

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:

AFSC/RACE/SAP/Swiney: Red king crab fecundity and embryo and larval quality

1.2. Summary description of the data:

Stock assessment of Alaskan red king crab, *Paralithodes camtschaticus* (Tilesius, 1815), can be improved by incorporating reproductive output, which requires an understanding of the size-fecundity relationship, interannual and seasonal variability in fecundity, and maternal size effects on embryo and larval quality. We collected red king crab egg clutches from Bristol Bay, Alaska, in summer of 2007-2010 and autumn of 2007-2009 and estimated fecundity. A monitoring project examining the size-fecundity relationship began in 2012 and data is collected every other year. In June 2009 and 2010 we collected embryo clutches of recently extruded red king crab embryos in Bristol Bay, Alaska, to assess embryo quality based on dry weight, carbon and nitrogen content. To assess larval quality, we collected ovigerous females from Bristol Bay in 2007 and reared them in the laboratory until larval hatching in 2008. Larval quality based on dry weight, carbon and nitrogen content, and time to 50% mortality under starvation conditions was assessed.

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:

2007-06 to 2012-07

1.5. Actual or planned geographic coverage of the data:

W: -168, E: -157, N: 58.65, S: 54.6
Bristol Bay, Alaska.

1.6. Type(s) of data:

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

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:

Katherine Swiney

2.2. Title:

Metadata Contact

2.3. Affiliation or facility:

2.4. E-mail address:

katherine.swiney@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:

Katherine Swiney

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?

No

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

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:

- To compare inter-annual and seasonal variability in red king crab fecundity, egg clutches of ovigerous females were collected from Bristol Bay, Alaska, in summer and autumn. Summer samples were collected during June to July 2007, 2008, 2009, 2010 and 2012 during bottom trawl surveys conducted by NMFS and autumn samples were collected during October to November 2007, 2008, and 2009 by observers from sampled bycatch aboard pot (trap) vessels during the commercial fishery. In summer 2007, ovigerous females were sampled from 10-mm size bins between 90 and 140 mm CL and samples were preserved at sea in 10% buffered formalin. For the rest of the collections, ovigerous females were sampled from 10-mm size bins between 80 and 150+ mm CL and samples were frozen at sea. For all of the collections, ovigerous females were haphazardly collected until 20 clutches per size bin were attained regardless of clutch size. In summer samples, only females that recently extruded eggs and were brooding uneyed embryos were collected. Samples were collected by either carefully removing the abdominal flap with attached embryos and placing the abdomen in a cloth bag or by placing the entire female with the legs removed in a plastic bag. In either case, the bags were closed in a way to prevent embryo loss. Upon collection, female carapace length were measured to the nearest 1.0 mm, and clutch fullness were recorded using the methods of Donaldson and Byersdorfer (2005).
- Fecundity was determined using dry weight methods modified from Otto et al. (1990). Embryos were carefully stripped off the pleopods and then two random samples of 250 embryos were counted. The subsamples and remaining embryos were dried at 60°C until a constant weight was achieved. Fecundity was estimated by dividing the total dry weight of embryos by the average of the two estimates of individual embryo dry weight obtained from the subsamples.
- To determine the percentage of embryos that was viable, clutches were examined for the presence of non-viable embryos in summer 2008 and 2009 and autumn 2007, 2008, and 2009. Non-viable eggs were identified by abnormal shape, color, asymmetrical cell cleavage in summer samples and absence of an eyed-embryo in autumn samples. For recently extruded eggs, freezing and formalin preservation prevented determination of embryo viability. So, for summer collections a random sample of fresh embryos were removed from a subset of the females collected for fecundity estimation and placed in labeled vials of seawater. Vials were kept chilled while at sea and examined under a dissecting microscope immediately upon arrival at the laboratory. In the autumn, all clutches with eyed embryos were examined for the percentage of viable embryos which was determined from the two subsamples of 250 embryos counted for fecundity estimation. If embryo eyes could not be seen macroscopically, then embryos were examined microscopically to determine viability.

- To examine maternal size effects and inter-annual variability in embryo quality, embryo clutches of ovigerous females were collected from Bristol Bay, Alaska, in June 2009 and 2010 during the National Marine Fisheries Service (NMFS) bottom trawl survey in the eastern Bering Sea. A subset of samples collected for the fecundity study were examined for embryo quality. Ten samples from 3 size bins (86-95 mm, 111-120 mm, and 136-145 mm CL) for a total of 30 were randomly chosen from the fecundity collections. Only females that recently extruded eggs and were brooding uneyed embryos were chosen. Samples were collected at sea by carefully removing the abdominal flap with embryos attached and placing the abdomen into a sealed cloth bag to ensure that no embryos were lost, and then frozen.

- We assessed embryo quality by measuring embryo dry weights, carbon content, and nitrogen content. To estimate embryo dry weight and fecundity, embryos were carefully stripped off of the pleopods and then two random samples of 250 embryos each were counted. The subsamples and remaining clutch were dried at 60°C until a constant weight was achieved. Individual embryo weights were calculated for each subsample and averaged to obtain the mean embryo dry weight for an individual crab. Fecundity was estimated by dividing the total dry weight of all embryos by the mean embryo dry weight. From each female, a few hundred embryos were dried, finely ground to a powder, and approximately 0.2 g of sample were sent to an analytical laboratory for carbon and nitrogen content analysis using the Dumas combustion method with an automated organic elemental analyzer (Gnaiger and Bitterlich, 1984).

- To assess maternal size effects on larval quality, live ovigerous red king crab were collected from Bristol Bay, Alaska, November 2007 by onboard observers during the commercial fishery. Crab were shipped to the NMFS Kodiak Seawater Laboratory where they were reared in a tank with flow-through, sand-filtered seawater. The seawater was chilled to approximate monthly average Bristol Bay bottom temperatures ranging from 1.7 to 4.4° C (mean = 2.7° C, SD = 0.8). Crab were fed ad libitum a diet of fish and squid biweekly. At the beginning of April 2008 each crab was transferred to an individual tub with flow-through seawater and netted outflows to monitor hatching. When an individual crab hatched approximately 500 larvae, the female was moved to a non-flow-through tub overnight to collect viable larvae for experiments; larvae were damaged in nets of the flow-through tubs and therefore not viable for experiments. The tub was placed in a bigger tank with flowing water that served as a water bath to maintain the proper water temperature in the tub; additionally an airstone was placed in the tub to oxygenate the water. In the morning active, phototactic larvae were collected for the experiments. Larvae from 35 females of sizes 93-134 mm CL were used in starvation survival experiments to measure larval fitness. Twenty-five larvae from each female were collected and used in each of 3 replicates, for a total of 75 larvae per each of the 35 females. For each replicate, 25 larvae were placed in a 10.16 cm diameter PVC tube with 650 micron mesh glued to the bottom. The PVC tubes were placed in 2 L beakers filled with UV sterilized filtered seawater. The experiments were conducted in a cold room at 8° C with a cycle of 12 hours light (1.4 lux) and 12

hours dark. Water was changed biweekly and larvae were not fed. Beakers were checked daily for molts and mortalities. A larva was considered dead when it had no color and did not move when observed in a pipette for 10 seconds. Lethal time to 50% mortality (LT50) was calculated as the average number of days when at least 50% mortality was observed. Larvae from each of the female crab used in the starvation experiment were collected upon hatching and dried at 60°C until a constant weight was achieved for measurements of dry weight and carbon and nitrogen analysis. Twenty dried larvae per female were weighed individually and averaged to estimate mean larval weight at the start of the survival experiments. From each female, a few hundred larvae were dried, finely ground to a powder, and approximately 0.2 g of sample were sent to an analytical laboratory for carbon and nitrogen content analysis, as described above for embryos.

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):
unknown

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:

- 1.7. Data collection method(s)
- 7.2. Name of organization of facility providing data access

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/24260>

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?

No

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?

No

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

Contact Point Of Contact for data request form.

7.2. Name of organization of facility providing data access:

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

yes

7.2.2. URL of data access service, if known:

https://console.cloud.google.com/storage/browser/nmfs_odp_afsc/RACE/SAP/Swiney%3B%20Red%20

7.3. Data access methods or services offered:

unknown

7.4. Approximate delay between data collection and dissemination:

unknown

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

No delay

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)

NCEI_MD

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):

Alaska Fisheries Science Center - Seattle, WA

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

Unknown

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

IT Security and Contingency Plan for the system establishes procedures and applies to the functions, operations, and resources necessary to recover and restore data as hosted in the Western Regional Support Center in Seattle, Washington, following a disruption.

9. Additional Line Office or Staff Office Questions

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