County: Clallam
Grant No: SEANWS-2014-ClCoCD-0007

PROJECT TITLE: GRP Update/Data Gap Assessment

DELIVERABLES FOR TASK NO: 3.4

PROGRESS REPORT: [ ] FINAL REPORT [x]

PERIOD COVERED: October 1, 2015 – September 30, 2016

DATE SUBMITTED: October 3, 2016

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CLALLAM COUNTY MARINE RESOURCES COMMITTEE
FINAL REPORT: GEOGRAPHIC RESPONSE PLAN UPDATE
SEPTEMBER 2016

EXECUTIVE SUMMARY

On December 21, 1985, residents of Clallam County experienced firsthand the effects of a significant oil spill when an accident involving the Arco Anchorage released 239,000 gallons of crude oil into Port Angeles Harbor. The oil affected an estimated 4,000 birds, and several thousand died despite response efforts. In recent years, the Clallam Marine Resources Committee (CMRC) has provided public forums and training to inform citizens and provide additional trained emergency responders to support local, state, and federal resource agencies tasked with oil spill response. Given the likelihood of a significant increase in oil transshipment along the Strait of Juan de Fuca in the coming years, the CMRC reviewed the publically-available version of the State of Washington's Geographic Response Plan GRP) for the Strait, noting in many cases that the environmental data used to guide initial spill response actions was dated or unavailable. Subsequent discussions with State resource agencies suggest that while newer information is available to support spill response, the information along the Strait is not comprehensive and data gaps are still present.

To improve temporal and spatial environmental data representation along the Strait, the CMRC initiated a project supported by a grant from the Northwest Straits Commission to identify georeferenced environmental information that could be used in a future GRP update and incorporate this information into SoundIQ, an interactive database operated by the Northwest Straits Commission. Outreach activities to local NGO's, tribal entities, and State and Federal resource agencies occurred during the spring and summer of 2016, and numerous web-based geographic information systems were searched for relevant information. The outreach and search efforts identified a variety of potential data sources that could be of value for a GRP update, including existing georeferenced information on a CMRC project documenting submerged aquatic vegetation in nearshore areas from Port Angeles to Dungeness Bay that was not included in the publically available version of the Strait GRP. We were also able to obtain and upload to SoundIQ a comprehensive beach seine study conducted by NOAA during the months of April to December from 2005 to 2015 that documented the monthly average catch of 70 species at 13 stations along the Strait.

During this project, we realized that highly detailed resource information, while scientifically valuable, may not be necessary to support spill response decisions during the initial phases of an oil spill, as described in the Strait GRP. In many cases, the locations of sensitive aquatic resources are already known, and protection strategies are already in place. Detailed, georeferenced environmental data, however, is invaluable in

establishing a current baseline or inventory that could be used to gauge post-spill resource damage, and enabling researchers to better understand the spatial and temporal trends for ecologically, commercially, or recreationally important aquatic resources along the Strait, and in identifying areas where data gaps exist that could be filled through citizen-science projects. The collection and archival of information in SoundIQ can also provide decision-support to local, State, and Federal resource agencies tasked with evaluating the potential effect of proposals for new water-related uses, assessing local and regional effects related to climate change, and providing information to guide shoreline management plan updates. Thus, we consider the collection and archival of environmental data along the Strait to be a "work in progress" that will benefit the citizens of Clallam County in many ways.

INTRODUCTION AND SUBTASK DESCRIPTIONS

Geographic Response Plans (GRPs) guide the initial response actions to an oil spill occurring in the inland and marine waters of Washington, Oregon and Idaho. These documents, developed in collaboration in collaboration with federal, state, and local oil spill emergency response experts; response contractors; and representatives from tribes, industry, ports, environmental organizations, and pilots, provide operational orders for on-scene coordinators during the initial stages of an oil spill (WDOE 2011). GRPs provide a variety of information, often as maps or figures that describe:

- Environmental resources requiring protection
- Locations of response resources (boom, boat ramps, vessels, etc.)
- Locations for site access and staging actions
- Tribal and local response community contacts, and
- Descriptions of local conditions (e.g. physical features, hydrology, currents and tides, winds and climate) that may affect response actions (WDOE 2011)

The Geographic Response Plan for the Strait of Juan de Fuca (Strait GRP) was originally released to the public on July 1, 1993. Subsequent revisions occurred on March 1996 and March 2003 to incorporate georeferenced information into Chapter 4 to support field operations related to general protection and collection strategies during oil spill event. To support response actions, the Strait of Juan de Fuca is divided into Strategy Locations, as shown in Figure 1. Based on the record of changes presented in current (publically available) version of the document (November 2011), the information pertaining to sensitive biological resources in Chapter 6) appears to be based on information from 1991 and 1992 (WDOE 2011). Although discussions with State resource agencies suggest that more recent environmental data not reflected in the publically available version of the GRP is available and would be used to support spill response planning, the CMRC believes an updated GRP document would benefit from recent local georeferenced environmental information. Thus, Task 3 of the Clallam MRC's 2015-2016 work plan to the Northwest Straits Commission is intended to meet this information need by identifying new georeferenced information sources that can be considered when subsequent revision to the Strait GRP occurs. When possible, this new information will be incorporated into SoundIQ, a searchable web-based collection of georeferenced data supported by the Northwest Straits Commission to enable access by State resource agency personnel. Subtasks associated with Task 3.4 included:

Subtask 3.1 Developing a list of data sources present in the current Strait GRP to support oil spill contingency planning and response:

- Reviewing the November 2011 version of the Strait GRP to identify existing data sources and maps associated with fish, shellfish, kelp, and eelgrass, as described in GRP Chapter 6.
- Creating a summary table showing the likely spatial coverage for species or species groups of interest included in the GRP, and the data sources used to develop the maps.

Subtask 3.2 Evaluating additional georeferenced data sources that would support initial spill response in the Strait of Juan de Fuca and a future update of the Strait GRP:

- Searching SoundIQ and other local data sources, including technical reports and gray literature from state and local agencies, tribes, and NGO's for relevant information.
- Providing a summary of the types of information that are currently available or may be available to Ecology for the Strait GRP update.

Subtask 3.3 Producing summary report of data and information gap assessment findings:

- Based on information obtained from Subtask 3.2, determining, if possible, geographic areas along with Strait of Juan de Fuca with little or no biological information, areas that have changed substantially since GRP publication, and areas with biological information that is dated or incomplete.
- Creating tables of information for the 13 Strategy Locations described in the current Strait GRP that show available data, owner, and date; providing a summary table for all areas.
- Creating a list of sensitive resource information that is not currently available in a georeferenced format that should be considered during a spill response and for inclusion in a GRP update. Including an estimate of the time required to transform the information into a usable electronic format.

Subtask 3.4 Providing final project completion report and presentation materials:

- Developing a final project report that reflects the information obtained from the above Subtasks, including a section describing data collection priorities that should be considered for future funding.

What follows is a summary of our progress in support of the above subtasks for FY2016. Specific information and data products are presented as attachments in the Excel data sheet accompanying this report.

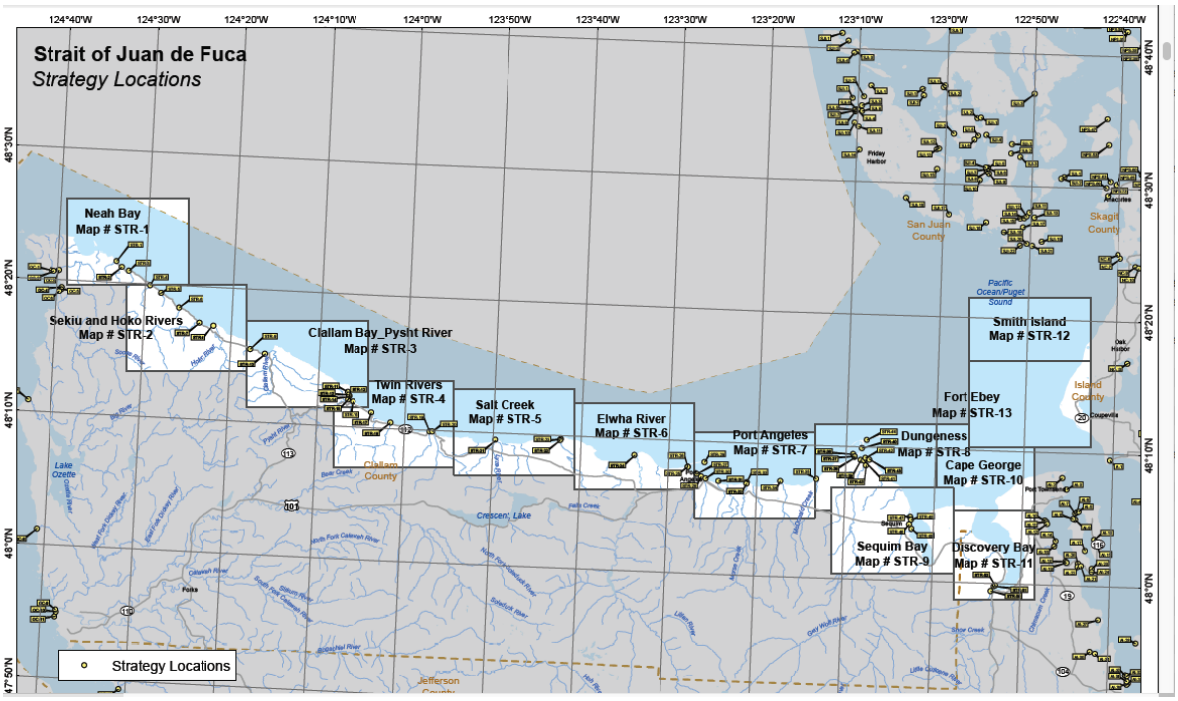

Figure 1. Strategy Locations for Oil Response Planning Along the Strait of Juan de Fuca

ENVIRONMENTAL INFORMATION IN THE PUBLICALLY AVAILABLE VERSION OF THE STRAIT GRP (Subtask 3.1)

As noted above, Task 3.1 was focused on evaluating the data sources associated with fish, shellfish, kelp, and eelgrass, as described in Chapter 6 of the November 2011 version of the Strait GRP. The Washington Department of Fisheries (now known as the Washington State Department of Fish & Wildlife, WDFW) prepared draft maps to represent nearshore fish and shellfish resources of high commercial, recreational, or ecological value. The Strait GRP also mentions kelp and eelgrass resources, but does not contain maps for any species known to be present in the GRP study area. Three important caveats are noted in Chapter 6 of the Strait GRP with regards to species distribution maps:

1. The information provided in the chapter is “intended to be used to provide a level of detail required during the initial phase of spill response.”
2. The shellfish maps do not offer complete information on intertidal and subtidal shellfish resources, as the primary focus was on areas that could be commercially harvested.
3. With regards to species distribution, “due to a combination of new data and incomplete data, it is not safe to assume that blank areas on the maps are not of concern.”

The results of the data assessment conducted by CMRC are presented in Attachment 1, and shows that 14 species or guilds were included in the most publically available of the Strait GRP, representing a variety of fish and invertebrate taxa. Fish included herring,

smelt, salmon, sand lance, and lingcod. Invertebrate data included information on intertidal and subtidal hardshell clams and intertidal softshell clams, geoduck, oysters, urchins, abalone, octopus, and shrimp. Although mentioned in GRP Chapter 6, there were no maps for seagrass or macroalgae (kelp). Species or groups of similar species occurring in the majority of the 13 Strategy Locations described in GRP Chapter 4 included cancer crab, intertidal and subtidal clams, and sea urchins. In addition, geoduck clams, octopus, and pandalid shrimp were found at many locations. Although pacific salmon (Chinook, coho, sockeye, chum, and pink) were included in the GRP, no information was available from the distribution map included in the document. In general, the quality of the maps varied by species or group, and many were difficult to interpret with regards to species presence at a particular location. It was also difficult at times to determine where a particular species occurred with respect to the 13 Strategy Locations, as there were few reference points included in the maps. And as noted above, blank spaces on the maps did not necessarily mean the areas were not of concern or that species of interest did not occur there.

In the text accompanying the maps in GRP Chapter 6, life history information for the species or species groups was obtained from Emmett et al. (1991), and the accompanying maps were based on work published by WDFW in 1992. Pandalid shrimp life history information was obtained from Hueckel (1980). Based on the listed citations, it must be assumed the biological resource data presented in the November 2011 version of the Strait GRP is over two decades old. Although it was not possible to determine if the information exists in a georeferenced format, the age of the information suggests not. Although the existing information in the GRP may be of value as baseline data when assessing long-term trends along the Strait of Juan de Fuca, more recent georeferenced information would greatly benefit oil response actions in this area. For example, the recent removal of the Elwha River dams has dramatically changed the hydrology, sediment composition, and presumably species composition in the nearshore areas where the river meets the Strait of Juan de Fuca. Knowledge of the changes to both the substrate and species composition would be an important component of an oil spill response action in this area. As noted above, State resource agencies have indicated that newer environmental information would be used during a spill response.

ADDITIONAL SOURCES OF GEOREFERENCED ENVIRONMENTAL INFORMATION FOR THE STRAIT OF JUAN DE FUCA (Subtask 3.2)

A variety of sources of georeferenced local information were found during this task, including SoundIQ, a web-based geographic information system supported by the Northwest Straits Commission; NOAA's Environmental Response Management Application (ERMA) database, and NOAA's Environmental Sensitivity Index (ESI), which provides a variety of information, including temporal sensitivity data. In addition, NOAA's Northwest Fisheries Sciences Center (Kinsey Frick) provided a georeferenced file to CMRC containing beach seine data from 2005 to 2015 for stations along the Strait for upload to SoundIQ. In addition to identifying web resources of relevant environmental information, the CMRC contacted Federal, State, and local organizations, the three local tribes and NGO's conducting research along the Strait to determine if they possessed

georeferenced or non-georeferenced information that could be used in emergency response planning and to update the Strait GRP. A description of these information sources is provided below.

Northwest Straits Commission SoundIQ

Results of the SoundIQ data search are summarized in Attachment 2, which shows that forage fish data collected from 1992-2007 for sand lance, surf smelt, and pacific herring is available for 11 of 13 strategy locations. Data summarized on SoundIQ also identifies of spawning and holding areas, and the locations of suitable forage fish spawning habitat. Although this information is more recent than that presented in the existing GRP, metadata characterizations were a bit unclear with regards to specific sampling dates. Smelt spawning habitat was identified in all strategy locations except STR-13 (Fort Ebey) based on 1991-2007 field campaigns. Forage fish spawning suitability was variable along the Strait, with a “very high” ranking only for STR-11 (Discovery Bay). Sampling dates for this field effort were not available in the associated metadata. No information for salmonid presence or habitat was available along the Strait in the SoundIQ database. As noted in the discussion of Subtask 3.1, the existing Strait GRP contains no information on kelp or seagrass habitats. Field and aerial photograph information for eelgrass, surfgrass, and floating kelp is available for the Strait in SoundIQ, 2006 and 2009 sidescan mapping process sponsored by the Clallam MRC, and georeferenced information from the Washington Department of Natural Resources (WDNR) and others for floating kelp. For invertebrates, SoundIQ provided georeferenced information from the 1976-1977 Marine Ecosystem Analysis (MESA) study and information from NOAA/ESI. Study dates for the latter were not available in the accompanying metadata. SoundIQ also provided georeferenced information for bald eagles, great blue heron, and seabirds from NOAA/ESI, but study dates were not available.

NOAA Environmental Response Management Application (ERMA)

Forage fish sampling performed by Phillip Dionne and Terry Johnson of WDFW was available in ERMA database for many of the strategy locations along the Strait (Attachment 3). Forage fish surveys were conducted in all 13 strategy locations. Sand lance and herring spawning and holding locations were noted in areas encompassing STR-7 to STR-11 (Port Angeles east to Discovery Bay). Sampling dates were not available in the accompanying metadata. Information on kelp and eelgrass distributions were also available from WDNR and are likely the same information provided by SoundIQ. ERMA also provided georeferenced presence/absence information for a variety of invertebrates, including red sea urchin, pandalid shrimp, Dungeness crab, geoduck, intertidal and subtidal hardshell clams, oysters and abalone based on WDFW data. As noted above for other information sources, metadata did not provide sampling dates. An extensive database on the abundance of marine birds was available in ERMA, including information on Rhinoceros Auklet, Pigeon Guillemot, Harquelin Duck, Caspian Tern, Cormorants, and Gulls. Areas with the highest observed densities are shown in Attachment 3. Highest densities for combined species (e.g., all cormorants) were

estimated based on the number of grids in a specific strategy location with observations of high densities.

NOAA Environmental Sensitivity Index (ESI)

NOAA's Environmental Sensitivity Index (ESI) website provides interactive maps showing coastal resources that would be at risk from an oil spill. These maps show the locations of at-risk resources including birds, shellfish beds, sensitive shorelines, and human-use resources (such as public beaches and parks. ESI information was used by the project team to provide a better understanding of the temporal sensitivity of species of interest to a potential oil spill event (Attachment 4). This information, along with the temporal information already available in the existing Strait GRP provides information on when sensitive life stages for selected species may be present to guide spill response planning. This information will also be useful in assessing the effects of anthropogenic and natural stressors on important ecosystem resource components.

NOAA Beach Seine Data

In response to our outreach effort, scientists at NOAA's Northwest Fisheries Science Center provided a georeferenced database containing average monthly catch data from beach seine sampling at 13 locations along the Strait (NOAA 2016). This database included information on 21 families or guilds collected during the months of April to September from 2005 to 2015 (Attachment 5). With NOAA's permission, this information is now available on SoundIQ. Although this level of detail may not be required to support emergency response planning, it will be very valuable in contributing to the understanding of spatial and temporal trends of important food web components that is needed to assess changes that occur over time from anthropogenic and natural stressors. This type of information may also be useful in assessing the potential impacts of proposals to expand existing marine-dependent uses or proposals that may product adverse impacts in nearshore areas. This information will support future shoreline management plan updates.

Other Local Information Sources

In addition to the database searches, Clallam MRC contacted representatives of Federal, State, local, tribal, and NGO's groups who may have environmental information that could be used in a future Strait GRP update. A summary of the entities contacted and the current status of the communications are provided in Attachment 6. In general, there appears to be an abundance of local information on fish, shellfish, seagrass, and seabird distributions and abundance. Some of this information is already in a georeferenced format; other data may need to be processed before it could be displayed in a geographic database. In some cases, detailed information being used to prepare scientific manuscripts may not be initially available, but less specific information (e.g., presence/absence) could be released by the authors after further consideration. Finally, in some cases, additional discussions will be needed with some data owners to determine what might be available to support the Strait GRP update. The Clallam MRC will continue to engage data owners throughout the remainder of the year and update our summary information accordingly prior to the development of the final report.

GAP ASSESSMENT (Subtask 3.3)

As shown in the summary Excel data sheets provided as a Subtask 3.2 deliverable, there is a significant amount of georeferenced environmental data available in SoundIQ and NOAA ERMA databases. In many cases, the georeferenced data available from these sites provides both spatial and temporal improvements to the information provided in the publically-available version of the GRP on the Department of Ecology's website. What follows is a brief summary of potential data gaps observed for the Strait GRP area. The project team will continue to engage key agencies and entities to better understand the spatial and temporal coverage of existing data, and to determine, from their perspective, the kinds of information that should be collected along the Strait to provide a more comprehensive picture of the marine resources present.

Forage Fish

As noted in Section 3.2, the publically-available version of the Strait GRP has limited information on forage fish abundance or the presence of suitable spawning or rearing areas along the Strait, with little to no information available west of STR-8 (Dungeness Spit). Additional information for a variety of forage fish species is available in SoundIQ, with surveys spanning the 1992-2007 timeframe. Information on forage fish survey locations and spawning areas are also provided in ERMA, but survey dates are not stated in the metadata. It is likely there is some overlap between SoundIQ and ERMA data, but this has not jet been confirmed. The next steps related to assessing data gaps related to forage fish will be to contact researchers from WDFW and WDNR to verify study dates of existing georeferenced information, and identify new data sources that can be incorporated into Sound IQ. As noted in Attachment 3, forage fish data from 2005 to 2015 provided by NOAA for 13 locations along the Strait has helped to fill the forage fish data gap.

Seagrass and Macroalgae

No information on seagrass and macroalgae presence is available in the publically available version of the Strait GRP, but is available in the SoundIQ and ERMA databases. In addition, newer georeferenced information may be available from WDNR (Helen Berry), and the Clallam MRC is initiated a kayak-based floating kelp survey at Freshwater Bay (near STR-6). These data will be incorporated into SoundIQ in FY17. As noted above, discussions with State resource agencies suggests they are aware of some of the newer seagrass and macroalgae data, and would use this information to guide response actions if an oil spill occurred. CMRC will continue discussions with State agencies in FY17 to ensure the local seagrass and macroalgae information is available to them for a future GRP update.

Salmonids

As noted in Section 3.2, the publically available version of the Strait GRP contains no information related to salmonid presence or abundance along the Strait, and there is currently no additional information available in the SoundIQ or ERMA databases. Information on salmonid hatchery and stream counts has been collected by the three

tribes within the Strait GRP area (Makah, Elwha, and Jamestown S'Klallam), and may be available for incorporation into SoundIQ. Initial contacts with tribal representatives have already occurred, and visits to each will be scheduled in FY17 to determine what information could be available to support a future GRP update.

Invertebrates and Shellfish

Georeferenced information on invertebrates and shellfish is available in the publically available version of the Strait GRP, SoundIQ, and ERMA. Although it is difficult to determine the study dates from the available metadata, it is likely much of the information is decades old, and probably collected during the 1976-1977 Marine Ecosystem Analysis (MESA) study, as noted in Section 3.2. The availability of newer invertebrate and shellfish data will be assessed during meetings or conference calls with state resource agencies, tribes, and local research groups in FY17. Invertebrate and shellfish surveys at specific locations along the Strait may be required to improve spatial or temporal coverage. Follow on studies could include a variety of citizen-science projects sponsored by the Clallam MRC.

Seabirds

Although not a primary focus of this project, the data search conducted during Subtask 3.2 identified a significant amount of seabird data along the Strait in both SoundIQ and ERMA databases. Data sources include NOAA/ESI (no study date), Puget Sound Ambient Monitoring Program for summer surveys (1992-1999, and winter surveys (1992-20143). Information is also available for bird studies conducted by Audubon in 2013. During 2016, the CMRC teamed up with Audubon to perform a census of Pigeon guillemot at the Dungeness Wildlife Refuge and Port Williams (STR 8 and STR 9). This collaborative effort will continue in FY17, and could be expanded, if funding was available, for additional bird studies along the Strait to improve temporal and spatial coverage

SUMMARY

In general, there is a significant amount of newer georeferenced information that could be used to update the publically available version of the Strait GRP. These data are available from State resource agencies, tribal entities, and independent research or monitoring groups in the area. As noted above, the Clallam MRC will continue to work with these groups in FY17 to obtain recent information from the Strait to support a future GRP update and to address other research or resource management decision, as discussed below. With regards to the collection of new environmental data, our data gap assessment suggests that, in general, strategy locations west of Dungeness Spit have the least amount of relevant environmental information to support oil response planning. The primary reasons for the paucity of data include the distance these areas from major population areas, limited public access point along the Strait, and the difficulty of accessing many locations due to the rugged nature of the coast or treacherous sea conditions that are often present. While collection of new information at these locations may be possible, careful planning and coordination with local agencies and entities will be essential to ensure the safety of research teams.

During this project, we also realized that some of the highly detailed resource information we discovered, while scientifically valuable, may not be necessary to support spill response decisions during the initial phases of an oil spill, as described in the Strait GRP. In many cases, the locations of sensitive aquatic resources are already known, and protection strategies are already in place. Detailed, georeferenced environmental data, however, is invaluable in establishing a current baseline or inventory that could be used to gauge post-spill resource damage, and enabling researchers to better understand the spatial and temporal trends for ecologically, commercially, or recreationally important aquatic resources along the Strait, and in identifying areas where data gaps exist that could be filled through citizen-science projects. The collection and archival of information in SoundIQ will also be helpful to local, State, and Federal resource agencies tasked with evaluating the potential effect of proposals for new water-related uses, assessing local and regional effects related to climate change, and providing information to guide shoreline management plan updates. Thus, we consider the collection and archival of environmental data along the Strait to be a "work in progress" that will benefit the citizens of Clallam County in many ways.

REFERENCES BY SUBTASK

Subtask 3.1- Existing GRP

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Hueckel, G.J. 1980. "Foraging on an artificial reef by three Puget Sound fish species." Wa. Dept. Fish. Tech. Rpt. 53. 110p. Not available online.

National Oceanic and Atmospheric Administration (NOAA). 2016. Beach Seine Data Along the Strait of Juan de Fuca: 2005 to 2015." NOAA Fisheries, Northwest Fisheries Science Center; contact: Kinsey Frick, kinsey.frick@noaa.gov

SoundIQ. Northwest Straits Commission. Suzanne Shull: sshull@padillabay.gov. http://www.nwstraits.org/our-work/soundiq/

Washington Department of Fisheries. 1992. "Salmon, marine fish and shellfish resources and associated fisheries in Washington's coastal and inland marine waters." Wa. Dept. Fish. Tech. Rpt. 79. 70p. Not available online.

Washington State Department of Ecology (WDOE). 2011. “Northwest Area Committee, Geographical Response Plan for the Strait of Juan de Fuca.” March 2003. Note: the electronic version of the GRP available at http://www.ecy.wa.gov/programs/spills/preparedness/GRP/StraitJuanDeFuca/strait_juan.htm indicates the most recent update was November 2011. This update involved removing the existing Chapter 3 and updating the table of contents and record of changes. Thus, the most recent substantial change to the GRP occurred on March 2003.

Task Number: 3.4

What was the goal of this project and did you accomplish it?
Increase the knowledge of the location and abundance of ecologically, commercially, or recreationally important marine and estuarine species along the Strait of Juan de Fuca to ensure oil spill response plans and subsequent actions are designed to protect these resources.

Please provide a list of measurable outcomes or accomplishments from this project (e.g. number of people trained, miles of shoreline restored, etc.):

A comprehensive beach seine data set covering 13 locations between Discovery and Freshwater Bay was uploaded into SoundIQ. A small dataset of marine debris removed from beaches along the Strait of Juan de Fuca was compiled and is ready to be uploaded into SoundIQ.

Please list the specific deliverables associated with this project (e.g. educational/outreach materials, monitoring protocol, summary report):

This report. One of the 2016 intern, Douglas Parks, worked on the GRP update project. He summarized his work into a poster that he presented at the Intern Celebration August 15, 2016.

Any difficulties encountered or lessons learned during the project? Arranging for meetings with local, State, Federal or Tribal resource managers was challenging during the summer, as most were engaged in field work. Future outreach activities will occur during the winter months.

If this task was part of an ongoing project, please provide a brief summary of the project to date, including initiation and expected completion dates, overall goals and anticipated outcomes: This project evolved from our initial interest in oil spill response preparedness and training. As noted in this report, we have made significant progress locating recent georeferenced data that can be used to support a future GRP update. We intend to continue this project in the coming FY and beyond, if possible, to keep local environmental data current on SoundIQ, continue partnerships and collaborations developed to date, and use the collected information to design citizen-science projects to fill data gaps

Were any other resources or funding leveraged for this project?

No other funding was used, but we did appreciate the help of the local/regional resource agencies, especially Kinsey Frick of NOAA Seattle, and the technical expertise of Suzanne Shull of SoundIQ.

Did you work with any partners or other MRCs to carry out this project? Yes- NWSC, NOAA, WDFW, and WDOE.
What are the regional cumulative significance/impacts/results of this project? This project helped provide a better understanding of baseline environmental conditions along the Strait of Juan de Fuca and identified areas where knowledge gaps exist. Baseline information can be used for a variety of purposes, including 1) supporting oil spill response planning, 2) assessing changes to local environments from anthropogenic and natural stressors, 3) supporting environmental impact assessments related to proposed or existing construction projects in nearshore areas, and 4) supporting shoreline master planning activities. All of these uses support those interested in better understanding the cumulative impacts of multiple stressors on nearshore environments.
Which NWSC Performance Benchmarks or PSP Near Term Actions does this project address? NWSC Goal 4: Educate local residents about the health of the NW Strait marine waters and habitat and provide opportunities for engagement.