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

Memorandum For: F/PR – James H. Lecky
Director, Office of Protected Resources

NOV 22 2011

From: F/PR1 – P. Michael Payne
Chief, Permits Division

Subject: Report on the Application for an Amendment to Scientific Research Permit No. 781-1824-02: Recommendation for Issuance

I recommend the National Marine Fisheries Service (NMFS) issue a permit to the Northwest Fisheries Science Center (NWFSC, Dr. M. Bradley Hanson, Principal Investigator), 2725 Montlake Blvd. East, Seattle, Washington 98112–2097 for research activities on marine mammals, pursuant to the Marine Mammal Protection Act of 1972 as amended (MMPA; 16 U.S.C. 1361 *et seq.*); the regulations governing the taking and importing of marine mammals (50 CFR Part 216); the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq.*); and the regulations governing the taking, importing, and exporting of endangered and threatened species (50 CFR Parts 222-226).

Summary of requested activities

Species: Southern Resident killer whales (SRKW, *Orcinus orca*); endangered and depleted.

Objectives: To determine winter ranges and increase data on distribution patterns of SRKW for use in critical habitat determinations.

Location: Eastern North Pacific off the coast of Washington, Oregon, and California

Methods: Increase the number of SRKW suction cup tagged (from 10 to 20 animals annually) and add satellite tagging of six SRKW with dart tags annually.

Duration: The amendment would be valid through April 14, 2012.

Chronology of processing

03/31/2010	Date of application
10/07/2010	Application determined complete
11/09/2010	Application published in the *Federal Register*
11/10/2010	Application distributed to internal and external reviewers
11/30/2010	A request was made by the Whale Museum to extend public comment period and to have a public hearing.
12/06/2010	NMFS responded to the Whale Museum. An extension of the comment period was authorized. It was determined that a public hearing was not warranted.

12/08/2010	Extension of comment period published in the *Federal Register*
12/09/2010	Close of first public comment period
12/09/2010	Marine Mammal Commission comments received
12/23/2010	Close of extension of comment period
07/07/2011	Biological Opinion completed and signed by PR3
11/22/2011	Finding of No Significant Impact for Supplemental Environmental Assessment signed

Summary of external comments and response

NMFS published a notice in the *Federal Register* announcing receipt of the application, making it available for public review. The application was also provided to the Marine Mammal Commission and the National Marine Sanctuaries national coordinator. The following external comments were received regarding the application.

The Marine Mammal Commission (MMC)
The MMPA stipulates that NMFS may not issue a permit without first seeking review of the application by the MMC and its Committee of Scientific Advisors.

In a letter dated December 9, 2010 the MMC recommended approval of the requested amendment provided that:

- the Service 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, and

- the conditions contained in the existing permit remain in effect.

NMFS Response: The applicant has stated in a written response to NMFS that he will coordinate research activities with those of Canadian researchers. Furthermore, the permit contains a condition that requires the Permit Holder to coordinate research with others conducting similar activities in the area. The existing permit conditions remain unchanged and one additional condition is added to address concerns regarding potential tag breakage:

> *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.*

The National Marine Sanctuary Program

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, 10 2010, the Office of National Marine Sanctuaries (ONMS) responded for all sanctuaries commenting in favor of permit issuance.

Public Comments General

We received 55 comments opposing the action and three in favor of the action, which are summarized below. A request for an extension of the comment period was granted. A public hearing was also requested. NMFS concluded the 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 also believed an additional public hearing would be duplicative of these events.

Public comments received by this office that were in favor of the action highlighted:

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

Public comments received by this office that were in opposition to the action highlighted:

- the physical risks of tagging (i.e. stress, infection, injury or mortality),
- 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,
- they are not coordinating with Canadian researchers adequately,
- individuals conducting tagging are not qualified,
- anthropogenic impacts on the species need to be mitigated first,
- animal rights and welfare concerns, and
- the review process was incomplete.

Nine of the commenters who generally opposed the tagging, did state that it was not well known and important to know where the SRKW's are going in the winter time.

NMFS General Response: On February 17, 2011 NMFS provided the Principal Investigator with a list of questions and requested a detailed response to address the issues raised by the public. On June 16, 2011, Dr. Hanson provided a document detailing the concerns raised about tag breakage that had been documented in two cases. 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. On July 12, 2011, Dr. Hanson provided additional responses to the public comments (see below). NMFS is satisfied with this information and has determined that the range of public concerns were adequately addressed.

The Office of Protected Resources staff veterinarian, Dr. Teri Rowles, was consulted regarding broken dart retention and infection concerns, and a determination was made that extended broken dart retention would be considered an unacceptable risk to a SRKW. NMFS added a condition to the permit to address this concern (see Condition III (B) (1)(g) listed above) and will require the permit holder to cease tagging of SRKW should tag breakage with the broken darts retained in the tagged animal be documented. The Permit Holder must submit a report of the event to NMFS for review and assessment.

<u>Public Comments Addressed by Category</u>
The public comments were reviewed and concerns were summarized into a table format (Attachment 1). Comments fell into the following categories and sub-categories, and responses for these were obtained as necessary from the applicant. Following each category is the list of Commenters numbers from Attachment 1 who made mention of that particular category.

- *Age Class Selection*

(Commenter Nos. 2,8,9,10,15,19,22,34,35,40,52)

-Concerns regarding age class selection (social value of females, reproductive potential of young males).

Applicant Response: We recognize that all killer whales in different sex and age classes play an important role in the population. All the animals in the population have intrinsic value. We dont believe that that tag deployments increase the likelihood of mortality for any age-class. The data we have collected for over 300 deployments of LIMPET tags on multiple species including killer whales does not indicate serious injury or mortality subsequent to tag implantation. We recognize that the risk is not zero, but rather it is extremely small, such that we do not believe that tagging any individuals will directly or indirectly result in serious injury, as defined by regulation, or mortality. However, we are erring on the side of caution by selecting animals that do not contribute directly to the reproductive potential of the population (i.e., reproductive females), or where there is redundancy (i.e., there are multiple adult males in each pod) regarding the animals that will be considered for tagging. It is important to note that recent genetic analyses indicate that breeding is limited to the oldest or largest males (i.e., currently J1 or L41) (Ford et al. in press).

-How you determine a female to be post-reproductive?

Applicant Response: In general most females are post-reproductive after age 40, however, we have reviewed, and will continue to review each female's documented reproductive history. SRKWs reproductive history is well-documented are well known, so we can quantify this for specific individuals. For example, a female has not calved in 10 years since her last calf and she is older than 40.

-Would a post-reproductive female have a greater likelihood of a calf dislodging the tag versus a a tag on a reproductive female or are both equally possible?

Applicant Response: There is no evidence to suggest that calves would dislodge a tag from an adult animal of any sex or age class.

-What is the status of the "missing" animals?

Applicant Response: Six whales went missing in 2010. None have been re-sighted. By convention, those that were not observed on 1 July are considered dead for the purposes of the annual census. Five of these whales were included as potential candidates for tagging. Three were adult males – as defined, they are sexually mature but not likely socially mature. It is well documented that average longevity of male killer whales is shorter than females but the reasons underlining this shorter lifespan are not known. Two of the females were post-reproductive females. It is not unusual for post-reproductive females, given their advanced age, to die. Consequently, many of the whales we are proposing to tag are likely near the end of their natural

life span, such that it is anticipated that some tagged animals may disappear from the population post-tagging, but this would not necessarily represent a direct consequence of tagging. Generalized debilitation or immune-suppression associated with aging may impede normal wound response or possibly predispose these animals to secondary bacterial infections. It is important to note that the tag associated tissue response we have observed is within the typical range of natural occurring injuries, such that we do not expect tag wounds to compromise the health of individuals.

-*What changes to the list of animals to be targeted will you make from what you provided in the application?*

Applicant Response: We updated the previous table to reflect the current population make up, i.e., we removed animals that have died since the permit modification was submitted.

- *Alternatives to Tagging*

(Commenter Nos. 2,4,8,13,14,15,16,22,26,27,30,33,34,35,37,41,42,44,45,47,48,50,52,53,54,55,56,58)

-*Why not conduct aerial surveys or use coastal pilot network instead in the winter?*

Applicant Response: The NWFSC has supported and will continue to support several non-invasive approaches to the adequately assessing the winter range of southern resident killer whales. We currently support a coastal sighting network, deployment of autonomous passive acoustic recorders, and survey cruises on Ocean class vessels. Aerial surveys are expensive for the information they return, i.e., although they have the advantage of covering a lot of area relatively quickly, if a killer whale sighting is obtained we still may not be able to ascertain even the ecotype, much less individual ID, because of the need to maintain altitude for safety reasons, such that photos suitable for photo-id may not be obtainable. In addition, the prevalent inclement weather during winter severely restricts aerial operations, much more so than a ocean-class survey vessel. Aerial surveys have been attempted to assess the winter distribution of gray whales off the Washington coast using aerial surveys in the 1990s and this approach was determined to be very limited (Sheldon et al. 2000). A vessel survey offers the potential opportunity to follow the whales day and night to determine habitat use and possibly collect predation samples and feces for diet studies. However, the NWFSC has typically only been allocated 10-20 sea days per year on NOAA's ocean class vessels for the five cruises conducted. In addition, for the past 2 years we have not been able to secure sea days due to funding cuts, and given ongoing fiscal constraints of the federal government it is likely that future opportunities will be extremely limited. Most of these other methods don't provide real time sightings therefore all we get is location such that there is no ability to respond for prey collection, etc.

-*Is the military hydrophone system a viable alternative?*

Applicant Response: The NWFSC has approached the Navy about obtaining killer whale detections on its hydrophone system to monitor SRKW movements. The Navy's response is that

there is “no Navy environmental hydrophone network along the US West Coast”. “Any other "Navy" system would be more operational and classified, in addition to not being used for environmental analysis.”

- *Assessing and Defining Critical Habitat, Value of Tag Data (Commenter Nos. 2,8,13,16,17,20,26,30,31,32,33,45,53,54,56,58)*

  -*What can be determined significantly from one season of tagging?*

  Applicant Response: The current permit was due to expire in April 2011, we have requested the standard one year extension while the new application, which includes a similar number of tag deployments, is processed. Because we do not anticipate the new permit being issued much prior to April 2012 we wanted to have the ability to begin collecting data rather than lose two field seasons. We only plan to tag a maximum of 6 whales per year. This will only be done in the winter months. Given the low encounter rates - the whales only occur sporadically in Puget Sound in the winter and inclement weather will limit access opportunities - we will be fortunate to tag one of the designated animals per year. However, we have found in several instances that tagging even one whale can provide significant new insights into movements and habitat use which can help refine questions or better direct future acoustic recorder deployments or survey cruise strategies.

  -*Please address what you may know about the timeline of critical habitat designation.*

  Applicant Response: There are no statutory deadlines for amending critical habitat. At this point it is based on whether the Agency has sufficient information. Satellite tagging would greatly improve our ability to designate critical habitat in coastal waters. Using only established, conventional methods, it would likely take much longer to gather sufficient information. An example of how satellite tagging information can accelerate this process is evidenced with Hawaiian Insular false killer whales. This population is in the process of being listed under the ESA and a significant body of satellite tag location data exists with which critical habitat will be able to be much more fully addressed within the near-term.

  -*Please address the arguments regarding the value of tagging J pod by commenter #2.*

  Applicant Response: Ironically, although J pod is the most commonly observed pod in inland waters, very little is known about its whereabouts compared to K and L pods in the winter. While satellite tag location data may be of limited use for U.S. Critical Habitat designation for J pod, it is possible they spend a substantial portion of their time in northern Washington waters that are poorly monitored. If the whales do use the west coast of Vancouver Island, determining where and when this occurs will be very important because many stocks of U.S. Chinook salmon also occupy this range and determining this overlap would provide additional weight to their potential dependency on particular Chinook stocks. In addition, Canada has similar obligations to identify important habitats under their Species At Risk Act, such that these data would also be of value to their Department of Fisheries and Oceans.

- *Tagging Reaction*

(Commenter Nos.4,6,9,10,11,16,18,19,22,23,24,28,30,31,32,35,36,37,38,40,42,44,47,49,51,53,54,58)

-Please address dorsal fin quiver and what the behavioral context of it is considered to be by killer whales specialists

Applicant Response: The fin "quiver" observed during tag deployment is a combination of startle response due to something unexpected making contact with the whale as well as from the impact of the tag hitting the fin. We find the observations made by commenter #4 do not appear to be factual. In only one instance have we tagged a whale in public view. In that case the whale was a male. Only one of the adult females tagged has 2 offspring (T30). Although this was in the vicinity of whale watch vessels it is unlikely that they could have observed any response and no reaction was documented by its offspring. A startle response is common for all cetaceans when biopsied, and missed biopsies. Sometimes the reaction is stronger from a miss when the dart or arrow hits the water.

-Please address concerns about follow up observation and anomalous behaviors.

Applicant Response: Over the past 5 years a total of 210 tags have been deployed on 15 species. We have conducted both dedicated and opportunistic re-sighting efforts. Despite the challenges associated with re-sighting animals that can range widely, a substantial number of the tagged animals have been re-sighted both during the time the tag was attached as well as post-tag loss. In no instance have we observed any anomalous behaviors or change in overall health status of the animals. Recognizing the challenges associated with accessing southern residents on the outer coast in the winter, to the extent possible we will follow whales while on the outer coast. The primary approach would be to use ocean–class vessels, if available, but given the budget constraints the federal government is facing, logistics but may also include small boat operations which will be admittedly more constrained and less efficient. We are particularly interested in, and committed to, making use of the location information to the maximum extent possible by accessing the whales for the collection of feces and predation samples which will provide critical information on SRKW diet which is needed to address risk factors in the Recovery Plan.

- *Tagging Injury/Impact*

(Commenter Nos. 2,3,4,5,11,15,16,18,20,21,22,24,25,27,28,30,31,32,33,34,35,36,37,38, 40,42, 43,44,45,46, 49,52,53,54,55,58)

-Do tags limit flexion of the body?

Applicant Response: The tags are attached to the dorsal fin. The dorsal fin is a relatively rigid structure compromised of dense fibrous connective tissue. Its shape is designed to act as a rudder-like control surface to increase maneuverability in tight turns. Although the fin flexes slightly the "footprint" of the attachment is relatively small (about 3 inches) such that the tissue movement is not constrained. It is worth noting that there are killer whales that have survived

for many years with severed dorsal fin damage (e.g., T2, X1a0).

*-Address potential increased risk of infection, and imuno-supression in SRKW, and comparisons to tagging of species in Hawaiian waters with lower toxin loads***.**

Applicant Response: The contaminant levels in insular stock of Hawaiian false killer whales are between those of southern resident killer whales and Alaska resident killer whales (Ylitalo et al. 2009). This similarity to SRKW is due to life history characteristics and feeding at a similar trophic level. In addition, transient killer whales have far higher contaminant burdens than southern resident killer whales. For neither false killer whales nor transient killer whales have we observed what would be interpreted as infected tissue in cases where normal dart out-migration occurred. However, based on consultation with veterinarians, even if a localized infection were to occur, it is extremely unlikely that this infection would become systemic.

-Address concerns about pain.

Applicant Response: It is likely that tagged whales are aware of the dart penetration at the time of tagging. The degree to which they have sensation of the attachment as it out-migrates from the tissue is unknown nor do we know how they perceive pain. However, the degree of tissue impacts that the darts cause is on par with what occurs naturally – in the case of killer whales these are caused by bites from conspecifics, and for species in Hawai'i and southern Pacific, including killer whales, cookie cutter shark bites can be extremely numerous on some individuals.

-Can tags be permanent? Provide a diagram of the tag and what is designed to "break away."

Applicant Response: Tags are not intended to be permanent nor is any part of the tag designed to breakaway. It is unlikely that any part will be permanent. Typically, hydrodynamic forces acting on the tag will cause the attachment darts to gradually be pulled out of the fin. In a few rare cases we have observed breakage of the tag body or the dart resulting in the dart remaining in the fin, and subsequent versions of the tags have been modified to correct issues causing tag breakage. In all but two case tissue fibrosis occurred around the dart. In these cases, we observed the dart/s to apparently migrate through the fin resulting in an extended period of tissue response.

-Do new dart designs increase infection risk?

Applicant Response: Any new dart designs will not increase the risk of infection. In all cases darts will be constructed of surgical grade titanium and follow strict sterilization procedures.

-Address T14 tagging comments.

Applicant Response: T14 was tagged in 1976 with a VHF radio tag and tracked within the San Juan Islands for about 10 days. It is important to note that the scars on the leading edge of the

dorsal fin were from a completely different tag configuration and attachment procedure. We have been compiling resighting data of transient killer whales and while this whale has a lengthy re-sighting history these events are relatively infrequent such that there is insufficient data to support that regular circumnavigations of Vancouver Island have been made by this whale. The commenter needs to provide data supporting this contention. In addition we found it interesting that there were multiple transmissions from T14 in the core area of whale watching in the inland waters of Washington and British Columbia on days in which he was not sighted.

-*Comment #27 implied a whales death was the result of a tag event, do you know about what event they are referring too? Please provide any detail you may have.*

Applicant Response: As noted, we are not aware of any mortalities resulting from ours or any other tagging studies – the commenter needs to provide factual data to support this claim. We have resight information for 10 of the 24 killer whales we tagged to date. We also closely monitor stranded killer whales from California to Alaska and none of them have been previously tagged.

-*Have individuals listed as potential targets for tagging (J1, J2) been biopsied or suction cup tagged previously? What has been their response to those actions?*

Applicant Response: Both have been biopsied. J1 has been suction cup tagged once. J1 - Flinch. J2 - flinch and fast dive.

In all the biopsy and suction cup tagging done to date reactions have been minor and animals have all been approachable in both the short and long-term.

-*Address comments regarding J18/Everett and his infected abscess. What were Everett's injuries?*

Applicant Response: J18 presented dead on March 20, 2000 near Tsawwassen, British Columbia in poor body condition. He also died the winter that his mother died; it is not unusual for male offspring to die soon after their mother. The most significant finding on gross examination was a large ulcer along the right abdominal wall with swelling of the adjoining skin. On incision and reflection of the abdominal wall, there was a large abscess which tracked through the abdominal musculature, perforated the adjoining peritoneal lining and the infection extended throughout the abdominal cavity. In addition, the inflammation dissected ventrally through the abdominal musculature to the midventral region of the abdominal cavity. Based on the nature of the inflammatory response, a skin defect or ulcer with secondary bacterial colonization, proliferation and extension was a prime consideration in the loss of this animal. Microscopically, there were numerous bacteria within blood vessels throughout the body, consistent with bacteremia and septicemia. The immediate cause of death of this animal was attributed to *Edwardsiella tarda* septicemia, secondary to the skin ulcer and suboptimal body condition. The location and nature of the skin wound were unusual and the genesis of infection could not be determined. A similar process could occur with tagged animals; however, based on

the anatomic location of tag deployment (dorsal fin versus mid flank), a similar process would be unlikely. Without behavioral observations and health assessment prior to death and stranding it is difficult to assess the pathogenesis of the wound and possible contribution of emaciation or elevated contaminant loads to the progression of the infection. Based on the diagnostic investigation, it cannot be conclusively stated that the contaminant levels contributed to the demise of this animal. The recovered bacteria, *Edwardsiella tarda* is a common pathogen of stranded killer whales and is part of the normal intestinal flora of health animals. Invasion of these bacteria through the intestinal lining and subsequent distribution through the blood system to internal organs and the blubber may also result in similar gross and microscopic findings. Consequently, it is important to note that the tissue response to tags, where intact darts out-migrated, did not feature any external indication of infection, In the two animals where some portion of the dart remained in the tissue, the inflammatory and wound repair response suggested secondary bacterial involvement, , but this appeared localized. While there is a possibility of opportunistic or secondary bacterial infections in response to the imbedded dart components, and this infection could become systemic and possibly result in death, the likelihood of this occurrence, is considered to be extremely low.

-*Address comments regarding poor tag placement, exposed barbs risk to con-specifics.*

Applicant Response: To date we have had two tags (T86a and T100b) that were deployed on transients where placement was sub-optimal, however not tag breakage occured. Such deployments are highly unusual. Despite being deployed by experienced taggers, circumstances do occur which compromise tag placement. Typically, an unanticipated motion of the boat or a change in the whale's surfacing behavior have caused tags to hit the leading or trailing edge of the dorsal fin. These deployments typically remain attached for only a few days (T86a- 8days, T100b – 18 days). Although exposed dart tips might be a possible source of injury to conspecifics, there is no evidence that during the short period of time that these exposed darts injured conspecifics. If a conspecific did make contact with a tagged individual it is likely that the degree of injury would be similar to bites which are commonly inflicted by conspecifics based on the extensive scarring present on the epidermis of all individuals.

-*Address the sighting of T030 on December 22nd, 2010 and the possible retention of a barb. Please submit the most recent photos of T030 you have.*

Applicant Response: Although we have seen barb retention in two of the tagged transients, (T90 and T123A Please see Addendum A), we do not believe this occurred with T30. In the 2 cases where a dart has remained in the dorsal fin, this has been a result of an attachment failure, which is generally reflected in a short duration of signal contact (T90 – 17 days, T123A – 8 days). In the case of T30, duration of contact was 94 days – one of the longest duration deployments to date. We believe the observed tissue response was primarily a function of the extended period of foreign body response to the darts.

-*What indicators do you use to determine if a whale is sick, and could a very sick whale lack visible/observable indicators? In addition to visible body condition have you documented*

changes in surfacing or social behaviors of animals that disappear and are then presumed dead?

Applicant Response: Health assessment is very challenging with killer whales. The most commonly observed indicator of potentially poor health is emaciation, which may not necessarily mean the animal is in poor health, but simply malnourished. It is typically manifested by the appearance of a depression behind the blow hole (i.e., the fat deposits in this area are depleted), or the flanks (near the saddle) of the animal are depressed, or the ribs are showing. Other potential indicators of poor health included foul smelling breath (J1 exhibited this a few months prior to having gone missing), lethargy or unusual skin conditions - although anomalous skin conditions are common and do not necessarily indicate poor health. In addition, changes in behavior, such as lack of foraging or interaction with group, lethargy, etc. may indicate the animal is sick.

-Provide a reasonable list (>10) of recent SRKW's that became listed as presumed dead, and if you observed indications of the animals declining health. What % of these presumed dead animals were a "surprise?" Also, please indicate other anthropogenic impacts that could have led to the unusual deaths. (If this is in a published or publically reported format, please note that).

Applicant Response: Recently, The Center for Whale Research provided a list of whales have gone missing since 2009 and a review of any circumstances pertaining to their disappearances. In 2009 and 2010 2 post-reproductive females, a reproductive age female, 2 adult males, an adolescent male, and 2 calves died. In general, the disappearance of adolescent males or females, and reproductive age females is considered unusual. The loss of post-reproductive females and new calves are not. The loss of the two adult males is some-what surprising in that, they were both relatively young (24 years old). However, the only abnormal circumstances that were noted was that one of the post-reproductive females was lagging behind conspecifics and in another case a whale switched pods shortly before disappearing.

- *Wound Healing*

(Commenter Nos.5,16,38,55,58)

-A major concern of several commenters is the wound healing process. Please summarize what is you will consider a normal healing process both in wound state and time frame.

Applicant Response: Wound healing is generally defined as a three step process with other sub-steps occurring within each step. The first step is the inflammatory phase which is characterized by swelling adjacent to the injury and typically observed within 2-5 days. The second step is the proliferative phase, which typically occurs 2 days to 3 weeks following injury and its primary feature is the formation of granular tissue, contraction and re-epithelialization. The third phase is the remodeling phase which takes 3 weeks to 2 years and is defined by the formation of new collagen to increase strength.

-*What do you expect wounds to look like during this process and what will healed areas to look like?*

Applicant Response: Based on resights of several different tagged species we typically observe the inflammatory phase within a few days of tag deployment. The proliferative (wound healing) phase is likely confounded by an ongoing foreign body response to the darts as they are gradually pulled out of the fin by drag and other forces acting on the tag, and because the duration of attachment can vary from a few weeks to a few months or more. We have only observed a few tagged animals shortly after tag loss. These generally show a well-developed area of granular tissue confined to the area surrounding each dart penetration site and full re-epithelialization occurs within 6 weeks. It is important to note that this likely occurs sooner than 6 weeks but this duration was a function of the re-sighting interval. The typical tissue remodeling observed post-tag loss includes a conical raised area (maximum size a few centimeters) and sometimes the center of the cone has a small area of depigmentation (white) at one or both of the dart penetration sites.

-Please keep in mind the exit wounds of T99A and place those on the continuum of wound healing.

Applicant Response: The granular areas of tissue observed on T99A were the most pronounced we have observed to date. However, this may have been related to the whale being sighted only 2 days following the loss of signal contact, indicating that the tag was likely recently lost – we typically do not resight whales this soon following tag loss. However, it is important to note that these areas resolved well with 6 weeks.

-*What is the persistent "swelling" that is observed, is it scar tissue?*

Applicant Response: The raised areas at each of the dart penetration sites in the initial phase is likely edema fluid and hemorrhage (blood) and over time, there is likely an accumulation of collagen associated with the granulation process (in the proliferative and reparative phase).

-*What will you consider outside the normal range of healing? What signs will you look for?*

Applicant Response: We would consider larger or expanding areas of tissue involvement than immediate to the dart penetration site of a protracted period of tissue response. Addendum A, which chronicles the tissue responses in 2 transient killer whales, illustrates an example of what would be considered outside the normal healing process assuming there is no ongoing foreign body response. Once the tag has been lost, the wound should contract, there is a delay in contraction or secondary accumulation of pus (exudate) this may indicate superficial bacterial colonization and infection. As long as the wound is well circumscribed and the swelling does not appear to extend peripherally, the infection is likely localized and should be contained by the normal host response.

-If not already stated elsewhere, please provide a description of other types of natural occurring

wounds that would fall into the category of wound type like that of a dart tag (i.e. shark bites, con-specific injuries, etc.). What percentage of the SRKW population has signs of prior substantial wounds?

Applicant Response: Both cookie cutter shark bites and bites by conspecifics and other types of wounds frequently occur on the various killer whale eco-types in the North Pacific. SRKW, due to limitations in their range do not incur cookie cutter shark bites. We do not consider any of these previously noted wound types as being substantial because they do not affect survival or reproduction. Over a quarter of SRKWs have definitive nicks on the trailing edge of their dorsal fin and although their source origin is unknown it is likely given the numerous rake marks on their bodies that these are bites from conspecifics. Other animals have featured subcutaneous swelling and superficial ulcers which may be attributed to localized bacterial infection and in rare instances, the distal limits of dorsal fins have been truncated and ulcerated, possibly due to impact and abrasion due to substrate corals or rocks.

For tagged whales, efforts have been undertaken to obtain follow up images and each photograph is reviewed and host response assessed for degree of injury and extent of repair over time. To date, with the exception of 2 animals, follow up images have demonstrated a normal host response and repair. In other species, supervening cookie cutter shark bites near the tag implant site have also demonstrated a normal host response with tagged animals, suggesting no or limited effects on wound contracture and re-epithelialization. In those two animals with failed tags, subsequent images have revealed closure of the wound with re-epithelization of the implant site. In those whales for which there are no follow up images, we cannot substantiate the course or extent of wound healing; however, based on those individuals with follow up photographs, there appears to be a normal host response. Please note that changes in the skin associated with tagging are always assessed in the overall context of the systemic health status, behavior and appearance of the animal.

Based on a review of the photo-ID catalog, numerous whales with in the southern resident community have sustained injuries significant enough to cause permanent nicks in the dorsal fin. It is important to note that these injuries sometimes happen to juvenile animals. L110 was observed with a loose flap of tissue along its upper lip.

-Please address SRKW immuno-suppressed state, toxin loads, and how recovery from a tag wound impacts an animal's health.

Applicant Response: The extent to which SRKW are immune-compromised due to toxin loads is unknown. It has been documented that they are above levels that harbor seals have been shown to be immune-compromised. However, even if individuals were immune-compromised the wound caused by dart penetration is minor, and based on veterinarian assessment, to date; these would be unlikely to be of significant risk to the animal's health.

- *Suction Cup Tagging*

(Commenter Nos. 8,15.16.30,51)

-Does the suction cup tag data have critical value?

Applicant Response: The suction cup attached tags we are currently using are the Dtags from WHOI. These tags have a hydrophone as well as a 2 axis accelerometers and a pressure sensor. Consequently besides getting received sound levels at the whale, a key data gap identified in the SRKW research planning workshops, the other sensors allow is to assess behavioral response to anthropogenic noise or activities.

-*What of value has been learned thus far, to justify additional tagging?*

Applicant Response: The data provided by the Dtags has exceeded our expectations. When combined with the track of the tagged whale at the surface and the vessel location data we are collecting we will be able to better address the whale's behavioral responses to noise and other anthropogenic activities. This effort has provided extremely valuable data. However, from this effort it is clear that requested number of takes not provide sufficient sample size since attachment duration is only a few hours.

-Can modeling address received noise levels adequately?

Applicant Response: A sound propagation model has already been developed for the area we are deploying tags (San Juan Islands). The point of this work is to determine if the propagation model is valid.

- *Tag Data: See comment below. Please address the following points:*

(Commenter Nos. 17,20,26,31,53,54,56,58)

-Will tagging effort requested provide sufficient data to address Critical Habitat?

Applicant Response: Based on the results of tag deployments on other species where only a limited number have been tagged, we have found that even a very small number of tags can provide significant new information. This was illustrated with Alaska resident killer whales in Southeast Alaska. Despite being studied for over 20 years, existing information indicated that some Alaska resident killer whale pods moved only between SEAk and PWS. The deployment of only one tag on SEAK pods showed that these whales travel much further west than had been previously known – the Alaska Peninsula and Kodiak - and also allowing identification of areas used during the fall which is outside of the typical survey period due to generally inclement weather (Hanson et al. 2011). A second tag deployed on an individual in the same pod in spring provides that when the whales are out of inside waters in the early summer they remain in coast waters adjacent to southeast AK. More tag deployments were needed on Hawaiian false killer whales because they have a larger population size and much more fluid social structure compared to SRKWs.

- *Collaboration: Please address the following point:*

(Commenter Nos.20,24,26,31,33,34,58)

-Multiple comments on collaboration and co-management with stakeholders, other US researchers , Canadian researchers and regulators; please summarize what is done in working with these parties (specifying agreements in place, working groups, research collaborations, etc.).

Applicant Response: The NWFSC will be collaborating closely with Cascadia Research Collective on tag deployment and follow-up of tagged whales. Similarly, we have worked informally, but closely, with Center for Whale Research and DFO researchers to obtain follow-up photos of tagged transient killer whales. Prior to tag deployments on southern residents we will review tagging and follow-up protocols with the Center for Whale Research and DFO in order to maximize follow-up sightings and other data (prey and fecal samples) given the likely limitations of proximity and inclement weather. We will share data on locations with these researchers and other researchers operating throughout the range of the tagged whales to maximize follow up photographic documentation and prey and fecal sample collection.

- *Biopsy Darting: See comment below. Please address the following points:*

- One comment addressed potential impacts of biopsy darting, given tagging is equal or greater in invasiveness, can you please respond to the comment below?

Applicant Response: A correlation does not necessarily imply cause and effect. We are well aware of this purported correlation, as it was raised during our recent plan to biopsy additional SRKWs. This correlation is spurious because the whales were not randomly sampled from the population. In fact, only the older whales, which are more likely to die than any other segment of the population other neonates, were sampled. These whales were sampled because they were likely to have higher contaminant levels and because determining the maximum contaminant levels was the objective of the study it was not surprising to see this result. Similarly, some of the whales we have proposed for tagging are near end of their life-span.

- *General comments, tagging value:*

(Commenter Nos. 2,3,5,10,13,15,16,20,21,22,24,25,26,30,31,32,34,35,36,37,40,42,44,45,46,48,49,50,51,52,53,54, 55,56,58)

-Real time follow up is limited due to weather, time, and vessel resource limitations. Without the follow up, what is the value of the track-only data if you do not know if it is one animal or a group? Also, limited immediate follow up will not allow for monitoring of injury/healing process or state of animals health, can you address these concerns?

Applicant Response: Track-only data would still have a great deal of value toward identifying areas to be included for Critical Habitat. Recent satellite tagging of Hawaiian Insular false killer

whales did not always include immediate follow-up resighting, yet we have been able to adequately assess from periodic resightings that survivorship is normal and that there have not been any other health issues. In addition, despite only periodic real-time follow up, even just the track data have been extremely valuable to critical habitat assessment.

-The commenter suggests shorter duration tags and alternate tag data (depth, dive duration, etc.) will be more informative to improving knowledge about the winter gap period (and prey utilization). Taking into consideration the reasons laid out in your application, and additional information provided in your letter to Mr. Andrew Jones, is there other information you can provide to address these points?

Applicant Response: The number of opportunities to tag SRKW will be extremely limited such that we want to ensure that for each deployment we get the maximum amount of information. Consequently, the goal would be to maximize the number of days for each deployment. Based on the results of our transient tagging it is possible to get up to 3 months of data. However, it is only possible to get location data for this duration by duty cycling the tag to stretch battery life for this long. Because we would likely be tagging whales in late – December and the gap in movements is almost 6 months, we would be inclined to maximize tag longevity. While tags are now available that will collect and uplink dive data, this comes at a power cost for both these functions. While dive data are of interest, they are likely of less value to Critical Habitat designation than the horizontal movement data given the limited number of whales that will be tagged.

-The commenter states, sufficient data exists establishing the continental shelf waters of the Western US coast as the wintering range and data is sufficient for critical habitat (CH) designation. You have stated in responses and in your application that these existing data points are minimal, and outlined the necessary information needed for CH designation. Is there a statistical/analytical/modeling argument for why the existing data are not sufficient to answer those?

Applicant Response: The data that support "establishing the continental shelf waters as the wintering range" are in fact not sufficient. It is important to note that these data, by virtue of how they were collected (i.e., there has been no effort off the continental shelf), are not only very limited, but more importantly, spatially biased. Satellite tagging, while of shorter duration than passive acoustic recorders, is unbiased spatially. Spatial assessment of the whale's movements is the primary data need. Although no statistical/analytical/modeling assessment has been undertaken of the available data, the total number of detections obtained over the 5 years since a concerted monitoring effort (approximately 100) was undertaken relative to the total monitoring period leaves relatively large temporal gaps during which the whales could have had made significant movements.

- *NMFS Review Process*

(Commenter Nos.2,3,4,6,14,19,20,23,26,2840,,41,47,52,54,56)

Several comments were made regarding the NMFS review process including: no public notification, the review time was too short, the permit process was biased, an EIS is needed, Biological Opinions are not publically available, that tagging impacts need to be made available to the public, that researchers are not qualified, and that there are too many researchers and vessels already operating in the area.

NMFS Response: All permit requests are subject to a regulated review process as described in 50 CFR Part 216 and are made available to the public for a 30 day review period. A two week extension of the standard 30 day public review period was granted following a request from a commenter during the initial review period. As detailed later in this memo, NMFS has determined an EIS is not required. The draft Supplemental EA was made available during the public comment period. All environmental assessments produced are available upon request including the final Supplemental EA produced for this amendment request. Like environmental assessments, Biological Opinions are public documents and are available upon request or can be obtained online through the Office of Protected Resources website. The impacts of tagging are evaluated in both the EA and the Biological Opinion, both of which are available to the public. In addition, multiple peer reviewed publications discussing effects of tagging are publically available through the internet. As a component of the review process, NMFS evaluates the experience and qualifications of the researchers conducting the activities, and applicant must sufficiently demonstrate their ability to conduct the activities requested in a safe, effective, and humane manner. NMFS also evaluates the cumulative impacts of all activities occurring around and directed at the target species. NMFS has determined the applicant has demonstrated their tagging qualifications and that the requested action will not significantly increase the cumulative level of vessel activity SRKW's are exposed to.

- *Research Protocols*

(Commenter Nos. 4,9,15,37)

Several comments were made regarding the research protocols outlined in the application, including: researchers intend to hide their tagging from public view, that multiple tag attempts in a day should not be allowed, that females with calves less than 3 years old should not be targeted, that no binding agreement to tag only adult males and post reproductive females exist, that focal follows should occur during foraging bouts, and that tagging video should be made publically available.

NMFS Response: The applicant intends to conduct tagging during periods when the approaches can be made quickly and efficiently and not subject to unintentional interference by unpredictable movement of other vessels. Tagging approaches are limited to two approaches per day, up to four per year per individual. No females with calves will be targeted for implantable tags. Females with calves greater than 6 months are authorized to approach for suction cup tagging under the applicant's current permit. The applicant is only authorized to tag the age and

sex classes requested. As stated in the application, focal follows will be conducted opportunistically, and may occur during foraging bouts. Tagging video is not maintained by the Permit's Office, and is not required for our records.

- *Canadian Permits*

(Commenter Nos. 2,4,16,20,24,26,31,33,34,58)

Several commenters expressed concern about the applicant's activities in Canadian waters and what authorizations were in place.

NMFS Response: NMFS does not authorize or regulate research in foreign waters. As discussed in Attachment 1, the applicant does collaborate with Canadian counterparts. In addition, the permit is conditioned to require coordination with other researchers studying the same species.

- *Animal Welfare*

One commenter (No. 4) stated an Institutional Animal Care and Use Committee (IACUC) was needed, and that NMFS must take into consideration animal rights and awareness.

NMFS Response: The activities requested in the application were reviewed and approved by an IACUC committee. In addition, NMFS has determined that the activities are humane as defined under the MMPA.

- *Mitigate for Other Impacts*

(Commenter Nos. 3,4,6,10,12,17,21,22,30,31,33,35,37,42,54,56)

Several commenters stated NMFS should focus on addressing and mitigating other impacts affecting SRKW, including the health of salmon populations and pollution.

NMFS Response: This is beyond the scope of the requested action.

- *No Enforcement*

One commenter (No.1) stated "*…NOAA lets the profiteer fisherment maraud. You do no law enforcement to speak of."*

NMFS Response: This is beyond the scope of the requested action, however NOAA does have a well establish law enforcement program with regional offices and personnel, including the Washington state, Puget Sound region.

Applicable federal permits and consultations

Marine Mammal Protection Act (MMPA) permit: Permits for scientific research on marine mammals are issued under section 104 of the MMPA and NMFS's implementing regulations at 50 CFR Part 216. These permits exempt *bona fide* scientific research and enhancement activities

on marine mammals from the MMPA's take prohibition. An MMPA section 104 permit is required for the research described because it will result in takes of marine mammals by Level A and Level B harassment.

Endangered Species Act (ESA) permit: Permits for scientific purposes are issued under Section 10(a)(1)(A) of the ESA, and must be consistent with Section 10(d) of the ESA. These permits exempt research and enhancement activities on threatened and endangered species from the ESA's take prohibitions. An ESA section 10 permit is required for the research described because it will result in takes of threatened and endangered species by harassment, harm, pursuit, and wounding.

ESA Section 7 Consultation(s): NMFS issuance of permits is a federal action subject to the interagency cooperation requirements of Section 7 of the ESA. NMFS is required to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any threatened or endangered species or result in destruction or adverse modification of habitat for such species.

The Permits Division determined that issuance of the permit is likely to adversely affect NMFS endangered species: Southern resident killer whales. The Permits Division consulted with NMFS Endangered Species Division, which determined in its Biological Opinion that issuance of the permit is not likely to jeopardize the continued existence of NMFS ESA-listed species or to result in the destruction or adverse modification of designated critical habitat. No conservation recommendations were included in the Biological Opinion.

Magnuson-Stevens Fishery Conservation and Management Act (MSA) consultation: Section 305(b)(2) of the MSA requires NMFS to complete an Essential Fish Habitat (EFH) consultation for any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by the agency that may adversely affect EFH. Consultation is required for renewals, reviews or substantial revisions of actions.

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 do not fall into these classes of actions.

The Permits Division determined that the requested actions will not affect designated EFH and did not initiate consultation with the NMFS Northwest and Southwest Offices of Habitat Conservation.

National Environmental Policy Act (NEPA) documentation

Scientific research permits are, in general, categorically excluded from the requirement to prepare an Environmental Assessment (EA) or Environmental Impact Statement (EIS) (NOAA Administrative Order Series 216-6, May 20, 1999).

However, for this permit NMFS prepared a supplemental Environmental Assessment (EA) to facilitate a more thorough assessment of potential impacts on endangered and threatened species. Based on the analysis in the EA, NMFS determined that permit issuance will not have significant impacts on the quality of the human environment, and prepared a Finding of No Significant Impact documenting this decision.

Findings and Recommendation

As required by the MMPA and NMFS regulations, the information provided by the applicant demonstrates that:

- the taking is required to further a *bona fide* scientific purpose
- the taking will be consistent with the purposes of the MMPA and applicable regulations
- the proposed research will not likely have significant adverse effects on any other component of the marine ecosystem of which the affected species or stock is a part
- for species or stocks designated or proposed to be designated as depleted, or listed or proposed to be listed as endangered or threatened
    - the research cannot be accomplished using a surrogate species or stock
    - the research, by itself or in combination with other activities will not likely have a long-term direct or indirect adverse impact on the species or stock

The Permits Division's review of the application and other relevant information, including MMC and public comments, indicates that the research methods ("manner of taking") are consistent with the MMPA's definition of "humane." The results of the research are likely to directly benefit Southern resident killer whales or otherwise fulfill a critically important research need for this depleted stock.

As required by the ESA, the Permits Division has determined that:

- the applicant applied for the permit in good faith
- the permitted research will contribute to recovery of the affected species.
- the permitted research will not operate to the disadvantage of endangered species

As required by the MMPA, the permit specifies: (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. NMFS has included a condition requiring researchers to cease dart tagging of 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. These terms and conditions are consistent with those in other permits NMFS has issued for research on marine mammals.

For these reasons, I recommend you sign the permit, with the terms and conditions as drafted by the Permits Divisio