

Please provide the following information, and submit to the NOAA DM Plan Repository.

Reference to Master DM Plan (if applicable)

As stated in Section IV, Requirement 1.3, DM Plans may be hierarchical. If this DM Plan inherits provisions from a higher-level DM Plan already submitted to the Repository, then this more-specific Plan only needs to provide information that differs from what was provided in the Master DM Plan.

URL of higher-level DM Plan (if any) as submitted to DM Plan Repository:

1. General Description of Data to be Managed

1.1. Name of the Data, data collection Project, or data-producing Program:

National Status and Trends: Mussel Watch Program - Resurrection Bay Database

1.2. Summary description of the data:

In response to the growing concerns among Native communities about the safety of subsistence shellfish, this project assessed the health risks associated with consuming softshell clams, mussels and cockles. The aforementioned shellfish were collected in traditional harvest area in Resurrection Bay, AK and analyzed for contaminant body burdens and for occurrences of pathogens and diseases. A broad suite of contaminants were analyzed including 55 Polycyclic Aromatic Hydrocarbons (PAHs), 27 chlorinated pesticides including DDT and its break-down products, 37 Polychlorinated Biphenyls (PCBs), 16 major and trace elements (Ag, Al, As, Cd, Cr, Cu, Fe, Hg, Mn Ni, Pb, Sb, Se, Sn and Zn), and tributyl-tin and its break-down products. The health of the subsistence shellfish were further characterized based on the presence an array of about 30 parasite taxa (e.g. bucephalus, chlamydia, ciliates, cestodes and nematodes) and occurrence of 11 diseases (e.g. MSX, tumors, neoplasm, edema and necrosis), which were quantified using prevalence and intensity computation. Results indicated that: - A great variation in metal body burdens among the different subsistence shellfish studied. Mercury was measured in all shellfish, but with the maximum value (0.2 ppm) found in blue mussels. Maximum tissue concentration for toxic metals such as chromium and Nickel were recorded in cockles. Maximum values for cadmium were found in mussels and softshell clams, while that of lead was found in the blue mussels. - Organic contaminants were detected in all subsistence shellfish although many of these compounds were banned more than three decades ago. - Metal and organic contaminant body burden were in general very low relatively to U.S. Food and Drug Administration guidelines for seafood safety. - Among the parasites assessed only large gill ciliates, small gill ciliates and gut rickettsia were detected in clam and blue mussels. - Among the bivalve diseases and tissue pathologies characterized in this study, digestive tubule atrophy was the most prevalent with 100% occurrence in cockles and mussels and about 96% in clams. Disease, such as ceroid bodies and histological condition such as diffuse and focal inflammations were also measured, but at relatively lower count than the digestive track atrophy. - In general, all infections and tissue pathology in the shellfish were

minor and the conditions do not appear to be either a threat to the health of the shellfish or to humans that consume them. As a part of this study interspecies concentration factors (ICFs) that relate chemical concentrations in mussels to those in subsistence shellfish, were determined. The intent is to use ICFs as factor to evaluate contaminant concentrations in a wide range of Alaskan shellfish based upon measurements obtained for one species, thereby eliminating the need to monitor all species. Concentration values for many compounds were low or not detected, but where possible ICFs were calculated. This project provides invaluable baseline chemical body burden data on shellfish species that is geo-referenced and posted on the internet through the NOAA's National Status and Trends data portal.

1.3. Is this a one-time data collection, or an ongoing series of measurements?

One-time data collection

1.4. Actual or planned temporal coverage of the data:

2009

1.5. Actual or planned geographic coverage of the data:

W: -149.5101, E: -149.3583, N: 60.1316, S: 59.967

1.6. Type(s) of data:

(e.g., digital numeric data, imagery, photographs, video, audio, database, tabular data, etc.)

1.7. Data collection method(s):

(e.g., satellite, airplane, unmanned aerial system, radar, weather station, moored buoy, research vessel, autonomous underwater vehicle, animal tagging, manual surveys, enforcement activities, numerical model, etc.)

1.8. If data are from a NOAA Observing System of Record, indicate name of system:

1.8.1. If data are from another observing system, please specify:

2. Point of Contact for this Data Management Plan (author or maintainer)

2.1. Name:

NCCOS Scientific Data Coordinator

2.2. Title:

Metadata Contact

2.3. Affiliation or facility:

2.4. E-mail address:

NCCOS.data@noaa.gov

2.5. Phone number:

3. Responsible Party for Data Management

Program Managers, or their designee, shall be responsible for assuring the proper management of the data produced by their Program. Please indicate the responsible party below.

3.1. Name:

NCCOS Scientific Data Coordinator

3.2. Title:

Data Steward

4. Resources

Programs must identify resources within their own budget for managing the data they produce.

4.1. Have resources for management of these data been identified?

4.2. Approximate percentage of the budget for these data devoted to data management (specify percentage or "unknown"):

5. Data Lineage and Quality

NOAA has issued Information Quality Guidelines for ensuring and maximizing the quality, objectivity, utility, and integrity of information which it disseminates.

5.1. Processing workflow of the data from collection or acquisition to making it publicly accessible

(describe or provide URL of description):

Process Steps:

- 2009-01-01 00:00:00 - Sample collection and data acquisition are described here:
Field Sampling Procedures: Three locations in Resurrection Bay were identified as traditional harvest areas. At each location, subsistence shellfish comprised of co-located cockles, blue mussels, and softshell clams were hand collected at low tide in edible sized proportions. The field team was trained to follow the standard quality control and quality assurance of the NSandT MWP protocol (Lauenstein and Cantillo, 1996). The shellfish were identified in the field based on local traditional knowledge using common (colloquial) names before a subsequent scientific identification (Foster, 1991). Identifying the subsistence shellfish with both local traditional and scientific names facilitates communication of the analytical results to resource managers and local communities. For each species, adults of roughly the same shell length were sampled to assure similar initial conditions among test organisms (Salazar et al., 1995). Sufficient numbers of shellfish were collected to ensure adequate sample size for chemical analysis and histopathology. Precautions were also taken to assure that the organisms are transported unstressed to the hatchery for the flow-through study. From the hatchery, test organisms were sent to

TDI Brooks in Texas for chemical analysis and Rutgers University, Haskin Shellfish Research Laboratory for histopathology analysis. Following the Mussel Watch quality control protocol for sampling and sample handling, a sample consists of a composite of 30 organisms put into labeled double Ziploc bags. For each species, three composite samples were collected at a time, one for each analytical method (trace elements, organics and histopathology), and kept chilled in an ice chest before shipment. Flow through system: Alutiiq Pride Shellfish Hatchery To effectively determine the interspecies concentration factors (ICFs), test organisms - adult market size shellfish (Salazar et al., 1995) - were to be brought to steady state concentration in a semi-controlled flow-through system. The Alutiiq Pride Shellfish Hatchery located in Resurrection Bay was used for the flow-through study. The hatchery facility is equipped with a tested and operational flow-through circulation system, which is owned and operated by the Alaskan Native communities of the Chugach region. The test species were placed separately into labeled nylon mesh bags or lantern nets (Figure 1), and deployed into a large flow-through chamber with circulating ambient water from the Bay. Mesh bags will be created from the commercially available tubular oyster netting used in aquaculture (ASTM, 2001). For each species, roughly 100 organisms were placed in each bag and labeled. It has been demonstrated that even if restrained within expandable mesh material, shellfish usually reposition themselves in the manner that allow them to use their filtration mechanisms efficiently (ASTM, 2001). Therefore after acclimatization, the test organisms are expected to survive in the flow-through chamber. In this assessment study, the test organisms were exposed to and acquired their food from water pumped from Resurrection Bay. Bay water was pumped into a holding tank before being dispensed to the flow-through chamber. The flow-through rate of the water was adjusted to correspond with 100% water exchange daily. This setting provided adequate filtration rates, but also contributed to eliminating most of the wastes generated by the test organisms. In addition, the flow-through rate of 100% was critical to ensure that water in the chamber was not oxygen depleted. (continued...)

- 2009-01-01 00:00:00 - (continued from above) The following describes the steps in sample collection. Step 1: background concentration An initial set of tissue samples was selected for analysis at the end of the field work. Those samples provided baseline information on the tissue contaminant content and histopathology of the test organisms. While the background analysis on contaminant body burden was conducted on single composite sample per species, the histopathology assessment was conducted on duplicated composites of all 4 species. This background information was used to assess the water quality in the subsistence harvest areas. Further, the background information was used to compare chemical concentrations between the traditional harvest areas and those of the study site. Step 2: steady state assessment After a month of acclimatization in the flow-through chamber, blue mussels and softshell clams from all three sites were sampled each month for a length of 5 months. This set of samples was collected to assess concentration change with time. Therefore, for cost saving purposes, the littleneck clams were used as

archetype of the clams in this step. Based on published data on mussels and clams, the body burden study state equilibrium was expected to be reached after three months of exposure (Salazar et al., 1995). However, the 5 months time period was conceptualized to ascertain that contaminant body burdens actually reached the steady state. Step 3: final contaminant body burden At the end of the fifth month following the acclimatization period, all 4 test species from the three sites were sampled for the final chemical analysis. Data from this analysis was used for comparison and ICF determination. A total of 38 individual composite tissue samples were collected and analyzed in addition to water parameters such as temperature, pH, dissolved oxygen and salinity, which was measured daily in the inflow chamber throughout the experiment. Chemical analysis Chemical analyses followed standard procedures used in the NOAA NSandT program (Kimbrough and Lauenstein 2007). A broad suite of chemicals were analyzed at each station, including metals, butyltins, PAHs, persistent organic compounds (PCBs, chlorinated pesticides, and the emerging flame retardant chemicals - PBDEs). a. Metals Samples were stored frozen until processed in the laboratory. Later, the samples were prepared for atomic absorption analysis (including cold vapor for mercury) and inductively coupled plasma mass spectrometric (ICP-MS) analysis by freeze drying and wet digestion. Dried samples were homogenized, weighed and digested in a sequence of heating steps in Teflon bombs with HNO₃, HF and, boric acid. For analysis of Hg, the samples were digested based on a modified version of EPA method 245.5, using a concentrated H₂SO₄ and HNO₃ digestion, followed by addition of KMnO₄, and K₂S₂O₈. Recalibration standards were run every 12 samples, and matrix modifiers were used as necessary. Quality control samples were processed in a manner identical to actual samples. A method blank was run with every 20 samples, or with every sample batch. Matrix spike/matrix spike duplicate (MS/MSD) samples were run with every 20 samples, or with every sample batch, also dependent upon whichever occurred most frequently. The spiking level was ten times the MDL. (continued...)

- 2009-01-01 00:00:00 - (continued from above) Reference materials were extracted and analyzed with each sample batch, while the method detection limit determined following the procedures outlined in CFR 40, part 136 (EPA, 2005). b. Organics (PAHs, PCBs, chlorinated pesticides) An aliquot of approximately 1 g of sample was weighed and oven dried at 63 - 56 degrees C to constant weight to determine wet/dry weight. For analyses, an aliquot of homogenized sample is chemically dried with sodium sulfate. After samples are spiked with surrogates the samples are extracted in a Soxhlet apparatus with dichloromethane on a hot sand bath for 8 hr and the extracts filtered through a funnel containing glass wool and sodium sulfate. The sample extract is then concentrated and solvent changed to about 2 ml of hexane. Silica gel/alumina column chromatography is utilized to concentrate and purify the samples before analysis. Quality control samples (method blank, matrix spike, and standard reference materials) was processed with each batch of samples in a manner identical to the samples, including matrix spikes. Quantification of PAHs and their alkylated homologues was performed by gas chromatography mass

spectrometry (GC/MS) in the selected ion monitoring (SIM) mode. Chlorinated hydrocarbons (chlorinated pesticides and PCBs, Tables 3 and 4) were quantitatively determined by capillary gas chromatography with an electron capture detector (ECD). The calibration solutions that were analyzed as part of the analytical GC/ECD run preceded by no more than six samples and no more than six samples were run between calibration mixtures. c. Organotins An aliquot of freeze dried tissue samples was weighed and appropriate amounts of surrogate standards were added to all samples, matrix spikes, and blanks. Samples were extracted three times by agitation with tropolone in dichloromethane. The sample extract was then concentrated in a hot water bath and the extract was centrifuged and further concentrated. The solvent was exchanged to hexane and concentrated to a final volume of about 10 - 20 ml at which point only hexane remained. Hexylmagnesium bromide (2 M; Grignard reagent) was added to the sample extract under nitrogen and heated to hexylate the sample. After separation from the organic phase, pentane:CH₂Cl₂ (3/1, v/v) was added to the aqueous phase and the sample shaken vigorously. The pentane:CH₂Cl₂ extraction was done twice. The hexylated extract was dried by addition of anhydrous Na₂SO₄ and then concentrated. The extract was purified using silica gel/alumina column chromatography and the eluent was collected and concentrated on a water bath. Quality control samples (method blank, matrix spike, and standard reference materials) was processed in a manner identical to actual samples. The method detection limit was determined following the procedures outlined in CFR 40, part 136 (1999). The quantitative method was based on high resolution, capillary gas chromatography using flame photometric detection (GC/FPD). The method allowed for determination of tetrabutyltin (4BT), tributyltin (TBT), dibutyltin (DBT) and monobutyltin (MBT) quantitatively. d. Polybrominated Diphenyl Ethers In addition to the contaminants listed above, the characterization of PBDEs, a class of persistent organic pollutants commonly used as flame retardants, was also quantified. Sample preparation and extraction are similar to those established for PCBs. Selected PBDE congeners were measured using GC/MS in selected ion monitoring mode (SIM) coupled with capillary column. The method is capable of detecting PBDEs in complex matrices. (continued...)

- 2009-01-01 00:00:00 - (continued from above) Sample extracts were injected into a temperature-programmed GC/MS, operated in splitless mode. The capillary column was a DB-XLB (30 m x 0.25 mm ID and 0.1 um film thickness). The mass spectrometer was capable of scanning from 53 to 500 AMU every second or less and used 70 electron volts energy in electron impact ionizing mode. Quality control samples (method blank, matrix spike, and standard reference materials) was processed with each batch of samples in a manner identical to the samples, including matrix spikes. PBDEs have been identified as emerging contaminants of concern for ecosystems throughout the US by USEPA. PBDE has been found in Canadian and Alaskan fish and wildlife and was assumed to be of long distance atmospheric source (Braune et al., 2005). However these contaminants have not been extensively characterized for the Gulf of Alaska ecosystem nor have they been considered under any of the restoration strategies. The partnership with the NOAA

NSandT is critical to these efforts because the program has developed appropriate techniques to evaluate PBDEs in tissue. e. Histopathology analysis In addition to the emphasis on the persistent contaminants listed above, the characterization of the histopathology of the targeted subsistence shellfish was also proposed. The histological analysis was performed at Rutgers University by the Haskin Shellfish Research Laboratory. It is a set of quantitative and semiquantitative analyses that determine the reproductive stage of, and occurrence of pathologies in shellfish. A detailed account of the protocol is described in the NOAA's NOS/NCCOS technical memorandum number 27 by Kim et al. (2006). From each sample composites, 5 individual organisms were randomly selected and prepared for the analysis. For both gonadal index and histopathology parameters (Table 7) analyses were conducted on paraffin-embedded tissues sectioned at a 5-micrometer thickness using microtome. After placing the sections onto slides, the paraffin was gently removed and the tissues hydrated using xylenes-ethanol series before being stained using a pentachrome staining procedure. Each slide was examined microscopically to determine the animal's sex and stage of gonadal development. Also the infection intensity of parasites, the occurrence and extent of tissue pathologies, and the intensity of diseases was recorded using quantitative or semi-quantitative measures. (end continuation)

- NAME OF DERIVED VALUES Organic contaminants: chemicals with similar structural properties were summed and reported as "Totals" (O'Connor 1994 and 1996). The components of these totals are as follows: Total DDT = sum of concentrations of ortho and para forms of parent and metabolites 2,4'DDE; 4,4'DDE; 2,4'DDD; 4,4'DDD; 2,4'DDT and 4,4'DDT. Total Chlordane = sum of concentrations of four compounds alpha-chlordane, trans-nonachlor, heptachlor, heptachlorepoxide. Total Dieldrin = sum of concentrations of two compounds aldrin and dieldrin. Total Butyl tin = sum of concentrations of parent compound and metabolites monobutyltin, dibutyltin, tributyltin, [concentrations are in terms of tin]. Total PAHs = sum of measured PAHs. Total measured PCBs = PCB8/5, PCB103, PCB18, PCB28, PCB29, PCB31, PCB44, PCB45, PCB49, PCB52, PCB56/60, PCB66, PCB70, PCB74/61, PCB87/115, PCB95, PCB99, PCB101/90, PCB105, PCB110/77, PCB118, PCB128, PCB138, PCB146, PCB149/123, PCB151, PCB153/132/168, PCB156/171/202, PCB158, PCB170/190, PCB174, PCB180, PCB187, PCB183, PCB194, PCB195/208, PCB198, PCB201/173/157, PCB206, PCB209.

- O'Connor, T.P. (1994). The national oceanic and atmospheric administration (NOAA) national status and trends mussel watch program: national monitoring of chemical contamination in the coastal United States. In Cr. Sothorn and N.P. Ross (eds), Environmental statistics, assessment, and forecasting (pp. 331-349). Boca Raton, FL. Lewis Publishers O'Connor, T.P. (1996) Trends in chemical concentrations in mussels and oysters collected along the US coast from 1986 to 1993. Marine Environmental Research, 41, 183-200.

5.1.1. If data at different stages of the workflow, or products derived from these data, are subject to a separate data management plan, provide reference to other

plan:

5.2. Quality control procedures employed (describe or provide URL of description):

6. Data Documentation

The EDMC Data Documentation Procedural Directive requires that NOAA data be well documented, specifies the use of ISO 19115 and related standards for documentation of new data, and provides links to resources and tools for metadata creation and validation.

6.1. Does metadata comply with EDMC Data Documentation directive?

No

6.1.1. If metadata are non-existent or non-compliant, please explain:

Missing/invalid information:

- 1.6. Type(s) of data
- 1.7. Data collection method(s)
- 4.1. Have resources for management of these data been identified?
- 4.2. Approximate percentage of the budget for these data devoted to data management
- 5.2. Quality control procedures employed
- 7.1. Do these data comply with the Data Access directive?
 - 7.1.1. If data are not available or has limitations, has a Waiver been filed?
 - 7.1.2. If there are limitations to data access, describe how data are protected
- 7.2. Name of organization of facility providing data access
 - 7.2.1. If data hosting service is needed, please indicate
- 7.3. Data access methods or services offered
- 7.4. Approximate delay between data collection and dissemination
- 8.1. Actual or planned long-term data archive location
- 8.3. Approximate delay between data collection and submission to an archive facility
- 8.4. How will the data be protected from accidental or malicious modification or deletion prior to receipt by the archive?

6.2. Name of organization or facility providing metadata hosting:

NMFS Office of Science and Technology

6.2.1. If service is needed for metadata hosting, please indicate:

6.3. URL of metadata folder or data catalog, if known:

<https://www.fisheries.noaa.gov/inport/item/39072>

6.4. Process for producing and maintaining metadata

(describe or provide URL of description):

Metadata produced and maintained in accordance with the NOAA Data Documentation Procedural Directive: https://nosc.noaa.gov/EDMC/DAARWG/docs/EDMC_PD-

Data_Documentation_v1.pdf

7. Data Access

NAO 212-15 states that access to environmental data may only be restricted when distribution is explicitly limited by law, regulation, policy (such as those applicable to personally identifiable information or protected critical infrastructure information or proprietary trade information) or by security requirements. The EDMC Data Access Procedural Directive contains specific guidance, recommends the use of open-standard, interoperable, non-proprietary web services, provides information about resources and tools to enable data access, and includes a Waiver to be submitted to justify any approach other than full, unrestricted public access.

7.1. Do these data comply with the Data Access directive?

7.1.1. If the data are not to be made available to the public at all, or with limitations, has a Waiver (Appendix A of Data Access directive) been filed?

7.1.2. If there are limitations to public data access, describe how data are protected from unauthorized access or disclosure:

7.2. Name of organization of facility providing data access:

7.2.1. If data hosting service is needed, please indicate:

7.2.2. URL of data access service, if known:

<https://products.coastalscience.noaa.gov/collections/ltmonitoring/nsandt/default.aspx>
<https://products.coastalscience.noaa.gov/collections/ltmonitoring/nsandt/default.aspx>

7.3. Data access methods or services offered:

7.4. Approximate delay between data collection and dissemination:

7.4.1. If delay is longer than latency of automated processing, indicate under what authority data access is delayed:

8. Data Preservation and Protection

The NOAA Procedure for Scientific Records Appraisal and Archive Approval describes how to identify, appraise and decide what scientific records are to be preserved in a NOAA archive.

8.1. Actual or planned long-term data archive location:

(Specify NCEI-MD, NCEI-CO, NCEI-NC, NCEI-MS, World Data Center (WDC) facility, Other, To Be Determined, Unable to Archive, or No Archiving Intended)

8.1.1. If World Data Center or Other, specify:

8.1.2. If To Be Determined, Unable to Archive or No Archiving Intended, explain:

8.2. Data storage facility prior to being sent to an archive facility (if any):

National Centers for Coastal Ocean Science - Silver Spring, MD

8.3. Approximate delay between data collection and submission to an archive facility:

8.4. How will the data be protected from accidental or malicious modification or deletion prior to receipt by the archive?

Discuss data back-up, disaster recovery/contingency planning, and off-site data storage relevant to the data collection

9. Additional Line Office or Staff Office Questions

Line and Staff Offices may extend this template by inserting additional questions in this section.