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

APR - 6 2012

Memorandum For: Tammy Adams
Acting Chief, Permits and Conservation Division

From: Gina Shultz
Chief, Endangered Species Act Interagency Cooperation Division

Subject: Biological Opinion on the proposal to issue permit No. 14534-02 to the National Marine Fisheries Service Office of Science and Technology, which would conduct scientific research on humpback whales in the US Navy's SOCAL Range Complex (i.e., Southern California), pursuant to Section 10(a)(1)(A) of the Endangered Species Act of 1973

Enclosed is the NOAA's National Marine Fisheries Service (NMFS) biological opinion on the effects of the directed take of humpback whales for scientific research purposes, prepared pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 USC 1531 *et seq.*).

In this biological opinion, NMFS concludes that the issuance of permit 14534-02 is likely to adversely affect, but not likely to jeopardize, the continued existence of humpback whales.

This concludes formal consultation on this action. Consultation on this issue must be reinitiated if: (1) the amount or extent of allowable 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 biological opinion; (3) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

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:	**Proposal to issue permit No. 14534-02 to National Marine Fisheries Service's Office of Science and Technology, which would conduct scientific research on humpback whales in the U.S. Navy's Southern California (SOCAL) Range Complex, pursuant to Section 10(a)(1)(A) of the Endangered Species Act of 1973**
Prepared by:	**Endangered Species Act Interagency Cooperation Division of the Office of Protected Resources, National Marine Fisheries Service**
Approved by:	_____
Date:	MAY 14 2012

Section 7(a)(2) of the Endangered Species Act (ESA; 16 U.S.C. 1536(a)(2)) requires each Federal agency to insure that any action authorized, funded, or carried out by such 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 a Federal agency's action "may affect" listed species or designated 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.

In this instance, the Permits and Conservation Division of NMFS ("Permits Division," the action agency) consulted with the Endangered Species Act Interagency Cooperation Division of NMFS (the consulting agency) on the former's issuance of a scientific research permit (the action) to the NMFS Office of Science and Technology (OST, the applicant or investigators). This Biological Opinion ("Opinion") is the result of our interagency consultation and describes how the Permits Division has insured that their issuance of scientific research permit No. 14534-02 is not likely to jeopardize the continued existence of the endangered humpback whale (*Megaptera novaeangliae*).

National Marine Fisheries Service

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We, the Endangered Species Act Interagency Cooperation Division, prepared this Opinion in accordance with Section 7 of the ESA and its regulations (50 CFR Part 402). We based our Opinion on information provided in the amended research permit application, the draft permit amendment, and the original and amended environmental assessments. We also reviewed published and unpublished scientific data, recovery plans, and other sources of information.

The format of this Opinion is as follows. After a brief history of the consultation, we describe the proposed action and the area in which it will occur (i.e., *Action Area*). In the *Status of the Species* section, we document which listed species occur in the action area. We identify which, if any, listed species are not likely to be adversely affected and can be eliminated from further consideration. For species that are likely to be adversely affected by the action, we provide the background information required to assess the action's impact on their continued survival. In the *Environmental Baseline* section, we review past and present activities that have affected these species, specifically in the action area. These summaries serve as the context for the *Effects of the Proposed Action* section, in which we consider the species' exposure and responses to stressors caused by the action. In the *Risk Analyses* section, we determine whether activities that adversely affect listed individuals are likely to reduce their fitness and, in turn, diminish the viability of the population(s) and species they represent. In addition, we consider the *Cumulative Effects* of future state or private activities that are reasonably certain to occur in the action area. We integrate all information in a final synthesis and use this to arrive at our conclusion: whether the Federal agency has insured that their action is not likely to jeopardize listed species or destroy/adversely modify critical habitat. We end with the following sections: *Incidental Take Statement*, *Conservation Recommendations* and *Reinitiation Statement*.

CONSULTATION HISTORY

On July 2, 2010, the Permits Division issued Permit No. 14534 to the NMFS Office of Science and Technology (OST), for research on marine mammals within southern California offshore waters primarily in the US Navy's Southern California Range Complex and the US Navy Hawaii Range Complex. This permit was amended on August 31, 2010 to combine permitted takes for two species of common dolphins into a single category. During their second field season, the investigators encountered larger than expected numbers and more frequent occurrences of humpback whales. They submitted a modification request for additional take and protocol clarifications. In response, the Permits Division requested ESA Section 7 consultation on an amendment to the permit. We initiated consultation on January 11, 2012.

DESCRIPTION OF THE PROPOSED ACTION

The Permits Division proposes to amend the applicant's current five-year, scientific research permit (Permit No. 13534-01 to expire on July 31, 2015), pursuant to Section 10(a)(1)(A) of the ESA and the Marine Mammal Protection Act (MMPA, 16 U.S.C. 1361). Permit No. 14534-02 would authorize OST investigators (responsible party, Ned Cyr) to annually take 174 humpback whales (*Megaptera novaeangliae*) in the US Navy's Southern California (SOCAL) Range Complex. The permit would exempt the applicant

from ESA and MMPA prohibitions against take, defined by the ESA as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. 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 in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [16 U.S.C. 1362(18)(A)]. This is similar to the U.S. Fish and Wildlife Service's regulatory definition of "harass" pursuant to the ESA (50 CFR 17.3). 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.

The proposed permit amendment would authorize the targeted take (i.e., harassment) in a multi-stimulus behavioral response study, which would document the responses of humpbacks (as well as several other marine mammal species, analyzed in the previous consultation) when exposed to underwater natural noises, novel synthetic noises, and simulated mid-frequency sonar noises. The investigators would also approach, tag, follow, photograph, observe, and collect sloughed skin samples from targeted animals (Table 1).

Table 1. Permitted activities and maximum annual takes under Permit No. 14534-02.

No. Humpbacks	No. Takes per Humpback	Life Stage	Activities
20	2	Adult/ Juvenile	Passive acoustic monitoring; focal follow; close approach; tagging; photography; active acoustic playback; behavioral observation.
80	3	Adult/ Juvenile	Passive acoustic monitoring; focal follow; close approach; tagging; photography; behavioral observation.
114	3	All	Passive acoustic monitoring; focal follow; photography; behavioral observation.
60	1	Non-neonate	Passive acoustic monitoring; active acoustic playback; behavioral observation.

Passive acoustic monitoring

The investigators would use existing US Navy underwater tracking range hydrophones to locate and monitor target marine mammals in the action area. They would also deploy their own passive acoustic monitoring equipment from a large research vessel (i.e., the "whale observation vessel"). The equipment would include one or more of the following instruments: towed linear arrays of hydrophones, single hydrophones, compact 4-hydrophone bearing arrays, and regular or broadband sono-buoys. Investigators would also conduct visual searches from aboard the whale observation vessel.

Focal follow
Once whales have been detected, the investigators would begin focal follow, the continuous observation and pursuit of a targeted individual or group. Weather permitting, the investigators would deploy rigid hulled inflatable boats (the "tagging boat") to conduct the focal follow. The whale observation vessel would maintain radio communication with the tagging boat, to help them locate the focal group. During rough conditions, the investigators would use the whale observation vessel to conduct focal follows at a distance.

Close approach
An "approach" is defined as a continuous sequence of maneuvers (including drifting) directed toward a cetacean or group of cetaceans for the purpose of conducting authorized research. A close approach is defined as any approach that involves coming closer than 100 yards to a cetacean. The investigators would utilize close approach for the attachment of tags and photography (both described below).

Tagging
The investigators would tag target humpback whales with one or two tags: the digital archival recording tag (DTAG2) and/or the bio-acoustic probe tag (BProbes). The DTAG2 measures received sound exposure, animal vocalizations, behavior, and physiology. It has sensors that record pressure, pitch, roll, heading, surfacing events, and ambient temperature. The DTAG2 is a high data rate recording tag and is designed to be attached to an animal for relatively short periods of time (5-18 hr). The dimensions of the tag (within its drag-reducing housing) are 20 cm x 10 cm x 4 cm. The tag is slightly positively buoyant to allow for retrieval after detachment from the target animal. It includes a GPS sensor that tracks the location of the tagged whales so that the vessel does not have to follow the animals continuously.

Bio-acoustic probe tags (BProbes) are electronic data-logging tags that record calibrated acoustic pressure, temperature, depth, acceleration, and body orientation of the tagged animal (see Goldbogen et al. 2006). The use of these probes will allow for 3-D tracking of target animals relative to the whale observation vessel. These tags are approximately 33 cm long and 6 cm in diameter. They are equipped with a flotation device and VHF transmitter to allow for recovery after detachment (Burgess et al. 1998).

The tags would be administered by using a hand-held carbon fiber pole or a 12 m cantilevered pole. The tags would be attached non-invasively using 4-60 mm diameter suction cups made from medical grade silicone.

Photography
The investigators would photograph the humpback(s) for subsequent identification.

Retreat
Once a tag is successfully attached and individuals photo-identified, the tagging boat would retreat. The follow would continue from a distance using the whale observation vessel.

Playback
After observing and recording the baseline behavior of target animals, the investigators would conduct playback experiments. These experiments would project a variety of natural (e.g. killer whale) and anthropogenic (e.g. simulated military active mid-frequency sonar) noises. The investigators would broadcast playbacks from underwater speakers attached either to a stationary object or the whale observation vessel, which would maintain a minimum distance of 200 m from target animals.

The investigators would transmit synthetic mid-frequency noises simulating sonar or pseudorandom sounds of 1.5-5.0 kHz and 0.5-5 seconds in duration every 20-60 seconds. They would transmit simulated killer whale vocalizations over a larger bandwidth (1-20 kHz) for up to 30 minutes.

Before starting each playback, the distance to the target animal would be estimated via passive acoustic monitoring and/or visual observations. Noises would be emitted from an underwater speaker with a maximum source level of 220 dB in order to reduce the maximum received level at the target animal to ≤180 dB.

Sloughed skin collection
Fragments of sloughed skin often remain attached to retrieved tag suction cups. The investigators would collect this skin opportunistically for genetic analyses.

Mitigation measures
The research project is designed to minimize the potential for stress, pain or suffering. Precautionary measures include:

1. Use of small (3-5 m), relatively quiet boats to minimize disturbance.
2. Each close approach would last a few minutes, and individuals would not be approached more than three times a day.
3. Close approaches would be conducted slowly, deliberately, and for as short a duration as necessary to tag and photograph the target whale.
4. The investigators would shut down the source transmissions if the target animal, or any other marine mammal, is observed to be within 200 m of the sound source.
5. They would cease the approach and select a different target if an animal attempts to avoid the approaching tagging vessel or exhibits a moderate or strong reaction (as classified by Weinrich et al. 1992).
    - Moderate reaction: animal modified its behavior in a moderately forceful manner (e.g., trumpet blows, hard tail flicks, etc.) but gave no prolonged evidence of behavioral disturbance.
    - Strong reaction: animal modified its behavior to a succession of forceful activities (e.g., continuous surges, tail slashes, numerous trumpet blows, etc.).
6. For tag attachment, the investigators would cease their attempts after three unsuccessful close approaches and select a different target for tagging.
7. They would attach tags to the whale using suction-cups, which are temporary and non-invasive.
8. They would disinfect suction cups prior to attachment to avoid possible infection or disease transfer.

9. Tags are designed to dislodge easily via rapid movements in response to irritation.
10. The investigators would compare the movements and vocal behavior of whales exposed to playbacks versus silent control baseline conditions to establish the minimum exposures necessary to produce detectable responses.
11. They designed the playbacks to avoid sound levels that could cause hearing damage. The maximum received level of 180 dB would be used for playback signals (after Southall et al. 2007).
12. They would limit the exposure of animals to playbacks to the shortest duration required to elicit identifiable behavioral reactions.
13. The investigators would follow playback subjects after exposure to monitor the whale's return to baseline behavior. They would modify the playback protocol if there is any evidence of longer term changes.
14. They would add a margin of error for safety to account for the possibility that the acoustic models used to predict received level at the animal are not correct. They would determine and validate this margin of error by comparing estimated levels to received levels measured during the course of the playback experiments.
15. The investigators would suspend playbacks if they observe prolonged responses that might pose a risk of injury (e.g., panicked flight toward shallow water). They would contact the Permits Division to develop a protocol which ensures that future playbacks would limit future exposure to levels below those likely to expose animals to any such risk.

PERMIT TERMS AND CONDITIONS

In addition to these mitigation measures, Permit No. 14534-02 includes terms and conditions that limit the research activities, specifies the number and kinds of species that can be taken, and specifies the location and manner of taking. Some of these terms and conditions are as follows:

1. The investigators must suspend all permitted activities in the event of serious injury or mortality[1] of protected species.
2. If authorized take is exceeded, the investigators must cease all permitted activities and notify the Chief of the Permits Division by phone as soon as possible, but no later than within two business days.
3. They must exercise caution when approaching animals and must retreat from animals if behaviors indicate the approach may be life-threatening.
4. They must not attempt to tag any cetacean calf less than one year old or any female accompanied by a calf less than one year old.
5. They shall consider a marine mammal to have been taken if:
    - During close approach, for photo-identification, or focal follows, an animal is approached within 100 m, regardless of whether the animal

1 This permit does not allow for unintentional serious injury and mortality caused by the presence or actions of investigators. This includes, but is not limited to; deaths of dependant young by starvation following research-related death of a lactating female; deaths resulting from infections related to sampling procedures; and deaths or injuries sustained by animals during capture and handling, or while attempting to avoid investigators or escape capture. Note that for marine mammals, a serious injury is defined by regulation as any injury that will likely result in mortality.

exhibits behaviors indicative of harassment.
    - During a tag attachment attempt, the animal is approached within 100 m; the tag misses (i.e., does not make contact); tag contacts the animal but does not successfully attach; or the tag attaches to the animal, regardless of duration of attachment.
    - The animal is exposed to a playback.
6. No individual animal may be taken more than six times in one day by any combination of focal follow, tag attachment, or photo-identification activities, and more than 2 times in one day by intentional exposure to playbacks.
7. The investigators must discontinue a tag attachment attempt if an animal exhibits a strong adverse reaction to the activity or the vessel (e.g., breaching, tail lobbing, underwater exhalation, or disassociation from the group).
8. They must discontinue a playback episode if an animal exhibits a strong adverse reaction to the playback activity or the vessel (e.g., breaching, tail lobbing, underwater exhalation, or disassociation from the group).

APPROACH TO THE ASSESSMENT

The National Marine Fisheries Service approaches its Section 7 analyses 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 effects (i.e., the *Action Area*).

The second step of our analyses identifies the listed resources that are likely to co-occur with these effects in space and time. We then perform our *Effects Analyses*. The first of these are our *Exposure Analyses*, in which 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 populations or subpopulations those individuals represent. We evaluate which aspects of the proposed actions could be considered stressors on listed species (i.e., *Potential Stressors*). We then examine available scientific and commercial data to determine whether and how listed individuals are likely to respond to each stressor (i.e., *Response Analyses*).

The final steps of our analyses include assessing the risks those responses pose to listed species and the impacts to their designated critical habitat (i.e., *Risk Analyses*). Our jeopardy determinations must be based on an action's impact on the continued existence of threatened or endangered species as those "species" have been listed, which can include true biological species, subspecies, as well as distinct populations segments (DPSs) and evolutionarily significant units (ESUs) of vertebrate species. The continued existence of species depends on the fate of the populations that comprise them. Similarly, the continued existence of populations is 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 populations that comprise the species, and the individuals that comprise those populations. They begin by

identifying the probable risks that actions pose to listed individuals. 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.

We measure risks to listed individuals in terms of "fitness," i.e., their 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 identified during our response analyses) are likely to have consequences for its fitness. When individual 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 in these measures) of the populations those individuals represent (Stearns 1992; Mills & Beatty 1979; Anderson 2000). Reductions in at least one of these variables (or one of the variables we derive from them) is a necessary condition for reductions in a population's viability, which is itself a necessary condition for reductions in a species' viability. Alternatively, 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. 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 must next consider whether those fitness reductions are likely to reduce the viability of the population(s) the individuals represent (measured using changes in 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 threatened or endangered species are likely to experience reductions in their viability and whether such reductions are likely to be appreciable.

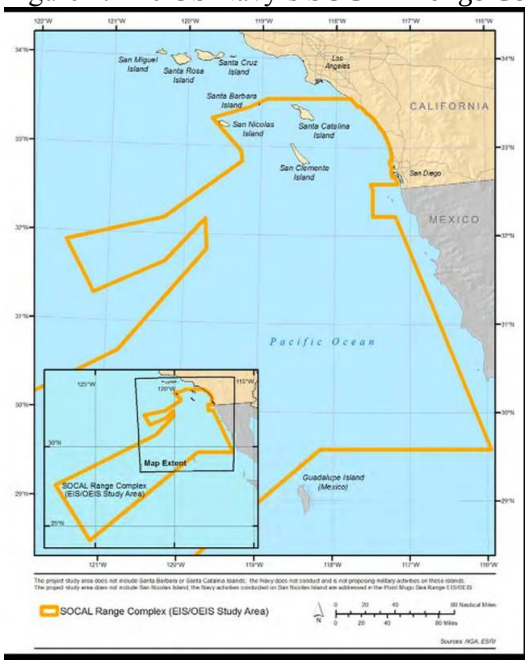
To conduct these analyses, we rely on all of the evidence available to us. This evidence might consist of: monitoring reports submitted by past and present permit holders; reports from NMFS Science Centers; reports prepared by natural resource agencies in states and other countries; reports from domestic and foreign non-governmental organizations involved in marine conservation issues; the information provided by the Permits Division when it initiates formal consultation; and published scientific literature. To find this information, we review peer reviewed scientific literature, master's theses, doctoral dissertations, government reports, and commercial studies. We use literature search engines such as *Science Direct*, *BioOne*, *JSTOR*, and *Google Scholar* as well as the use of NOAA and university libraries. We focus on identifying recent information on the biology, ecology, distribution, status, and trends of the threatened and endangered species considered in this opinion.

We evaluate all evidence based on the quality of the study design, sample sizes, and study results. 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. In those cases, in keeping with the direction from the U.S. Congress to provide the "benefit of the doubt" to threatened and endangered species [House of Representatives Conference Report No. 697, 96th Congress, Second Session, 12 (1979)], we generally make determinations which provide the most conservative outcome for listed species.

ACTION AREA

The action area consists of Southern California offshore waters in the US Navy's SOCAL Range Complex (NMFS 2010), primarily near the vicinity of San Clemente Island.

Figure 1. The US Navy's SOCAL Range Complex



STATUS OF THE SPECIES

The following endangered and threatened species may occur in the action area:

Common Name	Scientific Name	Listing Status
Marine Mammals		
North Pacific right whale	Eubalaena japonica	Endangered
Blue whale	*Balaenoptera musculus*	Endangered
Fin whale	*Balaenoptera physalus*	Endangered
Humpback whale	*Megaptera novaeangliae*	Endangered
Sei whale	*Balaenoptera borealis*	Endangered
Sperm whale	*Physeter macrocephalus*	Endangered
Steller sea lion	*Eumetopias jubatus*	
Eastern DPS		Threatened
Guadalupe fur seal	*Arctocephalus townsendi*	Threatened
Sea Turtles		
Leatherback turtle	*Dermochelys coriacea*	Endangered
Hawksbill turtle	*Eretmochelys imbricata*	Endangered
Loggerhead turtle	*Caretta caretta*	
North Pacific DPS		Endangered
Green turtle	*Chelonia mydas*	
Mexico's Pacific coast breeding populations		Endangered
All other populations		Threatened
Olive ridley turtle	*Lepidochelys olivacea*	
Mexico's Pacific coast breeding populations		Endangered
All other populations		Threatened
Marine and anadromous fish		
Green sturgeon	*Acipenser medirostris*	
Southern DPS		Threatened
Chinook salmon	*Oncorhynchus tschawytscha*	
California coastal ESU		Threatened
Central Valley Spring ESU		Threatened
Sacramento River ESU		Endangered
Steelhead trout	*Oncorhynchus mykiss*	
Southern California ESU		Endangered
Invertebrates		
Black abalone	*Haliotis cracherodii*	Endangered
White abalone	*Haliotis sorenseni*	Endangered

Species and Critical Habitat Not Likely to Be Affected by the Action

The purpose of this action is to perform acoustic research on humpback whales (and other target marine mammals), discussed in a later section. Non-target species may be affected by two potential stressors: risks associated with operating watercraft (i.e., vessel noise, visual disturbance, and collision with the vessel) and noise generated by the playbacks. No activities are likely to destroy or adversely modify black abalone critical habitat.

The whale observing vessel and tagging boat would maintain safe operating speeds and abide by safe boat-operating guidelines. In addition to the captain or boat driver, there would be observers aboard to watch out for marine animals. Investigators would not intentionally approach non-target species in their vessel. They would avoid all sea turtles, fish, and invertebrates. Vessel collision is thus discountable, i.e., extremely unlikely to occur, and not likely to adversely affect the above listed sea turtles, fish, and abalone. The noise and visual disturbance caused by the whale observation vessel or tagging vessel would be no more than that of other vessels in the area. The presence of one additional vessel in the action area (which has considerable vessel traffic) is unlikely to have a significant impact on listed species. Therefore, listed sea turtles, fish, and abalone are unlikely to be adversely affected by the operation of watercraft for the purposes of this action.

Playbacks involve underwater transmission of medium frequency sound (1-20 kHz). If this frequency does not overlap with the hearing range of listed species, the effects on exposed individuals would be insignificant. Sea turtles hear at low frequencies: green, 100-800 Hz; Kemp's ridley, 100-500 Hz; and loggerhead, 250-1000 (Bartol & Ketten 2000; Bartol et al. 1999; Ketten & Bartol 2006). The hearing range of leatherback and olive ridley sea turtles is likely similar to that of other sea turtle species (i.e., <1000 Hz). Fishes (such as the steelhead trout, green sturgeon, and Chinook salmon) likely hear at low frequencies of <0.5-1 kHz (Wahlberg & Westerberg 2005). Mollusks, such as abalone, merely detect low frequency sound (Mooney et al. 2010). Therefore, acoustic tracking is not likely to adversely affect the above listed sea turtles, fish, and abalone.

Several listed species occur to the north of the action area: North Pacific right whale, Steller sea lion (eastern DPS), green sturgeon (southern DPS), and Chinook salmon (California coastal ESU, Central Valley Spring ESU, and Sacramento River ESU). These species have rarely, if ever, been observed in the action area(NMFS 2012). They are unlikely to occur in the action area and thus would not be exposed to any of the research activities. Therefore, these species are not likely to be adversely affected by the action.

Black abalone critical habitat

Black abalone critical habitat consists of the rocky intertidal and subtidal areas along the California coast between the Del Mar Landing Ecological Reserve to the Palos Verdes Peninsula, as well as off the following islands: Farallon, Ano Nuevo, San Miguel, Santa Rosa, Santa Cruz, Anacapa, Santa Barbara, and Santa Catalina. This includes the intertidal and subtidal habitats from the mean high water line to a depth of 6 m (relative to the mean low water line). The primary constituent elements of black abalone critical habitat include: rocky substrate; food resources, including bacterial and diatom films, crustose coralline algae, and detrital macroalgae; juvenile settlement habitat, such as crustose coralline algae, crevices, and cryptic biogenic structures; suitable water quality; and suitable nearshore circulation patterns. The investigators' activities would not occur in rocky intertidal and subtidal areas. They would not affect food resources, water quality, or circulation patterns. Therefore, their actions are not likely to destroy or adversely modify black abalone critical habitat.

In conclusion, the following non-target species and their critical habitats are not likely to be adversely affected by the actions of the researchers, and therefore, are not considered further in this opinion: North Pacific right whale; Steller sea lion (Eastern DPS); leatherback turtle; hawksbill turtle; loggerhead turtle, North Pacific DPS; green turtle, Mexico's Pacific coast breeding populations and all other populations; olive ridley turtle, Mexico's Pacific coast breeding populations and all other populations; green sturgeon (southern DPS); Chinook salmon (California coastal, Central Valley Spring, and Sacramento River ESUs); steelhead trout, southern California ESU; black abalone; and white abalone.

Species Likely to be Adversely Affected by the Action

NMFS has determined that the actions considered in this Opinion are likely to adversely affect the following threatened and endangered species:

Humpback whale	*Megaptera novaeangliae*	Endangered
Blue whale	*Balaenoptera musculus*	Endangered
Fin whale	*Balaenoptera physalus*	Endangered
Sei whale	*Balaenoptera borealis*	Endangered
Sperm whale	*Physeter macrocephalus*	Endangered
Guadalupe fur seal	*Arctocephalus townsendi*	Threatened

We previously consulted with the Permits Division on permit No. 14534, which authorized similar directed research on Guadalupe fur seals and blue, fin, sei, and sperm whales. We found that boat strikes would be extremely unlikely and therefore discountable. Noise and visual disturbances would be brief and would not have long-term consequences on individual listed animals or the populations and species that they comprise. Any behavioral responses to tagging or playback activities would be minor and temporary. In our previous Opinion, we concluded that the activities authorized by the scientific research permit No. 14534 are not likely to jeopardize the continued existence of endangered sperm, sei, fin or blue whales, or threatened Guadalupe fur seals (NMFS 2010). Critical habitat has not been designated for any of these species.

At that time, we also considered the action's effect on humpback whales and concluded that the activities authorized by the scientific research permit No. 14534 were not likely to jeopardize the continued existence of the species (NMFS 2010). At the time, however, humpback whales were considered to be non-target species and only two would taken each year by unintentional exposure to playback. Because the Permits Division proposes to authorize additional research activities and takes (Table 1) under permit No. 14534-02, we re-evaluate the effect of the action on endangered humpback whales, starting with the status of the species.

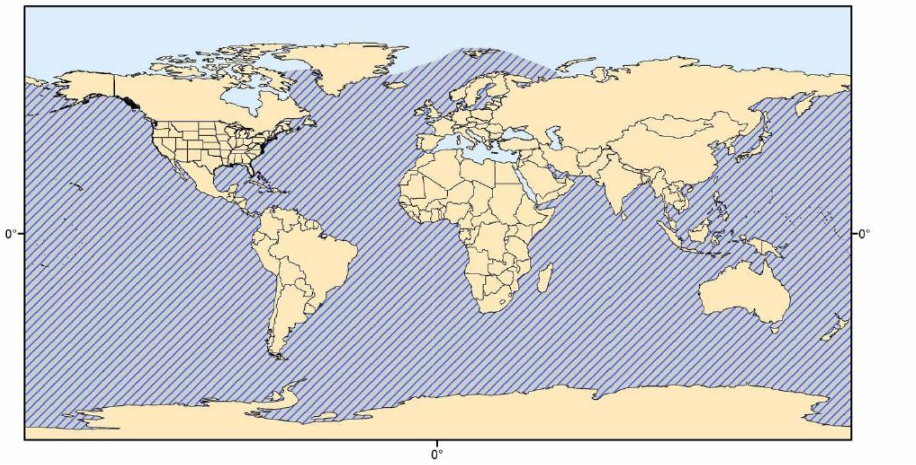
Humpback whale

Species Description and Distribution

The humpback whale is a cosmopolitan species that occurs in the Pacific, Atlantic, Indian, and Southern Oceans (Fig. 2). Most populations migrate between breeding areas

in tropical waters, usually near continental coastlines or island groups, and productive colder waters in temperate and high latitudes (Reilly et al. 2008).

Figure 2. Range of the humpback whale (map courtesy of NMFS OPR).



Listing Status

The humpback whale was listed as endangered under the ESA in 1973. It is considered depleted by the MMPA. In 2008, the IUCN Red List of Threatened Species downgraded the species from Vulnerable to Least Concern, reflecting its low risk of extinction; however, the Arabian Sea and Oceania populations remain listed as Endangered (Reilly et al. 2008). It is also protected by the International Whaling Commission (IWC) and the Convention on International Trade in Endangered Species of wild flora and fauna (CITES). Critical habitat has not been designated for the species.

Population Designations, Abundance and Trends

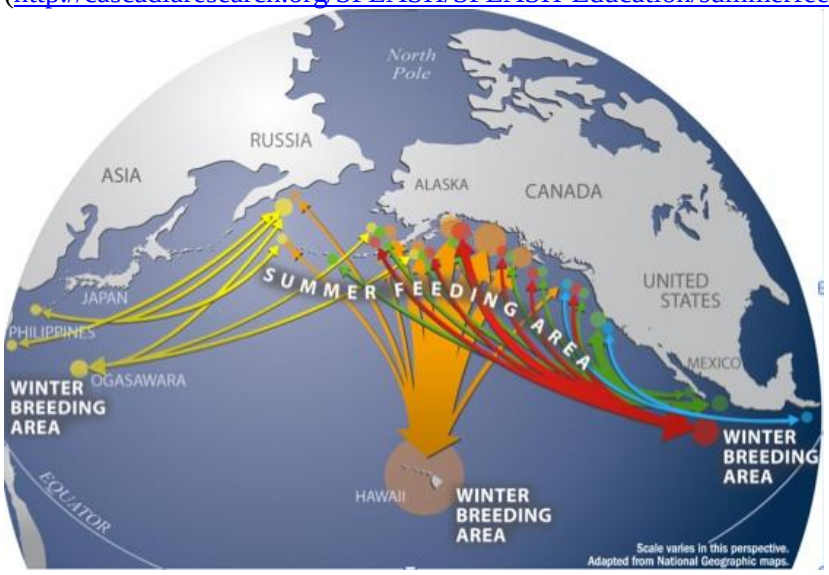
Prior to commercial whaling, hundreds of thousands of humpback whales existed worldwide (Roman & Palumbi 2003; Winn & Reichley. 1985). Global abundance declined to the low thousands by 1968, the last year of substantial catches (Reilly et al. 2008). Since then, the total population size has grown to over 60,000 individuals and continues to increase (Reilly et al. 2008).

Humpback whales are broadly divided into four broad geographic regions based on tagging and genetic data (Baker et al. 1990; Palsboll et al. 1995): North Pacific, North Atlantic, Arabian Sea, and Southern Hemisphere.

North Pacific. In the winter, humpback whales breed and calf in the coastal waters of Southeast Asia, Hawaii, Mexico, and Central America. In the summer, they move to foraging areas in the Bering Sea, the Gulf of Alaska, and the temperate eastern Pacific (Fig. 3; Calambokidis 2010). All breeding areas and most foraging areas are genetically differentiated, as indicated by maternally inherited genetic markers (i.e., mitochondrial haplotypes; Baker 2008). In addition, most breeding and foraging areas exhibit significantly different haplotype frequencies, indicating that there is not a simple one-to-one relationship among feeding and breeding areas (Baker 2008). An estimated 15,000 humpback whales resided in the North Pacific in 1905 (Rice 1978). Commercial whaling depleted the

population to the low thousands by 1965 (Perry et al. 1999). Current estimates indicate approximately 20,000 humpback whales in the North Pacific, with an annual growth rate of 4.9 percent (Calambokidis 2010).

Figure 3. Humpback whale migrations between wintering and foraging areas in the North Pacific (http://cascadiaresearch.org/SPLASH/SPLASH-Education/summerfeeding.html).



North Atlantic. In the summer, North Atlantic humpback whales range from the Gulf of Maine in the west and Ireland in the east. The northern extent of their range includes the Barents Sea, Greenland Sea, and Davis Strait. In the winter, the majority migrate to breeding grounds in the West Indies, though a small number migrate to the Cape Verde Islands (Reilly et al. 2008). Limited genetic exchange among summer feeding areas but mixing in the winter breeding areas is indicative of a single panmictic (i.e., interbreeding) population in the North Atlantic (Palsboll et al. 1997). Whaling nearly extirpated humpback whales from the eastern North Atlantic by 1910 and the Canadian Atlantic by 1920 (Stevick et al. 2003). Protection against whaling began in 1955, and the population has since rebounded. As of 1993, there was an estimated 11,570 humpback whales in the North Atlantic, growing at a rate of three percent annually (Stevick et al. 2003).

Southern Hemisphere. Humpback whales are abundant throughout the Antarctic during the summer; they occur south to the ice edge but not within the pack ice zone (Reilly et al. 2008). In the winter, Southern Hemisphere whales migrate to coastal areas within the South Pacific, South Atlantic, and Indian Oceans. There is genetic differentiation within and among all southern ocean basins (Baker et al. 1998; Rosenbaum et al. 2009). Over 200,000 humpback whales were killed in the Southern Hemisphere during the early 20th century. The area now supports more than 36,000 humpback whales and is growing at a minimum annual rate of 4.6 percent (Reilly et al. 2008)

Arabian Sea. A small, genetically and demographically distinct population of humpback whales resides year-round in the Arabian Sea (Mikhalev 1997; Reilly et al. 2008). Though historical estimates are not available, 242 whales were killed in 1965 and 1966

(Reilly et al. 2008). The minimum population size, based on photo-identification data, is 56 whales (Mikhalev 1997); the maximum estimate is 400 (Reilly et al. 2008).

Threats

Natural threats. There is limited information on natural phenomena that kill or injure humpback whales. Humpback whales are killed by orcas (Dolphin 1989, Florez-González et al. 1984, Whitehead and Glass 1985) and are probably killed by false killer whales and sharks. Naturally-produced biotoxins have led to mortality in adults and juveniles (Geraci et al. 1989). Other natural sources of mortality, however, remain largely unknown. Similarly, we do not know whether and to what degree natural mortality limits or restricts patterns of growth or variability in humpback whale populations.

Anthropogenic threats. Three human activities are known to threaten humpback whales: directed harvest, fisheries interactions, and vessel collisions. Historically, whaling represented the greatest threat to every population of humpback whales. It was ultimately responsible for the global decline in humpback whales prior to their listing as an endangered species. Hundreds of thousands of whales were removed from the world's oceans prior to bans on commercial whaling in the mid-20th century (Reilly et al. 2008).

Humpback whales are killed or injured during interactions with commercial fishing gear. A total of 595 humpback whales are reported to have been entangled in coastal fishing gear off Newfoundland and Labrador (Canada) between 1969 and 1990 (Lien 1994, Perkins and Beamish 1979); of these, 94 are known to have died as a result of that capture (Lien 1994). Along the Atlantic Coast of the U.S. and the Maritime Provinces of Canada, there were 160 reports of humpback whales being entangled in fishing gear between 1999 and 2005 (Cole et al. 2005, Nelson et al. 2007); of these, 95 entanglements were resulted in the death of 9 and injury of 11 whales. There were 23 reports of entangled humpback whales in Hawaiian waters from 2001 through 2006 (NMFS 2008). In these instances, however, the whales were disentangled and released or they were able to break free from the gear without injury.

Humpback whales are vulnerable to ship strikes, which are often fatal. On the Pacific coast, a humpback whale is killed about every other year by ship strikes (Barlow et al. 1997). Of 123 humpback whales that stranded along the Atlantic Coast of the U.S. between 1975 and 1996, 10 (8.1%) exhibited evidence of collisions with ships (Laist et al. 2001). Between 1999 and 2005, 18 humpback whales were reportedly struck by vessels along the Atlantic Coast of the U.S. and the Maritime Provinces of Canada (Cole et al. 2005, Nelson et al. 2007). Of these, 13 were confirmed as ship strikes, resulting in the death of seven whales.

Vocalization and Hearing

In foraging areas, both sexes vocalize in grunts (25 Hz to 1.9 kHz), pulses (25-89 Hz), and songs (30 Hz to 8 kHz, with dominant frequencies of 120 Hz to 4 kHz) (Au 2000; Erbe 2002; Payne & Payne 1985; Richardson et al. 1995; Thompson et al. 1986). In low-latitude breeding areas, male humpback whales produce complex sounds of 20-10 kHz and 144-174 dB (Au 2000; Au et al. 2006; Frazer & Mercado 2000; Payne 1970;

Richardson et al. 1995; Silber 1986; Tyack 1983; Winn et al. 1970). Direct hearing studies on humpback whales are not available, but it is assumed that they can hear the same frequencies that they produce. Morphology of the auditory apparatus indicates that the species is able to hear at least low-frequencies (Ketten 1997) and vocalizations in the low-frequency range (Richardson et al. 1995). Houser et al. (2001) modeled the potential hearing abilities for the humpback whale based on the length of the basilar membrane and predicted sensitivity to frequencies from 700 Hz to 10 kHz, with maximum relative sensitivity between 2 and 5 kHz.

Life History Information

Humpback whale reproductive activities occur primarily in winter. Gestation takes about 11 months (Winn & Reichley. 1985), followed by a nursing period of up to one year (Baraff & Weinrich 1993). Calving occurs in the shallow coastal waters of continental shelves and some oceanic islands (Perry et al. 1999). The calving interval is likely two to three years (Clapham & Mayo 1987), although some evidence exists of calving in consecutive years (Clapham & Mayo 1987; 1990; Glockner-Ferrari & Ferrari 1985; Weinrich et al. 1993). Mother/calf groups are found in relatively stable pairs (Ersts & Rosenbaum 2003). Sexual maturity in humpback whales is reached between five and 11 years of age (Clapham 1992; Gabriele et al. 2007). During the breeding season, humpback whales form small unstable groups (Clapham 1996). Males sing long, complex songs, compete for mates, and are polygamous (Clapham 1996).

Although largely solitary, humpback whales often cooperate during feeding activities (Elena et al. 2002). Feeding groups are sometimes stable for long periods of times, and there is good evidence of some territoriality on both feeding (Clapham 1996) and wintering grounds (Tyack 1981). Humpbacks exhibit a wide range of foraging behaviors and feed on a range of prey types, including: small schooling fishes, euphausiids, and other large zooplankton (Krieger & Wing. 1984; Krieger & Wing. 1986; Nemoto 1957; Nemoto 1959; Nemoto 1970). Because most humpback prey are likely found above 300 m depths, most dives are probably relatively shallow, with typical diving depths of approximately 60-170 m (Hamilton et al. 1997). Dives usually range between two and five minutes but can last to around 20 minutes (Dolphin 1987).

ENVIRONMENTAL BASELINE

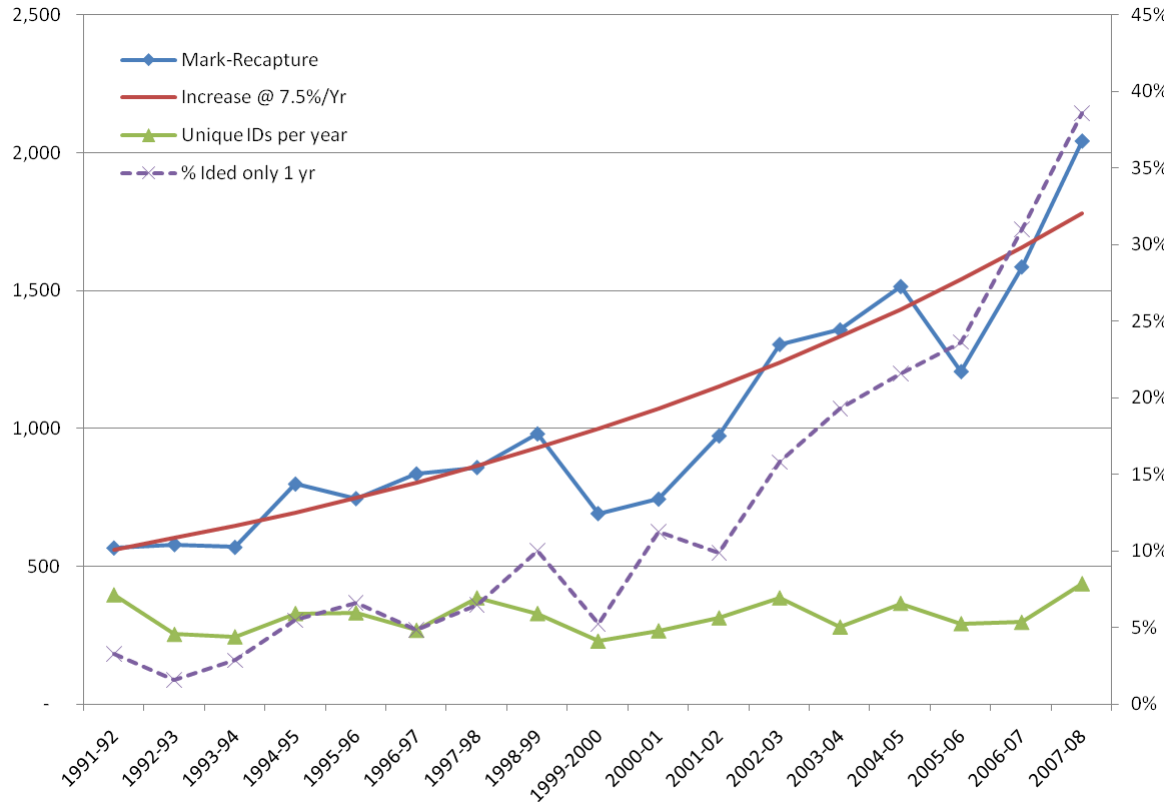
By regulation, environmental baselines for biological opinions include: the past and present impacts of all state, Federal, or private actions; other human activities in the action area; the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation; and the impact of State or private actions which are contemporaneous with the consultation in process (50 CFR 402.02). The environmental baseline for this biological opinion includes the effects of several activities that affect the survival and recovery of endangered whales in the action area (i.e., the Navy SOCAL Range Complex).

A number of human activities have contributed to the current status of eastern Pacific humpback whales. Some of those activities, most notably commercial whaling, occurred

extensively in the past, ended, and no longer appear to affect this population, although the effects of the reduction likely persist today. Other human activities are ongoing and may continue to affect this population. The following discussion summarizes the principal phenomena that are known to affect the likelihood that this population will survive and recover in the wild.

An international research collaboration entitled Structure of Populations, Levels of Abundance and Status of Humpbacks (SPLASH) provides the best available, most current data on humpback whales in the North Pacific (Calambokidis 2010). The collaborators conducted field work on all known North Pacific winter breeding regions during three seasons (2004, 2005, 2006) and all known summer feeding areas during two seasons (2004, 2005). They identified a total of 7,971 unique individuals and collected 6,178 genetic samples. Genetic data indicate that whales from the Central American and Mexican (Baja California, Gulf of California, and mainland) winter breeding areas mix in the California/Oregon summer foraging area (Baker 2008). Calambokidis (2010) estimates ~2,000 humpback whales utilize the California/Oregon foraging area annually (Fig. 4). This number has increased ~7.5 percent annually since the early 1990s (Calambokidis 2010).

Figure 4. Humpback whale abundance estimates off the California and Oregon coasts (Calambokidis 2010).



Natural Sources of Stress and Mortality

Humpback whales are preyed upon by killer whales and parasitized by the nematode, *Crassicauda boopis* (Dolphin 1987; Lambertsen 1986). Lethal strandings attributed to

harmful algal blooms (Geraci et al. 1989) and lethal entrapment in ice have also been observed (Mitchell 1979).

Natural climatic variability and change may affect humpback whales through changes in habitat and prey availability; however, these effects are not well understood. Possible effects of climatic variability for marine species include the alteration of community composition and structure, changes to migration patterns or community structure, changes to species abundance, increased susceptibility to disease and contaminants, alterations to prey composition, and altered timing of breeding (Kintisch 2006; Learmonth et al. 2006; MacLeod et al. 2005; McMahon & Hays 2006; Robinson et al. 2005). 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 worldwide (Beamish et al. 1999; Benson & Trites 2002; Francis et al. 1998; Hare et al. 1999; Mantua et al. 1997). Gaps in information and the complexity of climatic interactions complicate the ability to predict the effects of climate change on humpback whales (Kintisch 2006; Simmonds & Isaac 2007).

Anthropogenic Stressors

Commercial Harvest

Prior to 1900, aboriginal hunting and early commercial whaling on the high seas, using hand harpoons, took an unknown number of humpback whales (Johnson & Wolman 1984). Modern commercial whaling began in 1889 in the western Pacific and 1905 in the eastern Pacific; by 1960 approximately 23,000 humpback whales had been killed (Johnson & Wolman 1984). From 1960 until 1965, over 5,000 humpbacks were killed, reducing the North Pacific population to approximately 1,000 whales (Rice 1978). In 1965, the IWC banned the commercial hunting of humpback whales in the Pacific. Although commercial harvesting no longer targets humpback whales in the proposed action area, prior exploitation may have altered the population structure and social cohesion of the species such that effects on abundance and recruitment can continue for years after harvesting has ceased.

Fishing Activities

Entrapment and entanglement in fishing gear is a frequently documented source of human-caused mortality in marine mammals (see Dietrich et al. 2007). These entanglements also make animals more vulnerable to additional dangers (e.g., predation and ship strikes) by restricting agility and swimming speed. Marine mammals that die from entanglement in commercial fishing gear often sink rather than strand ashore thus making it difficult to accurately determine the extent of such mortalities. Between 2004 and 2008, 18 humpback whales were reported entangled in fishing gear off the coasts of California, Oregon, and Washington. Of these, 11 were entangled at sea in trap/pot fishery gear. Two of the 11 pot/trap gear entanglements resulted in death (Carretta et al. 2010).

Marine mammals probably consume at least as much fish as is harvested by humans (Kenney et al. 1985). Therefore, competition with humans for prey is a potential concern for whales. Reductions in fish populations, whether natural or human-caused, may affect

listed whale populations and their recovery. Humpback whales are known to feed on several species of fish that are harvested by humans (Waring et al. 2008); however, the magnitude of competition remains unknown.

Ship Strikes and Other Vessel Interactions

Ships have the potential to affect humpback whales through strikes, noise, and disturbance by their physical presence. Responses to vessel interactions include interruption of vital behaviors and social groups, separation of mothers and young, and abandonment of resting areas (Bejder et al. 1999; Boren et al. 2001; Colburn 1999; Constantine 2001; Cope et al. 1999; Kovacs & Innes. 1990; Kruse 1991; Mann et al. 2000; Nowacek et al. 2001; Samuels et al. 2000; Samuels & Gifford. 1998; Wells & Scott 1997). Whale watching, a profitable and rapidly growing business with more than 9 million participants in 80 countries and territories, may increase these types of disturbance and negatively affect the species (Hoyt 2001).

Ship strikes are considered a serious and widespread threat to marine mammals. This threat is increasing as commercial shipping lanes cross important breeding and feeding habitats and as whale populations recover and populate new areas or areas where they were previously extirpated (Swingle et al. 1993; Wiley et al. 1995). As ships continue to become faster and more widespread, an increase in ship interactions with marine mammals is to be expected. For whales, studies show that the probability of fatal injuries from ship strikes increases as vessels operate at speeds above 14 knots (Laist et al. 2001).

Ship strikes killed at least two humpback whales in 1993, one in 1995, one in 2000, and two from 2004 to 2008 (Carretta et al. 2010). From 2004 to 2008, the average number of humpback whale deaths by ship strikes was at least 0.4 per year, up from 0.2 per year for 1999-2003 (Carretta et al. 2010). This number is almost certainly an underestimate, as ship strikes often go unreported.

Noise

Noise generated by human activity has the potential to affect humpback whales. This includes sound generated by commercial and recreational vessels, aircraft, commercial sonar, military activities, seismic exploration, in-water construction activities and other human activities. These activities all occur within the action area to varying degrees throughout the year. Whales generate and rely on sound to navigate, hunt, and communicate with other individuals. As a result, anthropogenic noise can interfere with these important activities. The effects of noise on marine mammals can range from behavioral effects to physical damage (Richardson et al. 1995).

Commercial shipping traffic is a major source of low frequency anthropogenic noise in the oceans (NRC 2003). Although large vessels emit predominantly low frequency sound, studies report broadband noise from large cargo ships that includes significant levels above 2 kHz, which may interfere with important biological functions of cetaceans (Holt 2008). Commercial sonar systems are used on recreational and commercial vessels and may affect marine mammals (NRC 2003). Although, little information is available on potential effects of multiple commercial sonars to marine mammals, the distribution

of these sounds would be small because of their short durations and the fact that the high frequencies of the signals attenuate quickly in seawater (Richardson et al. 1995).

Seismic surveys using towed airguns also occur within the action area and are the primary exploration technique for oil and gas deposits and for fault structure and other geological hazards. Airguns generate intense low-frequency sound pressure waves capable of penetrating the seafloor and are fired repetitively at intervals of 10-20 seconds for extended periods (NRC 2003). Most of the energy from the guns is directed vertically downward, but significant sound emission also extends horizontally. Peak sound pressure levels from airguns usually reach 235-240 dB at dominant frequencies of 5-300 Hz (NRC 2003). Most of the sound energy is at frequencies below 500 Hz. In the U.S., all seismic projects for oil and gas exploration and most research activities involving the use of airguns with the potential to take marine mammals are covered by incidental harassment authorizations under the MMPA.

US Navy Activities

The U.S. Navy has been conducting training and other activities in SOCAL for over 70 years. They conduct the following activities: anti-submarine, anti-air, anti-surface warfare exercises, and amphibious warfare exercises; coordinated training events; research; and development and evaluation activities. The U.S. Navy conducts approximately eight major training exercises, seven integrated exercises, and numerous unit-level training and maintenance exercises in the Southern California Range Complex each year (U.S. Navy 2008).

In 2012, we issued a Biological Opinion on the US Navy's training and research activities in the SOCAL Range Complex. Though humpback whales would be exposed to potential ship strikes, the occurrence would be unlikely. Humpback whales would also be exposed to an estimated 300 instances of mid-frequency sonar, received at levels greater than 140 dB (NMFS 2012). Individuals would likely be exposed several times, especially during major training exercises. The behavioral responses of humpback whales are not likely to reduce their survival, reproductive potential, energy budget, or growth rate. Though US Navy activities in the SOCAL Range Complex are not likely to jeopardize the continued existence of the species (NMFS 2012), they adversely affect individuals; therefore, we include them in our list of threats to humpback whales.

Pollution

Marine Debris. Types of marine debris include plastics, glass, metal, polystyrene foam, rubber, and derelict fishing gear from human marine activities or transported into the marine environment from land. The sources of this debris include littering, dumping and industrial loss and discharge from land. Whales become entangled in marine debris, or ingest it, which may lead to injury or death. Given the limited knowledge about the impacts of marine debris on baleen whales, it is difficult to determine the extent of the threats that marine debris poses to humpback whales.

Pesticides and Contaminants. Exposure to pollution and contaminants has the potential to cause adverse health effects in marine species. In the eastern Pacific, marine ecosystems

receive pollutants from a variety of local, regional, and international sources and their levels and sources are therefore difficult to identify and monitor (Grant & Ross 2002). Marine pollutants come from multiple municipal, industrial and household as well as from atmospheric transport (Garrett 2004; Grant & Ross 2002; Hartwell 2004; Iwata 1993).

The accumulation of persistent pollutants through trophic transfer may cause mortality and sub-lethal effects in long-lived higher trophic level animals (Waring et al. 2008), including immune system abnormalities, endocrine disruption, and reproductive effects (Krahn et al. 2007). Recent efforts have led to improvements in regional water quality and monitored pesticide levels have declined, although the more persistent chemicals are still detected and are expected to endure for years (Grant & Ross 2002; Mearns 2001).

Hydrocarbons. Exposure to hydrocarbons released into the environment via oil spills and other discharges pose risks to marine species. Marine mammals are generally able to metabolize and excrete limited amounts of hydrocarbons, but exposure to large amounts of hydrocarbons and chronic exposure over time pose greater risks (Grant & Ross 2002). Acute exposure of marine mammals to petroleum products causes changes in behavior and may directly injure animals (Geraci 1990). Cetaceans have a thickened epidermis that greatly reduces the likelihood of petroleum toxicity from skin contact with oils (Geraci 1990), but they may inhale these compounds at the water's surface and ingest them while feeding (Matkin & Saulitis 1997). Hydrocarbons also have the potential to impact prey populations, and therefore may affect listed species indirectly by reducing food availability.

Scientific Research

Humpback whales that occur in the action area have been the subject of scientific research activities, as authorized by NMFS permits. Research includes vessel and aircraft surveys, biopsy sampling, collection of sloughed skin, tagging, and active acoustic experiments. No mortalities are authorized for any animal of any age. There are seven permits authorizing research on humpback whales in the California/Oregon summer foraging area, as follows:

- Permit No. 540-1811 (Calambokidas, Cascadia Research Collective) involves research on cetacean species in the North Pacific Ocean, including waters off California, Oregon, and Washington. Research activities include: photo-identification; collection of skin biopsies; and suction cup tagging to study the diving behavior, feeding, movements, and vocal behavior of cetacean species. The permit authorizes the investigators to take a total of 20 humpback whales. It expires in April 2012.
- Permit No. 727-1915 (Scripps Institution of Oceanography) involves research on cetaceans off the coasts of California, Oregon, and Washington. Research activities include: photo-identification, collection of skin biopsies; and suction cup tagging to study cetacean diving behavior, vocal behavior, feeding, movements and response to incidental anthropogenic sounds. The permit authorizes the investigators to take a total of 175 humpback whales. It expires in

February 2013.

- Permit No. 781-1824 (NMFS Northwest Fisheries Science Center) involves research on cetaceans off the coasts of California, Oregon, and Washington. Research activities include vessel surveys, photo-identification, collection of biological samples, acoustic monitoring, tagging, and tracking. The permit authorizes the investigators to take a total of 405 humpback whales and expires in April 2012.
- Permit No. 14097 (NMFS Southwest Fisheries Science Center) involves research on cetaceans off the coasts of California, Oregon, and Washington. Research activities include vessel surveys, aerial surveys, biological sample collection, radio-tagging, and satellite tagging. The permit authorizes the investigators to take a total of 1,760 humpback whales and expires in June 2015.
- Permit No. 14245 (NMFS National Marine Mammal Laboratory) involves research on cetaceans off the coasts of California, Oregon, and Washington. Research activities include vessel surveys, photo-identification, biopsy sampling, and tagging. The permit authorizes the investigators to take a total of 14,000 eastern Pacific humpback whales and expires in May 2016.
- Permit No. 15271 (Moss Landing Marine Laboratory) involves research on cetaceans off the coasts of California, Oregon, and Washington. Research activities include photo-identification, dart tagging, and suction cup tagging. The permit authorizes the investigators to take a total of 200 humpback whales and expires in March 2016.
- Permit No. 15330 (Cascadia Research Collective) involves research on cetaceans off the coasts of California, Oregon, and Washington. Research activities include vessel surveys, aerial surveys, photo-identification, behavioral observation, acoustic recording, sample collection, dart tagging, and suction cup tagging. The permit authorizes the investigators to take a total of 1,060 humpback whales. It expires in August 2016.

Conservation and Management Efforts

In 1946, the International Convention for the Regulation of Whaling began regulating commercial whaling of humpback whales. In 1966, the International Whaling Commission prohibited commercial whaling of humpbacks. The species was designated "endangered" under the Endangered Species Conservation Act in 1970 and under the Endangered Species Act in 1973. In 1972, it was listed as depleted under the Marine Mammal Protection Act (MMPA), which mitigates threats to humpback whales in the Pacific Offshore Cetacean Reduction Plan.

Several conservation and management efforts have been undertaken for humpback whales in the action area. The humpback whale recovery plan guides the protection and conservation of the species (NMFS 1991). NMFS implements conservation and management activities for the species through its Regional Offices and Fishery Science Centers in cooperation with states, conservation groups, the public, and other federal agencies. They have placed observers aboard driftnet fishing vessels and vessels engaged in seismic activities to record and monitor takes. The Pacific Offshore Cetacean Reduction Plan requires acoustic pingers to help repel marine mammals from fishing operations. NMFS mitigates ship strikes and responds to humpback whales in distress.

Together with their partners, they educate the crew of whale watch vessels and other boat operators on safe boating practices.

The 1991 humpback whale recovery plan set a goal of doubling extant populations within 20 years (NMFS 1991). The 2004-2006 SPLASH data indicate that the North Pacific population has doubled in size since 1991 (Calambokidis 2010). Because we do not have baseline abundance data, prior to commercial whaling, it is impossible to know whether the population has fully recovered. We conclude that the North Pacific population has made a substantial recovery and continues to grow, in spite of the threats listed above.

EFFECTS OF THE PROPOSED ACTION

Pursuant to Section 7(a)(2) of the ESA, Federal agencies are directed to insure 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. 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 consequences.

Potential Stressors and Response Analyses

For each activity listed below, we first identify potential physical, chemical, or biotic stressors (presented in a bulleted list). We then describe likely responses to such stressors. Animal responses to human disturbance are similar to their responses to potential predators (Beale & Monaghan 2004; Frid & Dill 2002; Gill & Sutherland 2001; Lima 1998; Romero 2004). These responses include interruptions of essential behavior and physiological processes such as feeding, mating, resting, digestion, etc. Each of these can result in stress, injury, and increased susceptibility to disease and predation (Frid & Dill 2002; Romero 2004).

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. When possible, we base the likelihood of a response on previously collected data describing humpback whale responses to similar stressors; however, when that data is not available, we use information from other species to proximate a humpback whale's response.

Passive acoustic monitoring

- Vessel noise
- Visual disturbance
- Potential for vessel strike

The Section 7 consultation on the US Navy's activities in the SOCAL Range complex evaluated passively listening for whale sounds using the US Navy's underwater tracking range hydrophones (NMFS 2012). This activity involves listening for whale sounds, without the transmission of any synthetic or man-made sound, and is unlikely to adversely affect humpback whales.

The investigators would also deploy their own passive acoustic monitoring equipment the whale observation vessel. This equipment includes towed linear arrays of hydrophones, single hydrophones, compact 4-hydrophone bearing arrays, and regular or broadband sono-buoys. This activity involves listening for whale sounds, without the transmission of any synthetic or man-made sound, and is unlikely to adversely affect humpback whales; however, any watercraft activity carries the risks of vessel noise, visual disturbance, and the potential for collision.

Ships are a major source of anthropogenic noise in the ocean (NRC 2003). The whale observation vessel would emit predominantly low frequency sound. The vessel (a 70 ft dive charter vessel) would produce a similar amount and frequency of noise as other vessels in the area. As previously stated, humpback whales generate and rely on sound to navigate, hunt, and communicate with other individuals. Vessel noise in general has the potential to interfere with these important activities; however, it is unlikely that the use of a single vessel, in addition to the hundreds of ships operating in the action area, would have a significant effect on humpback whales. Ship noise has not prevented the species from doubling in size since the early 1990s. Therefore, we conclude that the noise from the observation vessel is unlikely to reduce the fitness of humpback whales in the action area.

The mere sight of a ship also has the potential to disturb humpback whales as they feed and rest in the action area. Again, hundreds of ships of all sizes (including those that are larger and smaller than the whale observation vessel) frequent the area. It is unlikely that one additional ship would have a significant effect on humpback whales. Marine mammals often display great tolerance to boat traffic (Richardson et al. 1995). Previous occurrence of ships in the area has not prevented the species from doubling in size since the early 1990s. Therefore, we conclude that visual disturbance caused by the observation vessel is unlikely to reduce the fitness of humpback whales in the action area.

As previously described, ship strikes cause several whale deaths each year. To mitigate this risk, the investigators would conduct all vessel activities at safe operating speeds. They would be listening for whales using passive acoustic monitoring. In addition, they would conduct visual searches for whales from high aboard the whale observation vessel. In this ship, they would not perform close approach of whales. They would maintain a distance of at least 100 m from any whale. Given these precautions, we conclude that a ship strike would be highly unlikely and therefore would not reduce the fitness of humpback whales.

In conclusion, noise and visual disturbances to listed marine mammals that would result from the proposed activities are expected to be minor and short-lived. The chance of a ship strike is unlikely. None of the activities performed during passive acoustic monitoring are likely to diminish the fitness of any humpback whales.

Focal follow

- Vessel noise

- Visual disturbance
- Potential for vessel strike

The potential stressors during focal follow activities are the same as those described above: vessel noise, visual disturbance, and the potential for vessel strike. When weather requires that the focal follow be conducted from the whale observation vessel, the vessel would maintain a distance of at least 100 m. Focal follow from the tagging boat would potentially occur at distances of less than 100 m. The noise and visual disturbance from the tagging boat would increase at shorter distances; however, the smaller sized boat would generate less noise and disturbance. As described above, these visual and acoustic disturbances would be minor and short-lived. As such, they are not expected to reduce the fitness of exposed humpback whales. The potential for ship strike would still be unlikely, because the tagging boat would be operating at safe operating speeds. It is a smaller, more maneuverable boat. It would maintain safe distances from the whale, as guided by the observation vessel, which has higher vantage points and operates the passive acoustic monitoring equipment. We thus conclude that none of the activities performed during focal follow are likely to diminish the fitness of any humpback whales.

Close approach

- Vessel noise
- Visual disturbance
- Potential for vessel strike

The potential stressors during close approach activities are the same as those described above: vessel noise, visual disturbance, and the potential for vessel strike. Unlike the above activities, close approach involves coming to less than 10 m distance from the target whales in the tagging boat. The potential for ship strike would be greater. To mitigate this risk, the tagging boat would operate at optimal speeds while maintaining maneuverability. This small, inflatable boat moving at low speeds would be unlikely to cause injury or death to a humpback whale.

Marine mammals exhibit a variety of responses to noise and visual disturbances from boat based human activities such as the proposed close approaches. These include short-term changes in swimming and feeding behaviors, as well as diving and staying submerged for longer periods of time (Baker & Herman. 1987; Best et al. 2005; Brown et al. 1991; Clapham & Mattila 1993; Jahoda et al. 1997; Malme et al. 1984; Patenaude et al. 2002; Richardson et al. 1985; Watkins et al. 1981). These responses create additional energy expenditures that result in animals incurring an energy debt that must be compensated for by increased foraging. This can further interrupt normal behavior. Individually and collectively, these disturbances can adversely affect already imperiled individuals and populations.

A study involving the close approaches of research vessels to humpback whales showed that responses were minimal when approaches were slow (Clapham & Mattila 1993). Behavioral changes, if they even occurred, were short-lived (Clapham & Mattila 1993). Watkins (1986) found that several species of baleen whales simply ignored these vessel disturbances altogether. Interruptions of foraging, the reason whales migrate to this area in the winter, are expected to be minor and short in duration because the close approach

would last for only a few minutes; no more than three close approaches would occur in a day.

Any reactions to close approaches are thus expected to be minor and temporary. No mortality or physical injury to any animal is expected as a result of these proposed activities. In addition, investigators would employ mitigation measures such as conducting such approaches slowly, deliberately, and for as short a time as necessary. Actions would be terminated if target animals are observed to display unusual behavior, aggravation or distress. Therefore, we do not expect any reduction in fitness as a result of close approach.

Tagging

- Potential for injury
- Potential for entanglement
- Drag

All tags would be attached by using a hand-held carbon fiber pole several meters in length or a >12 m cantilevered pole deployed from the tagging boat. These activities have the potential to injure listed species, create drag, or increase the potential for entanglement in fishing gear and/or marine debris.

The tags would be attached via a suction cup. This minimizes the chance for injury or infection via penetration of the skin. The investigators would avoid the blowhole and eyes while applying the tag. The tag would be attached behind the blowhole so that it would not migrate toward the blowhole as the animal moves through the water. Therefore, injury associated with attachment of the tags is unlikely.

The tags were designed to remain attached for at most several days. They can release from the animal in at least three ways. First, the animal can dislodge it by rapid movements, breaching, rubbing it on the seafloor, or by contact with another animal. Second, the tag can simply release on its own due to slow leakage of the seal between the cup and the animal's skin, repeated diving (i.e., pressure changes) working the suction cup loose, some other mechanical failure, or releasing with sloughed skin. Third, the DTAG2 has a release mechanism that uses an electrically corrosive wire assembly to release the tag package (DTAG2, batteries, flotation, suction cups, plastic housing, and RF transmitter) from the animal. If the tag became entangled in fishing gear or marine debris, it is highly likely that the tag would become detached from the whale. It is therefore, unlikely to entangle the whale in fishing gear.

Although these tags would create drag, the proportion of this tag to a whale's size and weight is such that any drag effects would be insignificant. Any drag caused by the tags would not interfere with movement or foraging.

Tags similar to the proposed DTAG2 and BProbe have been used successfully in numerous past studies on baleen whales (see Burgess et al. 1998; Johnson et al. 2004; Tyack et al. 2006; Watwood et al. 2006). The investigators have tagged hundreds of whales using this method. They have not observed any problems or injuries associated

with the attachment of tags. The suction-cup attachment method is non invasive and the duration of the attachment is limited. The tagging protocol involves careful observation of potential behavioral reactions to the approach of the tagging vessel and to the actual tag attachment. Attempts to tag will be terminated if the animal shows any adverse reactions or after the third failed attachment attempt. Observations will be made and recorded of the target animal's behavior during approaches and tag attachment, as well as after the tags have detached.

Few studies have investigated the effects of tagging on cetaceans and the available data are often limited to visual assessments of behavior (Walker & Boveng 1995). To further complicate matters, reactions to tagging are difficult to differentiate from reactions to the close vessel approaches necessary to ensure proper tag placement. Evidence available on the short-term effects of tagging whales indicates that responses vary from little or no observable change in behavior to momentary changes such as skin twitching, startle reactions, altered swimming, diving, rolling, head lifts, high back arching and tail swishing (Goodyear 1981; Goodyear 1989; Goodyear 1993; Hooker et al. 2001; Mate et al. 1998; Mate et al. 1997; Watkins 1981; Watkins et al. 1984). Rarely, aerial displays like breaching are also noted (Goodyear 1989). Behavioral responses are usually short-term (Mate et al. 2007), and possibly dependant on the animal's behavioral state at the time of tagging (Hooker et al. 2001). Observed reactions to tagging include disturbances in foraging and diving behavior soon after the tag attachment (see Jochens et al. 2006).

Although there is evidence of minor short-term effects on tagged whales, no research has been done to assess long-term impacts of these activities. However, Goodyear (1989) observed that humpback whales did not appear to exhibit altered behavior monitored several days after being suction-cup tagged. In addition, Mate et al. (2007) observed that tagged whales re-sighted up to three years later did not appear to be affected or to behave differently than untagged whales.

In conclusion, the proposed tagging activities are not likely to result in injuries to humpback whales. Tag attachment is expected to only change a whale's short-term behavior and these disruptions are not expected to lead to the reduction in fitness of any individual animal. Any effects of the proposed tagging activities are therefore discountable.

Photography

- No stressors identified, other than those associated with close vessel approach

Retreat

- No stressors identified, other than those associated with close vessel approach

Playback

- Vessel noise
- Visual disturbances
- Potential for vessel strike
- Noise

- Simulate predatory behavior

The use of a playback vessel (potentially the whale observation vessel) would produce potential stressors that are the same as those described above: vessel noise, visual disturbance, and the potential for vessel strike. None of these is expected to reduce the fitness of any humpback whale, as previously explained.

The investigators would transmit synthetic mid-frequency noises simulating sonar or pseudorandom sounds of 1.5-5.0 kHz and 0.5-5 seconds in duration every 20-60 seconds. They would transmit simulated killer whale vocalizations over a larger bandwidth (1-20 kHz) for up to 30 minutes. Before starting each playback, the distance to the target animal would be estimated via passive acoustic monitoring and/or visual observations. Noises would be emitted from an underwater speaker with a maximum source level of 220 dB in order to reduce the maximum received level at the target animal to ≤180 dB.

The mid-frequency sound source proposed to be employed is constructed by the NATO Undersea Research Centre and consists of 3 ceramic free flooded ring transducers co-axially mounted on a central stainless steel air-filled cylinder. This source operates relatively omnidirectionally with the capability to direct sound energy downwards towards the target animal which would reduce exposures to nontarget species. The source is capable of a maximum source level of 219 dB operating at 2 kHz, and operates in the 1.5-5 kHz frequency range for optimal performance.

Other sound sources are also proposed for playback experiments. The Lubell LL9642T Underwater Acoustic Transducer may be used for relatively low-level broad band playbacks of simulated killer whale calls. This instrument is designed for general scientific applications. It has a wide output frequency range of 250Hz-20 kHz and a sound pressure level of 183 dB at 1 kHz, and 193dB at 10kHz. The operating depth is up to ~15m.

Broad band playbacks of odontocete vocalizations are proposed to be conducted with a J-9 transducer transmitting between 40 Hz to 20 kHz. It will be focused at the 40-80 kHz range where most odontocetes hear and vocalize. The LL-1424HP underwater acoustic transducer will be used when higher source levels at smaller frequency bands are desired. The LL-1424HP has a useful frequency range of 200Hz-9 kHz and a maximum sound pressure level of 197 dB. It operates at depths from ~2 to 15 m.

The playbacks were designed to avoid sound levels that could cause hearing damage. The maximum received level of 180 dB would be used for playback signals which should avoid any potential for injury to marine mammals (after Southall et al. 2007). Exposures of target animals to playbacks would be limited to the shortest duration required to elicit identifiable behavioral reactions. The playback subjects will be followed after exposure to monitor for their return to baseline behavior and playback protocols will be modified if there is any evidence of longer term changes. A margin of error for safety will be added to account for the possibility that the acoustic models used to predict received level at the animal are not always correct. This margin of error will be determined and validated by

comparing estimated levels to received levels measured during the course of the playback experiments.

Anthropogenic sounds can disturb or harm marine mammals in several ways. Whales have been observed to abandon feeding and mating grounds (Bryant et al. 1984; Morton & Symonds 2002; Weller et al. 2002), deviate from migration routes (Richardson *et al.* 1995), and change vocalizations because of manmade noise (Miller et al. 2000). Sonar exposures have been directly correlated with mass stranding events (Cox et al. 2006). Acoustic exposures can also result in induced hearing loss in marine mammals (Finneran et al. 2002). In addition to direct physiological effects, noise exposures can impair marine mammals' hearing abilities through "masking" or result in other adverse behavioral responses.

Simulated sonar playbacks are expected to affect humpback whales because these noises are within their assumed hearing ranges. Simulated killer whale vocalizations may be transmitted over a larger bandwidth (1-20 kHz) for up to 30 minutes. Simulated killer whale vocalization playback noises are also expected to affect listed humpback whales because they simulate predatory noises and may elicit anti-predatory behavior. The playback experiments could result in masking effects (Clark et al. 2009; Dunlop et al. 2010).

In a previous study, humpback whales responded to playback experiments in the 3.1–3.6 kHz range by swimming away from the sound source or by increasing their speed (Maybaum 1993). However, the frequency and duration of their dives and the rate of underwater vocalizations did not change. In a controlled exposure experiment involving low frequency active sonar sound, humpback whales responded with longer songs when the playback noises were louder (Fristrup et al. 2003). The playback experiments are likely to, and in some instances designed to, illicit a behavioral response from individuals. Therefore, playback experiments are likely to adversely affect individual whales. The experiments are short in duration, however, and are not likely to cause long-term behavioral modification. They would not significantly reduce the amount of time spent foraging or resting. They are not likely to reduce the fitness of humpback whales.

If there is any sign of prolonged responses that might pose a risk of injury, playbacks will be suspended. No animal will be taken more than two times in one day by intentional exposure to playbacks. A playback episode must be discontinued if an animal exhibits a strong adverse reaction to the playback activity or the vessels. Given the control over the single sound source, the precautions taken by the investigators and mitigation procedures in the permit, injuries from the proposed playback experiments are not expected. These risks are discountable.

In conclusion, humpback whale responses to playback experiments are likely to be short lived and do not appear to affect the long-term health of any individual animal. In addition, the proposed mitigation measures listed above would further ensure that any response these noises would be minor. Any behavioral responses to the proposed

activities are not expected to adversely affect the fitness of any individuals. These effects are therefore discountable.

Sloughed skin collection

- No stressors identified, other than those associated with close vessel approach

Exposure Analyses

In accordance with Section 10(a)(1)(A) of the Endangered Species Act, the Permits Division determines the maximum number of exempted annual takes allowed (Table 1), should the permit be issued. It is important to emphasize that the take table defines the maximum level of take that would be permitted; it does not necessarily reflect the number of whales that *are likely* to be exposed to such activities. To determine the number of humpbacks that are likely to be exposed to such activities, we consider past research efforts and humpback occurrence in the action area.

During the first year of the permit, from 7/02/2010 until 7/31/2011, the investigators placed 63 tags on 44 marine mammals of eight species over 35 days. They conducted 28 controlled sound experiments in which animals were monitored with acoustic and movement sensors (attached to animals with suction cups), remote listening devices, and visual observers (Southall et al. 2011).

For humpback whales, the expected take was two, and the actual take was zero. The researchers did take other baleen whales. They tagged 21 blue whales and conducted playback experiments on 19 of these. They also tagged and conducted playback experiments on five fin whales.

The US Navy also monitors marine mammal abundance in the action area. Though humpback whales are observed less frequently than other baleen whales (i.e., fin, blue and grey whales), sightings appear to be increasing (DoN 2011). During aerial surveys from 2008 to 2010, the Navy sighted five groups of humpback whales consisting of nine individuals total. During their 2011 aerial surveys, they observed 10 groups of humpback whales consisting of 12 individuals. During their 2011 CalCOF1 exercises, they sighted eight groups of humpback whales consisting of 11 individuals total, which represented twice the average rate of seasonal sighting rates for the species and the highest number in the past seven years (DoN 2011). In 2011, they also observed one group of humpback whales consisting of two individuals from island monitoring stations.

Given the Navy's 24 sightings of humpbacks within one year, it is possible that the investigators would tag and conduct playback experiments on 20 humpback whales (Table 1). As described above, there were twice as many Navy sightings last year as compared to prior years. It is possible that the number of whales sighted in the SOCAL area would double again this year and in each of the following four years (i.e., 48 in 2012, 96 in 2013, 192 in 2014, and 384 in 2015). It should be noted that we do not expect the number of humpback whales in the population to increase by 100% each year, but it is possible that the number of whales observed in the area may increase

significantly each year as a result of effort and as well as biological factors that remain unknown.

The permit would authorize the take of 174 humpback whales in various activities. This number is possible if sightings continue to increase as described above. There are approximately 2,000 humpback whales in the California/Oregon summer foraging population. The authorized take would represent approximately 9% of the total population; the SOCAL Range Complex occupies a similar proportion of the California/Oregon coastline (Fig. 1). Though the whales are not evenly distributed throughout their range, it is possible that the investigators would encounter 174 humpback whales. Therefore, we consider the effect that all authorized takes would have on individuals, the population, and the species.

Duration of Exposure
The investigators would approach the humpback whales in the tagging boat. The close approach would last only as long as necessary for photo-identification and suction-cup tag application (several minutes, up to three times per day). Suction cup attachments would potentially remain on the whale for several days. Playback of synthetic and natural sounds would last up to 30 minutes and occur up to two times per animal per day.

Stocks Exposed
Genetic and tagging analyses indicate that humpback whales occurring in the action area (SOCAL Range Complex) breed in Central American and Mexican waters during the winter (Calambokidis 2010). They migrate to California/Oregon waters in the summer to forage. There are approximately 2,000 humpback whales in this stock, and the population size has increased ~7.5 percent annually since the early 1990s (Calambokidis 2010). Males and females, juveniles and adults would be exposed to the activities. We do not expect any neonates to be exposed to any activities because neonates are not likely to be observed in the summer foraging areas. The investigators would not attempt to tag any cetacean calf less than one year old or any female accompanied by a calf less than one year old.

Risk Analyses
None of the activities above are likely to reduce the fitness of any humpback whale. Therefore, we do not expect the action to lower population viability or to threaten the continued survival of the species.

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 in this Opinion. Future Federal actions, including research authorized under ESA Section 10(a)1(A), 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. After reviewing available information, NMFS is not aware of effects from any additional future non-federal

activities in the action area that would not require federal authorization or funding and are reasonably certain to occur during the foreseeable future.

NMFS expects the natural phenomena in the action area (e.g., oceanographic features, storms, and natural mortality) will continue to influence listed whales as described in the *Environmental Baseline*. We also expect current anthropogenic effects will also continue, including the introduction of sound sources into marine mammal habitat, changes in prey availability, vessel traffic and scientific research. Potential future effects from climate change on marine mammals in the action area are not definitively known. However, climatic variability has the potential to affect these species in the future, including indirectly by affecting prey availability.

As the size of human communities increase, there is an accompanying increase in habitat alterations resulting from an increase in housing, roads, commercial facilities and other infrastructure. This results in increased discharge of sediments and pollution into the marine environment. These activities are expected to continue to degrade the habitat of marine mammals as well as that of the prey on which they depend.

INTEGRATION AND SYNTHESIS OF EFFECTS

The following text integrates and synthesizes the *Status of the Species*, the *Environmental Baseline* and the *Effects of the Action* sections of this Opinion. This information, in addition to the known cumulative effects, is used to assess the risk the proposed activities pose to endangered humpback whales in the action area.

The Permits Division proposes to issue Permit No. 14534-02, which would authorize direct "takes" of 174 humpback whales in the U.S. Navy's SOCAL Range Complex, primarily near the vicinity of San Clemente Island. The proposed activities under this permit include active acoustics, passive acoustic monitoring, close approaches, tagging, and the collection of sloughed skin. The permit would be valid for five years.

The current and historic stressors to humpback whales include natural mortality, depletion of populations due to overharvesting, fishing interactions, ship strikes, vessel interactions, noise, and scientific research. Commercial whaling depleted humpback whales worldwide, but populations have increased substantially since whaling was banned in 1965 (Reilly 2008). Ship strikes and entanglement in fishing gear now pose the largest threats to the species. Humpback whales are also exposed to anthropogenic noise, including US Navy exercises, and directed research. The Permits Division has approved a total of 17,620 non-lethal takes for the purpose of directed research. Though these takes are not expected to injure or kill humpback whales, the magnitude is so great that each individual is likely to be harassed more than once per year.

During the course of this consultation, we have identified several potential stressors associated with the activities to be authorized under proposed permit: potential boat strikes; vessel noise; visual disturbances; effects from tagging; and effects from recorded playback activities. 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 consequences.

As explained in the *Response Analyses* section of this Opinion, because of their small size, maneuverability, and safe operating procedures, boat strikes are extremely unlikely and therefore discountable. Noise and visual disturbances that would result from vessel operation are expected to be brief and would not have any long-term consequences to individual listed animals or the populations or species that they comprise. Proposed tagging procedures would be non-invasive and would incorporate several mitigation procedures to limit harassment. Any behavioral responses to tagging activities are expected to be minor and transitory; therefore, effects from these activities are discountable. The behavioral responses of humpback whales to playback experiments are also expected to be minor and temporary and therefore discountable.

There is no designated critical habitat for the humpback whale. The activities described above would not destroy or adversely modify the critical habitat of any threatened or endangered species.

CONCLUSION

After reviewing the current status of species, the environmental baseline for the action area, the anticipated effects of the proposed activities, and the cumulative effects, we conclude that the activities authorized by the proposed issuance of scientific research permit No. 14534-02 are not likely to jeopardize the continued existence of endangered humpback whales.

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 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.
However, as discussed in the accompanying Opinion, only the species permitted in the proposed research activities will be significantly harassed as part of the intended purpose of the proposed action. Therefore, the NMFS does not expect the proposed action will incidentally take additional threatened or endangered species.

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 permits that may affect endangered whales as well as reduce harassment related to authorized activities:

1. *Cumulative Impact Analysis*. The Permits Division should work with the Marine Mammal Commission, International Whaling Commission, and the marine mammal research community to identify a research program with sufficient scope and depth to determine cumulative impacts of existing levels of research on whales. This includes the cumulative sub-lethal and behavioral impacts of research permits on listed species.

2. *Estimation of Actual Levels of "Take."* For future permits authorizing activities similar to those contained in the proposed permit, the Permits Division should continue to review all annual and final reports submitted by investigators that have conducted such research as well as any data and results that can be obtained from the permit holders. 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. The results of the study should be provided to the Endangered Species Act Interagency Cooperation Division for use in the consultations on future research activities.

3. *Assessment of Permit Conditions*. The Permits Division should periodically assess the effectiveness of its permit conditions, including those for notification and coordination of research.

4. *Data Sharing*. For any permit holders planning to be in the same geographic area during the same year, the Permits Division should encourage investigators 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 an effort for us to remain informed of actions minimizing or avoiding adverse effects on, or benefiting, listed species or their habitats, the Permits Division should notify the Endangered Species Act Interagency Cooperation Division of any conservation recommendations they implement in their final action.

REINITIATION NOTICE

This concludes formal consultation on the proposal to issue scientific research permit No. 14534-02. 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) 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; (2) 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 (3) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of authorized take is exceeded, The Permits Division must immediately request reinitiation of section 7 consultation.

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