Elise Hsieh, Executive Director
Exxon Valdez Oil Spill Trustee Council
441 W 5th Ave Suite 500
Anchorage, Alaska 99501 10 April 2009

Dear Elise,

Please find attached our multi-year proposal to continue a multifaceted killer whale research program based on the monitoring of damaged groups. Although primary support will come from the EVOS Trustee Council, substantial contributions will be made by the Northwest Fisheries Science Center, Vancouver Public Aquarium, Norcross Foundation, and the North Gulf Oceanic Society to extend chemical analysis of biopsy samples, complete genetic analysis, provide equipment and extend the field season.

We believe that this work is a cornerstone of the dedication of the Trustee Council to long term monitoring. The database being created is unique and will be extremely valuable in assessing any future perturbations as well as continuing to measure the long term effects of the spill.

We have attempted at every opportunity to provide support for the educational goals and public outreach promoted by the Trustee Council and to collaborate with other projects, most recently projects assessing the impact of humpback whales on herring populations. Collaboration that includes not only by sharing current and historical data, sharing platforms and providing additional data collection opportunities.

It is an exciting time as we see the results of a multifaceted long-term killer whale monitoring and restoration program that has continued over the decades due to the vision and fortitude of members and staff of the *Exxon Valdez* oil spill Trustee Council.

We thank you for your support and look forward to continued collaboration.

Sincerely,

Craig Matkin,
Executive Director

PROPOSAL SIGNATURE FORM

THIS FORM MUST BE SIGNED BY THE PROPOSED PRINCIPAL INVESTIGATOR AND SUBMITTED ALONG WITH THE PROPOSAL. If the proposal has more than one investigator, this form must be signed by at least one of the investigators, and that investigator will ensure that Trustee Council requirements are followed. Proposals will not be reviewed until this signed form is received by the Trustee Council Office.

By submission of this proposal, I agree to abide by the Trustee Council's data policy (Trustee Council Data Policy*, adopted March 17, 2008) and reporting requirements (Procedures for the Preparation and Distribution of Reports**, adopted June 27, 2007).

PROJECT TITLE: _____

Printed Name of PI **Craig O. Matkin**

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City, State, Zip **Homer, Alaska 99603**

Phone: **907 235-6590**

Signature of PI: _____ Date: _____

Printed Name of PI _____

Email: _____

Mailing Address _____

City, State, Zip _____

Phone: _____

Signature of PI: _____ Date: _____

Printed Name of PI _____

Email: _____

Mailing Address _____

City, State, Zip _____

Phone: _____

Signature of PI: _____ Date: _____

* www.evostc.state.ak.us/Policies/data.cfm

** www.evostc.state.ak.us/Policies/reporting.cfm

FY10 INVITATION
PROPOSAL SUMMARY PAGE

Project Title: Monitoring, Tagging, Feeding Studies, and Restoration of Killer Whales in Prince William Sound/Kenai Fjords 2010-2012 Submitted under the BAA

Project Period: October 1, 2010 – April 30, 2013

Primary Investigator(s): Craig O. Matkin, North Gulf Oceanic Society

Study Location: Prince William Sound and Kenai Fjords

Abstract:
The proposed project is a continuation of the monitoring of AB pod and the AT1 population killer whale populations in Prince William Sound. These groups of whales suffered serious losses at the time of the spill and have not recovered at projected rates. The project also extends the scope of the basic monitoring to include an innovative satellite tagging program to examine habitat preference and incorporates a more extensive examination of feeding habits using observational and chemical techniques. The project will delineate important habitat and variations in pod specific movements and feeding behavior within a temporal and geographic framework. Results will allow us to more closely examine the potential for restoration. The project will more clearly delineate the role of killer whales, both fish eating and mammal eating in the nearshore ecosystem and possible effects on the restoration recovery of harbor seals and sea otters. Community based initiatives, educational programs, and programs for tour boat operators will continue to be integrated into the work to help foster restoration by improving public understanding and reducing harassment of the whales

Estimated Budget:
EVOS Funding Requested *(must include 9% GA)*

FY10	FY11	FY12	FY13	Total
$132,309	$132,309	$125,775	$0	$390,394

Non-EVOS Funds to be used:

FY10	FY11	FY12	FY13	Total
$23,500	$23,500	$23,500	$0	$70,500

(NOT TO EXCEED ONE PAGE)

Monitoring, Tagging, Feeding Studies, and Restoration of Killer Whales in Prince William Sound/Kenai Fjords 2010-2012
submitted under theBAA

I. NEED FOR THE PROJECT

A. Statement of Problem

On March 31, 1989 AB pod was observed in oil sheens and six of the 36 pod members were missing. A total of 13 whales were lost from resident AB pod in the year year following the *Exxon Valdez* oil spill, a rate of mortality 18 times what would have been expected. Since that time additional whales were have been lost from the pod, including animals orphaned at the time of the spill. Due primarily to the loss of reproductive females and juveniles at the time of the spill, the recovery originally predicted at 12 years may require 30 years. AB pod is not recovered and now contains 29 individuals compared to 36 prior to the spill. The AB25 subpod began traveling with with AJ pod following the spill and this has continued and is unprecedented in our work or in other work on resident killer whales in the North Pacific. The rate of mortality observed in AB pod after the oil spill far exceeds that recorded for 10 other resident pods observed in southern Alaska over the past 19 years or for 19 pods in British Columbia over the past 26 years (Matkin et al 1999, Matkin et al 2003).

The AT1 population, was stable at 22 individuals prior to the 1989 oil spill Nine individuals perished in the year following the spill including two reproductive females and 2 juveniles of unknown sex. Two additional mortalities followed in 1990. There have been no calves recruited to this population since 1984. The attrition of older males in recent years has reduced this group to 7 individuals. This unique transient population appears to range only in Prince WilliamSound/Kenai Fjords Although transient killer whale social structure is not fully understood, we are confident that the missing AT1 whales. No AT1 whale has been resighted after missing from our observations for more than 4 years. Unless one of the two remaining reproductive females produces offspring, the AT1 population appears headed for extinction. It is currently listed as depleted under the Marine Mammal Protection Act.

Twenty four years of systematic data collected under public and private funding have been placed in a specially designed database currently housed at the NGOS offices in Homer and at Alaska Sea Life Center, Seward, Alaska. The database contains nearly 1200 records of encounters with killer whales in and near Prince William Sound and Kenai Fjords, Alaska. Geographic analyses have determined large-scale differences in spatial distribution patterns between resident and transient whales and particular pods over time (Scheel et al. 2001). More detailed geographic data using innovative tagging methods are refining our understanding of group movements

Without more accurate information on killer whale range, habitat preferences, feeding locations and prey species on a pod by pod basis we cannot judge possible restoration strategies as well as understand long-term effects of the spill as well as the potential effect of future perturbations. In this project we will continue to develop and

use satellite tagging technology to examine movements of specific groups, primarily AB pod and the AT1 group and the primary resident pods that have consistently used the region (eg AE,AK,AI, and AJ pods)_. Tags may facilitate relocation of these groups and possibly permit additional encounter time for obtaining feeding data from observation and biopsy. Most important, we will monitor longer term movements remotely using locations downloaded daily from the Argos satellite system, determine use of habitat by these whales and assess changes in movements since the Exxon Valdez oil spill. This data will be used in conjunction with feeding data to determine important habitat

Feeding data will be collected during our long-term follows of killer whales. The previous project (FY2009) has begun to yield data, both observational and from biopsy samples needed for fine examination of feeding habits. We have published several papers from completed work including Herman et al (2005), Krahn et al 2007, and Herman et al (2008). From our previous work we know that resident killer whales appear to be primarily salmon feeders during spring summer and fall and with a preference is Chinook(Oncorhyncus tshawytscha) , Chum (Oncorhyncus keta), and Coho(Oncorhyncus kisutch). These three species have very different stable isotope ratio should be reflected in killer whale skin and blubber. However the chronology, spatial aspects and pod/matriline specific feeding habits of resident pods is just beginning to emerge as we acquire more data. Species of preference appear to vary by time and location and may vary by pod and even by matriline in cases where parts of the pod frequently travel separately with aspects that reflect home range.. Transient killer whales eat solely marine mammals including harbor seals, Dall's porpoise, harbor porpoise, and Steller sea lions (Saulitis et al 2000). Although we have observed only harassment of sea otters, and sea otters do not appear to be declining in the region, transient killer whales could potentially switch to this prey as has been postulated as the reason for the sea otter decline in the Central Aleutians (Estes et al 1998). The most recent AT1 stomach examined (Vos et al 2006) had sea otter remains in addition to harbor seals and suggest such a switch is possible.

We will continue to couple observations of feeding behavior with contaminant/ stable isotopes/lipid fatty-acid analysis as an aid in determination of killer whale feeding habits. Preliminary chemical analysis indicates different feeding preferences for different pods and even matrilines with in pods, although samples from a broader time frame and targeting specific pods are needed to resolve the details. . The DDT/PCB ratios and ppDDT/Total DDT ratios from biopsy samples indicate whales are not leaving the northern Gulf of Alaska to feed and are dependent on a prey concentrations in the northern Gulf of Alaska. However, it appears that some pods clearly range more nearshore as indicated by higher PBDEs (flame retardant used in many applications) that usually occurs near population centers or areas of human activity. Indeed in the case of AE pod higher PBDE levels as well as tagging data demonstrate their more restricted near shore movements. Do to the complexity of the interpretation of chemical data, in this phase of our work, we will narrow our scope and focus on the matrilines of 4 or 5 focal pods including AB pod. We will also obtain samples of potential prey (salmon species) at different periods and from specific locations to clarify chemical markers in the prey necessary for interpretation of the killer whale samples.

The AT1 group is now recognized as depleted under the Marine Mammal Protection Act. The results of the Integral Consulting review suggest it should be

considered as damaged by the spill and not recovering A total of 14 of the original 22 members of AT1 group of transient killer whales have died since 1989 (Matkin et al 2008) and there has been no recruitment within the group. Recovery for this group seems doubtful at this time. This project will continue to monitor the status of AB pod and the AT1 group and use innovative tagging and analytical techniques to examine restoration and recovery possibilities for these whales.

B. Relevance to 1994 Restoration Plan Goals and Scientific Priorities

The status of AB pod is considered "not recovered" at this time. AB pod now contains approximately 29 whales (2009 census is not yet complete), but numbered 36 whales before the spill and was a unified pod. The AB25 subpod generally does not travel with the rest of AB pod, but has attached itself to AJ pod. All members of AB pod appear to spend considerably more time outside the Sound that in past years, and particularly pre spill. These movements are being detailed by tagging. The AT1 transient group has also failed to recover from the 9 mortalities suffered following the spill and now numbers 7 individuals. This project continues monitoring the lingering oil spill effects and assesses recovery of AB pod and AT1 group killer whales following the *Exxon Valdez* oil spill and provides funding for analysis and publications. Satellite tagging studies will help determine locations of important killer whale feeding habitat and examine restoration possibilities via protection of important habitat or enhancement/protection of fish and marine mammal populations. We will continue the gradual process of examining feeding habits of killer whales using observational and chemical techniques and provide data to aid in examination of effects of predation on the the nearshore ecosystem and on relevant prey species. Data from this project will be suitable for use in future modeling projects.

Harbor seals, still at low numbers, are known to be a major prey item for the AT1 transient killer whales, and we are concerned that sea otters could also become an important prey. Recent evidence from stomach contents indicates AT1 whales are preying on sea otters to some extent. This is an excellent opportunity to determine whether transient killer whales might switch to sea otters in an area and time of low numbers of primary prey as postulated following the decline of sea otters in the Aleutian Islands (Estes et al 1998) Also, resident killer whales, including AB pod, are important near-shore predators on salmon. Previous work (Saulitis et al 2000) has indicated specific species may be important: detailed food habits studies will more clearly delineate species of salmon involved and determine if other species are also important and examine the restoration potential of producing/protecting particular salmon species.

An important part of the restoration plan is the long term monitoring of species damaged and recovering (AB pod) as well as those that are not recovering (AT1 population). To use the new methodolgies we have developed to examine feeding habits and habitat use requires an extensive multiyear collection of data, which is what we propose here.

An annual killer whale database of spanning 24 years now exists with an associated spatial database in GIS format. Details of all encounters as well as behavioral data in a spatial context are readily available. This is linked to our photographic identification database that includes identifications of all individuals from each frame of

film for every encounter. This type of information coupled with the tagging and feeding habit data collected from known individuals will give our analysis greater resolution

Restoration also has a strong community involvement aspect to foster understanding of oil spill effects and appreciation for the problems in recovery of killer whales following an oil spill. In the past we have been part of the Youth Area Watch program, and recently we have taken materials into the schools. In 2009, nvolvement has ranged from working on an oil spill project with 2nd graders at Paul Banks elementary in Homer to conducting seminars on oil spill effects at Whitman College in Walla Walla, Washington. We have done numerous public presentations in the past year updating and educating the public regarding the long term consequences of the oil spill. In addition, we provide research results and educational briefings to tour boat operators in both Seward and Whittier on a regular basis and participate in spring cruises that inform both operators and marketers. We maintain a monitoring program that examines tour boat interactions with killer whales and seeks to reduce harassment of specific groups including the AT1 transients. We exchange information with residents of Chenega village on a regular basis. Our observer network, maintained via marine VHF radio is gives verbal and web-based feedback on status of the whales creating support for conservation of these animals. This year (2009) we are funded by the Kenai Fjords National Park to establish a web based system where individuals can contribute sighting information and photographs that will be incorporated into our work.

PROJECT DESIGN

A. Objectives

1. To provide photographic population monitoring of resident killer whale pods, including the non-recovered AB pod in order to determine status. Also monitor the depleted AT1 transient group which has lost over half its members since the spill.

2. To advance the design and attachment of satellite tags and use these tags to aid in detailing habitat use and to allow relocations of pods for food sampling studies.

3. Examine seasonal feeding habits, particularly of AB pod and other resident type pods, using molecular and observational methods. To determine specifics and timing and predation we will use observational methods based on collection of fish scales from kill sites and using stable isotope and lipid/fatty acid analysis to corroborate and/or extend field observations.

4. Extend our tracking data and feeding habits examination into the non-summer season (spring and fall) to develop a broader picture of killer whale feeding ecology

5. Suggest restoration alternatives from feeding habit and habitat use data. Also provide understanding of what pods/groups would be most susceptible to future spills or other perturbations within Prince William Sound and Kenai Fjords

6. To provide data for assessment of the role of transient and resident killer whales in the near-shore ecosystem; to monitor any changes in feeding habits in this area based on previously published dietary information (Saulitis et al 2000).

7. To continue to work with local groups and other EVOS projects. This includes specifically the studies of humpback whale impact on herring, tour boat operators/industry, and our volunteer sighting network and providing community involvement with our work and promote restoration through education and reduction in harassment.

B. Procedural and Scientific Methods

Our work depends on accurate photo-identification of each individual in each pod/group that regularly uses the Sound, particularly AB pod and the AT1 population. It is important that researchers maximize the time actually spent with resident killer whales (particularly AB pod and other resident whales) to insure thorough identification of all individuals and meet other objectives of this proposal which now amended to include satellite tracking and detailed food habits evaluation.

Methods proposed to obtain photographic data necessary to meet monitoring objectives will be similar to those used by the NGOS in Prince William Sound/Kenai Fjords for the past 24 years. Searches for whales will not be made on random transects, but based on current and historical sighting information. In addition whales will be located by listening for killer whale calls with a directional hydrophone (calls can be heard up to 10 miles away), or by responding to VHF radio calls from other vessels reporting sightings of whales. We have developed network of cooperating vessel owners and tour boat operators that regularly report whale sightings. In addition, requests for recent killer whale sightings will be made routinely on hailing Channel 16 VHF and working channel 72. Finally, we will use satellite tracking positions, when possible, to direct searches for individuals and groups.

A vessel log and chart of the vessel track will kept for each day the research vessels operate. Nobletech software and a laptop computer configured with GPS will automatically record the research vessel track in real time. The elapsed time and distance traveled will be recorded and vessel track plotted. Record will be made of the time and location of all whale sightings and the weather and sea state noted at regular intervals.

Data from each encounter will be stored in an access database and trackline and all vessel and whale tracklines stored in a GIS database. This data system will be used in 2010-12 to log all encounters and summarize effort. Data recorded will include date, time, duration, and location of the encounter. Rolls of film exposed and the estimated number of whales photographed will also be recorded. A chart of the whales' track line during the encounter will be completed and the distance traveled by the vessel with the whales will be calculated by GIS on a daily basis. We will link general behavior of the whales (i.e. feeding, resting, traveling, socializing, milling) to location and time.

Photographs for individual identification will be taken of the port side of each whale showing details of the dorsal fin and gray saddle patch. Photographs will be taken

at no less than 1/1000 sec using Fuji Neopan 1600, a high speed black and white film. A Nikon F-100 auto focus camera with internal motor drive and a 300 mm f4.5 auto focus lens will be used. Digital photographs are taken as a backup using a Nikon D200 SLR camera, but film is still our primary recording medium. When whales are encountered, researchers will systematically move from one subgroup (or individual) to the next keeping track of the whales photographed. If possible, individual whales will be photographed several times during each encounter to insure an adequate identification photograph. Whales will be followed until all whales are photographed or until weather and/or darkness make photography impractical.

All photographic negatives will be examined under a Wild M5 stereomicroscope at 9.6 powers. Identifiable individuals in each frame will be recorded. When identifications are not certain, they will not be included in the analysis. Unusual wounds or other injuries will be noted. Photographic negatives will be analyzed using a photographic database that spans 24 years.

Recently we have developed the ability to make remote attachments of satellite transmitters to killer whales using a crossbow arrangement and small barbed tag that attaches to the dorsal fin of the whale. Re-sighting data indicates minimal scarring after the tag drops off. The position-only satellite transmitter that we are proposing to deploy is approximately 3.8 cm in diameter in a half dome shape, with a maximum height of 2.2 cm. The transmitting antenna is approximately 1.5 mm in diameter and 17 cm long sticking out of the center of the half dome. On the flat side, opposite the point of the antenna protrusion will be one or two barbed attachment post that will be 5 cm long and 0.6 cm in diameter. Attachments will be made from distances of approximately 6-8 meters using either a crossbow (e.g. Barnett Wildcat 170 pound bow or similar). Uplink schedules are set prior to tagging and data received through the Argos satellite system. We have had attachment times of up to 2 months in our tagging in Prince William Sound in 2007 and 2008. Reaction to application of the tags is slight and scarring after the tag drops off is minimal based on re-sight data from animals tagged in 2006. As part of this project we will attempt to place an average of seven tags per year 2010-2012, extending our examination of the ranges of various key groups over the season. We will examine variations in habitat use by the different pods as well as looking at the detailed movments of individuals. When possible we will access positions from the field on a daily basis to find individuals, in addition to compiling a long term record of movements.

Field observations of feeding will be made and prey parts collected when possible. Scales are retrieved from fish predations events and read for species and age at the Pacific Biological Station in Nanaimo, British Columbia, where a scale laboratory has been established and certified for over 20 years. If mammal prey species cannot be identified visually, then genetic analysis will be conducted if bits of prey remains are collected. The University of British Columbia, Department of Zoology genetics laboratory maintains a reference collection of genetic markers for each marine mammal species and will conduct species identification analysis.

Contaminant, lipid/fatty acid analysis and stable isotope analysis will be conducted from biopsies obtained from individual whales using collection procedures described in Matkin et al (2003). Genetic analysis conducted at the University of British Columbia using mtDNA haplotypes and nuclear DNA micro satellites will be used as necessary to identify the population of new groups or individuals (see Data Management and Quality

Assurance attached to this proposal). Lipid/fatty acid analysis and OC contaminants analysis will be conducted on the blubber samples using the procedures detailed in Herman et al (2005) and in the Data Management and Quality Assurance statement. Stable isotopes will be determined from epidermis tissue from biopsy samples using standard procedures (Herman et al 2005). All analysis will be conducted by the Environmental Contaminant Laboratory, Northwest Fisheries Science Center (NWFSC), Seattle,WA. Although the NWFSC maintains a large reference library of values for contaminants/fatty acids and stable isotopes for potential prey species of killer whales, it will be necessary to augment their collection with samples from our regions, as values may change appreciably between areas. Collection of potential prey for analysis (including all species of salmon and marine mammals as available) will be a part of this project as requested by the NWFSC.

The primary research platform will be a 34' diesel inboard powered vessel capable of 18 knots that can sleep 3-4 individuals (R.V. *Natoa).* With sleeping accommodations and large fuel capacity, the R.V. *Natoa* can remain in the field for periods up to two weeks. This vessel will operate a total of 40 days under funding from this project and an additional 10 days with NGOS funding. Over the study period, we will attempt to select operational days in a manner to maximize encounters with resident whales (AB pod) and the AT1 group during the early season (April/May) the late season (Aug/Sept) in order to compare habitat use and food habits during the different periods.

C. Data Analysis and Statistical Methods

Because photographic and observational data are being made in the same format as during the past 23 field seasons and using the techniques now standardized for studying killer whales, the data will be comparable with other data collected around the North Pacific. Since we identify every individual in each pod of resident killer whales, and pod membership only changes through death or calf production, we can accurately assess changes in pods/population.

The report for the monitoring segment will include a summary of all field effort including that funded outside of this DPD, and will include a summary of the pods and individuals encountered and a status report on AB pod and the AT1 group. Changes within AB pod will be examined with consideration for the age and sex structure of the pod and maternal groups within the pod and related to the population model now under development. Trends in transient killer whale sighting rates and demographics will also be presented.

Feeding data will be summarized and field observations and data from scales (species and age) will be summarized and statistically compared by area and by pod. In conjunction with the NWFSC we have used contaminant/fatty acid/stable isotope analysis to describe aspects of killer whale predation in other areas (Herman et al 2005, Krahn et al 2006, see Data Management and Quality Assurance). Analysis and publication for this aspect of the project will follow the model presented in these papers. We will also statistically compare chemical markers indicative of diet between pods and from different times of year (late winter/spring and late summer/fall). In our field sampling will take into account that chemical markers usually indicate prey from approximately two months

prior to the sample in temporal comparisons. Genetic analysis, when appropriate, will be conducted using the methods detailed in Matkin et al (2003) and Barrett-Lennard 2000 and will include mtDNA and nuclear DNA analysis. Track lines from whales tagged with satellite tracking devices will be presented and analyzed in GIS format. Tracks will be examined for patterns in movements, and in relation to bathymetry, to known migratory pathways of prey and to areas of potential prey abundance. We will establish home range estimates and kernel density estimates to determine important habitat and migratory pathways.

Frame by frame identifications of individuals tabulated by pod and by individual and added to our database. Frame by frame identification data will also be made available on disk. Copies of the GIS program and data base will be available by request to NGOS.

PC (Windows) compatible computers owned by NGOS will be used to analyze field data. The various long-term databases will be housed at NGOS offices and the Alaska Sea Life Center, although copies will be made available to other management agencies on request.

D. Description of Study Area

This project is part of an ongoing killer whale research in Prince William Sound and the Kenai Fjords region, Alaska (Matkin et al 2008). The overall study area stretches from the Nuka Bay, outer Kenai Peninsula region to Cordova on the eastern edge of Prince William Sound. However, the funding specifically requested in this proposal will be used primarily in western Prince William Sound and Kenai Fjords where likelihood of encountering the focal whales is most likely. We cannot predict the specific locations where encounters will occur.

E. Coordination and Collaboration with Other Efforts

The monitoring of killer whales and analysis of current data is part of a long-term program to investigate killer whale recovery, monitor populations and examine the interactions of killer whales with other species. The PI, Matkin, will work closely with collaborators Russ Andrews at the Alaska Sea Life Center, who has designed the satellite tags and with Dave Herman and Peggy Krahn at the Northwest Fisheries Science Center, who conduct diet and contaminant analysis, and Lance Barrett-Lennard who conducts the genetic analysis. We have been active collaborators on the studies examining the interaction of humpback whales and herring (Jeep Rice, PI) and have contributed our substantial long-term humpback whale photo database to their analysis. We will continue to collect humpback whale fluke identification data during the course of the proposed work and share research platforms when possible. As possible the proposed study will be integrated with near shore studies that focus on sea otters and with the oceanographic studies of the Alaska Coastal Current.

We have a record of community involvement and plan to continue work with the Youth Area Watch Program. This project will rely on approximately $15,000 annually in additional analytical time provided by the NWFSC, Environmental Contaminant

Laboratory, $5000.00 annually in additional vessel time contributed by NGOS, and $3500 annually by the Norcross Foundation in equipment. In addition we are supported and work cooperatively with the NMFS regional office (Kate Savage and Aleria Jensen) in providing observation and education of the tour boat fleet in the Prince William Sound/Kenai Fjords region. As a non-profit research institution familiar with private funding sources and cooperative programs, NGOS can work with the Trustee Council to maximize return for current and future funding.

III. SCHEDULE

A. Project Milestones

Objective 1. To prepare and launch field collection of data, including identification photos, prey samples and observations, biopsy samples and satellite tag attachments. Field work will begin in April 2010 and end by October 2012.

Objective 2. Conduct analysis blubber samples, scale samples, skin samples, and plot results of tagging efforts. Conducted annually, completion date February 2013

Objective 3. Statistical analysis and compilation of data from all years of the project to be published and included in final report (draft by April 2013)

B. Measurable Project Tasks

FY10, 1st quarter (October 1, 2009-December 31, 2009)
Funding obtained from EVOS Trustee Council, prepare for initiation of project Our project year begins in January
FY10, 2nd quarter (January 1, 2010-March 31, 2010)
January - Annual Marine Science Symposium. Compilation of previous data, preparation for field work
FY10, 3rd quarter (April 1, 2010-June 30, 2010)
Intiate annual field work. Conduct fieldwork in April (10 days) May (7days) and June (7 days).
FY10, 4th quarter (July 1, 2010- September 30, 2010)
Conduct fieldwork in August (10 days) and September-November (16 days) Initiate analysis of 2010 data

FY11, 1st quarter (October 1, 2010-December 31, 2010)
Workup satellite tag data in GIS format and update databases. Lipid/fatty acid, contaminant, stable isotope, prey sample and genetic analysis.
FY11, 2nd quarter (January 1, 2011-March 31, 2011)

January 23-27 Annual Marine Science Symposium Finish analysis of photographs from fieldwork and update catalogue. Workup satellite tag data in GIS format and update databases. Lipid/fatty acid, contaminant, stable isotope and genetic analysis completion

FY11, 3rd quarter (April 1, 2011-June 30, 2011)

Prepare for April field work Conduct fieldwork in April (7days) May (7days) and June (8days)

FY11, 4th quarter (July 1, 2011- September 30, 2011)

Conduct fieldwork in July-August (14 days) and September-November (14 days) Initiate analysis of 2011 data.

FY12, 1st quarter (October 1, 2011-December 31, 2011)

Workup satellite tag data in GIS format and update databases. Lipid/fatty acid, contaminant, stable isotope and genetic analysis.

FY12, 2nd quarter (January 1, 2012-March 31, 2012)

January 23-27 Annual Marine Science Symposium. Finish analysis of photographs from fieldwork catalogue, workup satellite tag data in GIS format and update databases. Lipid/fatty acid, contaminant, stable isotope, prey sample and genetic analysis completion.

FY12, 3rd quarter (April 1, 2012-June 30, 2012)

Prepare for April field work Conduct fieldwork in April (10 days) and May- June (10 days)

FY12, 4th quarter (July 1, 2012- September 30, 2012)

Conduct fieldwork in July/August (22 days). No late season. Initiate analysis of 2012 data and preparation of final report and papers.

FY13, 1st quarter (October 1, 2012-December 31, 2012)

Workup satellite tag data in GIS format and update databases. Lipid/fatty acid, contaminant, stable isotope prey sample and genetic analysis completion.

FY13, 2nd quarter (January 1, 2013-March 31, 2013)

January 23-27 Annual Marine Science Symposium. Final analysis and preparation of final report

C. Completion Date

Annual reports will be submitted by September of 2010,2011, and 2012. Final report to be submitted by April 2013 for review. Final report in June 2013

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EDUCATION

B.A. in Biology, University of California, Santa Cruz (1974)
M.S. in Zoology, University of Alaska Fairbanks (1980)

PROFESSIONAL EXPERIENCE

Executive Director, North Gulf Oceanic Society, Homer, Alaska, (1982-present)
Supervise and conduct research on cetaceans, primarily killer whales and humpback whales, oversee stranding network and educational operations, operate and outfit research vessels. Maintain collaborations with numerous institutions and oversee fiscal operations of NGOS.

Adjunct faculty, University of Alaska, Kenai Peninsula College, Kachemak Bay Campus, Homer, Alaska (1999-present)
Teaching of marine mammal classes and guest lectures on marine topics. Participation in elder hostel program.

Commercial Fisherman, Gulf of Alaska, Alaska (1977-1997)
Outfitting and operation of commercial fishing vessels harvesting, salmon, herring and various species of crab. Participation on boards of various fisherpersons organizations.

RELATED EXPERIENCE

Mr. Matkin has conducted research on marine mammals in southern Alaska since 1977. He completed work on harbor seals and Steller sea lions and their interactions with fisheries in 1977-79 leading to an M.S. degree. He initiated photo-identification work of killer whales and humpback whales in Prince William Sound in 1977. Since 1982 he has worked as executive director of the North Gulf Oceanic Society, acted as principal investigator on numerous contracts from the National Marine Mammal Laboratory, National Marine Fisheries Service; the U.S. Fish and Wildlife Service; Sea Grant Marine Advisory Program; Alaska Council on Science and Technology, U.S. Marine Mammal Commission; Hubbs Sea World Research Institute, the *Exxon Valdez* Trustee Council, the North Pacific Universities Marine Mammal Research Consortium and the Alaska Sea Life Center. He has directed the NGOS long-term photo-identification project examining killer whale population dynamics in Alaska since 1984. He has conducted population/distribution/genetics research on humpback whales from southeast Alaska to the Aleutian Islands and western Alaska, recently as part of the SPLASH program. He has specialized in biopsy sampling of various cetaceans including killer whales, humpback whales, fin whales and sperm whales. Using the biopsy sampling technique he has investigated population genetics and environmental contaminant levels in killer whales and humpback whales, and most recently, feeding habits using stable isotopes and lipid/fatty acids. He directed work for the past 18 years (1989-present) contracted by the *Exxon Valdez* Oil Spill Trustee Council and National Marine Fisheries Service assessing the long-term impacts of the *Exxon Valdez* Oil Spill on killer whales. He currently supervises a killer whale research program that extends from southeastern Alaska to the Eastern Aleutians. He has participated in marine mammal stranding work since 1986 as a designated agent of the National Marine Fisheries Service, providing field response and reports. Recently he has reviewed the status of the Cook Inlet beluga whale and provided recommendations to the National Marine Fisheries Service and he is the scientific reviewer for the Eagle River Flats beluga studies

MEMBERSHIPS

Alaska Scientific Review Group (Advising the National Marine Fisheries Service on marine mammal stock issues)
Society for Marine Mammalogy (Active group of Marine Mammal Scientists)

SELECTED PUBLICATIONS

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Collaborators:

Lance Barrett-Lennard Vancouver Public Aquarium, Vancouver, B.C. Canada
Russ Andrews, Alaska Sea Life Center
John Durban, National Marine Mammal Laboratory
Dave Herman, Northwest Fisheries Science Center
Peggy Krahn, Northwest Fisheries Science Center
Graeme Ellis Pacific Biological Station, Nanaimo, B.C. Canada
Peter Olesiuk Pacific Biological Station, Nanaimo, B.C. Canada
Eva Saulitis, North Gulf Oceanic Society, Homer, Alaska
David Sheel Alaska Pacific University, Anchorage, Alaska
Jan Straley, University of Alaska Southeast, Sitka, Alaska
Paul Wade National Marine Mammal Laboratory, Seattle, WA
Harald Yurk University of British Columbia, Vancouver, B.C. Canada

Budget Justification

	FY2010	FY2011	FY2012
Personnel	$34,250.0	$34,250.0	$36,800.0
Travel	$1,400.0	$1,400.0	$1,400.0
Contractual	$38,500.0	$38,500.0	$39,500.0
Commodities	$36,200.0	$36,200.0	$27,200.0
Equipment	$0.0	$0.0	$0.0
Indirect	11,035.0	11,035.0	10,490.0

Because our annual project funding cycle begins in January, there will be overlap from previous years funding into the next fiscal year in all years of the project. Final analytical and reporting costs which will occur in FY2013 are included in the FY 2012 budget.

Personnel: FY 2010-FY2013

Includes costs for the PI/Lead Field Biologist/Boat operator for each year, his time in annual analysis and reporting and includes the FY 2013 reporting costs. P.I. Matkin will supervise all aspects of the project and all contractors. Also included is annual is funding for an assistant field biologist/analyst for each year

Travel: FY2010-FY2013

Includes funds for travel and per diem for the Alaska Marine Science Symposium for each year of the project for the PI, Matkin

Contractual: FY2010-FY2013

This includes a majority of the vessel leases (40 days/year) with the remainder (10 days/year) supplied by NGOS funds. It also includes about 50% of the costs of chemical analysis of samples with the remainder supplied by the Northwest Fisheries Science Center. Also included is the cost of photographic analysis and cataloguing, GIS analysis of both effort data and tag data, and statistical analysis as necessary

Commodities: FY2010-2013

The most costly commodity are the satellite tags, with eight purchased in the first and second year and five in the third year when there will not be a late field season. Fuel and food for the vessel is included as well as film and processing and printing costs, the cost for sat phone and cell phone time, tracking time with the ARGOS satellite system, shipping costs and miscellaneous minor supplies

Indirect: FY2010-2013

For all years these costs include the use of NGOS field equipment including cameras and lenses, hydrophones and digital recorders, biopsy rifles and sampling equipment, tag application equipment, satellite phones and cell phones, prey sampling nets, battery chargers and inverters and the use of vehicles. Also included is office use expense, accounting and bookkeeping expenses, internet, phone, fax machine and use of NGOS computers both in the field and in the office and the preparation of tax documents and associated non-profit management expenses.

Data Management and Quality Assurance Control Statement

1. Many of our samples will consist of photographs that identify each individual whale (pods and groups) that we encounter. These photographs are part of a continuous photographic database collected since 1984 and housed at the Pacific Biological Station in Nanaimo, B. C. with a reference collection of individuals maintained at the North Gulf Oceanic Society offices in Homer, Alaska Photographs are compared to those in the database to determine identities of individuals and changes in structure in pods and groups. We will also collect samples (using biopsy techniques) of skin and blubber. Genetic identifications will be made in the case of new or unidentified groups, however the primary use of skin and blubber biopsy samples will be for contaminant/lipid fatty acid/stable isotope analysis in an effort to more closely examine feeding habits. The number of samples we collect by biopsy will be determined by which animals we encounter, which we cannot predict in advance, however budget limitations will allow processing of no more than 25 samples annually. We will primarily sample AB pod and as possible, members of the AT1 group, however, 4 other resident pods that spend considerable time in nearhore waters, AK,AE,AD,AJ, and AI will be specifically sampled to determine differences in diet between pods and populations.

2. Photographic data will be produced using Nikon F100 film cameras and Nikon digital D-200 cameras with either 80-200 zoom or 300mm lenses. Data will be produced in the form of individual identification photos for analysis. Biopsy samples are collected using a pneumatic rifle and custom-designed biopsy darts. A small dart is fired from a specially outfitted rifle powered by air pressure from a .22 caliber blank cartridge. The setup is similar to that used to deliver tranquilizing drugs to terrestrial mammals in wildlife research. A lightweight plastic and aluminum dart (approx. 10cm long by 1.2cm dia.) is fitted with a beveled tubular sterile stainless steel tip that takes a small core of skin and blubber (approximately 1.6cm long and 0.5cm dia.). The sterilized dart is fired from a range of 16-20m. The dart strikes the animal in the upper back, excises a small tissue sample, bounces clear of the whale, and floats with sample contained until retrieved with long handled net. From the biopsy samples, the epidermis, which is heavily pigmented, is separated aseptically from the other layers with a scalpel soon after retrieval. The dermal sample, the source of DNA, is stored at about 4 deg C. in a sterile 1 ml cryovial containing 1. ml of an autoclaved solution of 20%DMSO and 80% sodium chloride saturated with double distilled water (Amos and Hoelzel 1991). Thedermis and hypodermis are made up primarily of collagen and lipid, respectively, and were frozen at 20C in autoclaved, solvent-washed vials for contaminant analysis.
   Fatty acid concentrations will be determined for killer whale samples as follows: (1) extraction of approximately 0.5 to 1.0 g of tissue (mixed with sodium and magnesium sulfates to remove water) by accelerated solvent extraction (ASE) using 50 ml methylene chloride at 100°C and 2000 psi; (2) partitioning of the extract into 3 fractions [approximately 46% for OC analysis, 46% for total lipid

by the standard gravimetric method and 8% for fatty acid and lipid class (Iatroscan) analyses]; (3) derivatization of the fatty acid fraction to fatty acid methyl esters (FAMEs) using 3% sulfuric acid in methanol; (4) extraction of the FAMEs into iso-octane; (5) drying the extract over a bed of sodium sulfate; and (6) separation and analysis of the FAME extracts on a DB-23 capillary column using quadrupole gas chromatography/mass spectrometry (GC/MS) operated in the selected ion monitoring (SIM) mode. In most cases, the molecular ion will be chosen for quantitation, and a confirmation ion was also monitored. Fatty acids C11:1 (as triglyceride) and C13:1 will serve as surrogate recovery standards added to each sample prior to the ASE solvent extraction and transesterification steps, respectively. A method blank and a 1 g sample of National Institute Standards and Technology NIST fish tissue homogenate standard reference material (SRM 1946) will be analyzed with each set of 14 field samples as part of a performance-based quality assurance program.

Blubber samples will be analyzed for OC (contaminant) concentrations using the following: (1) extraction of approximately 1g blubber tissue using the same ASE procedure outline above for fatty acids; (2) clean-up of the entire methylene chloride extract on a single stacked silica gel/alumina column; (3) separation of OCs from the bulk lipid and other biogenic material by high-performance size exclusion liquid chromatography (HPSEC); and (4) analysis on a low-resolution quadrupole GC/MS system equipped with a 60 m DB-5 GC capillary column. The instrument was calibrated using a set of 10 multi-level calibration standards of known concentrations. Following this procedure, a total of 40 PCB congeners and 24 chlorinated pesticides will be determined in the samples.. Total lipid in killer whale blubber samples will be measured by either a gravimetric procedure or a more sensitive TLC/FID method (biopsy samples). Individual lipid classes (triglycerides, wax esters/sterol esters, free fatty acids, phospholipids, and sterols) will be measured by the TLC/FID method, and their concentrations summed to obtain values for total lipid.

Killer whale epidermal samples will be prepared for stable isotope analysis by (1) freeze-drying the skin overnight in a Virtis Freezemobile 12XL freeze-drier; (2) pulverizing the freeze-dried material to a powder in a micro ball mill; (3) transferring the powder into a 5 cm diameter glass filter paper folded into a cone, folded shut, and then placing the capsule into a 33 ml ASE cell; (4) extracting lipid using 2 cell volumes of dichloromethane at 25°C and 500 psi; (5) removing lipid-free skin from the extraction cell and drying at room temperature in a hood for 10 min; and (6) loading 0.4 to 0.6 mg dried powder into tin cups and combusting in a Costech elemental analyzer attached to a Thermo-Finnigan Delta Plus Isotope Ratio Mass Spectrometer. The values were calibrated against internal laboratory standards (aspartic acid and ^{15}N-enriched histidine), which were analyzed after every 10 samples. Unenriched histidine wasalso analyzed after every 25 samples as a control material to determine set-to-set reproducibility. For quality control, all standards and the reference material must have standard deviations $\leq$0.3‰ for δ^{15}N and $\leq$0.2‰ for δ^{13}C Stable isotope ratios are expressed in δ notation as per mil (‰) by the following expression:

$$\delta Z = [(R_{sample}/R_{standard}) - 1] \times 1000$$

(1)where Z is ^{15}N or ^{13}C and R_{sample} is the ratio $^{15}N/^{14}N$ or $^{13}C/^{12}C$ for the tissue sample. $R_{standard}$ is the ratio $^{15}N/^{14}N$ or $^{13}C/^{12}C$ of the corresponding standard, atmospheric air and Pee Dee Belemite limestone respectively. The statistical significance of the killer whale grouping differences will be calculated using the Tukey-Kramer honestly significant difference (HSD) test at $\alpha = 0.05$. Diets will be estimated from field data and literature for comparisons with data profiles generated by chemical analysis.

3. Photographs that show fin shape and unique nicks and scratches will be sufficient to determine individual identities of whales. Genetic data that develops mtDNA and nuclear DNA typing will be sufficient to determine population affiliations of new whales. Contaminant/lipid-fatty acid/stable isotope analysis that can be completed in the manner described in Herman et al (2005) will be sufficient for food analysis when coupled with field observations and identification of prey through observation, reading of scales taken from fish prey, and genetic identification of species from bits of unidentified marine mammal prey.

4. Not applicable

5. Photographic data is backed up on hard drives in the case of digital photos and stored by NGOS, film is developed by Wilf Hatch and negatives temporarily stored at the Pacific Biological Station in Nanaimo, BC Canada until they can be analyzed. Voucher photographs are scanned and backed up at harddrives at the NGOS offices.
   Skin from biopsy samples will be stored in vials of DMSO and placed in freezers aboard the research vessel. Blubber samples are placed in vials and immediately frozen. Skin samples are overnight shipped to the University of British Columbia genetics laboratory where they are held in -80C freezers. Remaining tissue is catalogued and stored at this facility. All blubber samples are overnight shipped in freezer pack coolers to the Northwest Fisheries Science Center in Seattle. Essentially all tissue is used in analysis, but they are stored in -80C freezers until analyzed.

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 10- FY 12

Budget Category:	Proposed FY 10	Proposed FY 11	Proposed FY 12	Proposed FY 13	TOTAL PROPOSED
Personnel	$34,250.0	$34,250.0	$36,800.0	$0.0	$105,300.0
Travel	$1,400.0	$1,400.0	$1,400.0	$0.0	$4,200.0
Contractual	$38,500.0	$38,500.0	$39,500.0	$0.0	$116,500.0
Commodities	$36,200.0	$36,200.0	$27,200.0	$0.0	$99,600.0
Equipment	$0.0	$0.0	$0.0	$0.0	$0.0
Indirect *(will vary by proposer)*	11,035.0	11,035.0	10,490.0	0.0	$32,560.0
SUBTOTAL	$121,385.0	$121,385.0	$115,390.0	$0.0	$358,160.0
General Administration (9% of subtotal)	$10,924.7	$10,924.7	$10,385.1	$0.0	$32,234.4
PROJECT TOTAL	$132,309.7	$132,309.7	$125,775.1	$0.0	$390,394.4
Other Resources (Cost Share Funds)	$23,500.0	$23,500.0	$23,500.0	$0.0	$70,500.0

Annually:15,000 Northwest Fisheries Science Center, Environmental Contaminant Lab: additional analytical and reporting services.
3,500 Norcross Wildlife Foundation, Equipment grant 5,000 NGOS in kind equiment use

FY10

Project Title: Long-term Monitoring and Restoration of Killer Whales
Lead PI: Craig Matkin

FORM 4A
NON-TRUSTEE
AGENCY SUMMARY

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 10- FY 12

Personnel Costs:		GS/Range/	Months	Monthly		Personnel
Name	Project Title	Step	Budgeted	Costs	Overtime	Sum
						0.0
Craig Matkin	P.I. Field Biologist		5.0	5100.0		25,500.0
Eva Saulitis	Field Biologist/Data analysis		2.5	3500.0		8,750.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		7.5	8600.0	0.0	
					Personnel Total	$34,250.0

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Attend annual Alaska Marine Science Symposium	950.0	1	3	150.0	1,400.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$1,400.0

FY10

Project Title: Long-term Monitoring and Restoration of Killer Whales
Lead PI: Craig Matkin

FORM 4B
PERSONNEL & TRAVEL DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 10- FY 12

Contractual Costs: Description	Contract Sum
Vessel Lease (R.V. Natoa/ 40 days @500/day)	20,000.0
NWFSC Environmental Contaminant Lab, Analytical Fees	12,000.0
GIS/Statistical Analysis	3,000.0
Photoidentification/Catalogue	3,500.0
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$38,500.0

Commodities Costs: Description	Commodities Sum
Misc tagging and biopsy supplies	2,000.0
8 satellite tags @3000 apiece	24,000.0
Field Food ($40/day for 40 days)	1,600.0
Fuel ($150/day for 40 days)	6,000.0
Film, Photo processing	1,800.0
Field Communication, Tracking, Shipping, and Misc supplies	800.0
Commodities Total	$36,200.0

FY10

Project Title: Long-term Monitoring and Restoration of Killer Whales
Lead PI: Craig Matkin

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 10- FY 12

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY11

Project Title: Long-term Monitoring and Restoration of Killer Whales
Lead PI: Craig Matkin

FORM 4B
EQUIPMENT DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 10- FY 12

Personnel Costs:		GS/Range/	Months	Monthly		Personnel
Name	Project Title	Step	Budgeted	Costs	Overtime	Sum
						0.0
Craig Matkin	P.I. Field Biologist		5.0	5100.0		25,500.0
Eva Saulitis	Field Biologist/Data analysis		2.5	3500.0		8,750.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		7.5	8600.0	0.0	
					Personnel Total	$34,250.0

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Attend annual Alaska Marine Science Symposium	950.0	1	3	150.0	1,400.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$1,400.0

FY11

Project Title: Long-term Monitoring and Restoration of Killer Whales
Lead PI: Craig Matkin

FORM 4B
PERSONNEL & TRAVEL DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 10- FY 12

Contractual Costs: Description	Contract Sum
Vessel Lease (R.V. Natoa/ 40 days @500/day)	20,000.0
NWFSC Environmental Contaminant Lab, Analytical Fees	12,000.0
GIS/Statistical Analysis	3,000.0
Photoidentification/Catalogue	3,500.0
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$38,500.0

Commodities Costs: Description	Commodities Sum
Misc tagging and biopsy supplies	2,000.0
8 satellite tags @3000 apiece	24,000.0
Field Food ($40/day for 40 days)	1,600.0
Fuel ($150/day for 40 days)	6,000.0
Film, Photo processing	1,800.0
Field Communication, Tracking, Shipping, and Misc supplies	800.0
Commodities Total	$36,200.0

FY11

Project Title: Long-term Monitoring and Restoration of Killer Whales
Lead PI: Craig Matkin

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 10- FY 12

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY12

Project Title: Long-term Monitoring and Restoration of Killer Whales
Lead PI: Craig Matkin

FORM 4B
EQUIPMENT DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 10- FY 12

Personnel Costs:		GS/Range/	Months	Monthly		Personnel
Name	Project Title	Step	Budgeted	Costs	Overtime	Sum
						0.0
Craig Matkin	P.I. Field Biologist		5.5	5100.0		28,050.0
Eva Saulitis	Field Biologist/Data analysis		2.5	3500.0		8,750.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		8.0	8600.0	0.0	
					Personnel Total	$36,800.0

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Attend annual Alaska Marine Science Symposium	950.0	1	3	150.0	1,400.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$1,400.0

FY12

Project Title: Long-term Monitoring and Restoration of Killer Whales
Lead PI: Craig Matkin

FORM 4B
PERSONNEL & TRAVEL DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 10- FY 12

Contractual Costs: Description	Contract Sum
Vessel Lease (R.V. Natoa/ 40 days @500/day)	20,000.0
NWFSC Environmental Contaminant Lab, Analytical Fees	12,000.0
GIS/Statistical Analysis	4,000.0
Photoidentification/Catalogue	3,500.0
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$39,500.0

Commodities Costs: Description	Commodities Sum
Misc tagging and biopsy supplies	2,000.0
5 satellite tags @3000 apiece	15,000.0
Field Food ($40/day for 40 days)	1,600.0
Fuel ($150/day for 40 days)	6,000.0
Film, Photo processing	1,800.0
Field Communication, Tracking, Shipping, and Misc supplies	800.0
Commodities Total	$27,200.0

FY12

Project Title: Long-term Monitoring and Restoration of Killer Whales
Lead PI: Craig Matkin

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 10- FY 12

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY13

Project Title: Long-term Monitoring and Restoration of Killer Whales
Lead PI: Craig Matkin

FORM 4B
EQUIPMENT DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 10- FY 12

Personnel Costs:		GS/Range/	Months	Monthly		Personnel
Name	Project Title	Step	Budgeted	Costs	Overtime	Sum
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		0.0	0.0	0.0	
					Personnel Total	$0.0

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.0

FY13

Project Title: Long-term Monitoring and Restoration of Killer Whales
Lead PI: Craig Matkin

FORM 4B
PERSONNEL & TRAVEL DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 10- FY 12

Contractual Costs: Description		Contract Sum
If a component of the project will be performed under contract, the 4A and 4B forms are required.	**Contractual Total**	$0.0

Commodities Costs: Description	Commodities Sum
Commodities Total	$0.0

FY13

Project Title: Long-term Monitoring and Restoration of Killer Whales
Lead PI: Craig Matkin

FORM 4B
CONTRACTUAL & COMMODITIES DETAIL

***EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL**
DETAILED BUDGET FORM FY 10- FY 12

New Equipment Purchases: Description	Number of Units	Unit Price	Equipment Sum
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage: Description	Number of Units	Inventory Agency

FY13

Project Title: Long-term Monitoring and Restoration of Killer Whales
Lead PI: Craig Matkin

FORM 4B
EQUIPMENT DETAIL