SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT ON THE EFFECTS OF ISSUANCE OF A SCIENTIFIC RESEARCH PERMIT AMENDMENT FOR RESEARCH ON THE EASTERN NORTH PACIFIC SOUTHERN RESIDENT KILLER WHALE (*ORCINUS ORCA*) PERMIT NO. 781-1824-02

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Lead Agency:	National Oceanic and Atmospheric Administration National Marine Fisheries Service, Office of Protected Resources
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Location:	Primarily waters of Washington State; also Alaska, Oregon and California
Supplements the EA Entitled:	Environmental Assessment (EA) on the Effects of the Issuance of Four National Marine Fisheries Service Scientific Research Permit and Three Permit Amendments on the Eastern North Pacific Southern Resident Killer Whale (*Orcinus orca*) in the U.S. Territorial Waters, Exclusive Economic Zones, and High Seas of the Eastern North Pacific Ocean Along the Coast of The U.S. from Southeastern Alaska to Central California, and Coastal Inlets and Estuaries of these States.

Abstract: The National Marine Fisheries Service (NMFS) proposes to issue an amendment to scientific research Permit No. 781-1824-01, pursuant to the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 *et seq*.) and the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq*.). The proposed amendment would authorize satellite tagging of Southern resident killer whales and an increase in the number of suction cup tags deployed on this species. This supplemental EA evaluates the potential impacts to the human environment from issuance of the proposed permit amendment.

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CHAPTER 1: PURPOSE AND NEED

1.1. DESCRIPTION OF ACTION

1.1.1. Purpose and Need

The National Marine Fisheries Service, Office of Protected Resources (NMFS PR), proposes to issue, pursuant to the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 *et seq*.), and the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 *et seq*.), an amendment to a scientific research permit No. 781-1824-01 held by Northwest Fisheries Science Center (NWFSC): Principal Investigator-Brad Hanson, Ph.D. [File No. 781-1824-02].

In 2006, NMFS prepared an *Environmental Assessment (EA) on the Effects of the Issuance of Four National Marine Fisheries Service Scientific Research Permit and Three Permit Amendments on the Eastern North Pacific Southern Resident Killer Whale (Orcinus orca) in the U.S. Territorial Waters, Exclusive Economic Zones, and High Seas of the Eastern North Pacific Ocean Along the Coast of The U.S. from Southeastern Alaska to Central California, and Coastal Inlets and Estuaries of these States*. The portion of that EA specific to issuance of NWFSC's original Permit No. 781-1824-00 (i.e., action area, and affected environment) will be incorporated by reference.

Permit No. 781-1814-00 authorizes takes of southern resident killer whales (SRKWs) by approach, biopsy, breath sampling, and suction cup tagging. The 2006 EA addressing these factors is supplemented here to analyze the proposed amendment to that permit to address implantable (dart) satellite tagging and an increase in suction-cup tagging takes from 10 to 20 of SRKWs. The purpose of using satellite tags on SRKWs is to investigate their fall, winter, and spring distribution and home range. Currently, there is a large data gap on SRKW distribution when they are not present in their core summering area, the inland waters of Washington State.

The primary purpose of the NMFS scientific research special exception permitting program is to authorize takes of marine animals and/or endangered species for scientific purposes, to provide a better understanding of their basic biology and ecology, and to evaluate the cause(s) of population decline in order to develop conservation and protective measures to ensure species recovery.

1.1.2. Objectives

The objective of the research authorized by the proposed permit amendment is to investigate winter distribution, movement patterns, and habitat use of SRKWs via satellite tagging (i.e., dart tags). SRKWs, comprised of three matrilineal based groups (J, K, and L pod), are frequently sighted throughout the late spring, summer, and early fall in the inland waters of Washington State and British Columbia. However, during the late fall, winter, and early spring, the ranges and movements of are less well known. J pod continues to occur intermittently in the Georgia Basin and Puget Sound part of this time,

but its location during apparent absences is uncertain (Osborne 1999). K pod and L pod are seen even less frequently.

While there are considerable data on SRKW use of inland waters of Washington in summer, there is very little information on the movements of SRKWs off the coast. Areas of activity of all pods are virtually unknown during their absences from inland waters. In the last 33 years of study, there are less than 50 confirmed sightings outside inland waters (Krahn et al., 2004; NWFSC unpubl. data).

Narrowing movement and habitat use data gaps for these time periods are goals outlined in the proposed Conservation Plan (October 3, 2005; 71 FR 57565) and proposed Recovery Plan (November 11, 2006; 79 FR 69101) for this stock of killer whales. Satellite tagging can provide this information with no long-term adverse impacts on individual cetaceans or populations, as shown from previous tagging efforts on alternative stocks of killer whales, which includes incidents of tag breakage (e.g., Andrews et al., 2005; Andrews et al., 2008).

This type of tag has provided high quality location data for time periods on average of multiple weeks, and as long as multiple months. Data collected would be key in determining movement patterns of individuals, particularly in remote locations during seasons with formidable weather and sea conditions. For example, once unknown migration routes of southern hemisphere humpback whales are now being discovered via Argos satellite transmission signals. (see: http://www.noaanews.noaa.gov/stories2007/20071012_whaletag.html).

Satellite tagging would provide the necessary data to implement proper management and conservation measures, especially with respect to providing information that will be used to determine if winter critical habitat areas should be designated for this endangered stock of killer whales.

1.2. SCOPING SUMMARY

1.2.1. *Marine Mammal Commission, National Marine Sanctuary Program, Northwest Region, and Public Comments on Application*

The application was sent to the Marine Mammal Commission for review at the same time during the comment period, pursuant to 50 CFR §216.33 (d)(2). Comments received on the application were considered as part of the scoping for this EA.

The Marine Mammal Commission (MMC) recommended that NMFS approve the requested amendment, provided that:

- The conditions contained in the existing permit remain in effect, and

- The Service (NMFS) ensure that the researchers coordinate and integrate all proposed tagging and biopsy activities with those of Canadian researchers studying the southern resident killer whale population.

  NMFS Response: Existing permit conditions will remain in effect and additional conditions will be added as detailed subsequently in the Mitigation Measures section of this EA. Coordination with other researchers is an existing condition in the permit.

The National Marine Sanctuary Program, operating under the National Marine Sanctuaries Act (32 U.S.C. 1431 *et seq*.) and administered by NOAA's National Ocean Service (NOS) has the authority to issue special use permits for research activities that would occur within a National Marine Sanctuary. Obtaining special use permits is the responsibility of individual researchers. As a courtesy, the Office of Protected Resources provided a copy of the application to NOS because the research would occur in or near the Olympic Coast, Cordell Bank, Channel Islands, the Gulf of the Farallones, and Monterey Bay National Marine Sanctuaries.

In an email dated December, 2010 , the Office of National Marine Sanctuaries (ONMS) responded for all sanctuaries commenting in favor of permit issuance.

A copy of the application was also sent to the NMFS Northwest Region (NWR) Office for review and comment because the activity will take place in the eastern North Pacific off the coast of Washington, Oregon, and California thereby requiring NWR to facilitate coordination of activities under this permit with those of other permits for research on marine mammals in the region.

NWR recommended approval of the permit and stated:

> *The NWR supports the activities proposed in the application submitted by NWFSC for modifications to permit 781-1824. NWFSC applicants worked closely with Southern Resident Killer Whale (SRKW) Recovery Coordinator, Lynne Barre, during development of the application to ensure that the work proposed is designed to enhance the SRKW recovery program. The proposed satellite tagging work will help identify critical habitat in coastal waters and clarify species migratory movements when absent from designated critical habitat in the inland marine waters of Washington.*

Federal agencies are also required to consider "the degree to which effects on the quality of the human environment are likely to be highly controversial" when evaluating potential impacts of a proposed action. [40 CFR §1508.27] The application for the proposed permit was made available for public review and comment on November 10, 2010. We received 55 comments opposing the action and three in favor of the action. A request for an extension of the comment period was granted on December 08, 2010. A public hearing was also requested; however, NMFS concluded a hearing was not warranted because the NMFS regional office and science center have an ongoing

outreach program to interface with the public and address their concerns as stated in the 2008 recovery plan for SRKWs. (http://www.nwr.noaa.gov/Marine-Mammals/Whales-Dolphins-Porpoise/Killer-Whales/Recovery-Implement/educ-outr.cfm)

In January of 2011, NMFS held the following public outreach events to discuss the tagging research:

- January 19, 2011, American Cetacean Society Puget Sound Chapter, Speaker Series. Brad Hanson, NOAA Fisheries. The not-so-secret lives of cetaceans in the Pacific Ocean: Using dorsal fin-mounted satellite tags to uncover their movements and habitat use patterns.

- January 29, 2011, Orca Network, Way of Whales Workshop. Brad Hanson, NOAA Fisheries NWFSC – Satellite tagging of orcas and other cetaceans to determine travels and habitats.

Therefore, NMFS believed a public hearing would be duplicative of these events.

Comments in favor of the action highlighted:

- the need to track and determine SRKWs winter foraging behavior and range and assess the risk to the population in those areas,
- that the information would provide educational benefit to the public, and
- that the results of the study would provide a conservation benefit to the species.

Comments in opposition to the action highlighted:

- the physical risks of tagging (i.e. stress, infection, injury, or mortality),
- the tags are not reliable (breakage, poor battery performance),
- the selected individuals and age classes are inappropriate,
- that the tagging is of no benefit to the species and that information on their winter range can be determined from other less invasive methods such as acoustic and visual surveys,
- the information is already known about winter distribution,
- the data will be of little value to regulators,
- there is too much research already occurring,
- the Permit Holder is not coordinating with Canadian researchers adequately,
- individuals conducting tagging are not qualified,
- animal rights and welfare, and
- the application review process was incomplete.

NMFS Response: NMFS provided the applicant with the list of concerns and requested a detailed response to address the issues raised by the public. Dr. Hanson provided on June 16, 2011, two documents detailing concerns raised about two documented occurrences of tag breakage in transient killer whales, further described in Section 2.2 below. A thorough assessment of these events as well as actions that would be taken to modify and correct the tag to prevent further breakage was provided by Dr. Hanson. In a final document received July 12, 2011, Dr. Hanson

provided substantial detail addressing the remaining public comments.[1] NMFS was satisfied with this information and concluded that the range of public concerns were adequately addressed. NMFS also added a condition to the permit to address the most significant concern, tag breakage, which will require the permit holder to cease tagging of SRKW should tag breakage be documented, and submit a report of the event to NMFS for review and assessment.

1.3 APPLICABLE LAWS AND NECESSARY FEDERAL PERMITS, and LICENSES

1.3.1 National Environmental Policy Act

Scientific research permits are generally categorically excluded from the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq*.) requirements to prepare an environmental assessment (EA) or environmental impact statement (EIS) (NAO 216-6). However, NMFS concluded that further environmental review was warranted to determine whether significant environmental impacts could result from issuance of the proposed scientific research permit amendment. Therefore, this document evaluates the relevant effects of research activities involving implantable tagging of SRKWs.

1.3.2 Endangered Species Act

NMFS has a responsibility to implement both the MMPA and ESA to conserve and recover threatened and endangered species under its jurisdiction, which includes species affected by the proposed action. The ESA prohibits takes of species listed as endangered or threatened. Section 10(a)(1)(A) of the ESA allows NMFS to issue permits to take ESA-listed marine mammals for scientific purposes or to enhance the survival of the species. Hence, the applicant is required to obtain a permit to conduct the proposed research. Permit issuance criteria require that research activities are consistent with the purposes and polices of these Acts and that such activities would not have an significant adverse impact on the species or stocks.

1.3.3 Marine Mammal Protection Act

The MMPA prohibits takes of all marine mammals in the U.S. (including territorial seas) with a few exceptions. Permits for *bona fide* scientific research on marine mammals, or to enhance the survival or recovery of a species or stock, are issued pursuant to section 104 of the MMPA. These permits must specify the number and species of animals that can be taken, and designate the manner (method, dates, locations, etc.) in which the takes may occur.

[1] All documents are on file and available upon request from the Permits, Conservation and Education Division, Office of Protected Resources, NMFS, 1315 East-West Highway, Room 13705, Silver Spring, MD 20910; phone (301)427-8401; fax (301)713-0376

NMFS has sole jurisdiction for issuance of such permits for all species of cetacean, and for all pinnipeds except walrus. NMFS may issue a permit to an applicant who submits with their permit application information indicating that the taking is required to further a bona fide scientific purpose. NMFS must also find that the manner of taking is "humane" as defined in the MMPA.

An applicant must demonstrate to NMFS that the taking will be consistent with the purposes of the MMPA and applicable regulations. If lethal taking of a marine mammal is requested, the applicant must demonstrate that a nonlethal method of conducting research is not feasible. In the case of proposed lethal taking of a marine mammal from a stock listed as "depleted" NMFS must also determine that the results of the research will directly benefit the species or stock, or otherwise fulfill a critically important research need.

NMFS has promulgated regulations to implement the permit provisions of the MMPA (50 CFR Part 216) and has produced OMB-approved application instructions, which prescribe the procedures (including the form and manner) necessary to apply for permits. All applicants must comply with these regulations and application instructions in addition to the provisions of the MMPA.

1.3.4 National Marine Sanctuaries Act

The National Marine Sanctuaries Act, also known as Title III of the Marine Protection, Research, and Sanctuaries Act of 1972 (NMFS; 16 U.S.C. § 1431 *et seq.*) authorizes the Secretary of Commerce to designate and manage areas of the marine environment of special national significance due to their conservation, recreational, ecological, historical, scientific, cultural, archeological, educational, or aesthetic qualities as national marine sanctuaries.

The primary objective of the NMSA is to protect marine resources, including maintenance of natural biological communities, and restoration and enhancements of natural habitats, populations, and ecological processes. There are currently 13 national marine sanctuaries and one marine national monument, collectively administered by NOAA's National Marine Sanctuary Program (NMSP).

In addition, NMSA regulations (15 CFR Part 922) specify a number of activities prohibited from occurring within sanctuaries. The applicant would be required to apply for the necessary permits to conduct research within National Marine Sanctuaries.

CHAPTER 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 ALTERNATIVE 1- NO ACTION

The no action alternative would be to deny the permit amendment request. This alternative would eliminate any potential risk to the human environment from the

proposed activities in this amendment, which includes the use of implantable tags in SRKW and an increase in the number of suction cup tags deployed however, the opportunity would be lost to collect information that would provide valuable information to NMFS needed to implement proper management and conservation actions. The activities proposed by the applicant would facilitate data collection that would contribute to recovery plan objectives of SRKWs. Denial of the permit amendment would eliminate such data collection, as discussed in Section 4.1 below.

2.2 ALTERNATIVE 2- PROPOSED ACTION

The EA for the original permit described the proposed action including research on killer whales (offshore, transient, AK resident, and southern residents), and eighteen species of cetaceans that could be targeted for research, including ESA-listed humpback whales (*Megaptera novaeangliae*), blue whales (*Balaenoptera musculus*), fin whale (*Balaenoptera physalus*), and sperm whale (*Physeter macrocephalus*). Descriptions of proposed research methods in the original EA are incorporated by reference and summarized here. These are specific to NWFSC's permit as follows: (1) close approach during vessel survey for photo-ID, behavioral observations, passive acoustic recording, and collection of prey samples; (2) breath and biopsy sampling; and (3) implantable (on species other than SRKW) and suction-cup tagging and tracking. The 2006 EA addressing these methods is supplemented here to describe implantable satellite tagging of SRKWs.

The proposed action is to issue a scientific research permit amendment to the NWFSC [File No. 781-1824-02] to conduct research on SRKWs. This historically small population of killer whales has undergone precipitous decline over the last couple of decades and was listed as endangered under the ESA in 2005 (70 FR 69903; November 18, 2005). The applicant is requesting to:

(1) Satellite tag (implantable dart tag) up to six (6) adult male or post-reproductive female SRKWs for the duration of the permit. No reproductive females, calves, or juvenile animals would be tagged; and

(2) Increase the number of suction cup tags deployed on SRKW from 10 to 20 tags. No calves would be suction-cup tagged. Suction cup tagging of SRKW was analyzed by NMFS in the 2006 EA for the original permit. The 2006 EA concluded that animals would not experience long-term stress, pain, injury, or infection from suction cup tags. The analysis in the 2006 EA for the original permit is, therefore, incorporated by reference; and suction cup tagging will not be considered further in this SEA.

The satellite tagging would be conducted until the permit expires (April 14, 2012). Tagging would occur in the late fall/early winter in Puget Sound (before animals leave the Sound) and off the coast of Washington, Oregon, and California in winter/spring. Individuals will only be successfully tagged once per year, but there may be up to two tagging attempts per individual per day and no more than 4 tagging attempts per

individual per year. The applicant is not requesting an increase in approaches, as authorized under Permit No. 781-1824-01, and incidental harassment will be covered under currently authorized takes.

All satellite tagging attempts would be fully documented using high resolution digital photographs, and high definition digital video to monitor behavioral reactions. The LIMPET satellite tag that would be used is small (7cm x 3cm x 2cm), and is held flush to the outside of the dorsal fin by one or two barbed darts (Figure 1).

Ideally, tags would be deployed in the early winter before they leave the greater Puget Sound area. Tags would operate between 401.610 and 401.690 MHz. Since first developed, over 300 LIMPET tags have been deployed on 16 species. Of these, over 100 have been deployed successfully on killer whales (Table 2). It is expected, based on previous tag deployments on killer whales, that the tag would provide high quality location data for time periods averaging four weeks, and for as long as three months.

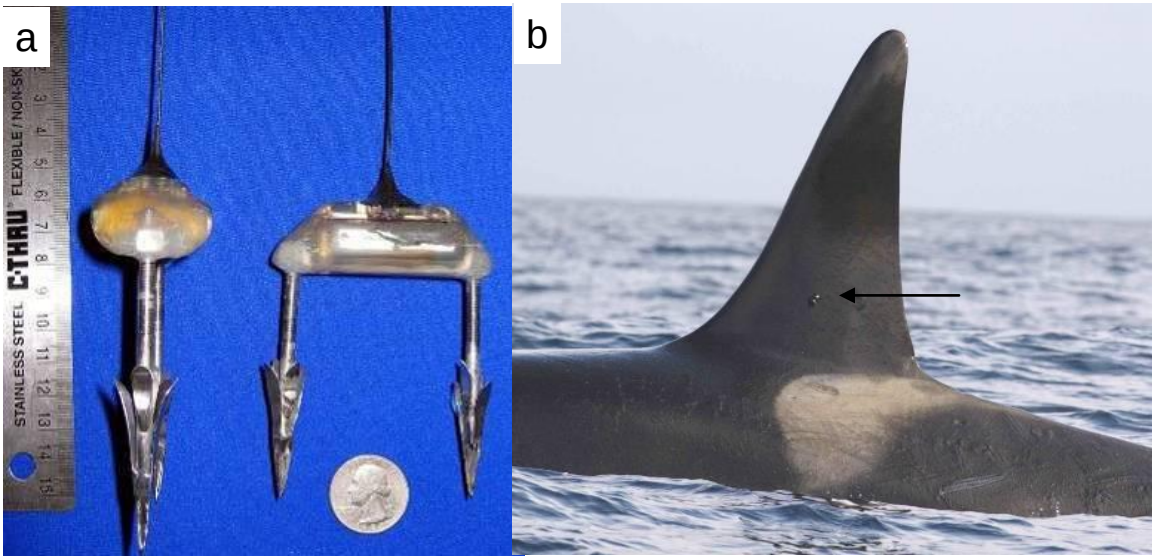

Figure 1: (a) Small satellite "dart" tag design (Unpublished data, Russ Andrews, Alaska SeaLife Center); (b) Tag successfully deployed on the dorsal fin of an adult male killer whale in the Aleutian Islands, Alaska (Unpublished data, NMML; Permit No. 782-1719).

In 2010, two adult killer whales (T90 and T123a) were tagged in Southeast Alaska and near the San Juan Islands by the NWFSC (see table 2). Concerns were raised to NWFSC that subsequent observations in 2010 by other researchers and the general public indicated the tags had broken and the darts were retained in the dorsal fins of the animals. Analysis by NWFSC of photographs from multiple contributers confirmed this. To address the issue of tag breakage that has resulted in extended retention of the two barbed darts, a new LIMPET tag version (Figure 2) has been developed and older LIMPET tags will be modified to include a steel plate and cone shape nuts attached to the screw-in darts (Figure 3) to reinforce the tag. Both the new version and the modified tags have resolved the weak point of the tags that resulted in the described breakage events.

The applicant proposes to use these new LIMPET tag versions or modified tags in the course of the proposed action.

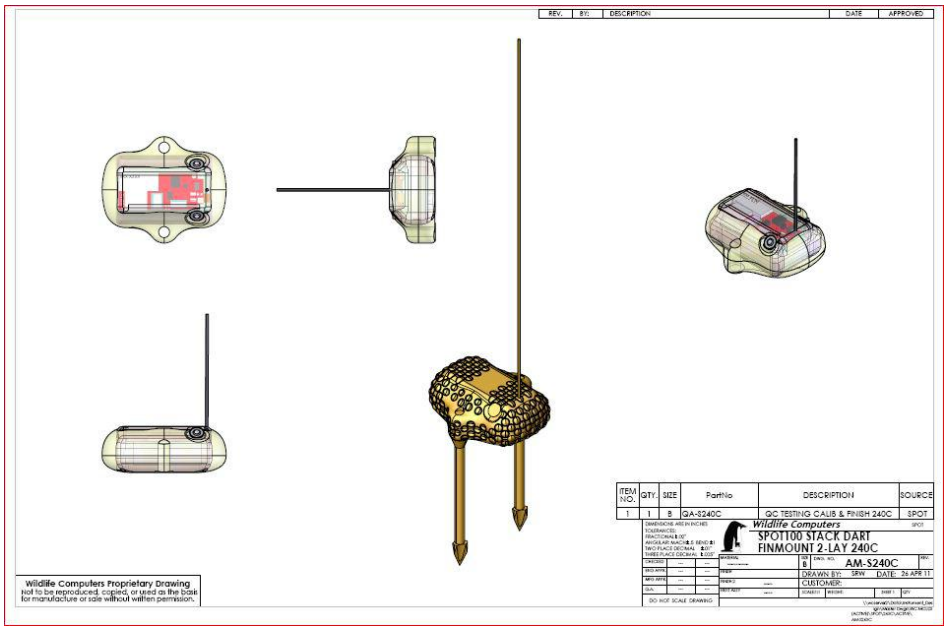

Fig. 2. New design for the LIMPET SPOT5 tag, Wildlife Computers model AM-240C

Fig. 3. Application of titanium 8-32 threaded nuts to old darts.

Tagging would be conducted from small maneuverable vessels (18-28ft) with EPA approved outboard engines. The tags would be deployed using a pneumatic projector, a crossbow, or a pole and requires approach to the target animal to within 10 meters. Boat approaches would be gradual, avoiding speeds greater than 8 knots and abrupt changes in engine rpm. A maximum of two tagging attempts would occur before the tagging operation is terminated. Implantable tags would be deployed on the dorsal fin.

Priority would be given to satellite tagging post-reproductive females, as there is recent evidence that attachment durations are shorter on adult males than adult females (transient killer whales) for reasons that remain unclear (NWFSC, unpubl. data, C. Matkin, pers. comm.). Only two tags would be deployed in each pod per year with the exception of L pod due to the generally different occurrence patterns of some subgroups, e.g., L11/L12 subgroup. Additional selections will be based on association patterns, e.g., L87 may be tagged as a surrogate for a K pod whale and L7 or L53 may be tagged as surrogates for J pod whales due to recent extended associations. Individuals will only be successfully dart implant tagged once per year.

Immediately following tagging, the tagged individual would be followed from a distance of 15-25m in order to obtain high quality digital photographs of the attachment site. This would allow the attachment site to be identified for future follow-up monitoring (based on previous tagging, the tagging site can be hard to see following successful healing). Priority would be given to photographing the tagged site again during future encounters with previously tagged whales. In addition, video documentation of behavioral reactions at the time of tagging and video taken during follow-up encounters would facilitate analysis of tagged whale behavior and physical health and wound healing. Follow-up monitoring would be facilitated by the ability to locate whales based on uplinked satellite locations from the tag.

CHAPTER 3 AFFECTED ENVIRONMENT

3.1 SOCIAL AND ECONOMONIC ENVIRONMENT

Although there are a variety of human activities that may occur in the action area such as commercial fishing, shipping, military activities, recreational uses (such as fishing and boating), and ecotourism, the social and economic effects of the proposed action mainly involve the effects on the people involved in the research, as well as any industries that support the research, such as charter vessels and suppliers of equipment needed to accomplish the research.

Permitting the proposed research could result in a low level of economic benefit to local economies in the action area. However, such impacts would be negligible on a national or regional (state) level and therefore are not considered significant. There are no significant social or economic impacts of the proposed action interrelated with significant natural or physical environmental effects. Thus, the EA does not include any further analysis of social or economic effects of the proposed action.

3.2 PHYSICAL ENVIRONMENT

The action area for the original permit included the inland waters of Washington State, the coastal waters of Washington, Oregon, California, and Alaskan waters. The action area for the permit amendment [File No.781-1824-02] would include primarily the inland and coastal waters of Washington State; additionally, research under the proposed amendment may extend to the coastal waters of Alaska, Oregon and California, including, Gulf of the Farallones, Olympic Coast, and Monterey Bay National Marine Sanctuaries. The permit would not authorize research in Canadian waters as these are outside the jurisdiction of a U.S. permit.

The glacial cut inland waters of Washington provide rich, ecologically diverse habitats for numerous species of birds, fish, invertebrates, plants, and marine mammals. Inhabitants of the inland waters of this region include protected animals such as marbled murrelets (*Brachyramphus marmoratus*), various cod and salmon species, harbor seals (*Phoca vitulina*), Steller sea lions (*Eumetopias jubatus*), and migrating gray whales (*Eschrichtius robustus*) and minke whales (*Balaenoptera acutorostrata*).

3.2.1 National Marine Sanctuaries, Parks, Historic Places

Research conducted under Permit No. 781-1824-02 would occur within three designated national marine sanctuaries during winter and spring months when SRKWs are present. However, issuance of the permit amendment would not result in research near or alteration of any parks or historic places. While some areas of the inland waters of Washington (e.g., around the San Juan Islands) are designated as protected areas for pinnipeds and birds, these areas are usually within 500 ft. of small islands. Research activities would remain in waters outside of 500 ft of small islands designated as protected areas for pinnipeds and birds. Therefore, it is not expected that any ecologically critical areas would be affected by research activities resulting from the proposed action.

Gulf of the Farallones National Marine Sanctuary (GFNMS): The Gulf of the Farallones National Marine Sanctuary protects an area of 948 square nautical miles (1,255 square miles) off the northern and central California coast. Located just a few miles from San Francisco, the waters within the GFNMS are part of a nationally significant marine ecosystem. Encompassing a diversity of highly productive marine habitats, the Sanctuary supports an abundance of species. The GFNMS is highly regulated with respect to human activity. Restricted activities include oil and gas development, discharge, seabed alteration, operating an aircraft lower than 1000 ft. while within one mile of biologically sensitive areas, and research activities without a permit. The GFNMS coordinates management plans with Cordell Bank NMS and Monterey Bay NMS. These sanctuaries are located adjacent to one another, managed by the same program, and share many of the same resources and issues.

Monterey Bay National Marine Sanctuary (MBNMS): The MBNMS is a federally protected marine area offshore of California's central coast. Stretching from Marin to Cambria, the MBNMS encompasses a shoreline length of 276 miles, extends 35 miles

offshore, and includes 5,322 square miles of ocean. Supporting one of the world's most diverse marine ecosystems, the Sanctuary is a home or migration corridor for 26 species of marine mammals, 94 species of seabirds, 345 species of fish, 4 species of sea turtles, 31 phyla of invertebrates, and over 450 species of marine algae. A rich array of habitats, including the open ocean, rugged rocky shores, sandy beaches, lush kelp forests, and wetlands support large numbers of seals and sea lions, whales, fish stocks, otters, and seabirds. Key species of the Sanctuary are the sea otter (*Enhydra lutris*), gray whale, blue whale, humpback whale, market squid (*Loligo opalescens*), brown pelican (*Pelecanus occidentalis*), rockfish (genus *Sebastes*), and giant kelp (*Macrocystis pyrifera*). For many migratory species, such as large whales, salmon, and brown pelican, the Sanctuary is also an important corridor to other habitats beyond its boundaries.

Olympic Coast National Marine Sanctuary (OCNMS): The OCNMS borders 135 miles of the rugged coastline of Washington's Olympic Peninsula. It is located approximately 150 miles west of the Puget Sound cities of Seattle and Tacoma. Twenty nine species of marine mammals and many species of fish and birds reside in or migrate through this area. Toothed and baleen whales, seals and sea lions and sea otters all represent the adaptation of land-based animal forms for survival in the marine environment. Gray whales, sea otters, harbor seals and Steller and California sea lions can be spotted from land at many locations along the coast at some time during the year. Other whales including humpback whales can only be seen from boats as they feed miles offshore.

Research is not expected to affect any physical or non-target biological aspect of any Sanctuary. All activities would be conducted from vessels on the water's surface and only adult male and post-reproductive female SRKWs would be targeted. All other species, including marine mammals, would be avoided and not approached. No anchoring or substrate modification would occur. No biotic or abiotic substances would be collected. Sanctuary research permits may be required as triggers for such permits include discharge of any material or matter (e.g., tags). The applicant has stated that he would contact the appropriate marine sanctuaries office prior to conducting research in any of these areas regarding permit requirements.

3.2.2 Essential Fish Habitat

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

EFH has been designated for many harvested fish species within the action area. Details of the designations and descriptions of the habitats are available in the Pacific,

West Pacific, and Alaska Fishery Management Plans. Activities that have been shown to affect EFH include disturbance or destruction of habitat from stationary fishing gear, dredging and filling, agricultural and urban runoff, direct discharge, and the introduction of exotic species. Activities proposed in this amendment will not affect any EFH; therefore, no consultation was conducted.

3.2.3 Designated Critical Habitat

Critical habitat within the action area has been established for SRKWs, Steller sea lions, and two species of salmon.

On November 29, 2006 (71 FR 69070), approximately 2,560 square miles of SRKW critical habitat was established throughout the inland waters of Washington and the Strait of Juan de Fuca (Attachment 1). These waters provide the primary constituent elements (PCEs) needed to support the SRKW whale population.

Based on the natural history of the SRKWs and their habitat needs, the physical or biological features of SRKW habitat are:

(1) Water quality to support growth and development;
(2) Prey species of sufficient quantity, quality and availability to support individual growth, reproduction and development, as well as overall population growth; and
(3) Passage conditions to allow for migration, resting, and foraging. Currently, due to the lack of data of offshore distribution, most offshore waters presumably used by SRKWs in the winter are not designated as critical habitat.

Research activities are not expected to affect any of the above listed PCEs of SRKW critical habitat. While vessels have the small possibility of developing oil or gas leaks, the amount would be insignificant compared to the size of the water body (e.g., Strait of Juan de Fuca, Puget Sound, Pacific Ocean). In addition, 4 –stroke engines would be used which are much more environmentally friendly, including quieter, than older 2-stroke engines. Therefore, water quality is not expected to be negatively impacted. Live prey would not be collected; however, remnants of prey from foraging events may be collected under the applicant's current Permit No. 781-1824-01. These samples would be shared with other researchers conducting investigations on prey abundance and choice of SRKWs. Finally, no structures (e.g., blockages, dams) would be erected which would interfere with passage conditions for migration, resting, and foraging.

Critical habitat designated for Puget Sound Chinook and Hood Canal summer-run chum ESUs occurs within the action area in nearshore marine areas contiguous with the shoreline from the line of extreme high water out to a depth of 30 m (98 ft) relative to MLLW (mean lower low water) (70 FR 52630; September 2, 2005). The Primary Constituent Element (PCE) for these habitat designations includes nearshore marine areas free of obstruction and excessive predation with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation, and natural cover.

Steller sea lion critical habitat has been designated for the Eastern DPS off Oregon and California. Critical habitat for this species includes terrestrial, air, and aquatic areas that provide for reproduction, rest, and refuge from predators and human-related disturbance (58 FR 45269; August 27, 1993). Critical habitat within the action area includes aquatic zones extending 3,000 ft (0.9 km) seaward of rookeries in Oregon and California, as well as an air zone extending 3,000 ft (0.9 km) above rookery areas. There are 7 major rookeries in Oregon and California. Research activities would be conducted in waters outside the critical habitat boundaries for Steller sea lions.

3.3 BIOLOGICAL ENVIRONMENT

3.3.1 *Southern Resident Killer Whales*

This distinct population segment of SRKW has been historically small and has fluctuated with a peak of 96 individuals in the 1990s, but decreased to 79 individuals in 2001 (Figure 4).

Three of the most likely explanations for the decline include prey decline (Ford and Ellis, 2006), toxin exposure from PCBs and PBDEs (Ross et al., 2000; Rayne et al., 2004; Ross 2006) and disturbance from boat traffic (Kruse 1991, Erbe 2002,Williams et al., 2002a, Williams et al., 2002b, Foote et al., 2004). However, there are few definitive studies that have linked any of these pressures to killer whale health.

Population Size and Structure

The SRKW population has gone through several periods of growth and decline since 1976 (Figure 2), when live-captures were ending and numbers were judged as beneath carrying capacity (Olesiuk et al., 1990). Between 1974 and 1980, total whale numbers expanded 19 percent (mean annual growth rate of 3.1 percent) from 70 to 83 animals. J and L pods grew 27 percent and 26 percent, respectively, during this period, whereas K pod decreased by 6 percent. This was followed by four consecutive years of decrease from 1981-1984, when count results fell 11 percent (mean annual decline rate of 2.7 percent) to 74 whales. The decline coincided with periods of fewer births and greater mortality among adult females and juveniles (Taylor and Plater 2001). A distorted age- and sex-structure, likely caused by the selective cropping of animals during live-captures 8-17 years earlier, also appears to have been a significant factor in the decline (Olesiuk et al., 1990). This resulted in fewer females and males maturing to reproductive age and a reduction in adult males that was possibly below the number needed for optimal reproduction. An unusually large cohort of females that stopped bearing young also played a role in the decline (Olesiuk et al., 1990).

The Southern Resident community entered yet another period of decline in 1996, with a 17 percent reduction (mean annual decline rate of 2.9 percent) in numbers occurring by 2001, when 81 whales remained. There is no indication that this decline was caused by any lingering demographic effects related to the live-capture era (Taylor 2004). Instead,

it appears to have resulted more from an unprecedented 9-year span of relatively poor survival in nearly all age classes and both sexes and secondarily from an extended period of poor reproduction (Krahn et al., 2002, 2004).

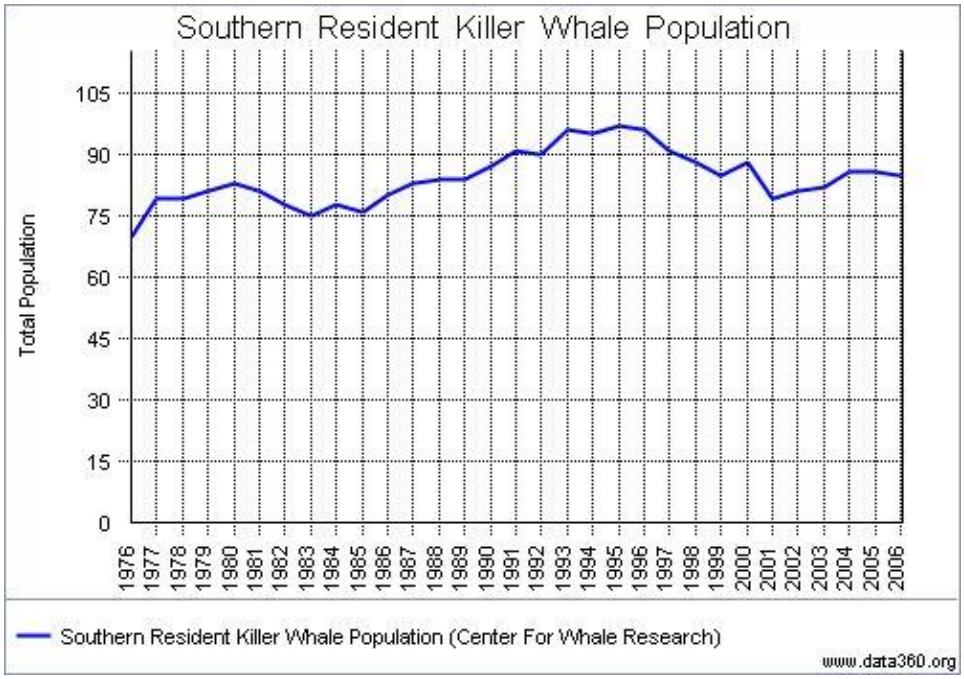

Figure 4: Population fluctuation of Southern Resident Killer Whales (1976-2006).

At present, the Southern Resident population has declined to essentially the same size that was estimated during the early 1960s, when it was considered as likely depleted (Olesiuk et al., 1990). Since censuses began in 1974, J and K pods have increased their sizes by 60 percent (mean of 1.9 percent per year) and 38 percent (mean of 1.2 percent per year), respectively. The largest pod, L pod, has grown 28.6 percent (mean of 0.9 percent per year) during this period, but more importantly, experienced a 10-year decline from 1994-2003 that threatened to reduce the pod's size below any previously recorded level. Despite hopeful data from 2002-2006 indicating that L pod's decline may have finally ended, such a conclusion is premature. From 1974-2006, there was an average of 3.4 births and 2.7 deaths per year in the community as a whole (Center for Whale Research, unpubl. data).

The SRKW population is divided into 3 matrilineal based pods: J, K, and L pod. Members maintain extremely strong bonds and individuals seldom separate from the group for more than a few hours. Permanent dispersal of individuals from resident matrilines has never been recorded (Bigg et al., 1990, Baird 2000) and the two recent separations of calves (A73 and L98) from their natal pods are considered anomalous. Matriarchal females likely hold important social knowledge that guides the behavior of individual matrilines (Boran and Heimlich 1999, McComb et al., 2001). Gradual changes in pod structure and cohesion occur through time with the deaths and births of members, as seen after the death of one matriarchal female, which appeared to prompt the

fragmentation of her matriline (Ford et al., 2003). While pods have been traditionally used as a social structure grouping, recent studies indicate that killer whale pods may be more ephemeral than previously believed, due to matrilineal splitting over time (Ford et al., 2003).

Currently, there are ~88 individuals in the SRKW distinct population segment (DPS) as of July, 2011. The population status is updated annually thru the cooperative efforts of multiple stakeholders in the region who contribute to the photo-identification catalog.

Distribution

The summer home range of SRKW is well documented with J-pod being the most frequently sighted in the Puget Sound/Strait of Juan de Fuca area. However, winter distribution is less well known and there are significant data gaps in home ranges of these whales, in particular for K and L pod. Ratios of contaminants in the different pods support observations that J and L pods may be occupying different ranges in the winter. L pod had higher DDT ratios, reflecting a "California signature," while J pod had higher relative PCB content, consistent with high PCB concentrations in Puget Sound (Krahn et al., 2007). Satellite tagging these whales will provide empirical location data that will aid in determining what habitats these animals are using during the winter/spring months; thereby aiding in implementing important management and conservation decisions.

Hearing and Vocalization

Killer whales are sensitive to sounds and have lower hearing ranges extending from 1 to at least 120 kHz, but are most sensitive in the range of 18-42 kHz, which is the approximate peak energy of the species' echolocation clicks (Szymanski et al., 1999). Hearing sensitivity declines below 4 kHz and above 60 kHz. SRKWs, like all marine mammals, rely heavily on vocalizations to carry our vital survival behaviors. Killer whales produce 3 types of vocalization, clicks, whistles, and pulsed sounds (Ford 1989). These vocalizations are important for navigation, locating prey, and communication. Most calls consist of both low- and high-frequency components (Bain and Dahlheim 1994) with most vocalization in the 4-30 kHz range although some clicks up to 85 kHz (Awbrey et al., 1982, Ford 1989, Riesch et al., 2006).

Prey

As top-level predators, killer whales feed on a variety of marine organisms ranging from fish to squid to other marine mammal species. Fish are the major dietary component of resident killer whales in the northeastern Pacific, with 22 species of fish and one species of squid (*Gonatopsis borealis*) known to be eaten (Saulitis et al., 2000, Ford and Ellis 2006). However, salmon is the main prey item, with Chinook, a very fatty fish, being the preferred species (Ford and Ellis, 2006). Chum salmon (11%) are also taken in significant amounts, especially in autumn. Other species eaten include coho (5%), steelhead (*O. mykiss*, 2%), sockeye (*O. nerka*, 1%), and non-salmonids (e.g., Pacific herring and quillback rockfish [*Sebastes maliger*]; 3% combined). The toxicology analyses of Krahn et al. (2002), who examined the ratios of DDT (and its

metabolites) to various PCB compounds in the whales, also suggest that the whales feed on Puget Sound salmon rather than other fish species.

Further detailed information on the natural history (e.g., social structure, communication and hearing, diet, dispersal patters, and diving and foraging behavior) of Southern Residents is contained within the Recovery Plan for SRKWs, available at http://www.nmfs.noaa.gov/pr/pdfs/recovery/whale_killer.pdf.

Listing Status

On November 18, 2005, the distinct population segment (DPS) of SRKWs was listed as endangered (70 FR 69903). Upon listing, all existing MMPA permits authorizing scientific research on SRKWs and new MMPA/ESA applications for research on this species (n=7) were re-analyzed in accordance with the ESA. In response, on March 9, 2006, a Biological Opinion (F/NWR/2006/00471) was prepared regarding the issuance of three scientific research permits, renewal of one permit, and amendments to three existing permits. The Biological Opinion concluded that while the research activities authorized in those permits would likely adversely affect SRKWs, mitigation measures and permit conditions would reduce the severity of impacts and therefore, are not likely to diminish the likelihood of SRKW survival and recovery. These permits require annual reauthorization.

Section 7 consultation re-initiation is required if, from all SRKW permits, the number of Level B harassment takes, in a given year, exceeds 10% of the total number authorized. In total, 1,935 takes were authorized for non-invasive research (i.e., Level B harassment) and 70 takes for invasive research (i.e., biopsy, suction-cup tagging, breath sampling). Based on the 2006 annual reports, submitted by researchers, Level B activities resulted in 20 takes (0.01% of takes authorized) and 18 (7 biopsies and 11 breath samples) intrusive takes.

Pursuant to the regulations found at 50 CFR §402.16, re-initiation of consultation is also required if a new research activity or increased number of takes for SRKWs is requested. Issuance of the requested permit amendment would result in a new activity (i.e., satellite tagging) that may adversely affect listed species; therefore, formal consultation under section 7 of the ESA was requested on May 23, 2011.

3.3.2 Non-Target Species

The inland waters of Washington and the Pacific west coast is an ecologically rich environment providing habitat for species of marine mammals, fish, birds, and invertebrates. Numerous non-target species inhabit the action area. Protected species include pinnipeds, including the Steller sea lion (*Eumetopias jubatus*) and its designated critical habitat; other cetaceans; sea turtles including leatherback (*Dermochelys coriacea*) and loggerhead (*Caretta caretta*); canary rockfish (*Sebastes pinniger*); Chinook salmon (*Oncorhynchus tshawytscha*), and its designated critical habitat; steelhead trout (*O. mykiss*); chum salmon (*O. keta*) and its designated critical habitat; coho salmon (*O.*

kisutch); bocaccio *(Sebastes paucispinis)*; Pacific eulachon (smelt) *(Thaleichthys pacificus);* yelloweye rockfish *(Sebastes ruberrimus);* green sturgeon *(Acipenser medirostris)*; and protected birds such as marbled murrlets (*Brachyramphus marmoratus*).

The applicant is currently authorized under Permit No.781-1824-01, to take or incidentally harass other ESA-listed species (i.e., humpback whales, blue whales, and sperm whales) throughout WA/OR/CA. Limited takes or incidental harassment of Dall's porpoise (*Phocoenoides dall),* Pacific White-sided dolphin (La*genorhynchus obliquiden),* harbor porpoise (*Phocoena phocoena*), northern right whale dolphin (*Lissodelphis borealis*), striped dolphin (*Stenella coeruleoalba*), short-beaked common dolphin (*Delphinus delphis*), non-SR killer whales (*Orcinus orca*), minke whale (*Balaenoptera acutorostrata*), eastern North Pacific gray whale (*Eschrichtius robustus*), pygmy sperm whale(*Kogia breviceps*), Baird's beaked whale (*Berardius bairdii*), Cuviers's beaked whale (*Ziphius cavirostris*), mesoplodont beaked whales (*Mesoplodon spp.*), short-finned pilot whale (*Globicephala macrorynchus*), and risso's dolphin (*Grampus griseus*) is authorized in the current permit.

It is expected that the number of animals incidentally harassed would be minimal, if any, for the tagging work, as activities would focus specifically on killer whales. Direct and incidental harassment of these species was previously analyzed in the 2006 EA and Biological Opinion for issuance of the NWFSC's current permit. It was concluded that harassment to these species would not result in significant adverse impacts to the stock or species affected. The prior EA is appropriately incorporated here by reference and no additional analysis of affected non-target marine, terrestrial, or avian species is needed nor is there a need for additional impacts analysis to such species.

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

4.1 EFFECTS OF ALTERNATIVE 1

There would be no environmental consequences above those previously analyzed in the 2006 EA for Permit No. 781-1824-00 under this SEA's Alternative 1 (i.e., denial of the permit amendment request). While the applicant would still be allowed to conduct research under his current permit, no implantable satellite tagging would be authorized. Whales would not be harassed by this activity, therefore avoiding any potential short-term negatively effects on whale behavior. Denial of this amendment request would also eliminate the risk of injury from use of implantable tags in SRKW. However, the opportunity would be lost to collect information that would provide valuable information to NMFS needed to implement proper management and conservation actions, which specifically include providing data to determine winter distribution and habitat use which could aid in establishing coastal and offshore critical habitat for SRKW. Thus, data essential to conservation of the species would not be collected as part of the currently authorized research if this amendment were denied.

4.2 EFFECTS OF ALTERNATIVE 2

4.2.1 Effects to the Physical Environment

It is not expected that adverse effects to the physical environment would occur as a result of the proposed research. Research would occur from small vessels on the water surface and no substrate would be disturbed. No biological material would be removed from the environment.

Other than vessel related material (e.g., fumes, bottom paint), the only substance released into the environment would be the deployed tags. When the tag eventually releases from the whale, both the tag and the darts would sink and are not retrieved. However, the barbed darts are constructed with inert titanium and the electronic components in the tag itself that could be considered hazardous would be small. These components would be completely encapsulated in a durable epoxy coating that is designed to withstand extreme pressures without degrading. The discarded tag, therefore, poses very minimal risk to the environment, including critical habitat.

The vessel itself would be well maintained by the researchers to prevent any oil or fuel leakage. In the slight chance that a spill occurs, the amount of fuel or oil it could leak into the water would be insignificant compared to the size and flushing of the water bodies in which they intend to work due to the small size of the engines.

Pinniped haul out or rookery sites and bird sanctuaries would be avoided. Any potential effects to designated critical habitat would be insignificant because the proposed activities would not cause obstruction or significantly affect predation, would not cause any significant changes to water quality in designated critical habitat, and would not affect forage or the ability for critical habitat areas to support growth and maturation of listed species. Therefore, the proposed activities are not expected to adversely affect designated critical habitat within the action area.

4.2.2 Effects to the Biological Environment

4.2.2.1 Close Approach

Several studies have suggested that boat presence can affect some killer whale behaviors and acoustic ability (Kruse 1991, Erbe 2002, Foote et al., 2004). Killer whales are surrounded by vessels on a daily basis during the summer, and while it could be argued that they have become adapted to engine noise and vessel presence (Richardson et al., 1995), reports have indicated these whales may alter direction or behavior when in the vicinity of boats (Williams et al., 2002a, 2002b). This may impair vital behaviors such as foraging and reproduction. However, killer whales display extreme variability in foraging techniques, behaviors, and dispersal patterns (Baird 2000), possibly making it easier for them to adapt to disturbance than if they were highly specialized. In addition, due to chronic vessel exposure, some animals may become habituated to vessel noise (Richardson et al., 1995).

It has been reported that killer whales have modified vocalizations in response to engine noise (Foote et al., 2004, Erbe 2002). However, Williams et al. (2002) demonstrated that movement paths of northern resident killer whales were significantly less direct and less predictable during encounters with "leapfrogging" vessels than during control periods when no approaches were made by boats. An unpublished study by Bain et al. (2006) revealed that transitions between activity states are significantly affected by vessel traffic, indicating a reduction in time spent foraging in the presence of vessels.

Vessel presence may also lead to masking of both communication and prey detection. Erbe (2002) predicted that a whale watching vessel traveling at 10 km/hour (5.4 kts) could result in an audibility and masking potential at approximately 1 km, a behavioral response at 50 meters, and a temporary threshold shift (TTS) of 5 dB in 50 minutes of exposure at 20 m range. However, some of these potential effects from presence of the research vessel would be minimized or negated due to the collection method and operation of the vessel. For example, it is not expected that fecal collection and satellite tagging would require a constant approach within 20m for 50 minutes. Therefore, TTS will not likely occur and harassment would be limited to behavioral reactions.

Under Permit No.781-1824-02, currently–authorized photo-ID would be conducted with tagging so that number of approaches would be minimized. Reproductive females, calves, or young males would not be approached for satellite tagging, therefore, limiting effects to mother/calf bonds. Further, tagging activities would take place during the winter and spring, outside of the core killer whale research/whale watching season.

4.2.2.2 Satellite Tagging

Advances in satellite tag electronics have allowed location-only tags to be developed that are small enough to be remotely deployed on the dorsal fins of killer whales (Andrews et al., 2005) (Figure 3). Such tags have now been deployed on killer whales in the Antarctic, Alaska, Washington, Oregon, and California since 2005, in collaborations between the Alaska SeaLife Center, the North Gulf Oceanic Society and the Alaska, Northwest, and Southwest Fisheries Science Centers. A summary of the available information for this effort is outlined in Table 2.

The tag functionality (i.e. the number of transmitting days) ranged from 0 to 109 days with an average of 28 days for the 101 tagging events listed in Table 2. These tags may cease transmitting due to battery failure, migrating out and falling off the whale, or in two events as previously mentioned, the tag breaks off (T90 and T123a).

Behavioral reactions to deployment included no response (46%), to a shake or startle response from the reported tagging events, illustrating that behavioral reactions are short-term and do not interfere with vital behaviors necessary for survival. These reactions are Andrews et al. (2005 and 2008) provide detailed description of short and long-term reactions of southeastern Alaskan resident and Antarctic killer whales to satellite tags

similar to those proposed in the amendment request. These responses are similar to those to be expected from the proposed action.

Andrews et al. (2005) also examined and justified placement of tags on dorsal fins compared to other parts of the body (e.g., the flank). They found that compared to blubber, the dorsal fin tissue is much better for holding the barbed dart due to the dense matrix of fibrous tissue. While large blood vessels run through the central portion of the fin, no bleeding was observed when these tags attached to the animals.

Reproductive females or calves would not be tagged and males of other killer whales stocks have shown only short term behavioral reactions; therefore, it is not expected that tagging, as proposed, would have a negative effect on reproduction potential. Tagging would occur when little to no other boats are around and in fall, winter, and spring, therefore, it is not expected that noise and presence of the vessel would result in long term disruptions to feeding or communicative behaviors. Acoustics from the tag (401MHz) are well above the hearing range of killer whales (up to 120 Khz: Szymanski et al., 1999); therefore, after the vessel leaves the area, no sound would be emitted into the environment that could disrupt the animals.

Figure 3: Photographs of killer whales with satellite tags attached. First photo: AJ21 with tag attached and affiliates. Second photo: Close up of AJ21's tag.

Table 2: Summary data on dart tags of the two-dart design version deployed on killer whales in the Antarctic, Alaska, Washington, Oregon, and California from 2006-2011. Data courtesy of Hanson, Andrews, Matkin, Durban, and Pitman (unpublished data).

Whale Id	Tagging location	Age Class and Sex	Date Deployed	Functional longevity (days)	Immediate Reaction
Type C	McMurdo Sound	adult M	20-Jan-06	65	none
Type C	McMurdo Sound	adult M	23-Jan-06	11	none
Type B	McMurdo Sound	adult F	31-Jan-06	27	none
Type B	McMurdo Sound	adult F	31-Jan-06	1	none
Type C	McMurdo Sound	adult F	31-Jan-06	1	none
Type C	McMurdo Sound	adult F	31-Jan-06	0	none
Type C	McMurdo Sound	adult F	31-Jan-06	7	none
Type C	McMurdo Sound	adult F	31-Jan-06	2	none
Type C	McMurdo Sound	adult F	1-Feb-06	11	acceleration
Type C	McMurdo Sound	adult F	2-Feb-06	0	none
WT14	Unimak Is.	Adult M	8-May-06	1.8	strong startle
WT17	Unimak Is.	adult F	10-May-06	0	mild startle
WT50	Unimak Is.	sprouter M	10-May-06	12	moderate startle
WT265	Unimak Is.	juvenile	11-May-06	3	none
WT221	Unimak Is.	adult M	11-May-06	18	none
UnId	Unimak Is.	adult F	24-May-06	10.5	none
WT136	Unimak Is.	adult M	26-May-06	2	none
WT121	Unimak Is.	adult M	27-May-06	28	none
WT121	Unimak Is.	adult M	27-May-06	35	none
RI T1	Rat Islands	adult M	10-Jun-06	14	slight shake

RI T2	Rat Islands	adult M	10-Jun-06	37	none
AK1	PWS	adult M	15-Jun-06	0	none
WT132	Unimak Is.	adult M	22-Jun-06	54	slight startle
AK1	PWS	adult M	9-Aug-06	45	slight startle
AJ21	PWS	adult M	1-Sep-06	26	none
AJ7	PWS	adult M	2-Sep-06	2	none
AB11	PWS	adult M	13-Sep-06	55	none
WT30	Unimak Is.	adult M	7-May-07	35	none
WT144	Unimak Is.	sprouter M	18-May-07	6	none
WT52	Unimak Is.	adult M	19-May-07	0.5	startle
WT135	Unimak Is.	adult M	19-May-07	19	none
WT136	Unimak Is.	adult M	19-May-07	18	moderate startle
WT137	Unimak Is.	adult M	27-May-07	21	startle and roll
WT345	Unimak Is.	adult M	28-May-07	59	slight startle
WT26	Aleutian Islands, AK	subadult Male	1-Jun-07	0	Startle
WT289	Aleutian Islands, AK	adult M	13-Jun-07	49	None
T30	San Juan Islands	adult F	14-Sep-08	94	flinch, fast dive, roll
T30A	San Juan Islands	adult M	14-Sep-08	47	fast dive
T19B	San Juan Islands	adult M	16-Sep-08	21	flinch, roll
88701	Antarctic Peninsula	adult F	8-Jan-09	8	None
B9	Antarctic Peninsula	adult F	14-Jan-09	14	None
B13	Antarctic Peninsula	adult F	15-Jan-09	18	None
B19	Antarctic Peninsula	adult F	24-Jan-09	21	None
T157	Oregon Coast	adult F	6-Apr-09	24	tail lob, fast dive
T11	Oregon Coast	adult F	6-Apr-09	93	dive/none
CA173	Washington Coast	adult F	8-Apr-09	22	none
WT143	Alaska	Adult F	26-May-09	n/a	startle and flight
AX111	Alaska	Adult F	3-Jun-09	n/a	slight shake
Offshore	Alaska	adult M	13-Jun-09	n/a	slight startle
WT300	Pribilof Islands, AK	adult M	24-Jun-09	3	Lean
WT336	Pribilof Islands, AK	adult N	24-Jun-09	0	Startle
WT295	Pribilof Islands, AK	adult M	25-Jun-09	39	Startle
WTNew	Aleutian Islands, AK	adult F	29-Jun-09	60	None
UNK GOA Transient	Alaska	adult F	1-Jul-09	n/a	strong startle
WR49	Aleutian Islands, AK	adult M	4-Jul-09	5	Startle
Awf	Alaska	adult F	21-Aug-09	n/a	none
AJ33	Alaska	adult M	14-Sep-09	n/a	slight shake
T60	Gulf Islands BC	adult F	14-Sep-09	86	minor quiver
T20	Gulf Islands BC	adult M	18-Sep-09	29	minor flinch, hard roll
T36A	South Puget Sound	adult F	20-Sep-09	86	roll
99220	Antarctic Peninsula	subadult M	13-Feb-10	12	None
93221	Antarctic Peninsula	adult F	13-Feb-10	98	None
93222	Antarctic Peninsula	adult F	13-Feb-10	109	None
93223	Antarctic Peninsula	adult F	14-Feb-10	28	None
93240	Antarctic Peninsula	subadult F?	16-Feb-10	44	Startle
T100B	North Puget Sound	adult F	21-Feb-10	17	quiver
T100C	North Puget Sound	adult F	21-Feb-10	16	accelerate

I62	WA	Adult M	15-Apr-10	102	Hard Dive
93243	Monterey Bay, CA	subadult M	15-Apr-10	0	Startle
CA122B	Monterey Bay, CA	subadult M	18-Apr-10	13	None
CA122A	Monterey Bay, CA	adult F	18-Apr-10	32	None
CA20	Monterey Bay, CA	adule M	25-Apr-10	12	None
T90	San Juan Islands	adult F	16-May-10	16	None
T14	San Juan Islands	Adult M	18-May-10	34	flinch and roll
T86a	San Juan Islands	adult F	25-May-10	7	flinch
AJ4	Alaska	n/a	9-Jun-10	n/a	slight startle
AX111	Alaska	n/a	9-Jun-10	n/a	slight startle
AJ41	Alaska	n/a	10-Jun-10	n/a	slight startle
New GAT	Alaska	n/a	12-Jun-10	n/a	slight startle
AJ42	Alaska	n/a	16-Jun-10	n/a	none
CA131	S. Cent CA - Mooro Bay	adult F	5-Jul-10	2	flinch
WT301	Aleutian Islands, AK	adult M	7-Jul-10	25	None
WT302	Aleutian Islands, AK	adult F	7-Jul-10	30	None
T99a	SEAK	adult F	25-Jul-10	32	Quiver
T123A	SEAK	Adult M	29-Jul-10	8	slight flinch
AJ27	Alaska	n/a	12-Aug-10	n/a	slight startle
AT9	Alaska	n/a	16-Aug-10	n/a	strong shake
AB53	Alaska	n/a	17-Aug-10	n/a	slight startle
AJ44	Alaska	n/a	19-Aug-10	n/a	dive
AJ73	Alaska	n/a	21-Aug-10	n/a	startle
N25	SoCal - San Miguel	Adult M	7-Sep-10	9	flinch
T124A1	SEAK	adult F	10-Sep-10	43	flinch
T51	SEAK	Adult M	18-Sep-10	31	flinch
T72	SEAK	Adult M	22-Sep-10	47	flinch
AF42	SEAK	Adult M	22-Sep-10	38	flinch/acceleration
B2	Antarctic Peninsula	adult M	13-Jan-11	19	None
B20	Antarctic Peninsula	adult F	13-Jan-11	44	None
103879	Antarctic Peninsula	adult F	15-Jan-11	48	None
103878	Antarctic Peninsula	adult F	15-Jan-11	48	Startle
103876	Antarctic Peninsula	adult F	24-Jan-11	22	None
AF18	SEAK	Adult M	5-Jun-11	37	slight flinch

n/a: Information not available at this time

A 2008 Biological Opinion (BiOp) prepared for a previously proposed action (issuance of Permit No. 532-1822-03 to Kenneth Balcomb) analyzed the effects of satellite tagging SRKWs. In summary, the BiOp for issuance of that permit concluded that the proposed action is not likely to jeopardize the continued existence of SRKWs. No new tagging information or observations have been reported since 2008 that differ from the analyzed effects. Tag breakage as discussed below, was a consideration in the 2008 BiOp as well as the 2011 BiOp for this action.

Reactions of whales to satellite tagging, and associated close approach, are expected to be limited to short-term, low to moderate behavioral response, if any, and/or a mild stress response. The risk to the species is expected to be minimized given the short duration of close, careful, close approaches and tagging attempts, permit conditions,

limited repeat exposures, post-tag monitoring, and training and experience of research personnel. No mortality or serious injury is expected. Additional risks to individuals from tagging include infection and interruption of blood flow to the tagged area of the body and the extended attachment of broken barbs. A review of 17 LIMPET tagging events of four species of Hawaiian odontocetes, including false killer whales was conducted by Dr. Hanson in 2008. Analysis of photographs collected post tagging, indicate that long term effects are scarring along with some tissue inflammation. There was no indication of infection or necrosis as expected based on prior studies of cetacean skin healing processes (Bruce-Allen and Geraci, 1984, Geraci and Bruce-Allen, 1987). The wounds associated with tagging fell within the range of naturally sustained tissue damage from sources such as cookie cutter sharks, remoras, con-specifics etc., which are commonly documented in healthy, reproductive cetaceans (Walker and Hanson, 1999; McCann, 1974; Heithouse 2001).

Follow-up studies in Alaska have re-photographed previously tagged individuals over periods ranging from days to 2 years, documenting excellent healing with no apparent long-term physical damage or behavioral changes in these individuals (Andrews, Matkin, Durban and Pitman, unpublished data). Experienced observers indicate that killer whale reactions to a hit by this particular tag type (LIMPET), are less than that observed from a biopsy dart hit (B. Pitman, pers. comm.).

In addition, in June 2011, a veterinary team composed of 5 board-certified veterinary pathologists, a veterinary pathologist and 2 clinicians with extensive marine mammal experience, reviewed a temporal series of photographs of two cases of LIMPET tag barb retention that resulted from tag breakage on two killer whales, T90 and T123a, tagged in 2010. The review assessed the nature and extent of injury and likelihood of wound recovery. The resulting assessments were inconclusive with respect to the level of risk for progression or resolution of the skin defects, and it was determined localized infection and inflammation were likely occurring. However, long term monitoring will be required to fully determine the progression and outcome of the wound healing process (Raverty, 2011).

Independent of and concurrent with the veterinary review, the tag developer (Russ Andrews), Dr. Hanson, other scientists, and the tag manufacturer (Wildlife Computers) designed a new LIMPET tag version (Figure 2) to reduce the chance of breakage. Because the developers determined the cause of the breakage (i.e., the weak point), they were also able to modify existing tags to reinforce the area prone to breakage with a steel plate and cone-shaped nuts (Figure 3). The applicant would use a combination of these new tags and older tags that have been reinforced. NMFS PR anticipates that these improvements will significantly reduce the risk of tag breakage since the developers were able to determine the cause of the breakage. Thus, the risk of extended dart retention and associated risk of infection from breakage would be minimized by the modified tags as well as the new tag design.

Although LIMPET tags have not previously been used on SRKWs, the new and modified tag version have and will be deployed on other species and other stocks of killer

whales and no tag breakage has been reported. Furthermore, the permit will be conditioned as detailed in Section 4.4 *MITIGATION MEASURES* of this document.

To minimize risk of infection to the whales, sterile procedures would be followed at all times. The barbed darts that penetrate the dorsal fin to hold the external tag in place are made using inert medical-grade titanium. Additionally, the dart would be cleaned with acetone and further sterilized using iodine solution prior to attaching the tag, and a topical antibiotic ointment would be applied. Following sterilization, all handling of the dart would be conducted using sterile gloves, and the dart would be wrapped in sterile foil until deployment. Protective caps would be placed over the sharp barbs to avoid risk to crew prior to deployment. To further ensure safety, the tag would only be placed on the crossbow immediately before tagging activities and the safety switch would be "on" until immediately before the tagging attempt. Once loaded, the crossbow would only be aimed at the water and target whale, and never at non-target individuals. If non-target individuals (e.g., females or calves) are in close proximity to a target whale, precluding a safe shot, the tagging attempt would be aborted. The crossbow would only be handled by personnel with extensive experience in crossbow operation and safe firearms practice.

In conclusion, the proposed action is not likely to significantly adversely affect the human environment, and specifically SRKWs. This is comparable to the analysis in the 2006 EA for Permit No. 781-1824-00 and the SEA for Permit No. 532-1822-03 (K. Balcomb) (NMFS, 2008). In addition, the BiOp for the original Permit No. 781-1824-00 as well as the BiOp for this proposed action found that the proposed action would not likely jeopardize the continued existence of SRKWs.

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

As summarized below, NMFS has determined that the proposed research is consistent with the purposes, policies, and applicable requirements of the MMPA, ESA, and NMFS regulations. NMFS issuance of the permit would be consistent with the MMPA and ESA.

4.3.1 Endangered Species Act

This section summarizes conclusions resulting from consultation as required under section 7 of the ESA. The consultation process was concluded after close of the comment period on the application and draft EA to ensure that no relevant issues or information were overlooked during the initial scoping process summarized in Chapter 1. For the purpose of the consultation, the draft SEA represented NMFS' assessment of the potential biological impacts.

As stated, the Biological Opinion prepared by NMFS' Endangered Species Division concluded that the action is likely to adversely affect but not likely to jeopardize the continued existence of Southern resident killer whales or destroy/adversely modify

designated critical habitat. No conservation recommendations were provided. (NMFS, 2011)

4.3.2 Marine Mammal Protection Act

The applicant submitted an application which included responses to all applicable questions in the application instructions. The requested research is consistent with applicable issuance criteria in the MMPA and NMFS implementing regulations. The views and opinions of scientists or other persons or organizations knowledgeable of the marine mammals that are the subject of the application or of other matters germane to the application were considered, and support NMFS's initial determinations regarding the application.

The permit would contain standard terms and conditions stipulated in the MMPA and NMFS's regulations. As required by the MMPA, the permit would specify: (1) the effective date of the permit; (2) the number and kinds (species and stock) of marine mammals that may be taken; (3) the location and manner in which they may be taken; and (4) other terms and conditions deemed appropriate. Other terms and conditions deemed appropriate relate to minimizing potential adverse impacts of specific activities (e.g., capture, sampling, etc.), coordination among permit holders to reduce unnecessary duplication and harassment, monitoring of impacts of research, and reporting to ensure permit compliance.

4.3.3 National Marine Sanctuaries Act

The applicant has been working with the identified National Marine Sanctuaries for years and is aware of all regulations and policies associated with working within Sanctuary boundaries. The applicant has obtained the necessary permits required to work in the identified sanctuaries.

4.4 MITIGATION MEASURES

An individual whale would not be taken for tagging or a combination of tagging and any other activity more than 2 times in one day. An individual would not be tagged more than once within one year. Tagged animals would be monitored over the long term and tag attachment sites would be photographed upon re-sighting for any indication of infection.

Identity of tagged whales and the timing of tag deployments will be shared with other researchers in order to minimize cumulative effects on these individuals. Planned tagging activities will also be shared with other research groups prior to initiating tagging work in order to ensure that other groups are not planning close approaches during this time. Uplinked satellite locations from tags will also be distributed to researchers to increase the efficiency of other research programs and reduce cumulative impact.

4.4.1 Conditions in Permit Amendment

The permit currently contains the following conditions, which would remain effective in the permit amendment:

2. Specific:

a. Where females with calves are authorized to be taken, researcher(s):

1) Must immediately terminate efforts if there is any evidence that the activity may be interfering with pair-bonding or nursing; and

2) Must not position the research vessel between the mother and calf.

b. To minimize disturbance of the subject animals the Permit Holder must exercise caution when approaching animals and must retreat from animals if behaviors indicate the approach may be interfering with reproduction, feeding, or other vital functions.

The following conditions would be added to the permit:

f. Sampling Activities: Biopsy and Tagging

1) All biopsy tips must be disinfected between and prior to each use.

2) A tag attachment attempt must be discontinued if an animal exhibits repetitive strong adverse reactions to the activity or the vessel.

3) In no instance will the Permit Holder attempt to biopsy or tag a cetacean anywhere forward of/anterior to the pectoral fin.

To address concerns regarding tag breakage and dart retention the following condition has been included:

III (B) (1)(g): The Permit Holder must cease dart tagging of Southern Resident Killer Whales (SRKW) in the event dart breakage occurs (i.e. dart barbs are separated from the tag sensor package and remain implanted) and notify the Chief, Permits Division by phone (301-427-8401) within two days of the event; and, submit an incident report that includes a complete description of the events surrounding the incident and identification of steps that will be taken to reduce the potential for additional breakage occurrence. Dart tagging SRKW's may recommence upon review of that information and authorization by the Chief, Permits Division.

4.4.2 Monitoring and Reporting

Researchers would be required to monitor the behavior, the tag site, of the targeted individuals. Furthermore, researchers would be required to report the number of approach episodes conducted, number of animals approached, and number of animals that behaviorally reacted to approach or sampling activity. Cumulatively, among all the researchers conducting work on SRKWs, these reports result in a very good picture of the impact of U.S. based scientific research, if any, is having on this population. Based on annual reports, less than 10% of takes authorized are actually occurring; therefore, research activities appear to have little effect on this population.

One caveat in monitoring and implementing conservation measures for this stock is that they utilize both U.S. and Canadian waters, requiring international coordination. Killer whales are protected under U.S. laws such as the MMPA and ESA, and various Washington, Oregon, and California state laws.

In Canada, killer whales, including SRKW, are protected under their Marine Mammal Regulations (MMR) of the Fisheries Act in 1994 and the Species at Risk Act. In addition, killer whales were placed on Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendix II in 1979, which requires all international shipments of the species to be accompanied by an export permit issued by the proper management authority of the country of origin. While NMFS cannot implement and enforce protective measures for these animals in Canadian waters, there are collaborative efforts being employed by both countries to contribute to the conservation and recovery of this killer whale DPS.

4.5 CUMULATIVE EFFECTS

4.5.1 Other Research Permits and Authorizations

As described above, the proposed action would result in effects to SRKW, and no non-target biological resources or other physical aspects of the environment are anticipated to be impacted specifically from the activities described in the amendment request. Cumulative effects are defined as those that result from incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (federal or nonfederal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

Currently, there are seven permits that authorize the taking of SRKWs (Attachment 2). No research-related mortality is or would be authorized. Cumulatively, issued permits authorize 2,375 Level B harassment takes annually, including incidental

harassment; and 135 Level A harassment takes, annually. The issuance of several these permits have been analyzed in the NMFS 2006 EA and Biological Opinion referenced in the beginning of this document. The most recently issued permits; Permit No. 10045 to Samuel Wasser, which authorizes close approach for fecal and prey sampling was analyzed in a 2008 EA and Biological Opinion. Permit No. 14097 to the Southwest Fisheries Science Center, which authorizes close approach and biopsy sampling was analyzed in a 2010 EA and Biological Opinion. Permit No. 15330 to Robin Baird, Ph.D. which authorizes close approach and suction cup tagging was analyzed in a 2011 EA and Biological Opinion. The proposed action was analyzed in the 2011 Biological Opinion specific to the proposed action. As discussed, while the survivorship and recovery of the southern resident DPS is a concern, the Biological Opinion concluded no jeopardy would result from the proposed action. A summary of all permitted objectives and authorized takes are listed in Attachment 2.

There is little debate that the amount of vessels surrounding SRKWs during the summer months is a concern and could be a factor in the population decline. The issuance of permit amendment would not increase the number of research boats around whales during this peak season due to the timing of tagging activities. The goal of the NWFSC's proposed project is to determine winter ranges for southern residents; therefore, tagging would only take place between late fall and early spring. Only six individuals would be tagged per year; therefore, a limited number of days on the water would be needed specifically for this activity. While exact number of days cannot be determined, it has been indicated that much of the research would be concentrated in the inland waters of Washington and along the coast. Tagging activities would be limited to times when little to no boats are present to minimize or eliminate public exposure to tagging.

NMFS has issued Incidental Harassment Authorizations (IHAs) for training activities in the U.S. military's Southern California Range Complex and the Northwest Training Range Complex, which contribute to noise emissions within SRKW habitats. Similarly, NMFS has previously issued incidental take authorizations for activities such as seismic research; however, most of these surveys occurred off the U.S. west coast and did not authorize take of marine mammals.

4.5.2 Vessel Interactions, Prey Availability, Toxins/Disease, Oil Spills

There is overwhelming evidence that SRKWs are exposed to anthropogenic stressors including vessel traffic (most notably in summer months), toxins, and lack of prey availability caused by destruction of prey species habitat and overfishing (NMFS 2005, NMFS 2006). For many depleted or endangered marine mammals, acute factors such as ship strikes or fishery interactions can be partially blamed for population decline. However, this is not the case for southern residents as it is not known which of the indentified stressors are leading to the decline in population or if it is a combination of these factors.

The 2004 a biological review team (BRT) concluded that there are 4 major factors that influence the health of the southern resident distinct population segment (DPS). Important concerns included (1) reductions in quantity or quality of prey, (2) high levels of organochlorine contaminants and increasing levels of many "emerging" contaminants (e.g., brominated flame retardants), putting Southern Residents at risk for serious chronic effects similar to those demonstrated for other marine mammals (e.g., immune and reproductive system dysfunction), (3) sound and disturbance from vessel traffic, and (4) oil spills.

Prey Availability

Decreased quantity and quality of prey have been cited as possible risk factors for the population decline of Southern Resident killer whales (Krahn et al., 2004, 2002). The preferred prey of Southern Residents is reported to be Chinook salmon (*Oncorhynchus tshawytscha*) (Ford and Ellis, 2006, Hanson et al., 2010), a high tropic level species. Other species of salmon and groundfish also consumed. Pollution, habitat loss, and overfishing, have been cumulatively instrumental in decreasing quantity and quality of killer whale prey. The foraging success of SRKWs may also decrease if the population decreases to below a critical threshold. Because the species hunts cooperatively, declining group sizes may result in decreased foraging efficiency and energy acquisition per individual (e.g., Baird and Dill 1996). The research vessels to be used for these projects are small (>28ft) with 4-stroke EPA approved outboard engines. Research would not take place in rivers and streams where salmon spawn. No collection of prey or habitat modification would occur. Therefore, it is not expected that the presence of the research vessels would compromise quantity and quality of prey for these killer whales.

Toxins/ Disease

Exposure to pollution and contaminants in the action area is a concern for SR killer whales and has the potential to cause adverse health effects in this species. In the eastern North Pacific, marine ecosystems receive pollutants from a variety of local, regional, and international sources (Grant and Ross 2002; (Garrett 2004), but the relative contribution of these sources in the contamination of killer whales is poorly known (NMFS 2008). With up to 1,000 new chemicals entering the global marine environment annually, it is difficult to monitor levels and sources of all contaminants (Grant and Ross 2002). Marine pollutants originate from a multitude of urban and non-urban activities, such as improper disposal of manufacturing by-products, processing and burning of fossil fuels, discharge from landfills and effluent from wastewater treatment plants, agricultural use of pesticides, terrestrial runoff, and disposal of chemicals used in households and for medical treatment (NMFS 2008). Atmospheric transport of pollutants from outside the action area is another important contaminant source.

In Washington State, most of the human population is concentrated in the Puget Sound basin, primarily along its coast or adjacent to major rivers that discharge into the sound (Grant and Ross 2002). From 1970–1990, the population in the central Puget Sound region increased by 38 percent and developed land use by 87 percent (Grant and

Ross. 2002). Hotspots for contaminants in the action area are centered near these major urban areas, where industrial and domestic activities are concentrated, but contamination can extend widely into even some rural bays and in nursery areas for many species. In general, water quality within the action area of the inland waters of Washington is poor. Persistent organic pollutants (POPs; e.g., PCBs, DDTs, hexachlorocyclohexanes (HCHs), chlordanes, hexachlorobenzene (HCB) and polybrominated diphenyl ethers (PDBEs)) are one factor thought to contribute to the recent Southern Resident population decline (Baird, 2001; Krahn et al., 2004, 2002). In 2004 and 2006, biopsy samples were collected from 9 SRKWs (with samples across all 3 pods) in the U.S, and British Columbia (Krahn et al., 2007). These samples revealed that these killer whales are highly contaminated with PCBs and at risk for adverse health effects. PCBs and other oganochlorines affect both immune and reproductive systems. Age and sex class may be a determining factor in whether immune or reproductive functions are most affected (NMFS 2006, 2008).

Suppressed immunity could increase susceptibility to disease. Emerging infectious diseases are among the main threats to endangered populations and ecosystems. In social mammals, disease dynamics are affected by patterns of contact among individuals. Guimarães et al. (2007) suggests that the observed vulnerability to disease is a consequence of the combined effects of both the topology (i.e., the distribution) and the interaction strength of social links in killer whales. Although this study focused on transient killer whales, the same network theory can be applied to SRKW based on their similar social structure.

The proposed research would not introduce any POPs into the water. No species would be introduced into the habitat. For tagging work, the tag is made from inert medical-grade titanium, would be sterilized with an iodine solution, and a topical antibiotic ointment would be applied prior to tag attachment. These measures would minimize or eliminate threats of infection or disease from research actions.

Oil Spills

Puget Sound is one of the leading petroleum refining centers in the U.S. with about 15 billion gallons of crude oil and refined petroleum products transported through it annually (Puget Sound Action Team 2005a in NMFS 2006). Inbound oil tankers carry crude oil to five major refineries in the sound, while outbound tankers move refined oil products to destinations along the U.S. west coast (Neel et al., 1997). In 2009, a total of 956tank ships passed through Washington's waters bound for ports in Puget Sound, Canada, and along the Columbia River (Washington State Department of Ecology 2010). In general, the Strait of Juan de Fuca and areas near Washington's major refineries (located in Anacortes, Ferndale, Blaine, and Tacoma) are considered the locations most at risk of major spills in the action area (Neel et al., 1997; NMFS 2008). Since the 1960s, there have been at least nine major oil spills of at least 100,000 gallons (378,500 liters) introducing oil into the action area – four involving vessels, four involving refineries, and one from pipelines discharging gasoline into marine waters (Neel et al., 1997; Puget

Sound Water Quality Action Team 2002 as cited in NMFS 2008). The largest of these spills totaled an estimated 2.3 million gallons (8.7 million liters).

Exposure to petroleum hydrocarbons released into the environment via oil spills and other discharge sources represents a serious and potentially catastrophic risk for SR killer whales. For example, the *Exxon Valdez* oil spill was identified as a potential source of mortality for resident and transient killer whales in Prince William Sound, Alaska (Dahlheim and Matkin 1994, Matkin et al. 2003: in NMFS 2006) and has raised concerns about potential implications for SRKWs, particularly if the entire stock is together in the vicinity of a spill. While large oil spills are stochastic, acute events,

Oil is present in the research vessel's engines; however, in the unlikely event oil from the engine would leak into the water, the amount of oil is insignificant compared to the size and fluidity of the water bodies (e.g., Puget Sound, Pacific Ocean). Therefore, oil spills from research vessels are not a concern regarding the proposed action and do not add to the cumulative impacts to this population.

4.5.3 Live-Captures for Aquaria

Since the 1960s, killer whales have been immensely popular as display animals in the world's aquaria. With the exception of an individual collected in Japan in 1972, Washington and British Columbia served as the only source for captive killer whales until 1976 (Hoyt 1990). From 1962-1977, of the 275-307 killer whales captured in Washington and British Columbia, 55 were transferred to aquaria, 12 or 13 died during capture operations, and 208-240 were released or escaped back into the wild. The peak years for live-captures were 1967-1971; however, due to increased public opposition to the practice of live-captures, operations declined significantly after 1971, with only eight whales subsequently removed. By the mid-1970s, provincial and state governments responded to public discontent by enacting legislation to prohibit live captures and requesting federal intervention to establish a moratorium on the practice. As a result, the live-capture of killer whales in the northeastern Pacific ceased after 1977 (NMFS 2006). Based on information from Olesiuk et al. (1990), around 70 percent (47 or 48 animals) of the whales retained or killed during live-capture activities were SRKW, 22 percent (15 animals) were Northern Resident whales, and seven percent (five animals) were transient killer whales.

For the Southern Resident community, collections and deaths were biased toward immature animals (63 percent of the total) and males (57 percent of identified animals). Removed whales included 17 immature males, 10 immature females, nine mature females, seven or eight mature males, and four (three immature, one adult) individuals of unknown sex (NMFS 2006). Only 15 of the whales were subsequently identified by pod, with nine animals coming from K pod, five from L pod, and one from J pod (Baird 2001). Furthermore, the selective removal of younger animals and males produced a skewed age and sex composition in the SRKW DPS, which probably affected its ability to recover (Olesiuk et al. 1990).

4.5.4 Conservation and Management Efforts

A number of conservation and management efforts have a positive effect on endangered SRKWs in the action area. Recovery plans under the ESA help guide the protection and conservation of listed species, and a final plan is in place for SR killer whales as of January 2008 (NMFS 2008). NMFS implements conservation and management activities for this species through its Northwest Regional Office and Northwest Fishery Science Center in cooperation with states, conservation groups, the public, and other federal agencies. Several efforts have worked to address pollution and contaminants issues in the action area. In 2007, the State of Washington established the Puget Sound Partnership, which is a new agency created to oversee the restoration of the environmental health of Puget Sound by 2020. The Partnership published their action plan in December 2008 that will contribute to killer whale recovery by identifying and prioritizing actions, identifying funding, and tracking and reporting progress (NMFS 2008). In 2007 the state of Washington passed a bill on use of PBDEs, outlining a process to phase out their use in common household products due to high levels of these contaminants in the environment and people, as well as the developmental effects that have been observed from exposure to PBDEs (NMFS 2008). In addition, during the late 1980s and early 1990s, Washington significantly upgraded its efforts to prevent oil spills in response to increased numbers of spills in the state and the Exxon *Valdez* accident in Alaska (NMFS 2008).

Several efforts have also worked to address issues related to vessel effects in the action area. In addition to the Whale Watch Operators Association Northwest guidelines (see *Whale Watching* section above), in 2006 the current "Be Whale Wise" guidelines were issued after input from the operators association, monitoring groups, whale advocacy groups, and governmental agencies (NMFS 2008). These guidelines provide vessel conduct recommendations that boaters can follow to minimize risk for SR killer whales. In addition, the Soundwatch Boater Education Program was created by The Whale Museum in Friday Harbor, and has operated around the San Juan Islands since 1993 (NMFS 2008). The program helps educate the boating public and monitors and gathers data on boater activities. Other conservation and management efforts include two voluntary no-boat areas off San Juan Island, within which commercial operators have agreed not to accompany whales. These areas were established in areas used preferentially by the whales for feeding, traveling, and resting, and facilitate uninterrupted access by whales to inshore habitats in these locations (NMFS 2008). In addition, on May 16, 2011 new NMFS vessel approach regulations took effect for SRKWs, including a 200 yard approach limit and a prohibition on intercepting or parking in the path of a whale.

4.5.5 Summary of Cumulative Effects

It is not that any single stressor has contributed to the population decline of SRKWs over the last few years, but rather a combination of the above (NMFS 2008). For instance, the tremendous amount of vessel traffic around these animals daily during the summer, in combination with shortages of prey due to anthropogenic alteration of habitat,

may produce enough pressure on the whales to hinder reproduction, care of young, or individual health.

The only addition to the factors listed above associated with the proposed permit amendment would be one additional research vessel closely approaching and tagging these animals. The applicant's research would be conducted at times when the whales are not subject to impacts from whale watching vessels (i.e., spring, winter). While vessel traffic is a high priority management issue, the benefits of gathering data would outweigh the short term harassment to the whales. In addition, researchers would be cautious in their approach and would limit harassment times to only those necessary to facilitate research. Excess time with the animals would be avoided.

In summary, authorization of this research is not likely to significantly contribute to cumulative effects to SRKWs. Annual reports indicate that harassment from research is minimal, including reactions of other killer whales to satellite tagging. Monitoring will be conducted to the fullest extent possible. Although other stressors stated above cannot be mitigated under this permit (e.g., pollution, prey reduction), vessel approaches and tagging efforts will be conducted in a manner to cause the least harassment to the target animals. NMFS has determined that tagging will not result in a significant adverse impact alone or in combination with the above listed actions.

CHAPTER 5 LIST OF PREPARERS AND AGENCIES CONSULTED

Agencies Consulted
Marine Mammal Commission
NOS National Marine Sanctuaries Program

Prepared By
This document was prepared by the Permits, Conservation and Education Division of NMFS' Office of Protected Resources in Silver Spring, Maryland.

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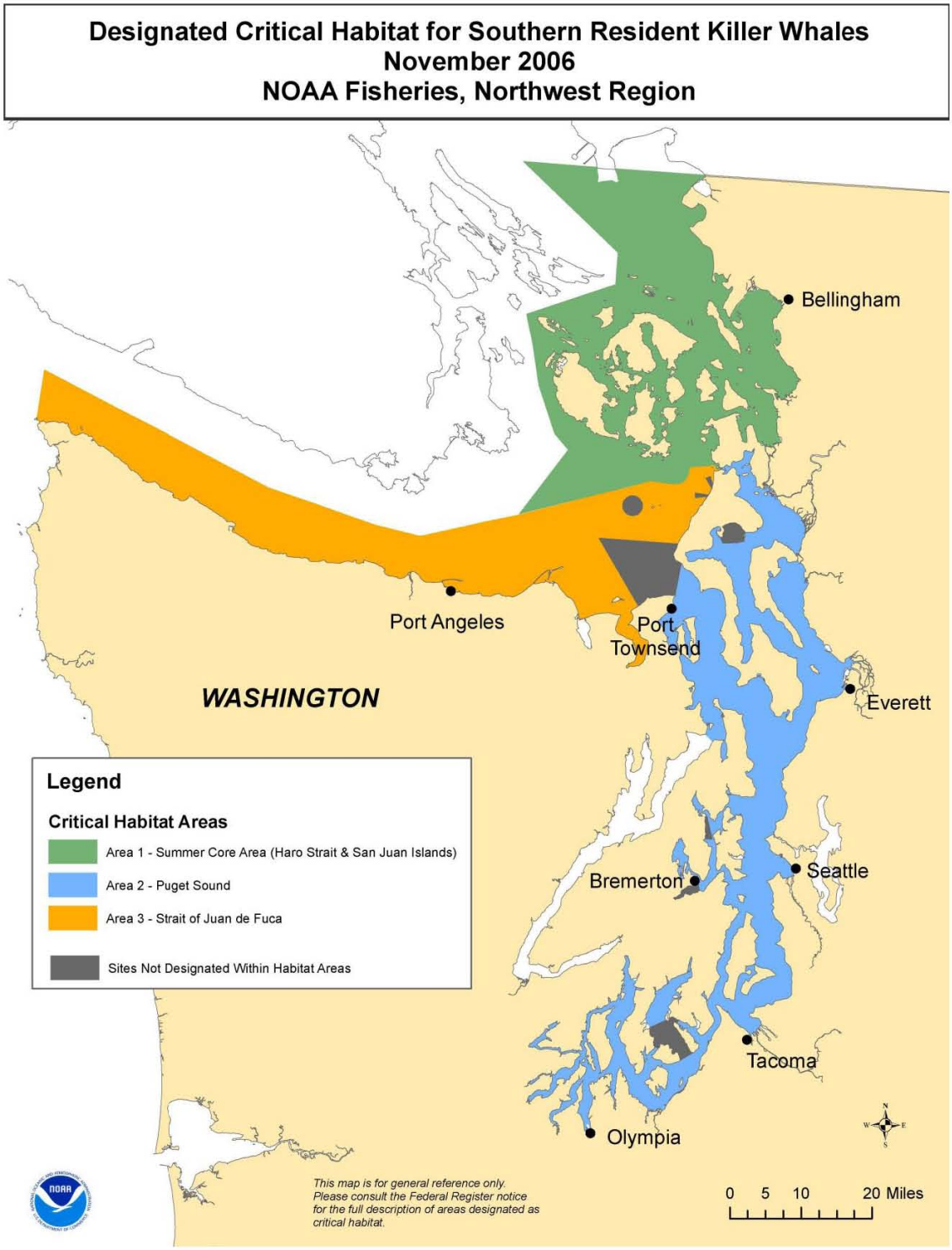
Attachment 1: SRKW Designated Critical Habitat



Attachment 2: Current Permits and Authorized Take

Mr. John Calambokidis
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Permit No. 540-1811: Mr. Calambokidis' permit authorizes him to study marine mammals in the North Pacific Ocean including the waters off California, Oregon, and Washington by (1) using photo-identification activities to determine the abundance, movements, and population structure of cetaceans; (2) collecting skin biopsies to determine sex and relatedness, and to evaluate stock structure of cetaceans; (3) conducting suction cup tagging activities to examine the diving behavior, feeding, movements, and vocal behavior of cetacean species; (4) conducting aerial, vessel, and shore-based surveys to examine distribution, abundance, habitat, and feeding behavior; and (5) recovering dead harbor seals for contaminant analysis. The permit includes authorization for 300 annual takes of SRKW by close approach for aerial and vessel surveys and photo-identification. This permit expires on April 14, 2012.

The Center for Whale Research
Principal Investigator: Mr. Kenneth C. Balcomb III
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Permit No. 532-1822-02: The Center for Whale Research is authorized to study Southern Resident killer whales throughout their range, from Monterey Bay, California to the Queen Charlotte Islands, Canada. The goal of this research is to continue the annual photo-identification studies of this population in order to monitor population size and demographics, movements and distribution, social structure, and individual health and body condition. To achieve these goals, the Permit Holder is authorized to take 500 SRKW annually by close approach for photo-identification during vessel and aerial surveys, fecal collection, and passive acoustic recordings. The Permit Holder is also authorized to collect photo-identification data from other killer whale stocks that are encountered opportunistically, including the eastern North Pacific Offshore stock, eastern North Pacific Northern Resident stock, and the eastern North Pacific Transient stock. Takes may occur by close approach by vessel survey for photo-identification, and by incidental harassment by aerial and vessel surveys. In addition, the permit allows the collection of non-marine mammal prey remains after the killer whales have left said area. This permit expires on April 14, 2012.

The NMFS Northwest Fisheries Science Center
Principal Investigator: Mr. Brad Hanson
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Permit No. 781-1824: The Northwest Fisheries Science Center (NWFSC) is authorized to conduct a five-year study to determine the abundance, distribution, movement patterns, habitat use, contaminant levels, prey choice, behavior, energetics, and stock structure of cetacean species in the eastern North Pacific off the coast of Washington, Oregon, and California. These studies are carried out through vessel surveys, photo-identification, focal follows, photogrammetry, passive acoustic monitoring, biological sample collection, satellite/radio and data log/time-depth tagging (using suction cup and implantable tags), and health assessments. On an opportunistic basis, prey remains, sloughed skin, and feces are collected from the water column and biopsy samples are collected from both free-ranging and stranded cetaceans. These biopsy samples undergo genetic, contaminant, stable isotope, and fatty acid analyses. To assess the health of cetaceans, the researchers collect breath samples from surfacing cetaceans and use an ultrasound transducer to measure blubber thickness of animals at the surface.
The Permit Holder is authorized to take 20 cetacean species, including endangered blue, fin, humpback, and sperm whales, as well as SRKW. All research activities target adult and juvenile males and females as well as females accompanying calves, but no calves will be taken. The permit authorizes 215 annual takes of SRKW by close approach for vessel and aerial surveys, photo-id, photogrammetry, and focal follows; 5 breath samples and 25 biopsy samples from SRKW each year; and the attachment of 10 suction cup data logging tags to SRKW annually. Each year, up to 300 SRKW may be incidentally harassed by the above research activities. This permit also authorizes the salvage and import/export of cetacean parts, specimens, and biological samples, including 30 parts, samples, or specimens from SRKW per year. This permit expires on April 14, 2012.

The NMFS Southwest Fisheries Science Center
Principal Investigator: Jeremy Rusin
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Permit No. 14097: This permit allows takes of the ESA-listed Southern Resident killer whale DPS to document the range of the SRKW within 300 nm of the California, Oregon, and Washington outer coasts, which are outside their relatively well-studied distribution in inland and coastal waters. This research is carried out opportunistically during SWFSC's line-transect surveys designed to provide data for Stock Assessment Reports on abundance and stock identity of all marine mammals in these areas. Photo-identification activities are conducted from small boats at a distance of 10 – 20 meters (approximately 33 – 65 feet) from the animals. Biopsy sampling is only done at the

request of the NWFSC. The SWFSC is now authorized to take 60 SRKWs and 1600 non-SRKWs for photo-identification, 10 SRKW and 400non-SRKWs for biopsy sampling, and 50 non-SRKW for tagging. This permit expires on June 30, 2015.

National Marine Mammal Laboratory
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Permit No. 14245: This permit authorizes NMML to opportunistically sample SRKW when encountered during stock assessment surveys. Specifically, the permit authorizes 990 annual takes of SRKW for photo-identification from aerial and vessel platforms and 10 annual takes of SRKW for biopsy sampling or suction cup tagging (excluding calves and accompanying females). All biopsy samples will undergo fatty acid, stable isotope, and contaminant analyses to determine the diet and nutrition of the animals.

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Permit No. 731-1774-01: This amended permit authorizes Dr. Baird to suction cup tag 35 Southern Resident killer whales per year to assess inter-annual variability in diving patterns. The Permit Holder is authorized to tag males and females of all ages, with the exception of calves under six months of age and females attending such calves. The permit also allows 100 takes of all age and sex classes of SRKW annually by harassment during close approach for vessel and aerial surveys, photo-identification, behavioral observations, video and acoustic recordings, and incidental harassment. This research primarily occurs in the waters of Washington, but may also occur in the waters of California and Oregon. The Permit Holder is authorized to import/export one part or sample from SRKW and four from other killer whales. This permit expires on August 12, 2011 and will be replaced by Permit No. 15330 which allows 30 suction cup tag takes of all juveniles and adults of SRKW annually and 1000 takes of all age classes and sex by harassment during close approach for vessel and aerial surveys, photo-identification, behavioral observations, video and acoustic recordings, and incidental harassment.

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Permit No. 10045: This permit authorizes close approach to southern resident killer whales for fecal and prey collection. The purpose of the research is to investigate the impacts of prey availability, toxins, and vessel traffic on killer whales using hormone fecal analysis. The permit holder may harass up to 100 southern resident killer whales annually; however, no calves less than 6 months or moms accompanying such calves may be approached. Each whale may be approached up to 30 times per year. This permit expires on July 15, 2013.