survey sites above the high tide line or on cliffs or bluffs. Researchers would select routes of approach to the monitoring sites to avoid seabird nesting areas, such as beaches where Western snowy plovers nest. Researchers would also suspend research activities and avoid or immediately vacate sites occupied by nesting seabirds.

In addition, trampling and disturbance of marine invertebrate and algal communities on the reefs may occur when conducting the surveys and installing bolts or equipment into rocky substrate. Due to the infrequency of the surveys and the small area needed for installation of bolts and equipment, however, the effects on marine invertebrate and algal communities is expected to be low. MARINe researchers would avoid walking on vulnerable species such as mussels and generally use soft-soled shoes to minimize crushing invertebrates and algae.

Overall, the No Action alternative would not be expected to have a significant effect on other marine invertebrate, algal, marine mammal, or seabird species. MARINe researchers must continue to comply with existing regulations and obtain any permits that may be required to address the potential effects on these species, such as MMPA, ESA, and MBTA permits.

4.2 EFFECTS OF ALTERNATIVE 2: Issue permit with standard conditions

Under Alternative 2 (the Proposed Action and preferred alternative), a permit would be issued to authorize the take of black abalone in the course of the proposed research activities, with standard permit terms and conditions (see Section 2.2 of this EA). The proposed black abalone research activities would be conducted as part of the ongoing MARINe rocky intertidal surveys. The effects of Alternative 2 on the physical and biological environment would be similar to the effects under the No Action alternative. The main difference would be that under Alternative 2, black abalone research and monitoring activities would be conducted as proposed, resulting in take of black abalone. This take would be expected to result in a low level of disturbance to black abalone individuals and populations. The information generated as a result of the proposed research, however, would be valuable to the assessment of the status, trends, and recovery of black abalone populations. Thus, Alternative 2 would not be expected to result in significant adverse effects on the physical and biological environment and would be expected to result in benefits to black abalone.

4.2.1 Effects on the Physical Environment

The effects on the physical environment under Alternative 2 would be similar to the effects under the No Action alternative. The ongoing MARINe surveys would continue, with black

abalone research conducted as proposed in the permit application. The potential for trampling and disturbance of the rocky intertidal sites would be the same as described under the No Action alternative, with a similar low level of disturbance expected. Under Alternative 2, researchers would be permitted to survey each site up to four times per year. However, at most sites except for the four tagging sites, researchers would expect to conduct surveys up to two times per year. At the four tagging sites, researchers may conduct surveys up to four times per year to allow for tagging and monitoring of tagged black abalone. This increase in the frequency and/or duration of the surveys would not be expected to be significant (e.g., up to four surveys at each site per year) and would not be expected to result in a significant increase in the level of disturbance anticipated. Thus, Alternative 2 would not be expected to result in significant effects on the physical environment. MARINe researchers must continue to comply with existing regulations and obtain applicable permits, such as National Marine Sanctuary permits and state permits.

4.2.2 Effects on the Biological Environment

Under Alternative 2, a permit would be issued to authorize the take of black abalone (see Table 1 in Chapter 2 of this EA), in the course of the proposed research activities as described in the permit application. Authorized take under this permit would include: (1) touching black abalone during abalone counts and when measuring the shell length; (2) touching black abalone when applying tags or marking the shell during abalone counts; and (3) collecting dead or dying black abalone. Black abalone juveniles and adults of both sexes would be subject to take. Take of black abalone during abalone counts, shell length measurements, and tagging studies would be non-lethal. Black abalone would most likely respond by temporarily clamping down tightly onto the substrate. Rarely, an abalone may become active and move after the disturbance, which could expose it to greater risk by predators or being dislodged by waves, but more often would result in the abalone seeking shelter and better protection. These responses may result in mild stress to the abalone. The presence of the epoxy and tag on the abalone shell would not be expected to affect the movement, growth, or normal functions of tagged individuals, because of the similarity in size to barnacles that sometimes encrust on abalone shells. The collection of dying black abalone would be considered lethal take, but the individuals would have died due to the disease regardless of whether or not they were collected. In addition, collection of dying abalone would remove diseased individuals from the population and potentially reduce the spread of the disease. Researchers would use specific criteria (i.e., no longer attached to the substrate; no response to a person's presence or light touch; inability to resist gentle pulling on the shell; withered and discolored foot muscle; see Section 2.2.3 of this EA) to correctly identify individuals exhibiting symptoms of withering syndrome. Although the applicant is requesting authorization to collect up to ten dead or dying black abalone, it should be noted that an increase in the take number would not cause an adverse impact to the species, for the reasons as described above. Overall, Alternative 2 would not be expected to result in significant adverse effects on black abalone populations. Alternative 2 would be expected to result in benefits to black abalone by allowing the collection of data that would contribute valuable information on black abalone biology and population status and trends to inform recovery of the species.

Similar to the No Action alternative, Alternative 2 would be expected to result in a low level of disturbance to other marine invertebrate, algal, marine mammal, and seabird species within the affected environment. An extra level of disturbance may result under Alternative 2 due to an increase in the frequency and/or duration of the surveys, particularly at the four tagging sites.

However, this increase in the frequency and/or duration of the surveys would not be expected to result in a significant increase in the level of disturbance anticipated. Thus, Alternative 2 would not be expected to result in a significant effect on other marine invertebrate, algal, marine mammal, or seabird species. MARINe researchers must continue to comply with existing regulations and obtain any permits that may be required to address the potential effects of the action on these species, such as MMPA, ESA, and MBTA permits.

4.3 SUMMARY OF COMPLIANCE WITH APPLICABLE LAWS, NECESSARY FEDERAL PERMITS, LICENSES, AND ENTITLEMENTS

As summarized below, NMFS has determined that the proposed research activities are consistent with the purposes, policies, and applicable requirements of the ESA, MMPA, and NMFS regulations. NMFS issuance of the permit would be consistent with the ESA and MMPA. The applicant has secured or will apply for necessary permits under the MMPA to cover effects on marine mammal species.

4.3.1 Endangered Species Act

The issuance of a scientific research permit by NMFS to the Channel Islands National Park for takes of black abalone in the wild (i.e., Alternative 2 or the Proposed Action) is subject to consultation under section 7 of the ESA. This section summarizes conclusions resulting from this consultation. For the purpose of the consultation, this draft EA represented NMFS' assessment of the potential biological impacts of the No Action alternative and Alternative 2 (the Proposed Action).

After reviewing the current status of the endangered black abalone, the environmental baseline for the action area, the effects of the proposed research and the knowledge to be gained from the proposed research, it is NMFS' biological opinion that the issuance of Permit No. 14400 and the scientific research activities it authorizes is not likely to jeopardize the continued existence of black abalone in the wild. It is also NMFS' conference opinion that the issuance of Permit No. 14400 and the scientific research activities it authorizes is not likely to destroy or adversely affect areas proposed for designation as critical habitat for black abalone.

4.3.2 Marine Mammal Protection Act

As described in Section 4.2 of this EA, marine mammal species that may be encountered and affected by the proposed research activities include Northern elephant seals, Pacific harbor seals, and California sea lions. Guadalupe fur seals, Northern fur seals, and Steller sea lions occur in the affected environment, but are generally not present during the times of year when the proposed research activities would be conducted. Southern sea otters also occur in the affected environment, but generally occur offshore and would not be expected to come onshore when researchers are conducting research activities. MARINe researchers must obtain an IHA under the MMPA to address effects on Northern elephant seals, Pacific harbor seals, and California sea lions. These IHAs would contain standard terms and conditions as stipulated in the MMPA and NMFS' regulations, and would specify: (1) the effective date of the IHA; (2) the number and kinds (species and stock) of marine mammals that may be taken; (3) the location and manner in which they may be taken; and (4) other terms and conditions deemed appropriate, including measures to minimize the potential adverse impacts of the specific activities, monitoring of

impacts, and reporting requirements. An IHA has been issued to Glenn VanBlaricom, U.S. Geological Survey (2008), authorizing the harassment of Pacific harbor seals, California sea lions, and Northern elephant seals on San Nicolas Island as a result of black abalone research activities. The Channel Islands National Park is in the process of obtaining an IHA to address the harassment of these pinnipeds as a result of black abalone survey activities on the northern Channel Islands.

4.3.3 Migratory Bird Treaty Act

Seabird species may be affected by the proposed research activities. MBTA permits are not required, however, because research activities are generally not conducted when seabirds are nesting and seabirds typically nest higher on the rocks, outside of the survey areas. If seabirds are found to be nesting at or near the sites, researchers would suspend research activities and avoid or immediately vacate those sites.

4.3.4 National Marine Sanctuaries, National Parks, and State Parks

Because the MARINe monitoring sites occur within National Marine Sanctuaries, National Parks, and state parks, permits may be required to conduct the proposed research activities. In particular, permits may be required to install bolts or research equipment into the rocky substrate. MARINe researchers have been working in collaboration with the National Marine Sanctuaries on monitoring activities, precluding the need for any special use permits. MARINe researchers will obtain any other permits that may be required from the appropriate agencies.

4.3.5 Magnuson-Stevens Fishery Conservation and Management Act

The proposed research activities would occur within areas defined as EFH for several fish species within the affected environment. As described above, the proposed research activities would result in a low level of disturbance to the physical and biological environment. Based on discussions with EFH experts in the NMFS Southwest Region Habitat Conservation Division, it was determined that the proposed research activities are not likely to adversely affect EFH and consultation regarding effects on EFH is not required.

4.4 COMPARISON OF ALTERNATIVES

Neither the No Action alternative or Alternative 2 (Proposed Action) would be expected to result in significant adverse effects on black abalone and its habitat or on other aspects of the physical and biological environment. Both the No Action alternative and Alternative 2 would be expected to result in low levels of disturbance to the physical environment and to marine invertebrate, algal, marine mammal, and seabird species found within the affected environment. The primary difference between the two alternatives is that under the No Action alternative, no take of black abalone would be expected to occur, whereas under Alternative 2 take of black abalone would be expected. Although no take of black abalone is expected under the No Action alternative, modifications to research activities to avoid take of black abalone may limit the ability to assess and recover black abalone populations. Under Alternative 2, non-lethal take of black abalone may cause short-term, mild stress to individuals, but would not be expected to result in significant adverse effects on individuals or populations. Over the long-term, proposed research activities conducted under Alternative 2 would be expected to generate valuable information necessary to assess the status of and trends in black abalone populations and to

inform recovery of the species. Table 4 provides a comparison of the two alternatives with regard to the expected effects on the affected environment and potential to achieve the stated purpose and objectives of the proposed research activities.

Table 4. Comparison of the effects of the No Action alternative and Alternative 2 (Proposed Action).

	No Action Alternative	Alternative 2 (Proposed Action)
Physical Environment	Low level of disturbance expected from trampling and installation of bolts and equipment for surveys.	Low level of disturbance expected from trampling and installation of bolts and equipment for surveys.
Biological Environment – Black Abalone	No take of black abalone is expected.	Non-lethal take of black abalone is expected to result in short-term, mild stress to individuals. Removal of dying abalone would constitute lethal take, but only abalone that are obviously dying of withering syndrome would be collected.
Biological Environment – Other Species	Low level of habitat trampling and human disturbance to marine mammals and seabirds.	Low level of habitat trampling and human disturbance to marine mammals and seabirds.
Potential to Achieve the Stated Purpose and Objectives of the Proposed Research Activities	The inability to conduct tagging studies would limit the study of individual black abalone growth, survival, habitat selection, and movement. The inability to collect dead or dying abalone would limit monitoring of withering syndrome. Limiting surveys to visual counts and size estimates may affect the accuracy or consistency of the data.	Conducting the proposed research as described in the permit application would likely achieve the stated purpose and objectives of gaining fundamental knowledge of several aspects of black abalone status, ecology, and habitat preference (e.g., population density, size frequency, and trends; individual growth, survival, habitat selection, and movement) to inform species recovery.
Potential for Adverse Impacts on Black Abalone Individuals and Populations	Although no take of black abalone would be expected, restrictions on the proposed research activities may preclude adequate assessment of population ecology, status, and trends. This may limit the ability to manage and recover black abalone.	Non-lethal take under this alternative would not be expected to adversely impact black abalone individuals or populations. Lethal take of dead or dying abalone would not be expected to adversely impact black abalone populations. The information gained through the proposed research activities would benefit black abalone by contributing to the assessment of black abalone ecology, population status and trends, and recovery.

4.5 MITIGATION MEASURES

Under the No Action alternative, no permit would be issued and thus no mitigation measures would be required. Under Alternative 2 (Proposed Action), the permit would require the permit holder and researchers under the permit to follow certain procedures in order to minimize and mitigate any effects of the proposed research activities on black abalone and other ESA-listed

species. The permit holder and other researchers under the permit must also abide by the conditions and measures specified within the permit application. These conditions and measures contained in the permit and in the permit application are described below.

- *Monitoring methods*: Researchers would use non-destructive search methods (i.e., boulders are not rolled, rocks are not broken apart, and organisms are not removed) when conducting monitoring surveys. Care would be taken to avoid touching the mantle when measuring abalone with calipers. Contact and time spent with each individual abalone would be minimized. Researchers should wash all field gear and equipment with fresh water between survey sites to avoid the potential introduction and spread of disease and non-indigenous species between sites.
- *Tagging methods*: Researchers would avoid covering the respiratory pores and shell edges when applying the tags and epoxy to abalone shells. The edges of the epoxy would be smoothed to reduce tag loss as well as any drag on the shell. Abalone would not be removed from the substrate for tagging. Contact and time spent with each individual abalone would be minimized.
- *Minimizing effects on other species and the habitat*: Researchers would avoid walking on vulnerable species like mussels and would wear soft-soled shoes to minimize crushing of invertebrates and algae on the reefs. Researchers would approach monitoring sites slowly and quietly to avoid disturbing marine mammals and seabirds nearby. If researchers encounter ESA-listed species other than black abalone, they must exercise caution and remain a safe distance from the animals to avoid take.
- *Authorized take of black abalone is exceeded or mortality occurs*: The permit holder and researchers under the permit must suspend permitted activities if the authorized number of takes (Table 1) of black abalone is exceeded, or if mortality of black abalone occurs. The permit holder must notify NMFS within two business days and must submit a written incident report for review by the NMFS Permits Division. Permitted activities may not resume until the NMFS Permits Division grants authorization.
- *Transfer of biological samples*: Written approval by the NMFS Office of Protected Resources is required prior to the transfer of any biological samples from the permit holder to researchers other than those specifically identified in the application.
- *Maintenance of biological samples*: All biological samples obtained shall be identified by a unique number and maintained according to accepted curatorial standards. After completion of initial research goals, remaining samples shall be maintained by the permit holder or deposited into a bona fide scientific collection that meets minimum standards of collection, curation, and data cataloguing as established by the scientific community.
- *Commercial culture and sale*: Commercial culture and sale of black abalone (including black abalone parts, such as shells) is forbidden.
- *Notification and coordination*: The permit holder must provide written notification of planned field work to NMFS at least two weeks prior to initiation of a field trip or field season. To the maximum extent practical, the permit holder must coordinate permitted activities with activities of other permit holders conducting the same or similar activities on the same species, in the same locations, or at the same times of year to avoid unnecessary disturbance of animals. If a mass mortality of black abalone is detected, researchers should notify NMFS of the location(s) and potential cause(s) of the mass mortality as soon as possible.

- *Inspections*: At the request of NMFS, the permit holder must cooperate with review of permitted activities by a NOAA employee, or a person designated by NMFS, and provide all documents or other information relating to the permitted activities.

The implementation of these mitigation measures would avoid adverse impacts on black abalone. These measures ensure that permitted activities are suspended and NMFS is notified if the authorized take is exceeded or mortality of black abalone occurs due to the proposed research activities under the permit. NMFS may then work with the permit holder to review the protocols and determine whether and how the permitted activities should continue to avoid adverse impacts on the species. The research measures and conditions as described in the permit and permit application would avoid and minimize effects on black abalone, other species in the area, and the habitat. The measures regarding the transfer and maintenance of biological samples obtained or collected under the permit would ensure that accepted protocols are used and samples are properly stored for future use. Notification and coordination measures ensure that researchers limit unnecessary disturbance to the species. Finally, these measures provide NMFS a means to inspect and review the permitted activities if needed. No irreversible or irretrievable commitments of resources are expected under the issuance of the proposed permit as described under Alternative 2.

4.6 UNAVOIDABLE ADVERSE EFFECTS

No unavoidable adverse effects are expected to occur under the No Action alternative or Alternative 2. Neither alternative would be expected to result in significant adverse effects on black abalone or its habitat, or on other aspects of the physical and biological environment.

4.7 CUMULATIVE EFFECTS

Cumulative effects are defined as those that result from the incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (federal or non-federal) or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions that take place over a period of time. The cumulative effects on black abalone and its habitat, as well as on other aspects of the physical and biological environment, are described below. Although other actions may affect black abalone and the physical and biological environment, the proposed issuance of the scientific research permit for takes of black abalone and the proposed research activities would not be expected to result in cumulatively significant adverse effects.

4.7.1 Cumulative effects on black abalone and its habitat

Other factors that may affect black abalone include implementation of California's Abalone Recovery and Management Plan and California's Marine Life Protection Act, the designation of critical habitat for black abalone under the ESA, and continuing threats to the population, especially from withering syndrome and poaching. The potential effects of these factors on black abalone and its habitat are assessed below. Overall, the proposed issuance of the scientific research permit for take of black abalone and the proposed research activities would not be expected to result in cumulatively significant adverse effects on black abalone and its habitat.

Abalone Recovery and Management Plan: On 9 December 2005, the California Fish and Game Commission adopted the Abalone Recovery and Management Plan (ARMP) developed by the California Department of Fish and Game. The ARMP provides a framework for the recovery of abalone populations in Southern California and the management of the abalone fishery in Northern California, as well as future abalone fisheries. The ARMP would likely benefit black abalone populations throughout California by raising awareness of and focusing efforts on abalone conservation and management. The proposed research activities would be expected to contribute valuable data for the successful implementation of the ARMP with regard to black abalone recovery goals.

California's Marine Life Protection Act: In 1999, the state of California approved and signed the Marine Life Protection Act (MLPA), directing the state to re-evaluate and redesign its system of marine protected areas (MPA) as a coherent network to protect and conserve marine life and habitats. The state is currently engaged in the MLPA planning process. To conduct the re-evaluation and redesign of MPAs, the state was divided into five study regions. The planning process for the North Central coast (Point Arena to Pigeon Point) and Central coast (Pigeon Point to Point Conception) has been completed and new regulations have been issued to enact the redesigned MPAs in these regions. The planning process for the North coast (California/Oregon border to Point Arena) and the South coast (Point Conception to the California/Mexico border) are currently underway. The MLPA process may enhance and increase protections for black abalone and its habitat, as well as other marine species, in the affected environment by providing for more effective management measures and enforcement in MPAs.

Critical habitat designation: On 28 September 2010, NMFS proposed the designation of critical habitat for black abalone in coastal rocky intertidal habitats along the coast of California and the offshore islands (75 FR 59900). NMFS plans to make a determination on the final designation in July 2011. Once critical habitat is designated, Federal agencies must comply with section 7 of the ESA to ensure that actions they carry out, permit, or fund will not result in the destruction or adverse modification of designated critical habitat. The designation of critical habitat would provide additional protections for black abalone and its habitat. The proposed research activities may result in a low level of trampling and disturbance to rocky habitats, but would not be expected to adversely affect the habitat.

Ongoing threats to black abalone: In the final rule to list black abalone as endangered under the ESA, several threats to the species were identified, including disease (i.e., withering syndrome), poaching, historical overfishing, elevated water temperatures, entrainment and impingement of early life stages at water intake structures, predation, activities leading to substrate destruction, reduced water quality (e.g., pollution, oil spills), and reduced food quality and quantity. Withering syndrome was identified as the primary threat to black abalone populations. Withering syndrome is expected to continue its northward progression along the California coast, facilitated by the fluctuating but generally upward trend in water temperatures associated with short-term and long-term climate change (e.g., El Niño events and global climate change). Localized incidents of elevated water temperature due to anthropogenic discharge of thermal effluent may also facilitate the spread of withering syndrome or increase its virulence. Poaching

was also identified as an important ongoing threat to black abalone populations throughout California. Withering syndrome and poaching, as well as the other threats identified in the final listing rule, can have a substantive effect on black abalone populations. The proposed research activities would not be expected to exacerbate the negative effects of these threats. Instead, the proposed research activities would be expected to help managers address these threats by facilitating the monitoring and early detection of withering syndrome at the survey sites and providing valuable data on black abalone population status and trends to inform management decisions.

4.7.2 Cumulative effects on other aspects of the physical environment

In addition to the proposed action, several categories of actions may affect rocky intertidal habitats along the California coast. Coastal development and in-water construction activities (e.g., coastal armoring; pier or jetty construction; installation of intake structures, cables, or pipelines), sand replenishment or beach nourishment, and side-casting may result in increased erosion or sediment input into rocky habitats or affect wave action along the coast. Construction of facilities such as onshore liquefied natural gas (LNG) projects and desalination plants may disturb or alter rocky habitats. Though rare, oil and chemical spills are also a potential threat. In addition, Navy operations occurring on and in the waters surrounding San Nicolas Island and San Clemente Island may affect black abalone and its habitat. Existing laws and regulations (e.g., National Marine Sanctuary regulations and permits, Clean Water Act permit requirements, Rivers and Harbors Act permit requirements) requiring environmental review and/or mitigation of environmental effects for the activities listed above provide a measure of protection for rocky intertidal habitats. The proposed research activities would not be expected to result in cumulatively significant adverse effects on the physical environment.

4.7.1 Cumulative effects on non-target species

The marine invertebrate, algal, marine mammal, and seabird species within the affected environment may be affected by research and other activities that directly target or incidentally impact these species. In many cases, separate permits and authorizations would be required under which the effects of the research or other activities on the species would be analyzed and addressed. For example, permits issued pursuant to section 104 of the MMPA are required for *bona fide*[2] scientific research on marine mammals, or to enhance the survival or recovery of a species or stock. The species may also be affected by activities that impact their habitats, such as those described above that may affect the physical environment. As stated above, existing laws and regulations already provide some level of protection for most activities by requiring permits or compliance with measures to reduce or avoid adverse environmental impacts on species and their habitats. Recreational use of the rocky intertidal habitats may also result in additional trampling effects on marine invertebrate and algal communities, but the monitoring sites are generally less accessible and therefore subject to lower levels of recreational use compared to other areas along the coast. Given the low level of disturbance that is likely to result from the proposed research activities, cumulatively significant adverse effects on non-target species are not expected.

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2 The MMPA defines bona fide research as "scientific research on marine mammals, the results of which – (A) likely would be accepted for publication in a refereed scientific journal; (B) are likely to contribute to the basic knowledge of marine mammal biology or ecology; or (C) are likely to identify, evaluate, or resolve conservation problems."

CHAPTER 5 LIST OF PREPARERS AND AGENCIES CONSULTED

List of Preparers:

- National Marine Fisheries Service, Office of Protected Resources, Permits, Conservation, and Education Division
- National Marine Fisheries Service, Southwest Region, Protected Resources Division

Agencies Consulted:

- National Marine Fisheries Service, Southwest Region, Habitat Conservation Division
- National Park Service, Channel Islands National Park

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