

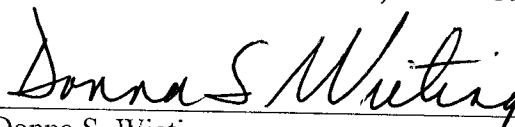
NOAA's National Marine Fisheries Service
Endangered Species Act Section 7 Consultation
Biological Opinion

Agency: Permits and Conservation Division of the Office of Protected Resources, National Marine Fisheries Service

Proposed Action: Issuance of a Modification to Permit No. 16087-01 for research on Guadalupe fur seals, pursuant to Section 10(a)(1)(A) of the Endangered Species Act of 1973

Prepared by: Endangered Species Act Interagency Cooperation Division
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Approved by:



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Date:

SEP 11 2014

Section 7(a)(2) of the Endangered Species Act (ESA; 16 U.S.C. 1531 et seq.) requires each federal agency to ensure that any action authorized, funded or carried out by such an agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When an action of a federal agency "may affect" endangered or threatened species or critical habitat, that agency is required to consult with the National Marine Fisheries Service (NMFS) or U.S. Fish and Wildlife Service, depending on the species that may be affected. This Biological Opinion (Opinion) is the result of an intra-agency consultation between the Permits and Conservation Division and the ESA Interagency Cooperation Division in the NMFS Office of Protected Resources. This Opinion describes whether Permits and Conservation Division's issuance of a modification to scientific research Permit No. 16087-01 (Responsible Party: John Bengtson, Ph.D.) would likely jeopardize the existence of threatened Guadalupe fur seals.

This Opinion has been prepared in accordance with section 7 of the ESA and regulations promulgated to implement that section of the ESA. It is based on information provided in the research permit application, the Permits and Conservation Division's draft supplemental environmental assessment, the draft permit, the most current marine mammal stock assessment reports, published and unpublished scientific information on the biology and ecology of threatened Guadalupe fur seals, and other sources of information.

A complete administrative record for this consultation is on file at the NMFS Office of Protected Resources.

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Abbreviations and Acronyms

the Applicant	John Bengston, Ph.D, Responsible Party, National Marine Mammal Laboratory
DDT	dichlorodiphenyltrichloroethane
DPS	distinct population segment
ESA	Endangered Species Act
ESU	evolutionarily significant unit
ft	feet
HCB	hexachlorobenzene
HCH	hexachlorocyclohexanes
kHz	kilohertz
km	kilometer
m	meter
mi	mile
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
NMFS HQ	National Marine Fisheries Service Headquarters Office in Silver Spring, Maryland
NMML	National Marine Mammal Laboratory
NOAA	National Oceanic and Atmospheric Administration
Opinion	this biological opinion
PBDE	polybrominated diphenyl ethers
PCB	polychlorinated biphenyls
the Permits Division	Permits and Conservation Division of the Office of Protected Resources, National Marine Fisheries Service
POP	persistent organic pollutant
SAR	stock assessment report
U.S.	United States
yds	yards

2 Consultation History

On May 19, 2014, the Permits and Conservation Division (Permits Division) requested a consultation under the ESA in a memorandum on its proposal to issue a modification to scientific research Permit No. 16087-01. The applicant would be conducting research on threatened Guadalupe fur seals (*Arctocephalus townsendi*) on offshore islands in the Pacific Ocean from the U.S./Mexico border to the U.S./Canada border.

Consultation was initiated on June 25, 2014, after additional information was provided by the Permits Division.

3 Description of the Proposed Action

The Permits Division proposes to issue a modification to a scientific research permit pursuant to section 10(a)(1)(A) of the ESA and the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 et seq.).

The proposed action is to issue a modification to scientific research Permit No. 16087-01 to the National Marine Mammal Laboratory (Responsible Party: John Bengtson). Upon issuance the modified permit would authorize close approaches for ground and vessel surveys, incidental disturbance, and direct sampling of threatened Guadalupe fur seal. This research would represent a modification to the research currently conducted under Permit No. 16087-01, currently held by the Applicant. The study has two objectives aimed at Guadalupe fur seals: 1) to obtain a population assessment throughout their U.S. range, and 2) to describe their population biology and behavior. The research would consist of ground and vessel surveys observing Guadalupe fur seal pups and non-pups. Guadalupe fur seal pups would be subject to capture and restraint, flipper tagging, measuring, weighing, and the collection of hair clips and skin biopsy samples.

The permit would also authorize the unintentional mortality of one pup at any location over the duration of the permit (including humane euthanasia). The researchers would salvage any dead animals or parts found during the surveys or sampling. This study would provide valuable information on the current status of Guadalupe fur seals; there has been recent evidence of Guadalupe fur seals expanding their breeding range into U.S. waters.

As part of this proposed Action, the Permits Division is also considering the authorization of additional research on non-listed pinnipeds. This part of the modification to Permit No. 16087-01 would change the number of annual takes and allow additional sampling activities for California sea lions (*Zalophus californianus*), Pacific harbor seals (*Phoca vitulina*), and northern elephant seals (*Mirounga angustirostris*) in the Channel Islands; it would also add takes for the incidental disturbance of Guadalupe fur seals during these research activities. The effects of these additional research activities on those non-listed species from this part of the proposed Action will not be considered in this Opinion. However, since takes for Guadalupe fur seals would be authorized for incidental disturbance during these research activities, and this aspect of the proposed Action will be considered in this Opinion.

The proposed modification to the permit would authorize the “take” of listed species during research activities (Table 1). Take is defined under the ESA as an activity that would harass,

harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect a listed species, or to attempt to engage in any such conduct.

Table 1 The proposed number of Guadalupe fur seals (both sexes) authorized to be taken in the haul outs and offshore islands in California, Oregon and Washington as conducted under Permit No. 16087-02.

Listing Unit/Stock	Life Stage	Authorized Take (n)	Takes per animal per year	Procedures	Project Details
1. Location: Haul outs and offshore islands in California, Oregon, and Washington, including but not limited to Santa Rosa Island, Santa Cruz Island, Año Nuevo Island, Farallon Islands, Monterey Bay, San Francisco Bay, Columbia River, and Puget Sound					
Guadalupe fur seals (NMFS Threatened)	All	40	4	Vessel and ground surveys; Count/survey; Collect scat; salvage (carcass, tissue, parts)	Abundance Surveys
Guadalupe fur seals (NMFS Threatened)	Pups	20	1	Mark, flipper tag; Measure (standard morphometrics); Restrain, hand; Restrain, net; Sample, clip hair; Weigh	Pup Research
Guadalupe fur seals (NMFS Threatened)	All	40	4	Incidental disturbance	Incidental disturbance during Guadalupe fur seal pup research, abundance surveys or non-listed pinniped research
2. Location: San Clemente Island, California					
Listing Unit/Stock	Life Stage	Authorized Take (n)	Takes per animal per year	Procedures	Project Details
Guadalupe fur seals (NMFS Threatened)	All	40	4	Vessel and ground surveys; Count/survey; Collect scat;	Abundance Surveys

				salvage (carcass, tissue, parts)	
Guadalupe fur seals (NMFS Threatened)	Pups	20	1	Mark, flipper tag; Measure (standard morphometrics); Restrain, hand; Restrain, net; Sample, clip hair; Weigh	Pup Research
Guadalupe fur seals (NMFS Threatened)	All	40	4	Incidental disturbance	Incidental disturbance during Guadalupe fur seal pup research, abundance surveys or non-listed pinniped research

3. Location: San Miguel Island, California

Listing Unit/Stock	Life Stage	Authorized Take (n)	Takes per animal per year	Procedures	Project Details
Guadalupe fur seals (NMFS Threatened)	All	40	4	Vessel and ground surveys; Count/survey; Collect scat; salvage (carcass, tissue, parts)	Abundance Surveys
Guadalupe fur seals (NMFS Threatened)	Pups	20	1	Mark, flipper tag; Measure (standard morphometrics); Restrain, hand; Restrain, net; Sample, clip hair; Weigh	Pup Research
Guadalupe fur seals (NMFS Threatened)	All	40	4	Incidental disturbance	Incidental disturbance during Guadalupe fur seal pup research, abundance

					surveys or non-listed pinniped research
4. Location: San Nicolas Island, California					
Listing Unit/Stock	Life Stage	Authorized Take (n)	Takes per animal per year	Procedures	Project Details
Guadalupe fur seals (NMFS Threatened)	All	40	4	Vessel and ground surveys; Count/survey; Collect scat; salvage (carcass, tissue, parts)	Abundance Surveys
Guadalupe fur seals (NMFS Threatened)	Pups	20	1	Mark, flipper tag; Measure (standard morphometrics); Restrain, hand; Restrain, net; Sample, clip hair; Weigh	Pup Research
Guadalupe fur seals (NMFS Threatened)	All	40	4	Incidental disturbance	Incidental disturbance during Guadalupe fur seal pup research, abundance surveys or non-listed pinniped research
5. Location: Santa Barbara Island, California					
Listing Unit/Stock	Life Stage	Authorized Take (n)	Takes per animal per year	Procedures	Project Details
Guadalupe fur seals (NMFS Threatened)	All	40	4	Vessel and ground surveys; Count/survey; Collect scat; salvage (carcass, tissue, parts)	Abundance Surveys
Guadalupe fur seals (NMFS Threatened)	Pups	20	1	Mark, flipper tag; Measure (standard	Pup Research

				morphometrics); Restrain, hand; Restrain, net; Sample, clip hair; Weigh	
Guadalupe fur seals (NMFS Threatened)	All	40	4	Incidental disturbance	Incidental disturbance during Guadalupe fur seal pup research, abundance surveys or non- listed pinniped research
Locations 1-5: Any area described in the permit where authorized research occurs					
Listing Unit/Stock	Life Stage	Authorized Take (n)		Procedures	Project Details
Guadalupe fur seals (NMFS Threatened)	Pup	1		Incidental mortality (including humane euthanasia)	One unintentional mortality over the life of the permit

The lethal take of one Guadalupe fur seal pup (including humane euthanasia) over the duration of the permit would be authorized. The threatened species that would be taken is Guadalupe fur seals; the Permits Division would also authorize takes of the non-listed pinnipeds (Pacific harbor seals, California sea lions and northern elephant seals). As these other species are not listed under the ESA, they will not be considered further in this Opinion.

The proposed permit would be valid for five years, and research would be authorized to occur each year the permit is valid. The abundance surveys would be authorized to occur year-round; there would be four surveys annually. Research activities concentrating on the sampling of Guadalupe fur seal pups would take place in all months except June and July, the time period when births are expected. There would be one pup-sampling event annually.

3.1 Abundance surveys (Ground and vessel surveys)

The proposed modification to the permit would authorize ground and vessel surveys to Guadalupe fur seals of all life stages for the purpose of population assessment. The abundance surveys would occur four times a year, and the permit would authorize four takes per individual in each of the five locations (Table 2). This portion of the research may also involve scat collection and the salvage of parts and carcasses as those situations arise.

Table 2 Total number of proposed takes to occur during abundance surveys

Research Location	Maximum number of individuals taken annually	Maximum number of takes per individual annually	Maximum number of takes occurring at each location annually
Location 1: West Coast	40	4	160
Location 2: San Clemente	40	4	160
Location 3: San Miguel	40	4	160
Location 4: San Nicolas	40	4	160
Location 5: Santa Barbara	40	4	160
Maximum number of individuals taken annually (at all locations combined)			200
Maximum number of takes at all locations authorized over the five year duration of the permit			800

The authorization would include a yearly limit of four takes per individual. The permit would authorize up to 200 takes of individual Guadalupe fur seals during each year of the permit due to close approaches during the abundance surveys. The Applicant estimates that there are at least 15 individual animals regularly using San Miguel and San Nicolas islands. In subsequent years, the total actual takes of Guadalupe fur seals would depend on the growth of the population in U.S. waters, but takes per year would not exceed 40 individuals at each location. Accordingly, the maximum authorized takes in each year of the five-year permit would be 800 (200 takes of individuals per year, with four takes per individual).

3.2 Incidental disturbance of Guadalupe fur seals

During research activities for other non-listed pinniped species, up to 40 Guadalupe fur seals may be incidentally disturbed (Table 3).

Table 3 Total number of proposed incidental disturbance takes

Research Location	Maximum number of individuals incidentally disturbed annually	Maximum number of takes per individual annually	Maximum number of takes occurring at each location annually
Location 1: West Coast	40	4	160
Location 2: San Clemente	40	4	160
Location 3: San Miguel	40	4	160
Location 4: San Nicolas	40	4	160
Location 5: Santa Barbara	40	4	160
Maximum number of individuals taken annually (at all			200

locations combined)	
Maximum number of takes at all locations authorized over the five year duration of the permit	800

3.3 Sampling of Guadalupe fur seal pups

To better understand the population biology and behavior of Guadalupe fur seals, the researchers would conduct direct sampling of pups, including capture by hoop net, restraint by hand and net, application of flipper tags, measurement and weighing, and the collection of hair and skin samples. Up to 20 pups would be sampled at each of the five locations annually (Table 4). Each of these procedures is described in detail below.

Table 4 Total number of proposed takes for sampling of Guadalupe fur seal pups

Research Location	Maximum number of individuals incidentally disturbed annually	Maximum number of takes per individual annually	Maximum number of takes occurring at each location annually
Location 1: West Coast	20	4	80
Location 2: San Clemente	20	4	80
Location 3: San Miguel	20	4	80
Location 4: San Nicolas	20	4	80
Location 5: Santa Barbara	20	4	80
Maximum number of individuals taken annually (at all locations combined)			100
Maximum number of takes at all locations authorized over the five year duration of the permit			400

3.3.1 Capture and Restraint

Guadalupe fur seal pups would be stalked and captured using small hoop nets. The pups would be restrained by hand by holding the animal behind the head and the researcher's other hand around the rear flippers. If needed, the animal could alternatively be straddled by the researcher, and the researcher's knees used to pin the foreflippers to the seal's body. Guadalupe fur seal pups could also be restrained using cone-shaped nets that fit snugly around the chest of the animal, holding its foreflippers against the body.

3.3.2 Flipper Tagging and Skin Sampling

Flipper tags would be applied to the Guadalupe fur seal pup's foreflipper using the pliers supplied by the manufacturer. The tags are small rectangular plastic tags and are uniquely numbered so that individual seal pups can be identified. During tag application, a small piece of skin is released from the interdigital webbing of the foreflipper. That piece serves as the skin sample, and it is placed in a cryovial for preservation and analysis; no additional procedure is necessary to obtain a skin sample. Skin samples will be used for genetic analysis.

3.4 Incidental Mortality

The applicant has requested the unintentional mortality of one pup for all locations over the duration of the permit. This would be authorized in the event that a pup was injured due to research activities and could not be saved by transport to and care at a rehabilitation facility, and needed to be humanely euthanized. Permit No. 16087-02 has a veterinarian identified, and this individual would be contacted and consulted with should the situation arise.

3.5 Research Practices and Permit Conditions

Researchers are expected to apply the following practices, which are considered “good practice,” and commonly taken by qualified, experienced personnel to minimize the potential risks associated with the proposed activities. To minimize disturbance and ensure adequate opportunities for sampling, permit holders shall approach animal(s) gradually, from behind or alongside, rather than head-on. The amount of time spent in close proximity to an animal(s) shall be limited to the minimum necessary to meet research objectives. Only personnel with extensive experience with the proposed research activities may be involved in the research activities.

The proposed modification to Permit No. 16087-01 lists conditions which would be followed as part of the authorized activities. Developed by the Permits Division, these conditions are intended to minimize the potential adverse effects of the research activities on Guadalupe fur seals, and include the following:

- Researchers working under this permit may collect visual images (e.g., photographs, video) in addition to the photo-identification or behavioral photo-documentation authorized in Appendix 1 as needed to document the permitted activities, provided the collection of such images does not result in takes.
- The Permit Holder may use visual images and audio recordings collected under this permit, including those authorized in Table 1, in printed materials (including commercial or scientific publications) and presentations provided the images and recordings are accompanied by a statement indicating that the activity was conducted pursuant to a NMFS Permit. This statement must accompany the images and recordings in all subsequent uses or sales.
- The Chief, Permits Division may grant written approval for photography, filming, or audio recording activities not essential to achieving the objectives of the permitted activities, including allowing persons not essential to the research (e.g., a documentary film crew) to be present, provided:
 - The Permit Holder submits a request to the Permits Division specifying the location and nature of the activity, approximate dates, and number and roles of individuals for which permission is sought.

- Non-essential photography, filming, or recording activities will not influence the conduct of permitted activities or result in takes of protected species.
 - Persons authorized to accompany the Researchers for the purpose of such non-essential activities will not be allowed to participate in the permitted activities.
 - The Permit Holder and Researchers do not require compensation from the individuals in return for allowing them to accompany Researchers.
- Researchers must comply with the following conditions related to the manner of taking:
 - Researchers must minimize the time lactating females are removed or otherwise separated from their dependent offspring as a result of research activities.
 - Researchers must take reasonable steps to identify pups of lactating females before attempting to immobilize a lactating female.
 - If a lactating female dies as a result of the permitted activities and her dependent pup can be identified, Researchers must immediately contact the appropriate NMFS Regional Stranding Coordinator and proceed as directed. If the pup cannot be identified or the Stranding Coordinator determines the pup is not a candidate for rehabilitation, the pup is to be counted as a permit-related mortality.
 - For activities in California, contact the Southwest Stranding Coordinator in Long Beach, CA at (562) 980-4017
 - For activities in Washington and Oregon, contact the Northwest Stranding Coordinator in Seattle, WA at (206) 526-6733
 - If a pregnant female dies as a result of the permitted activities, both the female and the unborn pup shall be counted as permit-related mortalities.
 - Researchers shall capture and handle pinnipeds in groups small enough that handling and restraint time for each animal is minimized and all animals can be adequately monitored for signs of adverse reactions that could lead to serious injury or mortality.
 - Researchers shall immediately cease attempts to approach, capture, restrain, sample, mark, or otherwise handle pinnipeds if the procedure does not appear to be working or there are indications such acts may be life-threatening or otherwise endanger the health or welfare of the animal. To the extent that it would not further endanger the health or welfare of the animal, Researchers may monitor or treat (*e.g.*, administer reversal agents or attempt resuscitation) the animal as deemed appropriate in consultation with a veterinarian.
 - Researchers must use aseptic techniques for collection of external tissue samples

- (e.g., swabs), puncture procedures (e.g., venipuncture, flipper tagging), surgical procedures, and collection of internal tissue samples (e.g., blubber biopsy).
- Researchers must use sterile disposable instruments (e.g., needles, biopsy punches) to the maximum extent practicable.
 - When capturing or detaining animals in traps, pens, carriers, etc., Researchers must adequately monitor the animals to prevent injury, mortality, dehydration, and thermal stress.
 - Sedated and anesthetized animals should be monitored closely and not be released until they recover normal locomotor capabilities. When sedated/anesthetized animals are too large or dangerous to be held until fully recovered from sedation/anesthesia, they should be placed in secure sites where they will not be subject to physical harm or extremes of temperature, and can be monitored from a safe distance.
 - Researchers must take appropriate actions (e.g., disinfection procedures) for minimizing the introduction of new disease agents, vectors capable of efficiently transmitting indigenous dormant diseases or those not currently being effectively transmitted, and species that can serve as amplification hosts for transmitting indigenous diseases to other species.
 - To the maximum extent practical without causing further disturbance of marine mammals, Researchers shall monitor study sites following any disturbance (e.g., surveys or sampling activities) to determine if any marine mammals have been killed or injured or pups abandoned. Any observed serious injury to or death of a marine mammal is to be reported as indicated in Condition A.2. Any observed abandonment of a dependent marine mammal pup is to be reported to the applicable NMFS Stranding Network Coordinators as indicated above (Condition B.5.c).

Other relevant permit conditions include:

- ensuring qualified individuals are authorized to conduct research activities;
- limiting the number of researchers present to essential personnel;
- requiring individuals to be properly licensed as necessary;
- prohibiting commercial activities to take place during research activities;
- requiring that new personnel must be reviewed by the Permits Division prior to being added to the permit;
- requiring that a copy of the permit must be retained on the boat during research for reference;
- providing requirements and instructions for submitting annual, final and incident reports;
- instructions for notifying NMFS Regional Office of the research activities;
- instructions to coordinate research activities with other researchers in the area;
- notification that activities conducted under the permit may be reviewed and observed by NMFS; and

- the notification that the permit can be modified, suspended or revoked upon at the discretion of the Director, NMFS Office of Protected Resources.

4 Approach to the Assessment

NMFS approaches its section 7 analyses of research permits through a series of steps. The first step identifies those aspects of proposed actions that are likely to have direct and indirect physical, chemical, and biotic effects on listed species or on the physical, chemical, and biotic environment of an action area. As part of this step, we identify the spatial extent of these direct and indirect effects, including changes in that spatial extent over time. The results of this step define the action area for consultation. The second step of our analyses identifies the listed resources that are likely to co-occur with these effects in space and time and the nature of that co-occurrence (these represent our exposure analyses). In this step of our analyses, we try to identify the number, age (or life stage), and gender of the individuals that are likely to be exposed to an action's effects and the nature of that exposure, we examine the scientific and commercial data available to determine whether and how those listed resources are likely to respond given their exposure (these represent our response analyses).

The final steps of our analyses—establishing the risks those responses pose to listed resources—are different for listed species and designated critical habitat (these represent our risk analyses). Our jeopardy determinations must be based on an action's effects on the continued existence of threatened or endangered species as those “species” have been listed, which can include true biological species, subspecies, or distinct populations of vertebrate species. Because the continued existence of species depends on the fate of the populations that comprise them, the continued existence of these “species” depends on the fate of the populations that comprise them. Similarly, the continued existence of populations are determined by the fate of the individuals that comprise them; populations grow or decline as the individuals that comprise the population live, die, grow, mature, migrate, and reproduce (or fail to do so).

Our risk analyses reflect these relationships between listed species, the population that comprise that species, and the individuals that comprise those populations. Our risk analyses begin by identifying the probable risks actions pose to listed individuals that are likely to be exposed to an action's effects. Our analyses then integrate those individual risks to identify consequences to the populations those individuals represent. Our analyses conclude by determining the consequences of those population level risks to the species those populations comprise. We measure risks to listed individuals using the individuals' “fitness,” or the individual's growth, survival, annual reproductive success, and lifetime reproductive success. In particular, we examine the scientific and commercial data available to determine if an individual's probable lethal, sub-lethal, or behavioral responses to an action's effect on the environment (which we identify during our response analyses) are likely to have consequences for the individual's fitness.

When individual ESA-listed plants, or animals are expected to experience reductions in fitness in response to an action, those fitness reductions are likely to reduce the abundance, reproduction, or growth rates (or increase the variance of these measures) of the populations those individuals represent (Stearns 1992). A reduction in at least one of these variables (or one of the variables we derive from them) is itself a necessary condition for reductions in a species' viability. As a result, when listed plants or animals exposed to an action's effects are not expected to experience

reductions in fitness, we would not expect the action to have adverse consequences on the viability of the populations those individuals represent or the species those populations comprise (Brandon 1978, Mills and Beatty 1979, Stearns 1992, Anderson 2000). As a result, if we conclude that listed plants or animals are not likely to experience reductions in their fitness, we would conclude our assessment.

Although reductions in fitness of individuals are a necessary condition for reductions in a population's viability, reducing the fitness of individuals in a population is not always sufficient to reduce the viability of the population(s) those individuals represent. Therefore, if we conclude that listed plants or animals are likely to experience reductions in their fitness, we determine whether those fitness reductions are likely to reduce the viability of the populations' abundance, reproduction, spatial structure and connectivity, growth rates, variance in these measures, or measures of extinction risk). In this step, of our analyses, we use the population's base condition (established in the *Environmental Baseline* and *Status of the Species* sections of this Opinion) as our point of reference. If we conclude that reductions in individual fitness are not likely to reduce the viability of the populations those individuals represent, we would conclude our assessment.

Reducing the viability of a population is not always sufficient to reduce the viability of the species those populations comprise. Therefore, in the final step of our analyses, we determine if reductions in a population's viability are likely to reduce the viability of the species those populations comprise using changes in a species' reproduction, numbers, distribution, estimates of extinction risk, or probability of being conserved. In this step of our analyses we use the species' status (established in the *Status of the Species* section of this Opinion) as our point of reference. Our final determinations are based on whether such reductions are likely to be appreciable.

To conduct these analyses, we rely on all of the evidence available to us. This evidence might consist of monitoring reports submitted by past and present permit holders; reports from NMFS Science Centers; reports prepared by natural resource agencies in states and other countries; reports from domestic and foreign non-governmental organizations involved in marine conservation issues, the information provided by the Permits Division when it initiates formal consultation, and the general scientific literature.

During each consultation, we conduct electronic searches of the general scientific literature using search engines like Google Scholar, ScienceDirect, BioOne, Conference Papers Index, JSTOR, and Aquatic Sciences and Fisheries Abstracts. We supplement these searches with electronic searches of doctoral and master's theses. These searches specifically try to identify data or other information that supports a particular conclusion (for example, a study that suggests whales will exhibit a particular response to approach) as well as data that does not support our conclusion. When data are equivocal, or in the face of substantial uncertainty, our decisions are designed to avoid the risks of incorrectly concluding that an action would not have an adverse effect on listed species when, in fact, such adverse effects are likely.

We rank the results of these searches based on the quality of their study design, sample sizes, level of scrutiny prior to and during publication, and study results. Carefully designed field

experiments (for example, experiments that control potentially confounding variables) are rated higher than field experiments that are not designed to control those variables. Carefully designed field experiments are generally ranked higher than computer simulations. Studies that produce large sample sizes with small variances are generally ranked higher than studies with small sample sizes or large variances.

5 Action area

The action area is defined in 50 CFR 402.2 as “all areas to be affected directly or indirectly by the Federal Action and not merely the immediate area involved in the action.” The action area under these proposed activities would be as follows. The proposed action area includes offshore islands from the U.S./Mexico border to the U.S./Canada border. Concentrated effort would take place in the California Channel Islands, including Santa Catalina, San Clemente, Santa Barbara, San Nicolas, Anacapa, Santa Rosa, Santa Cruz, and San Miguel islands (Figure 1). Other locations where activities would be authorized include haulouts along the California, Oregon and Washington coasts, Año Nuevo Island, Farallon Islands, Monterey Bay, San Francisco Bay, Columbia River and Puget Sound.



Figure 1 Map of the proposed action area

The proposed research takes are described in the take tables, which are grouped by the location where they would be carried out (Table 1). All research activities would be authorized to be conducted at all locations, with no more than 40 takes occurring annually at each designated location (Table 5). The proposed incidental mortality of a single pup over the life of the permit could occur at any location within the action area.

Table 5 Proposed research activities grouped by location (number of takes annually)

Research Location	Abundance surveys	Pup Sampling	Incidental Harassment
Location 1: West Coast <ul style="list-style-type: none"> Haulouts/offshore islands CA/OR/WA Santa Rosa, Santa Cruz, Anacapa, Año Nuevo, Farallon Islands Monterey Bay, San Francisco Bay, Columbia River, and Puget Sound 	40	20	40
Location 2: San Clemente Island	40	20	40
Location 3: San Miguel Island	40	20	40
Location 4: San Nicolas Island	40	20	40
Location 5: Santa Barbara Island	40	20	40

6 Status of Listed Resources

NMFS has determined that the actions considered in this Opinion may affect the following listed resources provided protection under the ESA of 1973, as amended (16 U.S.C. 1531 et seq.), and are described in the table below.

Table 6 Listed Species within the action area

Species	ESA Status	Critical Habitat ¹	Recovery Plan
Marine Mammals–Pinnipeds			
Guadalupe fur seal (<i>Arctocephalus townsendi</i>)	T- 51 FR 51252	-- --	-- --
Marine Mammals – Cetaceans			
Southern Resident killer whale (<i>Orcinus orca</i>)	E - 70 FR 69903	71 FR 69054	73 FR 4176
Blue whale (<i>Balaenoptera musculus</i>)	E - 35 FR 18319	-- --	07/1998
Fin whale (<i>Balaenoptera physalus</i>)	E - 35 FR 18319	-- --	71 FR 38385
Humpback whale (<i>Megaptera novaeangliae</i>)	E - 35 FR 18319	-- --	55 FR 29646
North Pacific Right whale (<i>Eubalaena japonica</i>)	E - 73 FR 12024	73 FR 19000	-- --
Sei whale (<i>Balaenoptera borealis</i>)	E - 35 FR 18319	-- --	-- --
Sperm whale (<i>Physeter macrocephalus</i>)	E - 35 FR 18619	-- --	75 FR 81584
Sea Turtles			
Green turtle (<i>Chelonia mydas</i>)	E - 43 FR 32800	63 FR 46693	63 FR 28359
Loggerhead turtle (<i>Caretta caretta</i>) North Pacific DPS	E - 76 FR 58868	-- --	63 FR 28359
Leatherback turtle (<i>Dermochelys coriacea</i>)	E - 61 FR 17	77 FR 4170	63 FR 28359
Olive ridley turtle (<i>Lepidochelys olivacea</i>)	E - 43 FR 32800	-- --	63 FR 28359
Invertebrates			
Black abalone (<i>Haliotis cracherodii</i>)	E - 74 FR 1937	76 - FR 66806	-- --
White abalone (<i>Haliotis sorenseni</i>)	E - 66 FR 29046	-- --	73 - FR 62257

¹ Listed species in Table 3 may have designated critical habitat, although this critical habitat may not lie within the proposed Action area. See discussion in 6.1.

Species	ESA Status	Critical Habitat ¹	Recovery Plan
Fish			
Georgia Basin Bocaccio (<i>Sebastes paucispinus</i>)	E - 75 FR 22276	78 FR 47635*	-- --
Georgia Basin Canary rockfish (<i>Sebastes pinniger</i>)	T - 75 FR 22276	78 FR 47635*	-- --
Georgia Basin Yelloweye rockfish (<i>Sebastes ruberrimus</i>)	T - 75 FR 22276	78 FR 47635*	-- --
Green sturgeon (<i>Acipenser medirostris</i>)	T - 75 FR 22276	74 FR 52300	-- --
Pacific Eulachon/smelt (<i>Thaleichthys pacificus</i>)	T - 75 FR 13012	76 FR 65324	-- --
Scalloped Hammerhead shark (<i>Sphyrna lewini</i>) Eastern Pacific DPS	E - 79 FR 38213	-- --	-- --
Chinook Salmon (<i>Oncorhynchus tshawytscha</i>) Evolutionarily Significant Units (ESU)			
Puget Sound ESU	T - 70 FR 37160	70 FR 52630	72 FR 2493
California Coastal ESU	T - 64 FR 50394	70 FR 52630	-- --
Lower Columbia River ESU	T - 70 FR 37160	70 FR 52630	78 FR 41911
Chum Salmon (<i>Oncorhynchus keta</i>) ESUs			
Hood Canal Summer Run ESU	T - 70 FR 37160	70 FR 52630	72 FR 29121
Columbia River ESU	T - 70 FR 37160	70 FR 52630	-- --
Coho Salmon (<i>Oncorhynchus kisutch</i>) ESUs			
Lower Columbia River ESU	T - 70 FR 37160	78 FR 2725*	78 FR 41911
Oregon Coast ESU	T - 76 FR 35755	73 FR 7816	-- --
Central California Coast ESU	E - 77 FR 19552	64 FR 24049	77 FR 54565
Southern Oregon/Northern California Coasts ESU	T - 70 FR 37160	64 FR 24049	-- --
Steelhead Trout (<i>Oncorhynchus mykiss</i>) Distinct Population Segments (DPS)			
Puget Sound DPS	T - 72 FR 26722	78 FR 2725*	-- --
Northern California DPS	T - 71 FR 834	70 FR 52630	-- --
South-Central California DPS	T - 71 FR 834	70 FR 52630	78 FR 77430
Central California Coast DPS	T - 71 FR 834	70 FR 52630	-- --
Southern California DPS	E - 71 FR 834	70 FR 52630	77 FR 1669

Key: T=Threatened; E=Endangered

*Proposed Rule

6.1 Species and designated critical habitat not considered further in this Opinion

To refine the scope of this Opinion, NMFS used two criteria (risk factors) to determine whether any endangered or threatened species or critical habitat are not likely to be adversely affected by vessel traffic or human disturbance associated with the proposed actions. The first criterion was *exposure*: if we conclude that particular endangered or threatened species or designated critical habitat are not likely to be exposed to vessel traffic or human disturbance, we must also conclude that those listed species or designated critical habitat are not likely to be adversely affected by the proposed action. The second criterion is *susceptibility upon exposure*: species or critical habitat may be exposed to vessel traffic or human disturbance, but may not be unaffected by those activities—either because of the circumstances associated with the exposure or the intensity of the exposure—are also not likely to be adversely affected by the vessel traffic or human disturbance. This section summarizes the results of our evaluations.

6.1.1 Pinnipeds

Critical Habitat

The Steller sea lion eastern DPS was delisted on November 4, 2013 (78 FR 66139); therefore this DPS will not be considered in this Opinion. However, this change in listing status does not affect the designated critical habitat for Steller sea lions (58 FR 45269), because “removing the eastern DPS from the List of Endangered and Threatened Wildlife does not remove or modify that designation” (78 FR 66162). Steller sea lion designated critical habitat remains in place until a separate rulemaking amends the designation.

In 1997, NMFS designated critical habitat for the Steller sea lion. The critical habitat includes specific rookeries, haulouts, and associated areas, as well as three foraging areas that are considered to be essential for the health, continued survival, and recovery of the species. The three areas of Steller sea lion critical habitat are located in Alaska, Oregon and California; only the critical habitat areas in Oregon and California fall within the action area (Figure 2).

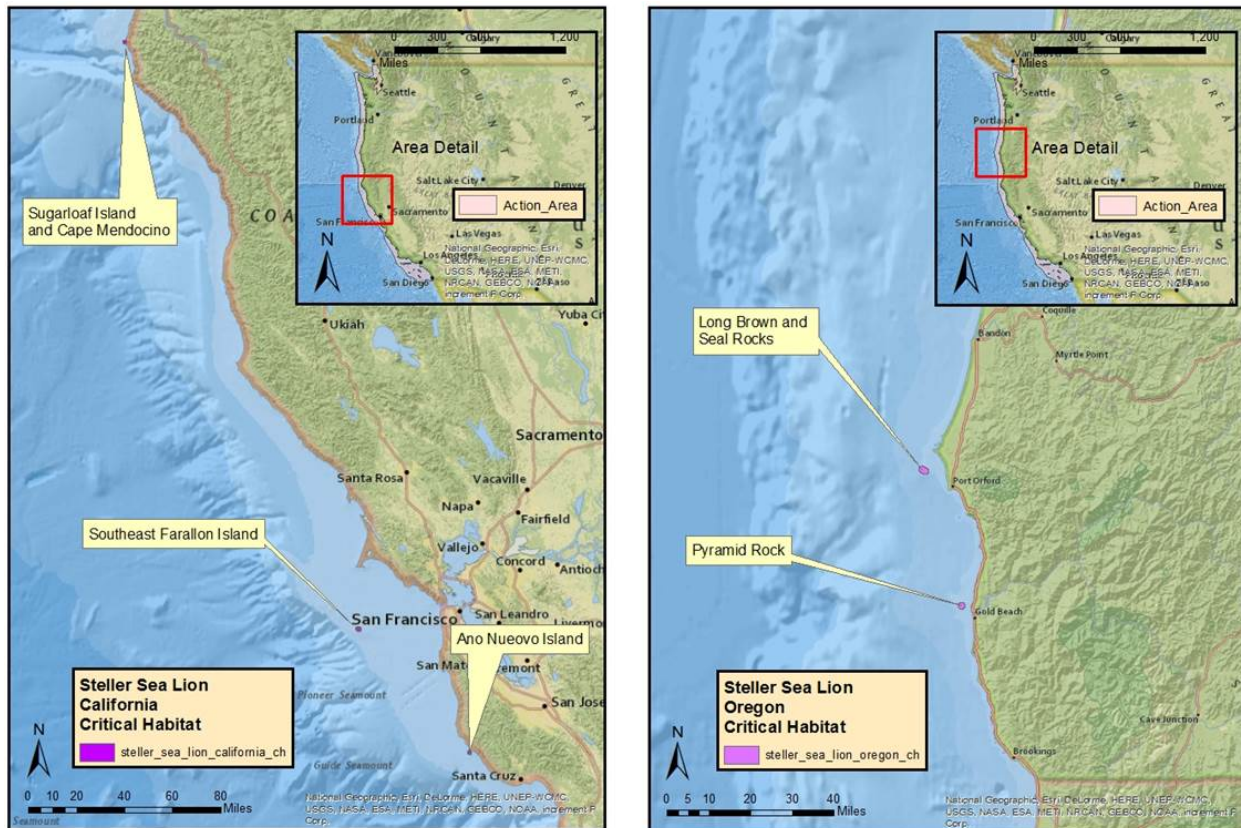


Figure 2 Maps of Steller sea lion critical habitat in the action area

In California and Oregon, major Steller sea lion rookeries and associated air and aquatic zones are designated as critical habitat. Critical habitat includes an air zone extending 3,000 feet (0.9 km) above rookery areas historically occupied by sea lions. Critical habitat also includes an aquatic zone extending 3,000 feet (0.9 km) seaward. These sites are located near Steller sea lion abundance centers and include important foraging areas, large concentrations of prey, and host large commercial fisheries that often interact with the species.

The proposed research activities would be directed at Guadalupe fur seals and would not involve aircraft, or affect commercial fishing activities or prey concentrations. Research activities taking place on land would not alter the terrestrial habitat the rookeries rely upon, and the associated boating activities would not alter the nearshore waters surrounding rookeries and haulouts. Therefore, the proposed action is expected to have no effect on designated critical habitat for Steller sea lions and will not be discussed further in this Opinion.

6.1.2 Cetaceans

Species

Humpback whale, Southern Resident killer whale, North Pacific right whale, sperm whale, fin whale, blue whale, and sei whale may occur in the action area, but are not expected to be affected by the proposed activities.

If protected whales are observed in the action area, they would be avoided and the research vessel would operate at a reduced speed, following the applicable regional marine mammal viewing guidelines². Because of the protective measures in the permit, the effects of non-target listed whales being exposed to the research activities would not reach the scale where take occurs. Therefore, the effects of the proposed action would be insignificant, and are not likely to adversely affect any non-target listed whales. These whale species are not likely to be adversely affected by the proposed action and will not be discussed further in this Opinion.

Critical Habitat

Critical habitat has been designated for the Southern Resident killer whale in Haro Strait, U.S. waters around the San Juan Islands, the Strait of Juan de Fuca, and throughout Puget Sound (71 FR 69054) and falls within the proposed action area (Figure 3). The physical, chemical, and biotic features that form killer whale critical habitat include water quality to support growth and development; prey species of sufficient quantity, quality, and availability to support individual growth, reproduction and development, as well as overall population growth; and passage conditions to allow for migration, resting, and foraging.

² See http://www.nmfs.noaa.gov/pr/pdfs/education/viewing_northwest.pdf and http://www.westcoast.fisheries.noaa.gov/publications/protected_species/marine_mammals/california_whale_watching_guidelines.pdf



Figure 3 Map of designated critical habitat for Southern Resident killer whale in the action area

The proposed permit would authorize activities in critical habitat areas of the SR killer whale DPS, but the research is not expected to adversely affect any of the physical, chemical, or biotic features that form the critical habitat. The proposed activities would not adversely affect the population ecology or population dynamics of SR killer whale prey species and, therefore, are not expected to affect prey quality, quantity, or availability. Any effects on water quality or passage conditions are expected to be insignificant. As a result, the proposed activities are not likely to adversely affect the conservation value of the designated critical habitat for SR killer whale, or result in its destruction or adverse modification. Southern Resident killer whale critical habitat is not addressed further in this Opinion.

6.1.3 Sea Turtles

Species

Green sea turtle, North Pacific DPS loggerhead sea turtle, and leatherback sea turtle may occur in the action area, but are not expected to be exposed to the proposed activities. According to the West Coast Regional Office, there are no breeding beaches for ESA-listed sea turtles in

California, Oregon or Washington.³ Therefore, we do not expect the researchers to encounter any listed sea turtles during the terrestrial portion of the research activities. However, since leatherback, green and North Pacific DPS loggerhead sea turtles may occur in the action area, it is possible that researchers may encounter sea turtles while boating.

Because the research is focused on Guadalupe fur seals and would be conducted in ways that should only affect the targeted species, the effects of exposure to listed sea turtles should not reach the scale where take occurs. Researchers will follow safe boating practices to avoid sea turtles while boating. Therefore, the effects of the proposed action would be insignificant, and are not likely to adversely affect ESA-listed sea turtles. Sea turtles will not be discussed further in this Opinion.

Critical Habitat

Leatherback sea turtle critical habitat is the only sea turtle critical habitat designated within the proposed action area (Figure 4), along the California coast from Point Arena to Point Arguello and from Cape Flattery, Washington to Cape Blanco, Oregon. The proposed research would take place along the coast of California, Oregon, and Washington, and includes the Strait of Juan de Fuca and Puget Sound.

Only one primary constituent element was identified for leatherback critical habitat: The occurrence of prey species, primarily scyphomedusae of the order Semaestomeae (e.g., *Chrysaora*, *Aurelia*, *Phacellophora*, and *Cyanea*), of sufficient condition, distribution, diversity, abundance and density necessary to support individual as well as population growth, reproduction, and development of leatherbacks.

The proposed permit would authorize activities in critical habitat areas for leatherback sea turtles, but the research is focused on Guadalupe fur seals and is not expected to adversely affect any aspect of prey availability that forms the primary constituent element for the critical habitat. As such, the proposed action is expected to have no effect on designated critical habitat for leatherback sea turtle and will not be discussed further in this Opinion.

³ http://www.westcoast.fisheries.noaa.gov/protected_species/sea_turtles/marine_turtles.html



Figure 4 Map of designated critical habitat for leatherback sea turtle within the action area

6.1.4 Fishes

Species

The Puget Sound/Georgia Basin DPSs for bocaccio, yelloweye rockfish, and canary rockfish, Southern DPS green sturgeon, Southern DPS Pacific eulachon, and the specified DPS/ESUs for Chinook, steelhead, chum and coho salmon (Table 6) may occur in the action area, but are not expected to be exposed to the proposed activities. The research will not use any nets in the water, and, with the exception of boating activities, will take place on land.

Because the research is focused on Guadalupe fur seals and would be conducted in ways that should only affect the targeted species, the effects of exposure to listed fishes are unlikely to occur. Therefore, the effects of the proposed action would be discountable, and are not likely to adversely affect ESA- listed fishes. None of the threatened or endangered fish species listed above will be discussed further in this Opinion.

Critical Habitat

The designated critical habitat for several species of listed fishes falls within the action area, including:

- Eulachon Southern DPS
- Canary Rockfish Puget Sound/Georgia Basin DPS
- Yellow Rockfish Puget Sound/Georgia Basin DPS
- Boccacio Puget Sound/Georgia Basin DPS
- Chinook salmon
 - California Coastal ESU
 - Lower Columbia River ESU
 - Puget Sound ESU
 - Upper Willamette River ESU
 - Upper Columbia River spring-run ESU
- Chum salmon
 - Hood Canal summer-run ESU
 - Columbia River ESU
- Coho salmon
 - Oregon Coast ESU
- Sockeye salmon
 - Ozette Lake ESU
- Steelhead
 - California Central Valley DPS
 - Lower Columbia River DPS
 - Middle Columbia River DPS
 - Upper Columbia River DPS
 - Northern California DPS
 - Snake River DPS
 - Southern California Coast DPS
 - Upper Willamette River DPS
- Green sturgeon Southern DPS

Eulachon

Critical habitat has been designated for the southern DPS of Pacific eulachon (76 FR 65323), and falls within the proposed action area (Figure 5). The designated areas are a combination of freshwater creeks and rivers and their associated estuaries, comprising approximately 539 km (335 mi) of habitat. The physical or biological features essential to the conservation of the DPS include:

- Freshwater spawning and incubation sites with water flow, quality and temperature conditions and substrate supporting spawning and incubation, and with migratory access for adults and juveniles.
- Freshwater and estuarine migration corridors associated with spawning and incubation sites that are free of obstruction and with water flow, quality and temperature conditions supporting larval and adult mobility, and with abundant prey items supporting larval feeding after the yolk sac is depleted.
- Nearshore and offshore marine foraging habitat with water quality and available prey, supporting juveniles and adult survival.

The proposed activity involves boating, observation and incidental disturbance, capture and sampling of Guadalupe fur seals, which would not alter any of these essential features. The

proposed action would not destroy or adversely modify designated critical habitat for Southern DPS eulachon, and is not considered further in this Opinion.

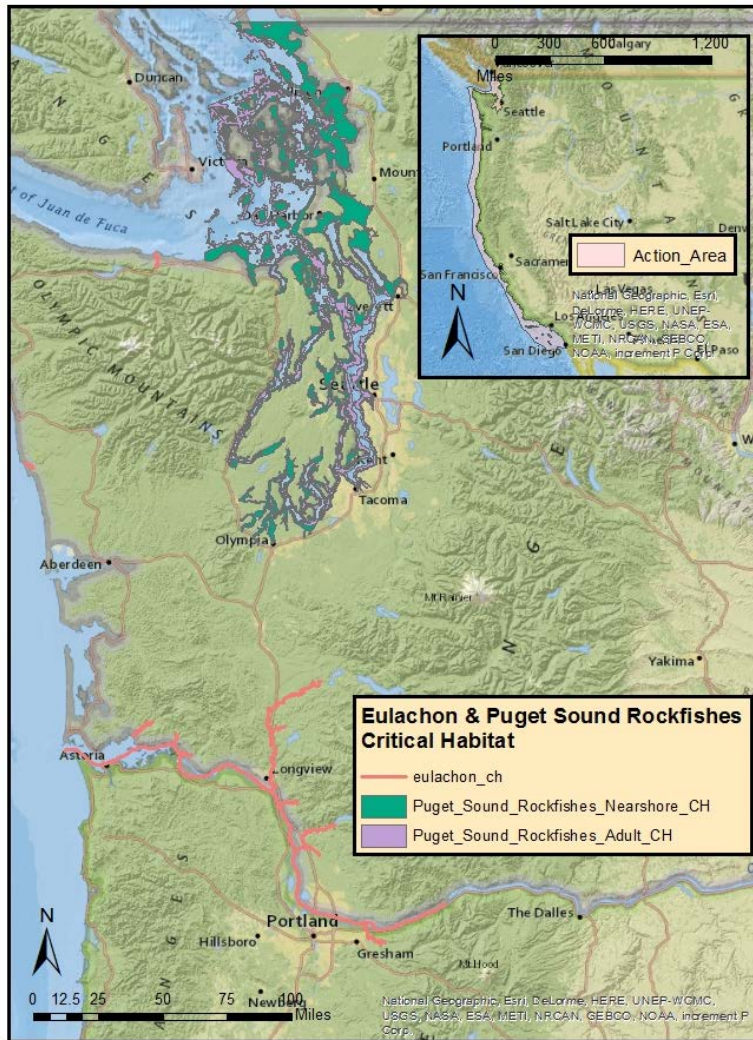


Figure 5 Map of designated critical habitat for Puget Sound rockfishes and eulachon in the action area

Rockfishes and Bocaccio

Critical habitat for the Puget Sound/Georgia Basin DPS for bocaccio, canary rockfish, yelloweye rockfish was proposed in 2013 (78 FR 47635), and it overlaps with the proposed research area (Figure 5). The specific areas proposed for designation for canary rockfish and bocaccio include approximately 1,184.75 mi² (3,068.5 km²) of marine habitat in Puget Sound, Washington. The specific areas proposed for designation for yelloweye rockfish include approximately 574.75 mi² (1,488.6 km²) of marine habitat in Puget Sound, Washington. Features essential for adult canary rockfish and bocaccio and adult and juvenile yelloweye rockfish (>30 m deep) include sufficient prey resources, water quality, and rocks or highly rugose habitat. For juvenile canary rockfish and bocaccio features essential for their conservation include sufficient prey resources and water quality.

The proposed research activities would not alter or impair benthic habitat, water quality, or prey resources of the proposed critical habitat for the Puget Sound/Georgia Basin DPS rockfishes. Thus, the proposed action would not result in the destruction or adverse modification of proposed critical habitat for the Puget Sound/Georgia Basin DPS for bocaccio, canary rockfish, or yelloweye rockfish, and is not considered further in this Opinion.

Pacific Salmon

The proposed action area encompasses designated critical habitat for several species of Pacific salmon. Listed Pacific salmon critical habitat can be found in Puget Sound, Columbia River, San Francisco Bay, and in numerous watersheds draining into Washington, Oregon and California coastal areas. For the designated critical habitats for each of the listed Pacific salmon noted above, the primary constituent elements (PCEs) identified in the Final Rules are the same.

The Rules identifies several PCEs, including: freshwater spawning and rearing sites that are unobstructed with appropriate water quality conditions and natural cover, and freshwater migration corridors, unobstructed estuarine and nearshore marine areas with natural cover, and offshore marine areas with water quality and forage (70 FR 52630; 73 FR 7816). Critical habitat for Puget Sound DPS Steelhead was proposed in 2013 (78 FR 2725); the Proposed Rule identified the same PCEs.

The proposed activity involves boating, observation and incidental disturbance, capture and sampling of Guadalupe fur seals. The proposed research would not alter any physical habitat, impair water quality, or in any other way adversely affect designated critical habitat for any listed Pacific salmon identified above and will not be considered further in this Opinion.

Green Sturgeon

Critical habitat for Southern DPS green sturgeon was designated in 2009 (74 FR 52300), and includes the waters of Puget Sound in Washington, within the action area of the proposed research (Figure 6). Features identified as PCEs include food resources, substrate type and size, water flow, water quality, migratory corridor, water depth, and sediment quality. The proposed activity involves boating, observation and incidental disturbance, capture and sampling of Guadalupe fur seals, which would not alter any of the PCEs. The proposed action would not destroy or adversely modify designated critical habitat for green sturgeon, and is not considered further in this Opinion.

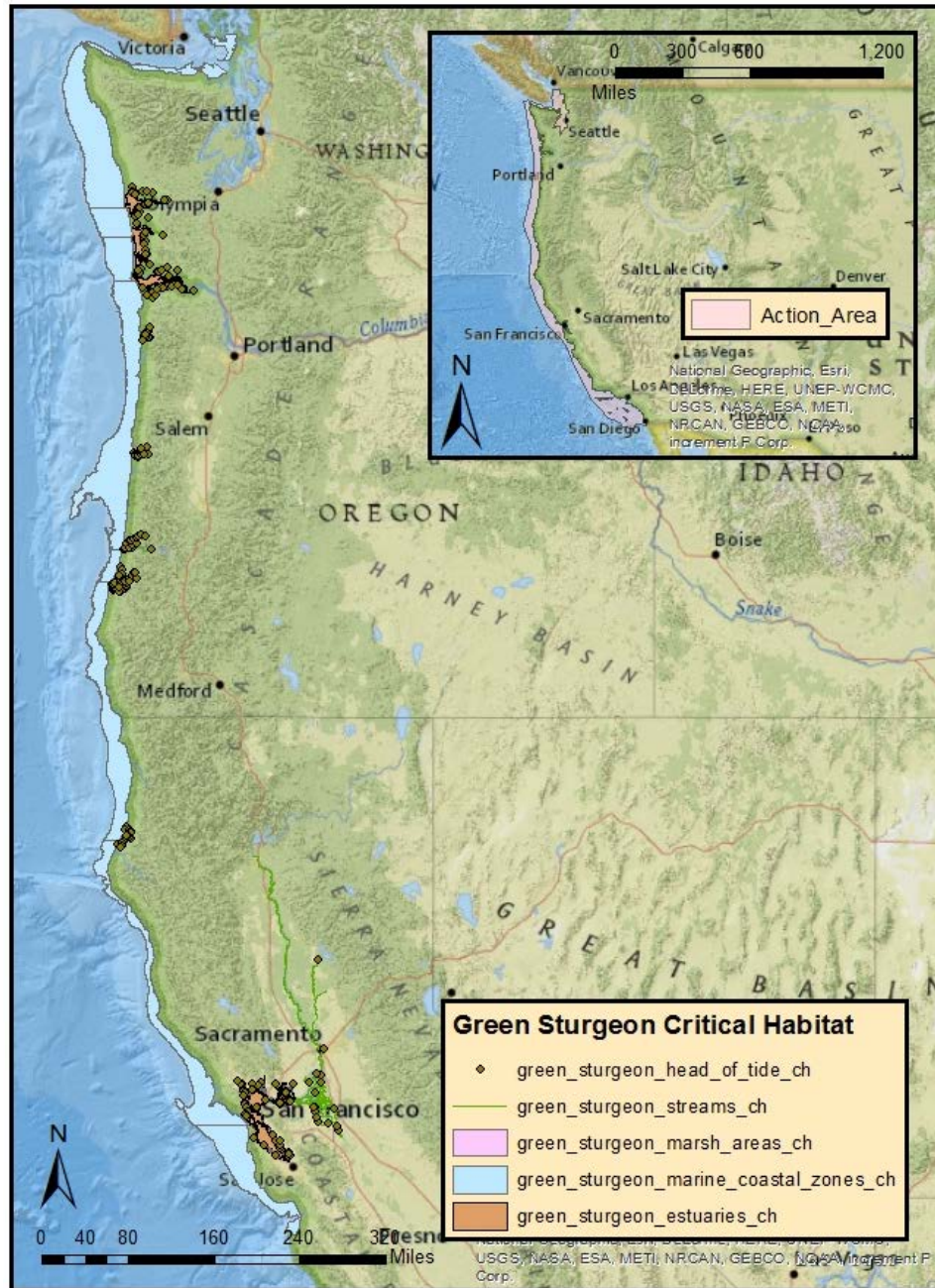


Figure 6 Map of designated critical habitat for green sturgeon in the action area

6.1.5 Invertebrates

Species

Black abalone and white abalone may occur in the action area, but are not expected to be exposed to the proposed activities. The research will not use any nets in the water, and, with the exception of boating activities, will take place on land.

Because the research is focused on Guadalupe fur seals and would be conducted in ways that should only affect the targeted species, the effects of exposure to listed abalone species are unlikely to occur. Therefore, the effects of the proposed action would be discountable, and are

not likely to adversely affect black or white abalone. Neither of the listed abalone species will be discussed further in this Opinion.

Critical Habitat

On October 27, 2011, critical habitat was designated for black abalone (76 FR 66806). Designated critical habitat areas include approximately 360 square kilometers of rocky intertidal and subtidal habitat within five segments of the California coast between the Del Mar Landing Ecological Reserve to the Palos Verdes Peninsula, as well as on the Farallon Islands, Año Nuevo Island, San Miguel Island, Santa Rosa Island, Santa Cruz Island, Anacapa Island, Santa Barbara Island, and Santa Catalina Island. The Rule identifies several PCEs required by black abalone, such as: rocky substrates, food resources, juvenile settlement habitat, suitable water quality, and suitable nearshore circulation patterns.

The proposed action involves boating, observation and incidental disturbance, capture and sampling of Guadalupe fur seals. These proposed research activities would not alter or impair any PCEs for designated black abalone critical habitat, and is not considered further in this Opinion.

Critical habitat has not been designated for white abalone because it was determined to be “not prudent,” due to concern that identifying its location would increase the threat of poaching (66 FR 29048).

6.2 Species Likely to be Adversely Affected by the Action

The proposed action is a research study targeting Guadalupe fur seals. The species narrative that follows focuses on attributes of life history and distribution that influence the manner and likelihood that this species may be exposed to the proposed action, as well as the potential response and risk when exposure occurs. Consequently, the species’ narrative is a summary of a larger body of information on localized movements, population structure, feeding, diving, and social behaviors.

A summary of the status and trends of Guadalupe fur seals is presented to provide a foundation for the analysis of the species as a whole. We also provide this brief summary of the species’ status and trends as a point of reference for the jeopardy determination, made later in this Opinion. That is, we rely on a species’ status and trend to determine whether an action’s direct or indirect effects are likely to increase the species’ probability of becoming extinct.

6.2.1 Guadalupe fur seal

Species description and distribution

Guadalupe fur seals are medium sized, sexually dimorphic otariids that are generally asocial with their conspecifics and other species (Belcher and T.E. Lee 2002, Reeves et al. 2002). Except for adult males, members of this species resemble California sea lions and northern fur seals. Distinguishing characteristics of the Guadalupe fur seal include the digits on their hind flippers (all of similar length), large, long foreflippers, unique vocalizations, and a characteristic behavior of floating vertically with their heads down in the water and their hind flippers exposed for cooling (Reeves et al. 2002).

It is largely held that Guadalupe fur seals commonly ranged along the Pacific coast of the Baja Peninsula at the Revillagigedo Islands, Mexico, and up the California coast, to the Gulf of Farallons (Figure 7) (Belcher and T.E. Lee 2002, Rick et al. 2009). However, historical evidence indicates that Guadalupe fur seals were once found even further north. Skeletal remains of Guadalupe fur seals have been uncovered at the Ozette archeological site in Washington, dating from ~1500-1719AD (Etnier 2002). Ozette Lake is approximately 1,600 km away from the Farrallon Islands, and the species is known to travel long distances (see below).

Currently, the species breeds mainly on Guadalupe Island, Mexico, 155 miles off of the Pacific Coast of Baja California. A smaller breeding colony, discovered in 1997, appears to have been established at Isla Benito del Este in the San Benito Archipelago, Baja California, Mexico (Belcher and T.E. Lee 2002).



Figure 7 Map of the historic range of Guadalupe fur seals, with current breeding colonies

There are reports of individuals being sighted in the California Channel Islands, Farallon Islands, Monterey Bay, and other areas of coastal California and Mexico (Belcher and T.E. Lee 2002,

Carretta et al. 2002, Reeves et al. 2002). Guadalupe fur seal rookeries are located on Guadalupe Island and San Benitos Archipelago in Mexico. A single pup was born on San Miguel Island, Channel Islands, California, in 1997 (Melin and DeLong 1999).

Status

Guadalupe fur seals were listed as threatened under the ESA on December 16, 1985 (50 FR 51252), and are currently listed in Appendix 1 of CITES. The species was listed primarily in response to population reductions caused by commercial exploitation; at the time of listing, the population was estimated at 1,600 individuals, compared to approximately 30,000 before hunting began. A population was “rediscovered” in 1928 with the capture of two males on Guadalupe Island; from 1949 on, researchers reported sighting Guadalupe fur seals at San Nicolas Island, California, Isla Cedros (near the San Benito Archipelago), and Guadalupe Island (Bartholomew Jr. 1950, Peterson et al. 1968). In 1994, the population at Guadalupe Island was estimated at 7,408 individuals (Gallo-Reynoso 1994)

After compiling data from counts over 30 years, Gallo calculated that the population of Guadalupe fur seals in Mexico was increasing, with an average annual growth rate of 13.3% on Guadalupe Island (Gallo-Reynoso 1994). More recent estimates of the Guadalupe fur seal population of the San Benito Archipelago (from 1997-2007) indicates that it is increasing as well at an annual rate of 21.6% (Esperon-Rodriguez and Gallo-Reynoso 2012), and that this population is at a phase of exponential increase (Aurioles-Gamboa et al. 2010).

All Guadalupe fur seals represent a single population. While hunting was previously the principal cause of population decline, it is no longer a major threat. Because of its listed status, hunting or otherwise taking Guadalupe fur seals is illegal in the U.S; Guadalupe fur seals are also protected under Mexican environmental laws.

Life history

Guadalupe fur seals prefer rocky habitats and can be found in natural recesses and caves (Fleischer 1978). Female Guadalupe fur seals arrive on beaches in June, with births occurring between mid-June to July (Pierson 1978); the pupping season is generally over by late July (Fleischer 1978). Females stay with pups for 7-8 days after parturition, and then alternate between foraging trips at sea and lactation on shore; nursing lasts about eight months (Figuerroa-Carranza 1994). Foraging trips can last between 4-24 days (average of 14 days) (Gallo-Reynoso et al. 1995). Tracking data show that adult females spend 75% of their time sea, and 25% at rest (Gallo-Reynoso et al. 1995). Guadalupe fur seals feed mainly on squid species (Esperon-Rodriguez and Gallo-Reynoso 2013).

Guadalupe fur seals have been known to travel great distances, with sightings occurring thousands of kilometers away from the main breeding colonies (Aurioles-Gamboa et al. 1999). In 1998, a female Guadalupe fur seal was released with a tracking device after rehabilitation from central California. She traveled 800km south to Guadalupe Island, and then headed 1,430 km north; over a period of 7 weeks, the female traveled 2,890km (Lander et al. 2000). Three rehabilitated juvenile fur seals were also fitted with tracking devices and released in 2003, and had minimum travel rates of 19-40km/d (Nickel and Greig 2005).

Population dynamics

Since commercial exploitation has ended, the species has since made a partial recovery (Aurioles-Gamboa et al. 2010). When the most recent stock assessment report for Guadalupe fur seals was published in 2000, the breeding colonies in Mexico were increasing (Figure 8); more recent evidence indicates that this trend is continuing ((Aurioles-Gamboa et al. 2010) (Esperon-Rodriguez and Gallo-Reynoso 2012). Guadalupe fur seals are infrequently observed in U.S. waters. However, according to the Applicant, these fur seals can be found more regularly on California's Channel Islands, with as many 15 individuals being sighted since 1997 on San Miguel Island, including three females that had given birth and reared pups.

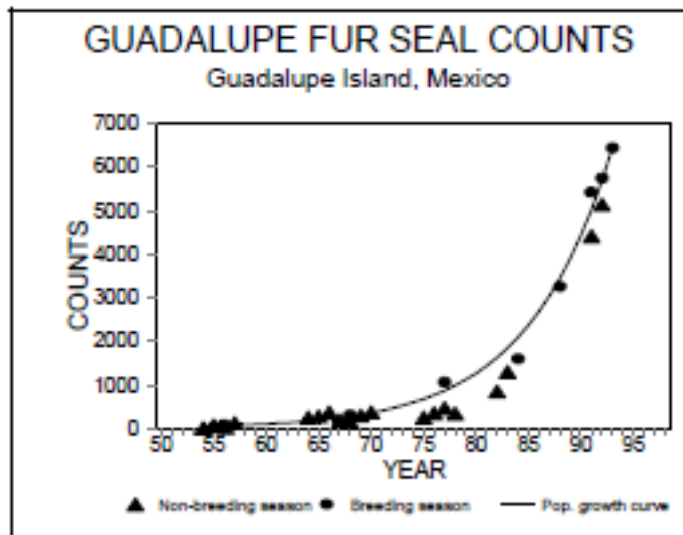


Figure 8 Counts of Guadalupe fur seals at Guadalupe Island, Mexico, and the estimated population growth curve derived from counts made during the breeding season, from NMFS SAR, 2000.

Because of the fact that over the last 50 years the population has been increasing since being severely depleted, we believe that the Guadalupe fur seal population is resilient to future perturbations.

Critical habitat

No critical habitat has been designated for Guadalupe fur seal.

7 Environmental Baseline

By regulation, environmental baselines for Opinions include the past and present impacts of all state, federal or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation in process (50 CFR §402.02). The Environmental Baseline for this Opinion includes the effects of several activities affecting the survival and recovery of ESA-listed Guadalupe fur seals in the action area.

Because Guadalupe fur seals have had a relatively small population that is largely found in foreign waters, there has been comparably less research conducted on this species. It is reasonable to assume that what affects other more thoroughly-researched or frequently observed pinnipeds could affect Guadalupe fur seals in similar ways.

A number of human activities have contributed to the current status of this species in the action area. Although some of those activities, such as commercial hunting, occurred in the past, have since ceased, the effects of these types of exploitations persist today. Other human activities, such as entanglements from commercial fishing gear, are ongoing and continue to affect these species.

The following discussion summarizes the natural and human phenomena in the action area that may affect the likelihood these species will survive and recover in the wild. These include climate variability, strandings, fisheries interactions, noise, pollution, and scientific research.

7.1 Natural Mortality

Guadalupe fur seals appear to have no terrestrial predators. White sharks are a well-known natural predator of pinnipeds in South Africa, and are commonly found near Guadalupe Island, but there are few accounts of white sharks preying on Guadalupe fur seals (Domeier and Nasby-Lucas 2007). However, recent isotopic studies show that pinnipeds from Guadalupe Island (possibly including Guadalupe fur seals) are a significant prey species for white sharks in the area (Jaime-Rivera et al. 2014). Cookiecutter sharks have been known to attack Guadalupe fur seals (Gallo-Reynoso and Figueroa-Carranza 1992).

Little is known about common diseases or parasites that inflict Guadalupe fur seals in the wild, although stranded individuals offer some insight (see discussion below in Stranding)

7.2 Stranding

Guadalupe fur seal strandings are infrequently reported along the West coast of the U.S., and the species accounts for a relatively low proportion of the overall stranded pinnipeds. From 1986-1998, the Marine Mammal Center reported 13 live-strandings of Guadalupe fur seals along the central California coast, out of 6, 196 total pinniped species. Two of the Guadalupe fur seals showed evidence of human interaction (i.e., discarded fishing gear, monofilament line) (Goldstein et al. 1999). Guadalupe fur seals have also stranded in Washington and Oregon, with an unusual mortality event being declared for the species in 2007 (Calambokidis 2008) (Engelhard 2012). The cause of the unusual mortality event (which had a total of 19 strandings in Oregon and Washington) was undetermined.

Although marine debris is a source of concern and can be a causal factor in stranding, other stranded fur seals have diseases, or are malnourished. Guadalupe fur seals stranded in northern California were found to be suffering from hemorrhagic gastroenteritis (Gerber et al. 1993). Guadalupe fur seal strandings are also reported at the southern end of their range, inside the Gulf of California (i.e., on the eastern side of the Baja California peninsula), thousands of kilometers from Guadalupe Island (Aurioles-Gamboa et al. 1999). Many stranded individuals are emaciated

and malnourished, and some die during rehabilitation (Hanni et al. 1997, Aurioles-Gamboa et al. 1999).

Gallo (1994) pointed out that the dispersal of Guadalupe fur seals to the north was associated with the El Niño Southern Oscillations. Despite the coincidence between some Guadalupe fur seal strandings and El Niño events, dispersal of the species to the north and south could be common (especially when one takes into account the observations of long-distance traveling); however, migrants may disperse mostly to the north during these events (Aurioles-Gamboa et al. 1999).

7.3 Historic Commercial Exploitation

Commercial sealers in the 19th century decimated the Guadalupe fur seal population, taking as many 8,300 fur seals from San Benito Island (Townsend 1924). Numbers on the total number of fur seals harvested are difficult to ascertain because of the difficulty the hunters had in distinguishing species while hunting (Seagars 1984). These harvests were devastating for the Guadalupe fur seal population, so much so that in 1892, only seven individuals were observed on Guadalupe Island, the location of one of the larger known breeding colonies (Bartholomew Jr. 1950); two years later, a commercial sealer took all 15 remaining individuals that could be found (Townsend 1899).

The species was presumed extinct, until 1926, when a small herd was found on Guadalupe Island by commercial fishermen, who later returned and killed all that could be found. In 1954, during a survey of the island Hubbs (1956) discovered at least 14 individuals. Although population surveys occurred on an irregular basis in subsequent years, evidence shows that the Guadalupe fur seal has been increasing ever since (see Section 6.2.1).

How the Guadalupe fur seal population was able to persist despite intensive and repeated episodes of hunting is not definitively known, although several factors likely played a role. Hubbs (1956) postulated that since Guadalupe fur seals bred in caves, it made them difficult to find, and they were able to evade hunters. Furthermore, since the adult females spend up to 75% of their time at sea for two weeks or more at a time, it is possible that enough females were away during hunting to survive these episodes.

7.3.1 Genetic Consequences of Historic Commercial Exploitation

Whenever a population experiences a severe depletion, there is a possibility that a population bottleneck may occur, leading to a decreased likelihood that the population can recover due to diminished genetic variability and by extension, fitness. Like the northern elephant seal (*Mirounga angustirostris*) and the Hawaiian monk seal (*Monachus schauinslandi*), the Guadalupe fur seal clearly experienced a precipitous decline due to commercial exploitation, and may have undergone a population bottleneck.

Bernardi et al. (1998) compared the genetic divergence in the nuclear fingerprint of samples taken from 29 Guadalupe fur seals, and found an average similarity of 0.59 of the DNA profiles. This average is typical of outbreeding populations. However when comparing the amount of unique character fragments found in Guadalupe fur seals to that of other pinnipeds (e.g., Hawaiian monk seals), that amount is much higher (0.14 vs. 0.05). The authors hypothesized that

the numbers of Guadalupe fur seals left after harvest may have been underestimated, and the population may not have actually experienced a bottleneck, or the bottleneck may have been of short duration and not severe enough to suppress genetic diversity.

Although the relatively high levels of genetic variability are encouraging, it is important to note that commercial harvest still genetically impacted the population. Later studies comparing mitochondrial DNA found in the bones of pre-exploitation Guadalupe fur seals against the extant population showed a loss of genotypes (with 25 genotypes in pre-harvest fur seals, and 7 present today) (Weber et al. 2004).

7.4 Climate Change

Limited prey availability, which is a major threat to several pinniped species, may be the result of reduced ecosystem productivity, caused by cyclic climate events. Although the effects of climate change on Guadalupe fur seals have not been directly studied, there is evidence that other pinniped species are being affected by climate change. Declines in Stellar sea lion (*Eumetopias jubatus*) populations overlap temporally and geographically with oceanic regime shifts (Trites et al. 2007). Reduction in juvenile Hawaiian monk seal survival is also correlated with a large-scale climate event (Polovina 1994).

Climate change is projected to have substantial direct and indirect effects on individuals, populations, species, and the structure and function of marine ecosystems in the near future (IPCC 2014). For pinnipeds, the major threats of climate change are reduced prey availability and loss of habitat. Warming sea surface temperatures and ocean acidification are likely to further reduce the availability of prey (Polovina et al. 2008). Sea level rise would reduce available beach habitat for Hawaiian monk seals. For the ice seals (i.e., ringed and bearded seals), climate change is the greatest threat to species survival because of their dependence upon pack ice for breeding, nursing, and resting.

Climatic variability and change may be affecting Guadalupe fur seals in the action area; however, the effects of climate change on any marine species are not definitively known. Gaps in information on species movements and distribution, the difficulty involved with studying highly mobile marine mammals, as well as insufficient historical information and long-term data sets on habitat and distribution all complicate any potential conclusions on the effects of climate change for such species (Kintisch 2006, Simmonds and Isaac 2007). Possible effects of climatic variability for marine species include the following: alteration of ecological community composition and structure, possibly resulting in species relocating from areas they currently use in response to changes in oceanic conditions; changes to migration patterns or community structure; changes to species abundance; increased susceptibility to disease and contaminants; alterations to prey composition and availability; and altered timing of breeding (Macleod et al. 2005, Robinson et al. 2005, Kintisch 2006, McMahon and Hays 2006). Such changes could affect reproductive success and survival, and therefore would have consequences for the recovery of marine mammal species (Robinson et al. 2005, Learmonth et al. 2006, Cotte and Guinet 2007).

Naturally occurring climatic patterns, such as the Pacific Decadal Oscillation and El Niño and La Niña events, are identified as major causes of changing marine productivity and may also influence prey abundance in the action area (Mantua et al. 1997, Francis et al. 1998, Beamish et

al. 1999, Hare et al. 1999, Benson and Trites 2002, Dalton et al. 2013). Squid species are the primary prey of Guadalupe fur seal and climate change impacts on prey species has been specifically identified as a threat to Guadalupe fur seals (Kovacs et al. 2012). The response of inshore squid populations to climate change would likely be very complex, but it is possible that the elevated water temperatures would increase squid growth rates, leading to earlier maturation and at a smaller size (Pecl and Jackson 2008).

Although no formal predictions are available on the effects of such climate change for Guadalupe fur seals, it is likely any changes in weather and oceanographic conditions resulting in effects on squid and other prey species would have consequences for the fur seals. Anthropogenic sources of climate change, such as the continuing buildup of human-produced atmospheric carbon dioxide, are predicted to have major environmental impacts along the west coast of North America during the 21st century and beyond.

7.5 Pollution and Contaminants

7.5.1 Marine Debris

Marine debris poses a threat to pinnipeds primarily in the form of ingestion and entanglement. Ingestion of or entanglement in marine debris can cause restricted movement, decreased swimming ability, stunted growth, and inability to eat or forage, all of which can inhibit an individual's fitness or even cause mortality.

Observations of Guadalupe fur seals entangled in fishing gear are scarce, although individuals have stranded showing evidence of interaction with discarded fishing gear or marine debris (Goldstein et al. 1999). For other pinnipeds within the action area like California sea lions and northern elephant seals, entanglement in discarded fishing gear, plastic garbage and synthetic materials is an on-going problem (Harcourt 1994, Hanni and Pyle 2000). Marine debris is considered to be a threat at the population level only for Hawaiian monk seal, due to its small population (Kovacs et al. 2012).

Given the prevalence of marine debris in the ocean, and that many instances of entanglement and ingestion go un-observed, it is likely that marine debris will be a continuing problem for Guadalupe fur seals in the action area.

7.5.2 Oil Spills

Exposure to petroleum hydrocarbons released into the environment via oil spills and other discharge sources represents a potentially serious risk for Guadalupe fur seals. Chronic oil pollution kills large numbers of seabirds (e.g., (Wiese and Robertson 2004)); however, its impact on the Guadalupe fur seal population is poorly documented. In addition, the long-term effects of repeated ingestion of sub-lethal quantities of petroleum hydrocarbons on marine mammals are not well understood, either. As a result, the magnitude of the risks posed by oil discharges in the proposed action area is difficult to precisely quantify or estimate.

One of the more high-profile oil spills in the action area was the 1969 Santa Barbara oil spill, which remains the largest oil spill in California to date (and the third largest in the U.S.), where

an estimated 80,000-100,000 barrels were spilled along the coast of southern California.⁴ During this spill, San Miguel and San Nicolas Islands were particularly impacted, along with the area of Santa Barbara Channel. Although the impacts to pinnipeds in the area were difficult to assess directly, over one hundred dead California sea lions and northern elephant seals were found on San Miguel Island less than two months after the spill (Brownell Jr and Le Boeuf 1969).

Large, catastrophic oil spills undoubtedly grab ahold of the public's attention, but oil spills occur on a smaller scale with unfortunate regularity. In a nationwide study examining vessel oil spills from 2002-2006 found that over 1.8 million gallons of oil were spilled from vessels in U.S. waters (Dalton and Jin 2010). In this study, "vessel" included numerous types of vessels, including barges, tankers, tugboats, and recreational and commercial vessels, demonstrating that the threat of an oil spill can come from a variety of type of boats.

Although oil spills can have devastating impacts on marine life and habitat, it is important to note that the susceptibility of a particular species to oil exposure varies from that of another (Rainer Engelhardt 1983). Cetaceans, for instance, have a thickened epidermis that greatly reduces the likelihood of petroleum toxicity from skin contact with oiled waters (Geraci 1990, O'Shea et al. 1991). Likely pathways of exposure of fur seals to hydrocarbons include inhalation of vapors at the water's surface and ingestion during feeding. Marine mammals are generally able to metabolize and excrete limited amounts of hydrocarbons, but acute or chronic exposure poses greater toxicological risks. Acute exposure of marine mammals to petroleum products can cause changes in behavior and reduced activity, inflammation of the mucous membranes, lung congestion, pneumonia, liver disorders, and neurological damage (Geraci 1990). In addition, oil spills have the potential to adversely impact prey populations, and therefore may affect Guadalupe fur seals indirectly by reducing food availability.

Because of the prevalence of oil spills in U.S. waters, it is likely that Guadalupe fur seals will continue to be exposed to this problem in the action area for the foreseeable future.

7.5.3 Contaminants

Persistent organic pollutants (POPs) is a collective term for environmental contaminants like dioxins, furans, PCBs, PBDEs, dichlorodiphenyltrichloroethane (DDT), hexachlorocyclohexanes (HCHs), and hexachlorobenzenes (HCBs). These chemicals are used (or have previously been used) in pesticides, industrial manufacturing, and pharmaceutical production, to name a few applications. A common characteristic of POPs is their high lipid solubility, aiding in their absorption in the fatty tissues of living organisms. In addition, POPs are semi-volatile, and can travel great distances in the atmosphere (Ritter et al. 2007). POPs tend to persist over long periods in the environment, and can bioaccumulate in fatty tissues, and be transmitted from mother to offspring (Haraguchi et al. 2009). Even though a POP can be banned, its characteristics allow it to persist in the environment, remaining in soil, the atmosphere, and the fatty tissues of organisms. (Ritter et al. 2007).

Because they were in the pesticides and industrial products used so extensively after World War Two, organochlorines (e.g., PCBs, DDT) are a principal contaminant threat (Ross et al. 2000). Organobromines like PBDEs are also a threat; unlike many organochlorines, which have been

⁴ <http://www.sbcountyplanning.org/energy/information/history.asp>

banned or restricted, organobromines are currently used in fire retardants (Ritter et al. 2007). With up to 1,000 new chemicals entering the global marine environment annually, it is difficult to monitor levels and sources of all contaminants (Grant and Ross 2002). Marine ecosystems receive pollutants from a variety of local, regional and international sources (Grant and Ross 2002, Garrett 2004). Hotspots for contaminants in the action area are centered near these urban areas where industrial and domestic activities are concentrated; however, because of the properties of POPs, contamination can extend widely, and into nursery areas for many species.

Numerous factors can affect concentrations of POPs in marine mammals, such as age, sex and birth order, diet, and habitat use (Mongillo et al. 2012). In marine mammals, POP contaminant load for males increases with age, whereas females pass on contaminants to offspring during pregnancy and lactation (Addison and Brodie 1987, Borrell et al. 1995). POPs can be transferred from mothers to juveniles at a time when their bodies are undergoing rapid development, putting juveniles at risk for immune and endocrine system dysfunction later in life (Krahn et al. 2009).

As for cetaceans and other forms of marine life, pollutants and contaminants cause adverse health effects in pinnipeds. Acute toxicity events may result in mass mortalities; repeated exposure to lower levels of contaminants may result in immune suppression and/or endocrine disruption (Atkinson et al. 2008). In addition to hydrocarbons and other persistent chemicals, pinnipeds may become exposed to infectious diseases (e.g., Chlamydia and leptospirosis) through polluted waterways (Aguirre et al. 2007).

The world's largest DDT manufacturer was located in southern California, and from 1948-1970 discharged up to 20 tons of DDT waste into the Los Angeles outfall. Organochlorine pesticides and PCBs have been found in the blubber of California sea lions, gray whales, humpback whales, northern elephant seals, and harbor seals in the southern California area (Kannan et al. 2004). California sea lions co-occur with Guadalupe fur seals on Guadalupe Island, and California sea lions eat a variety of prey species, including squid.

Because POPs are both ubiquitous and persistent in the environment, Guadalupe fur seals (and other forms of marine life) will continue to be exposed to POPs for all of their lives. The effects of POPs to Guadalupe fur seals are unknown and not directly studied, but it is possible that the effects could be sub-lethal and long-term in nature, and include impacting reproduction, immune function, and endocrine activity. These are effects that would become more apparent as time goes on. At present, however, the effects of POPs in Guadalupe fur seals are not currently well known.

7.6 Commercial Fishing Operations/Entanglement

Fisheries interactions are a universal threat to pinnipeds (Kovacs et al. 2012), and can pose problems in several ways: prey reduction, shootings, incidental bycatch, and entanglement in fishing gear. Reduced quantity or quality of prey appears to be a major threat to several pinniped species, as evidenced by population declines, reduced body size/condition, low birth rates, and high juvenile mortality rates (Trites and Donnelly 2003). Other species of pinnipeds (e.g., Steller sea lions) are shot in response to actual or perceived competition with fishermen (Atkinson et al. 2008).

There have been reports of Guadalupe fur seals stranding with evidence of entanglement in fishing gear or other marine debris (Hanni et al. 1997). The available bycatch data do not report any Guadalupe fur seal bycatch in fisheries in the U.S., including observed fisheries such as the driftnet and gillnet fisheries in California, and the groundfish trawl fishery in California, Washington and Oregon (NMFS 2000, 2013). Incidence of Guadalupe fur seal bycatch in Mexican fisheries is unknown.

Impacts to Guadalupe fur seals from commercial fishing operations and entanglement are difficult to quantify or assess. However, if the current trends of expansion into U.S. waters and increasing population size continue, it is probable that Guadalupe fur seals will come into contact with commercial fishing more frequently in the future.

7.7 Noise

All marine mammals present in the action area, including Guadalupe fur seals, are regularly exposed to several sources of natural and anthropogenic sounds. Anthropogenic noises that could affect ambient noise arise from activities that occur in and near the sea, any combination of which can contribute to the total noise at any one place and time. These noises include those coming from activities like transportation, dredging, construction, oil, gas, and mineral exploration in offshore areas, seismic surveys, sonars, explosions, and ocean research activities (Richardson et al. 1995).

Transportation, including commercial and recreational vessel traffic, airplanes and helicopters, all contribute to sound in the ocean (NRC 2003). The military uses sound to test the construction of new vessels, as well as for naval operations. In some areas where oil and gas production takes place, noise originates from the drilling and production platforms, tankers, vessel and aircraft support, seismic surveys, and the explosive removal of platforms (NRC 2003).

Researchers have described behavioral responses from marine mammals due to these noises, which included cessation of feeding, resting, or social interactions. Many contend that anthropogenic sources of noise have increased ambient noise levels in the ocean over the last 50 years (NRC 1994, Richardson et al. 1995, NRC 2000, 2003, 2005). Much of this increase is due to increased shipping as ships become more numerous and of larger tonnage (NRC 2003).

The issue of noise in the marine environment and its potential effects to marine life has come under scrutiny in recent years and is likely to continue to receive attention. In 2005, a U.S. vessel participating in sonar exercises apparently caused significant behavior changes in killer whale activity in the area, such that the whales vacated the area (NMFS 2005). Although such activities are now receiving close scrutiny, the potential remains for these disruptions to occur, or even the potential for auditory trauma, stranding, and death. The International Maritime Organization recently adopted guidelines providing recommendations on minimizing ship noise through proper vessel maintenance and guidance on designing quieter ships (IMO 2013).

The effects of noise on Guadalupe fur seals specifically is not known, although generally noise from aircraft and shipping traffic is thought to cause at least disturbance to pinnipeds within the vicinity (Fair and Becker 2000). Although the impacts of noise on marine mammals is receiving attention and regulating bodies are working to mitigate those effects, sources of marine noise are likely to persist or increase into the future.

7.8 Scientific Research

Scientific research permits, issued by NMFS, authorize the study of listed resources in the action area. The primary objective of these studies is generally to monitor populations or gather data for behavioral and ecological studies. Activities authorized include: surveys, marking, tagging, biopsy sampling, and attachment of scientific instruments. These activities may result in harassment, stress, and, in limited cases, injury or mortality.

Due to their limited geographic distribution, Guadalupe fur seals are one of the less studied pinniped species. There are currently only seven scientific research and enhancement permits for Guadalupe fur seals, one of them being for non-releasable captive animals, one for the import and export of parts for genetic studies, and the others for incidental disturbance during other research projects (Table 7). In the past, NMFS issued only three scientific research and enhancement permits, two of which authorized take to harass, and the other to maintain captive Guadalupe fur seals.

If issued, Permit No. 16087-02 would be the only current NMFS permit authorizing direct sampling and capture of Guadalupe fur seals in U.S waters. Guadalupe fur seals are the subject of scientific research in Mexico

Table 7 Current NMFS permits authorizing take of Guadalupe fur seals

Permit No.	Permit Holder	Permit Description	Activities	Age Class	Annual Takes	Expiration Date
14186	Sea World California	Public display of non-releasable animals	Captive Maintenance	All	6	June 30, 2015
14534	NOAA Science and Technology	Marine mammal behavioral response to sound studies	Harass	Non-pup	5	June 30, 2015
14856	Oregon State University	Cetacean research	Harass, Vessel survey	All	100	December 31, 2018
15330	Cascadia Research Collective	Cetacean research	Harass; Incidental disturbance	All	100	August 1, 2016
16163	NMFS Northwest Fisheries Science Center	Cetacean research	Harass; Incidental disturbance during vessel and aerial surveys	All	200	June 6, 2017

16239	HDR, Inc.	Marine species monitoring program	Count/survey; observation/monitoring; photo-identification; incidental disturbance; photogrammetry; remote sensing during vessel and aerial surveys	All	2964	September 30, 2018
17952	University of California, Santa Cruz	California sea lion research	Import/Export parts	All	50	June 7, 2017

7.9 Integration of the Environmental Baseline

Taken together, the components of the environmental baseline for the action area include sources of natural mortality as well as influences from natural oceanographic and climatic features in the action area. The effects of climatic variability on this species in the action area and the availability of its prey remain largely undetermined; however, it is likely that any changes in weather and oceanographic conditions resulting in effects on squid populations would have consequences for Guadalupe fur seals.

The baseline also includes human activities resulting in disturbance, injury, or mortality of individuals. These activities include commercial hunting of Guadalupe fur seals, which affected the species in the past but no longer occurs at present. However, effects from these activities may still persist today. Current anthropogenic activities and effects on individuals in the action area are thought to include habitat degradation (e.g., contaminants, oil spills, underwater sound, disease), interactions with fishing gear and marine debris, and scientific research on Guadalupe fur seals. Conservation and management efforts are ongoing, and take prohibitions have undoubtedly had a positive effect on the status of threatened Guadalupe fur seals within the action area.

Guadalupe fur seals may be affected by the proposed activities authorized by the modification to Permit No. 16087-02. This species is, or has been, exposed to the components of the environmental baseline. The activities discussed in the above section likely have some level of effect on Guadalupe fur seals in the proposed action area; however, the combined consequences of those effects on the status, trend, or demographic processes that drive the status and trends of this population remain largely unknown.

8 Effects of the Proposed Action

Pursuant to Section 7(a)(2) of the ESA, federal agencies are directed to ensure that their activities are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. The proposed modification to the permit issued by the Permits Division would expose Guadalupe fur seals to actions that constitute “take.” In this section, we describe the potential physical, chemical or biotic stressors associated

with the proposed action, the probability of individuals of listed species being exposed to these stressors based on the best scientific and commercial evidence available, and the probable responses of those individuals (given probable exposures) based on the available evidence. As described in the Approach to the Assessment section, for any responses that would be expected to reduce an individual's fitness (i.e., growth, survival, annual reproductive success, and lifetime reproductive success), the assessment would consider the risk posed to the viability of the population. The purpose of this assessment is to determine if it is reasonable to expect that the research, as conducted under the permit, can be expected to have direct or indirect effects on threatened species that appreciably reduce their likelihood of surviving and recovering in the wild.

For this consultation, we are particularly concerned about behavioral disruptions that may result in animals that fail to feed or breed successfully or fail to complete their life history because these responses are likely to have population-level, and therefore species level, consequences. The proposed permit would authorize non-lethal "takes" by harassment of listed species during activities, and one unintentional mortality due to the activities. The ESA does not define harassment nor has NMFS defined the term pursuant to the ESA through regulation. However, the MMPA of 1972, as amended, defines harassment as any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal population in the wild or has the potential to disturb a marine mammal or marine mammal population by causing disruption of behavioral patterns, including, but limited to, migration, breathing, nursing, breeding, feeding, or sheltering [16 U.S.C. 1362(18)(A)]. For this Opinion, we define harassment similarly: an intentional or unintentional human act or omission that creates the probability of injury to an individual animal by disrupting one or more behavioral patterns that are essential to the animal's life history or its contribution to the population the animal represents.

8.1 Stressors

During the course of the consultation, we identified the following direct and indirect potential stressors from the research activities:

- vessel strike
- vessel noise
- vessel discharge
- approach of seals
- capture, restraint, and handling
- flipper tagging/skin sample collection
- measuring and weighing
- hair clip sample collection
- incidental disturbance
- incidental mortality

As summarized below, we determined the following possible stressors would be negligible: vessel strike, vessel noise, and vessel discharge.

The probability of vessel strike is remote and would pose a negligible risk to Guadalupe fur seals, given the experience of the Applicant in detecting these species and conducting these surveys during other pinniped research projects. In addition, the majority of the research would take place on land. We expect the Applicant would be able to locate, identify, and avoid Guadalupe fur seals during transit. We expect the Applicant to comply with the permit terms and conditions pertaining to vessel operation that are protective of the species.

Vessel noise is also expected to pose only a negligible risk to Guadalupe fur seals. Behavioral responses to vessels are analyzed further in the Response Analyses (7.7) of this Opinion. The Applicant will be conducting the majority of the research on land, and would be following safe boating practices during vessel surveys to minimize impacts.

Vessel discharges in the form of fuel/contaminant spills are expected to be negligible as well. Given the experience of the Applicant in conducting these surveys and navigating the action area, it is unlikely the Applicant would run aground while boating and discharge fuel/contaminants in the water.

Accordingly, this consultation focused on the following stressors that are likely to be produced by the proposed research activities and may affect Guadalupe fur seals:

- approach of seals (by vessel and on land)
- capture, restraint, and handling
- flipper tagging/skin sample collection
- measuring and weighing
- hair clip sample collection
- incidental disturbance
- incidental mortality

The assessment for this consultation identified vessel approach as a possible stressor associated with the proposed permit activities, which will be analyzed further.

8.2 Exposure Analysis

The Applicant has conducted scientific research studies on pinnipeds using similar methods, and has produced multiple reports from these projects.

Exposure analyses identify the co-occurrence of ESA-listed species within the action's effects in space and time, and identify the nature of that co-occurrence. This Exposure Analysis identifies, as possible, the number, age or life-stage, and gender of the individuals likely to be exposed to the action's effects and the population(s) or subpopulation(s) those individuals represent.

The Permits Division proposes to issue a modification to a permit for scientific research to the Applicant. Most of the activities would be conducted year round in the haul outs and offshore islands in California, Oregon and Washington. Table 1 identifies the numbers of Guadalupe fur seals that the Applicant would be authorized to conduct ground and vessel abundance surveys on Guadalupe fur seal pups and non-pups, and directed research activities would focus on pups only under the proposed permit modification. Individuals of either sex or age may be taken during the abundance surveys or incidental disturbance, and only pups (of either sex) would be taken during the directed sampling. A maximum of 500 individuals Guadalupe fur seals would be permitted to be exposed to the suite of procedures covered under the proposed permit modification annually. The authorized takes would be limited to four per individual fur seal.

The amount of authorized take is likely to be greater than the actual amount of Guadalupe fur seals that will be taken over the course of the five year permit. Guadalupe fur seals have been sighted in U.S. waters on a fairly regular basis only in the Channel Islands, and this is likely

where the majority of the research will occur. Although there are reports of Guadalupe fur seals stranding in central and northern California, as well as in Washington and Oregon, these events are not common, and we do not expect a great deal of research to occur in these areas.

The Applicant estimates that there are at least 15 individual animals regularly using San Miguel and San Nicolas islands. By using the annual growth rate generated by Aurióles-Gamboa et al. (2010) of 13.3% for Guadalupe fur seals during their colonization phase, the Applicant estimated that up to 40 animals could be at San Miguel Island by the end of the permit period. The annual pup production growth rate at Guadalupe Island was estimated at 24.6% (Aurióles-Gamboa et al. 2010), leading the Applicant to estimate that up to 20 pups per year could be born at each of the take locations by the time the permit expires.

We agree that although the best available information indicates that the Guadalupe fur seal population is increasing, it is difficult to predict exactly how many Guadalupe fur seals there will be on any of the islands within the action area five years from now. At present, there are confirmed sightings of Guadalupe fur seals at two of the proposed take locations: San Nicolas and San Miguel islands. It is certainly possible that as the population expands that Guadalupe fur seals could begin to populate the other nearby islands within the next five years. The proposed take numbers are likely a liberal estimate, and we believe that ultimately, fewer numbers of Guadalupe fur seals will be exposed to the research activities. The population growth may not match what has been predicted, and that five years may not be enough time for the population to expand over the large spatial range covered by the action area.

8.3 Response Analyses

As discussed in the Approach to the Assessment section of this Opinion, response analyses determine how listed resources are likely to respond after being exposed to an action's effects on the environment or on directly listed animals themselves. For the purposes of consultation, our assessments try to detect potential lethal, sub-lethal (or physiological), or behavioral responses that might reduce the fitness of individuals. Ideally, response analyses would consider and weigh evidence of adverse consequences as well as evidence suggesting the absence of such consequences.

Evidence indicates that wild animals respond to human disturbance in the same way they respond to predators (Lima 1998, Gill et al. 2001, Frid and Dill 2002, Frid 2003, Beale and Monaghan 2004, Romero 2004). These responses may manifest themselves as stress responses, interruptions of essential behavioral or physiological events, alteration of an animal's time budget, or some combination of these responses (Frid and Dill 2002, Romero 2004, Walker et al. 2005).

As mentioned in Section 7.8, this permit would be the only current NMFS permit authorizing direct sampling of Guadalupe fur seals in U.S. waters. Several of the more recent publications on Guadalupe fur seal research from the Mexican research community (e.g., (Aurióles-Gamboa et al. 2010, Esperon-Rodriguez and Gallo-Reynoso 2013, Gallo-Reynoso and Esperon-Rodriguez 2013, Garcia-Aguilar et al. 2013)), relied on census counts and scat collection, not capture or other forms of direct handling. As a result, there is little information available as to how specifically Guadalupe fur seals will respond to the proposed research activities. However,

Guadalupe fur seals are otariids, like the more commonly-studied Steller sea lions and California sea lions, we expect that Guadalupe fur seals would exhibit similar responses to the proposed action. The research techniques are common in pinniped research, and will be employed by experienced personnel.

8.3.1 Response to approaches during surveys

Guadalupe fur seals have been known to stampede when they are disturbed (Aurioles-Gamboa et al. 2010). To minimize this risk, the researcher will maintain safe distances from the fur seals during observation, conducting surveys from blinds, cliff tops, and using remote cameras to remain out of sight of the animals. In addition, the researchers will wear camouflaged clothing and move slowly, approaching the animals from downwind to avoid detection.

To minimize the effects of close approach, the permit requires researchers to exercise caution when approaching animals and to retreat if behaviors indicate the approach may be interfering with reproduction, feeding, or other vital functions. Researchers would also apply “good practice” measures to minimize potential risks associated with the research activities.

8.3.2 Response to incidental disturbance

The permit would authorize take for incidental disturbance of Guadalupe fur seals during other NMML pinniped research activities, namely for California sea lions and northern elephant seals. Although California sea lions can be found co-occurring with Guadalupe fur seals, the two species appear to segregate because California sea lions prefer open flat beaches in contrast to Guadalupe fur seals (Peterson et al. 1968, Garcia-Aguilar et al. 2013). Northern elephant seals prefer open sandy beaches, and harbor seals will haul out on offshore islands, intertidal sandbars, and rocky shores and beaches.

8.3.3 Response to capture, handling and restraint

Capture, handling and restraint can lead to stress, which in turn can cause myopathic injury (muscle damage stemming from stress hormone release) or even death. A major factor in myopathic injury and death is the time involved with handling. In general, the shorter the interaction between humans and fur seals, the better, as mammalian stress hormone levels increases with handling time. Evidence from several species indicates that the HPA axis responds rapidly to a stressor, with increases within 5 minutes (Moe and Bakken 1997). Depending upon the species and the perceived threat level, the stress response may level out (where it may remain for periods of days or weeks) or continue to rise throughout the experience. This response can be additive with repeated exposure, eventually leading to severe injury or death (Cowan and Curry 1998, 2002, Herraes et al. 2007, Cowan and Curry 2008).

Decline in body condition can also result from repeated capture or chronic stress caused by handling and restraint (Cattet et al. 2008). However, Engelhard et al. (2002) found no difference in the cortisol response between southern elephant seal pups being captured and restrained for the first time and those having been captured and restrained multiple times. This suggests that there is no effect from previous capture and restraint exposures on how stressful future captures and restraints will be for a pinniped.

8.3.4 Response to measuring and weighing

As part of the tagging procedure, length and girth measurements would be taken, and the animal would be weighed. Taking these measurements would involve additional handling that is

expected to contribute a few minutes of handling to the process. The most significant response by fur seals will likely be the added stress of the procedure. However, this additional stress is not expected to significantly hamper any individual's ability to survive or reproduce and carries no fitness consequence. These findings are consistent with previous investigations on Steller sea lions, where Petrauskas et al. (2008) found that capture and restraint elicit greater responses than the invasive or non-invasive procedures to which they are exposed.

8.3.5 Response to flipper tagging/skin sampling and hair sample collection

Flipper tagging may involve several responses on the part of the Guadalupe fur seals. The most significant of these may be pain. Individuals who are being flipper tagged may flinch as the tag is applied through the webbing of the flipper, apparently in response to transitory pain. This technique has been applied in other listed pinniped species like Hawaiian monk seals, and the response is reported as fleeting. Apart from the overt flinching reflex, the pain sensation is also expected to increase stress to the individual. However, this additional stress is expected to be transitory. The skin sample would be obtained during the flipper tagging, because the tagging releases a piece of skin of sufficient size for genetic analysis.

A hair sample will be collected by using scissors or an electric trimmer; if the pup is molting, the researcher may simply use a comb to obtain the hair. Care would be taken to only take the sample from the top layer of guard hair, leaving the underfur intact (which is vital to the pup's thermoregulation). This would be a minor, non-invasive technique, and would only require a short amount of additional handling. As for flipper tagging, any stress expected to the animal due to this procedure is expected to be transitory.

8.3.6 Response to incidental mortality

During research activities, it is possible that moribund fur seal pups could die or be euthanized at the discretion of the on-site veterinarian. In all cases of euthanasia and mortality, death will occur to the focal individual. However, this will not always significantly reduce the individual's future survival or reproductive potential. Euthanasia will occur based upon a variety of factors:

- the likelihood of survival if not euthanized
- the clinical signs of disease and the concern that a particular animal and/or animals represent a serious contagious threat to a larger group of animals (e.g. respiratory signs consistent with a morbillivirus infection or systemic ocular disease)
- gender
- number of animals involved

The euthanasia of a moribund or severely ill Guadalupe fur seal pup is not expected to carry a reduced survival or reproductive cost to many, if any, individuals, as euthanized fur seals would not likely survive on their own for a significant period, let alone successfully compete for mating opportunities or successfully produce offspring. By euthanizing, removing, and necropsying these individuals, benefits can be realized by other fur seals. Necropsy findings would add to the understanding of disease and illness in fur seals.

Summary

Only pups in good body condition would be exposed to proposed stressors for the directed sampling activities—those individuals whose body reserves could be able to withstand the metabolic stresses involved with the proposed actions. We expect that, if healthy individuals are exposed and subsequently become moribund and die, the stressors associated with the proposed

study will not have contributed significant to the individual's decline (i.e., the individual would have died regardless of the action).

The permit conditions, the experience of the researchers, and best practices for close approaches and sampling would help minimize any risk of disturbance or injury occurring during the proposed studies. Assuming an animal is no longer disturbed after it returns to pre-approach behavior, we do not expect long-term consequences for the individuals affected. The permit also requires coordination of the proposed activities with other permit holders conducting similar activities on the same species in the same locations or times of year to avoid unnecessary disturbance.

Permit conditions also address the potential for repeat disturbance of these species. Available information suggests the cumulative effect of close approaches could be greater than the effect of each individual approach (e.g., Weinrich et al. 1992; Beale and Monaghan 2004). To minimize repeated disturbances to individual fur seals, the proposed permit limits takes to no more than four per individual each year.

9 Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered by this Opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

During this consultation, NMFS searched for information on future state, tribal, local or private actions reasonably certain to occur in the action area. We did not find any information about non-Federal actions other than what has already been described in the Environmental Baseline, which we expect will continue into the future. Anthropogenic effects include vessel traffic, noise, climate change, prey availability, pollution, and scientific research. An increase in these activities could result in an increased effect on ESA-listed species; however, the magnitude and significance of any anticipated effects remain unknown at this time.

10 Integration and Synthesis of the Effects

The proposed Permit No. 16087-02 would authorize up to 500 "takes" during the five years of the permit. This corresponds to each individual in the action area being taken no more than four times per year. For the proposed permit, the research activities would entail incidental disturbance, capture, handling, fur and skin sampling, tagging, and one unintentional pup mortality. These activities are standard protocol for pinniped research, and would be carried out by qualified personnel.

At present, several factors (see Environmental Baseline section 7) may be affecting Guadalupe fur seal survival and recovery in the action area. Natural factors include natural mortality, disease and parasites. Past and present anthropogenic effects potentially affecting Guadalupe fur seals in the action area include hunting, entanglement in commercial fishing gear, pollution, climate variability, noise, and scientific research.

After reviewing the available information, we determined the proposed activities to be conducted under Permit No. 16087-02 are likely to produce several stressors for Guadalupe fur seals that required further analysis: close approach by researchers (by vessel and on land), capture, restraint, handling, flipper tagging, skin and hair clip sampling, measuring, weighing, incidental disturbance, and incidental mortality. Negligible stressors were determined in Effects of the Action: Stressors (section 8.1) to be vessel strike, vessel noise, and vessel discharges. It is expected that Guadalupe fur seals would not be exposed to the research activities (“taken”) more than 500 times over the life of the permit and no more than four times in any one year. It is possible that an individual could be taken more than four times per year, or that the total annual take limit could be exceeded. However, due to the fact that there are so few Guadalupe fur seals within the action area, it is unlikely that the total annual take limit could be exceeded; in fact, the Applicant requested an annual take limit based on projected population growth to account for possible increases to the population in later years. Furthermore, because Guadalupe fur seals are a recent addition to U.S. waters, and the population has been historically small, the species has not been the focus of much directed research. The total number research takes that are authorized for Guadalupe fur seals are for a large geographic area, and do not focus solely on the individuals that are likely to be taken for the research activities conducted under Permit No. 16087-02.

The takes that would be authorized under the proposed Permit No. 16087-02, combined with the amount of currently authorized research takes for Guadalupe fur seals, far exceeds the total number of individuals in the known U.S. However, in all other instances, the currently-permitted researchers have reported far fewer annual takes than have been authorized (see Environmental Baseline, section 7.8).

If issued, Permit No. 16087-02 would authorize the unintentional mortality of one pup due to the research activities over the life of the permit. The scientific research activities are standard in pinniped research and are expected to be non-lethal. However, there still remains the possibility that the research activities could exacerbate some latent, unknown condition in a pup during sampling, causing a mortality. All available evidence indicates that the Guadalupe fur seal population is increasing, so we do not expect that the loss of a single fur seal pup due to the permitted activities would cause population-level effects.

Due to lack of available information, it is difficult to quantify and assess the effects of possible repeat disturbance by these researchers on Guadalupe fur seals. The Permits Division limits repeated harassment by requiring (to the extent practicable) coordination among permitted research as a permit condition and specifying daily and annual exposure limits for individuals during research activities. In our Conservation Recommendations, we posed recommendations for the Permits Division to monitor reports from all pinniped research permit holders in the area for Guadalupe fur seal population information, and to encourage data-sharing amongst permit holders to maximize the benefits of these research projects on this small, localized population.

Based on the relatively small known population size within the action area, we expect that most, if not all of the individuals in the known Guadalupe fur seal population in U.S. waters would be exposed to the research activities. Any age and either sex of fur seal may be exposed to activities under the proposed permit. The action area includes foraging, breeding, pupping and migration areas for Guadalupe fur seals. Proposed research activities would occur on offshore islands along

the coasts of California, Oregon, and Washington year-round, except for June and July, annually for five years, until June 2019. Given the location and timing of the proposed research activities, we expect foraging, breeding, pupping and migrating fur seals to be present in the action area. The duration of each sampling event would vary, but is not expected to exceed 20 minutes.

The anticipated responses of Guadalupe fur seals to activities conducted under proposed Permit No. 16087-02 were described in detail in the Effects of the Action: Response Analyses (section 8.3). Possible responses resulting from exposure to close approaches and the research activities range from no response to sub-lethal (or physiological), short-term behavioral responses with a possibility of mortality to pups as a result of research activities.

Based on the available information, we conclude the way the research is conducted significantly influences Guadalupe fur seal response. With careful techniques and experienced personnel, we expect fewer Guadalupe fur seals to exhibit responses that might indicate stress, but that some of these approaches might still be stressful for some individuals and may interrupt behaviors such as foraging or migration. The permit contains conditions to minimize these impacts.

We believe short-lived stress responses due to close approach and sampling activities by researchers are possible for a few individuals, as are short-term interruptions in behaviors such as foraging. Assuming an animal is no longer disturbed after it returns to its pre-approach or pre-capture behavior, we do not anticipate that these brief disruption to lead to reduced opportunities for foraging or reproduction for targeted individuals. With the exception of the unintentional mortality, overall, no individual seal is expected to experience a fitness reduction, and therefore no fitness consequence would be experienced at a population or species level.

11 Conclusion

After reviewing the current Status of Listed Resources, the Environmental Baseline for the Action area, the anticipated effects of the proposed activities, and the Cumulative Effects, it is NMFS' Opinion that the activities authorized by the proposed issuance of scientific research Permit No. 16087-02, as proposed, is not likely to jeopardize the continued existence of Guadalupe fur seals.

12 Incidental Take Statement

Section 9 of the ESA and federal regulation pursuant to Section 4(d) of the ESA prohibit the "take" of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of Sections 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

As discussed in the accompanying Opinion, only the species targeted by the proposed research activities would be harassed as part of the intended purpose of the proposed action. Therefore, NMFS does not expect the proposed action would incidentally take any non-targeted threatened or endangered species.

13 Conservation Recommendations

Section 7(a)(1) of the ESA directs federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

We recommend the following conservation recommendations, which would provide information for future consultations involving the issuance of marine mammal research permits that may affect threatened Guadalupe fur seals as well as reduce harassment related to authorized activities:

1. *Report monitoring.* Monitor all annual and final reports submitted by investigators as well as any data and results that can be obtained from all permit holders conducting similar pinniped research in the area for sightings of Guadalupe fur seals. This should be used to estimate the amount of harassment that occurs given the level of research effort, and how the harassment affects the life history of individual animals, as well as to provide additional information to the ESA Interagency Cooperation Division on the population status and range of Guadalupe fur seals for use in future consultations.
2. *Data sharing.* The Permits Division should continue to encourage permit holders planning to be in the same geographic area during the same year to coordinate their efforts by sharing research vessels and the data they collect as a way of reducing duplication of effort and the level of harassment threatened and endangered species experience as a result of field investigations.

In order for the NMFS ESA Interagency Cooperation Division to be kept informed of actions minimizing or avoiding adverse effects on, or benefiting, listed species or their habitats, the Permits Division should notify the ESA Interagency Cooperation Division of any conservation recommendations they implement in their final action.

14 Reinitiation Notice

This concludes formal consultation on the proposal to issue scientific Permit No. 16087-02 to NMML authorizing research on threatened Guadalupe fur seals in haulouts and offshore islands along the coasts of California, Oregon and Washington. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion; or (4) a new species is listed or

critical habitat designated that may be affected by this action. In instances where the amount or extent of authorized take is exceeded, the NMFS Permit Division must immediately request reinitiation of Section 7 consultation.

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