Data Management Plan

Outline of data to be obtained in proposed research project: Collaborative Research: Mechanisms of resistance and resilience to system-wide loss of a keystone predator in an iconic intertidal community

1. Types of data to be collected will include:
(1) Community surveys, taken to quantify patterns of low intertidal community structure and diversity at up to 18 sites from central Oregon to southern California. These will be based on 10 1 m2 plots that are permanently marked at each study site, and monitored both photographically and directly in the field. Data yielded would be percent cover of all algae and sessile invertebrates.
(2) Documentation of changes in mussel cover in 10 m wide "sectors" will be done photographically three times per year. Data will be an archive of the photographs.
(3) Quantifying downward movement of mussel beds. Measurements of change through time at all study sites, including ancillary sites, will be taken seasonally. Data will be downward distance in m at each of the 10 transects at each site.
(4) Densities and sizes of invertebrate predators counted in the same plots as (1)(whelks, *Leptasterias*) or in 2 x 10 m "belt" transects (for sea stars). Because of the infusion of many sea star recruits, belt transects require careful close examination of the area included in each belt, and are time-consuming. Data will be counts and sizes measured as shell length (whelks) or arm length and weight (sea stars).
(5) Numbers and species of sea birds. These will be counted first from distance, and then, as field crews enter the study site on foot, birds missed will be added to the counts. Only birds known to prey on mussels will be counted, including oystercatchers, sea gulls, crows, and surfbirds. Data will be counts per sample date by species.
(6) Sessile invertebrate recruitment. Monthly deployments of standard collectors for mussels and barnacles at each core study site, to be done for three years. Data will be number of mussels or barnacles per collector per month.
(7) Sessile invertebrate colonization. Annual abundance of mussels and barnacles in cleared and uncleared 0.25 m2 plots. Data will be percent cover of all sessile organisms, but particularly mussels and barnacles, identified to species.
(8) Sea star recruitment. Recruits are determined by size, and data will come from the belt transects. Data will be the proportion of recruits occurring in spring and summer samples taken at all core sites.
(9) Sea star wasting. We will conduct surveys at each site that document the occurrence of sea star wasting, including tracking the symptoms of all diseased sea stars. Data will include numbers of sea stars surveyed, life stage (recruit, juvenile, adult) and symptom.
(10) Experimental removal of mussels invading low intertidal. Data will include percent cover of mussels and other sessile organisms by sample data of each 0.25 m2 plot of each treatment (+mussels or – mussels).
(11) Experiments testing effects of whelks x *Leptasterias*. Data will include percent cover of all sessile organisms in each experimental unit of each treatment, the number and identification of species invading each, and densities and size of whelks and *Leptasterias* in the vicinity of the experiment.
(12) Experiments testing effects of invertebrate predators x birds (seagulls, crows, oystercatchers, surfbirds) on sessile organisms. Data will include percent cover of all sessile organisms in each experimental unit of each treatment.
(13) Mussel growth. Annual translocation of mussel clumps (50/clump) with five replicates per site at all sites. Mussels are marked, outplanted, collected after 12 months, and sampled for shell and tissue growth. Data will be mm growth per month divided by initial shell length.
(14) Recruitment facilitation of mussels by barnacle and algal turf mimics. Data will be number of mussels recruiting to each treatment (high vs. low rugosity of barnacle mimics, high vs. low density of turf "fronds") of the two types of surface.

(15) Sea star diets. Prey being consumed by sea stars will be quantified twice annually at each study site, using the sea stars collected during the belt transects.
(16) Predation rate. Data will be number and percent of mussels surviving in each of the five treatments at each biweekly sample date.
(17) Environmental measures. We will monitor air and seawater temperatures, phytoplankton abundance and nutrients at each site. Data will be hourly mean air and seawater temperatures, chlorophyll-a (micrograms/l) and micromolar NO3, NO2, PO4, and SiO4.

2. Standards to be used for data and metadata format and content are those of DataONE and PISCO (see below).

3. Policies for access and sharing. All data but those involved in graduate thesis research will be available within a year or sooner of collection. Thesis-related data will be made available upon publication, or within 3 years of collection, whichever comes sooner.

4. Policies and provisions for re-use, re-distribution and production of derivatives. See 3 above; no limits but those involved in thesis research.

5. The overall data management framework for this project will involve the use of Biological and Chemical Oceanography Data Management Office (BCO-DMO) as the primary metadata catalog and where appropriate, data storage and access portal. The core data management objectives will be to archive and make accessible data sets from ecological and experimental studies as coupled, cross-referenced data resources. Metadata and data will be hosted by BCO-DMO, the PISCO database (http://www.piscoweb.org/DataCatalogAccess/DataCatalogAccess.html), and Data One. For datasets that are not directly hosted by BCO-DMO, access will be provided through web links made available through the BCO-DMO portal. BCO-DMO will submit metadata and data to the NODC for long-term archiving as per policy.

The PISCO database is replicated on DataONE (http://www.dataone.org): The PISCO (Partnership for Interdisciplinary Studies of Coastal Oceans) has existed since 1999, and data generated by the research conducted by the four academic institutions (OSU, UCSC, UCSB, Hopkins Marine State of Stanford University) are archived in the database.

6. Outreach. Material relating to public dissemination of wasting syndrome, including publications, podcasts, any available recorded lectures, microdocumentaries, film and TV appearances when available and any other recorded media will be made available on the PISCO data portal.