

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/Long: Data from: Effects of Ocean Acidification on Juvenile Red King Crab (*Paralithodes camtschaticus*) and Tanner Crab (*Chionoecetes bairdi*) Growth, Condition, Calcification, and Survival

### 1.2. Summary description of the data:

This data set is the results of a laboratory experiment. Juvenile red king crab and Tanner crab were reared in individual containers for nearly 200 days in flowing control (pH 8.0), pH 7.8, and pH 7.5 seawater at ambient temperatures (range 4.4-11.9 C). Survival, growth, and morphology were measured throughout the experiment. At the end of the experiment, calcium concentration was measured in each crab and the dry mass and condition index of each crab were determined.

### 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:

2010-06 to 2010-12

### 1.5. Actual or planned geographic coverage of the data:

W: -152.395268, E: -152.395268, N: 57.782403, S: 57.782403  
Kodiak Fisheries Research Center

### 1.6. Type(s) of data:

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

### 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:**

Metadata Coordinators MC

**2.2. Title:**

Metadata Contact

**2.3. Affiliation or facility:****2.4. E-mail address:**

AFSC.metadata@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:**

Chris Long

**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:

- For this experiment, we used filtered seawater pumped into the laboratory from Trident Basin (Kodiak, AK). The experimental setup used flow-through water at ambient temperature and salinity. As we did not control temperature, the conditions the crabs were exposed to mimicked the natural fluctuations to which crabs would naturally be exposed. We used seawater acidified with CO<sub>2</sub> to pHs based on projected future levels of atmospheric CO<sub>2</sub> and the predicted change in seawater pH associated with it: 1) ambient pH (about 8.0), 2) 7.8 pH c. 2100, and 3) 7.5 pH c. 2200. To obtain the desired treatment levels CO<sub>2</sub> was bubbled in ambient local seawater to a pH of 5.5. This water was mixed with seawater to the treatment pHs using a peristaltic pump whose speed was controlled by a pH probe in a head tank similar. Water from the head tank was supplied to the experimental containers. When the measured pH in the experimental containers deviated from the nominal pH levels by more than 0.02 units the settings on the pH probe were adjusted accordingly.

- Red king crabs were supplied by the Alutiiq Pride Shellfish Hatchery. Ovigerous red king crabs were captured in Bristol Bay, Alaska, in commercial pots during the winter of 2009. Larvae were reared to the first crab stage before being transported to the Kodiak lab in insulated shipping containers. Juvenile Tanner crabs were caught in a modified benthic sled with a 1 m mouth opening in local Kodiak waters. Throughout the experiment, the crabs were fed to excess on a gel diet of “Gelly Belly” (Florida Aqua Farms, Inc., Dade City, Florida, USA) with Cyclop-eeze powder and pollock bone powder (United States Department of Agriculture, Agricultural Research Service, Kodiak, Alaska, USA). Crabs were fed three times a week and old food was removed just prior to feeding. The experiment was performed in three tanks (120 (L) x 60 (W) x 60 (H) cm), each of which was randomly assigned a treatment. Ninety crabs per species were randomly assigned to each of three treatments (30 crabs per species per treatment). Each crab was placed in an individual holding cell made of a piece of PVC pipe (diameter 5.1 cm) with mesh glued on the bottom. Flow-through water from the head tanks was provided to each cell. The Tanner crab experiment was started on June 4, 2010, and the red king crab experiment on June 10, 2010. Daily, five randomly selected cells per treatment were monitored for pH and temperature. pH was measured using a Ross Combination glass bulb pH electrode (Thermo Electron Corporation, Beverly, MA) calibrated with Tris buffer on the pHF scale. Weekly water samples were taken from the head tanks, poisoned with mercuric chloride, and sent to an analytical laboratory for salinity, dissolved inorganic carbon (DIC), and alkalinity analysis. DIC was determined using a CM5014 Coulometer with a CM5130 Acidification Module (UIC Inc., Joliet, IL) using Certified Reference Material from the Dickson Laboratory (Scripps Institute, San Diego, CA). Alkalinity was measured via open cell titration. Crabs were checked daily for molting or death. Dead crabs and exuvia were removed from the tanks for morphometric analysis. The carapace from each exuvia and dead crab was carefully removed and photographed under a stereomicroscope. Partway through the experiment, we noted that it had become difficult to remove the carapace off dead crabs, particularly in the low pH treatments, so we started photographing

dead crabs before attempting to remove the carapace. If successful, we photographed the carapace as well and used that for image analysis; otherwise, we used the image of the dead crab. Image analysis was performed using Image-Pro Plus v. 6.00.260 imaging software (Media Cybernetics, Inc., Bethesda, Maryland, USA) calibrated with a micrometer. On red king crab we measured carapace width, carapace length, rostrum base width, orbital spine width, and the first spine length. On Tanner crab, we measured carapace width (CW), carapace length (CL), carapace length to the rostrum, carapace length to the eye orbit, rostrum base width, rostrum length, orbital spine width, and orbital spine length. The wet mass of each crab, after it was carefully blotted dry, was measured at the beginning of the experiment and 7 days after each molt. The experiments were ended on December 20, 2010, when temperatures had dropped low enough that the crabs were no longer molting frequently. At the end of the experiment, all crabs were sacrificed by freezing. The crabs were imaged for morphometric analysis as above. Each crab was dried to a constant mass at 60 C to obtain the dry mass. Calcium, magnesium, potassium, and sodium content in each crab was determined at an analytical laboratory using a Dionex Ion Chromatography system. The conditions of the crab at the end of the experiment were calculated as the condition index (also known as the body mass index) defined as the dry mass in grams divided by the  $CL^3$  (red king crab) or  $CW^3$  (Tanner crab) in millimeters.

**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):**

All data was checked for accuracy, examined for outliers, and data outside of the range.

## 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/26895>

**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](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:**

There are no legal restrictions on access to the data. They reside in public domain and can be freely distributed.

**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/Long%3B%20Data%20fr](https://console.cloud.google.com/storage/browser/nmfs_odp_afsc/RACE/SAP/Long%3B%20Data%20fr)

**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.*