

Update Report

Period 2/1/2013 - 1/31/2014

Project R/LME/N-5 - Planning for sustainable shellfish aquaculture in complex multiple use environments Determining social and ecological carrying capacity for south Puget Sound, Washington

STUDENTS SUPPORTED

Abdulghani, Lisa, labdulghani@gmail.com, The Evergreen State College, no department, status new, field of study Environmental Science, advisor Gerardo Chin-Leo, degree type BA, degree date 2014-09-01, degree completed this period No
Student Project Title NA

Involvement with Sea Grant This Period Intern & work study, involved with a variety of tasks related to project

Post-Graduation Plans Not yet determined

King, Derek, NA, The Evergreen State College, no department, status new, field of study Marine studies, advisor Erik Thuesen, degree type BS, degree date 2013-12-01, degree completed this period Yes
Student Project Title The responses of oyster drills to acidified water

Involvement with Sea Grant This Period Intern, working on various projects with PSI

Post-Graduation Plans Continuing with graduate studies

CONFERENCES / PRESENTATIONS

Growers workshop to present the FARM model, public/profession presentation, 20 attendees, 2013-07-20

PCSGA/National Shellfisheries Association meeting, public/profession presentation, 200 attendees, 2013-09-30

Sea Grant facilitated workshop for present Ecohab model to selected stakeholders, SG-sponsored, 50 attendees, 2013-03-15

ADDITIONAL METRICS

K-12 Students Reached	0	Acres of degraded ecosystems restored as a result of Sea Grant activities	0
Curricula Developed	0	Resource Managers who use Ecosystem-Based Approaches to	0

		Management
		HACCP - Number of people with new certifications 0
Volunteer Hours	1040	
Responding to survey (~800 hr) attending stakeholders workshops (~240 hr).		
Cumulative Clean Marina Program - certifications	0	

PATENTS AND ECONOMIC BENEFITS

Description	Patents	Economic Benefit (\$)	Businesses Created	Businesses Retained	Jobs Created	Jobs Retained
None	Actual	0	0	0	0	0
	(2/1/2013 - 1/31/2014)					
	Anticipated	0	0	0	0	0
	(2/1/2014 - 1/31/2015)					

TOOLS, TECH, AND INFORMATION SERVICES

No Tools, Tech, or Information Services Reported This Period

HAZARD RESILIENCE IN COASTAL COMMUNITIES

Name of coastal community	County	Number of resiliency trainings / technical assistance services provided	Was community hazard resiliency improved (e.g., via changes in zoning ordinances) ?
None		Actual (2/1/2013 - 1/31/2014)	0
		Anticipated (2/1/2014 - 1/31/2015)	0
			Yes

ADDITIONAL MEASURES

Safe and sustainable seafood

Number of stakeholders modifying practices

Actual (2/1/2013 - 1/31/2014) 0

Anticipated (2/1/2014 - 1/31/2015) 0

Number of fishers using new techniques

Actual (2/1/2013 - 1/31/2014) 0

Anticipated (2/1/2014 - 1/31/2015) 0

Not yet determined
Sustainable Coastal Development
Actual (2/1/2013 - 1/31/2014) 0
Anticipated (2/1/2014 - 1/31/2015) 0
Not yet determined

Not yet determined
Coastal Ecosystems
Actual (2/1/2013 - 1/31/2014) 0
Anticipated (2/1/2014 - 1/31/2015) 0
Not yet determined

PARTNERS

No Partners Reported This Period

IMPACTS AND ACCOMPLISHMENTS

Title Washington Sea Grant investigates social and ecological carrying capacity for shellfish aquaculture

Type accomplishment

Description Relevance Washington is the nation's leading producer of farmed bivalve shellfish, producing about 40,000 metric tons valued at more than \$100 million annually. At the same time, the Puget Sound region is developing rapidly, with an anticipated expansion to a population of 5.3 million by 2025. Friction between shoreline residents and shellfish growers has grown in recent years and assessment of the regional carrying capacity could inform difficult management decisions. Response With national strategic initiative funding, Washington Sea Grant-supported researchers began an assessment of south Puget Sound's production, ecological, and social carrying capacity for shellfish aquaculture. They collected farm production records and shellfish species metrics, industry assessments of aquaculture-related policies and regulations, and information on regional constraints and incentives. They also reviewed nutrient and dissolved-oxygen models, examined model outputs, and initiated ongoing research into nitrogen removal and natural shellfish recruitment at one inlet. They held the first of three planned stakeholder meetings and disseminated the project's goals via an article in the Pacific Coast Shellfish Growers Association's newsletter and a flyer distributed at its joint annual meeting with the National Shellfisheries Association. Results Information from a variety of sources will be integrated into an ecosystem model that will allow the industry and managers to identify and evaluate social and environmental considerations for aquaculture development in South Puget Sound. The model will build upon and complement other research under another national strategic initiative that is ongoing.

Recap Washington Sea Grant-supported research investigated the physical conditions and coastal-community views that determine ecological and social carrying capacity for shellfish aquaculture.

Comments Secondary Focus Areas COCC (SCD) State Goals Support conservation and sustainable use of living marine resources through effective and responsible approaches, tools, models and information for harvesting wild and cultured stocks and preserving protected species (SSSS Industry). Assist coastal communities and marine-dependent businesses in planning and making decisions that provide local and regional economic benefits, increase resilience and foster stewardship of social, economic and natural resources (SCD Inter-relationships).

Related Partners none

PUBLICATIONS

Title Determining social and ecological carrying capacity for South Puget Sound

Type General Public and Advisory Reports, Fact Sheets, Posters Publication Year
2013 Uploaded File [CC_one_pager.pdf](#) URL none

Abstract None

Citation Pacific Shellfish Institute. 2013. Determining social and ecological carrying capacity for South Puget Sound. Informal informational brochure. Olympia, Washington.

Copyright Restrictions + Other Notes

Journal Title none

OTHER DOCUMENTS

No Documents Reported This Period

LEVERAGED FUNDS

No Leveraged Funds Reported This Period

UPDATE NARRATIVE

Uploaded File [Cheney_1729_update_nar....8.pdf](#)

WASHINGTON SEA GRANT PROGRESS REPORT

Year 1 -- for the period 2/1/2013 – 1/31/2014

Project Title: NOAA Sea Grant Aquaculture Research Program: Planning for sustainable shellfish aquaculture in complex multiple use environments: Determining social and ecological carrying capacity for south Puget Sound, Washington

Principal Investigator and Affiliation:

Daniel Cheney, Pacific Shellfish Institute / (360) 754-2741 / cheney@pacshell.org

Co-Investigators and Affiliations:

Joao Ferreira, Longline Environment, Ltd. / +351 96902 1264 / joao@hoomi.com

Teri King, Wash. Sea Grant Extension / (360) 432-3054 / guatemal@uw.edu

David Preikshot, Dept. of Fisheries & Oceans, Canada / (250) 715 1771 / Dave.Preikshot@dfo-mpo.gc.ca

Mindy Roberts, Washington Dept. of Ecology / (360) 407-6804 / mrob461@ecy.wa.gov

John Tarnai, WSU Social & Economic Research Center / (509) 335-1511 / tarnai@wsu.edu

Suzanne Bricker, NOAA National Ocean Service / (301) 713-3020 x139 / suzanne.bricker@noaa.gov

1. ACCOMPLISHMENTS AND OUTCOMES

Objective 1: Calculate production and ecological carrying capacity at the farm scale

Task: Model the effects of shellfish production on key ecological variables, and estimate the value of nitrogen removal.

This task was primarily the responsibility of Joao Ferreira, Longline Environment, Ltd., and the bulk of the work is scheduled for Year 2. Activities completed during the Year 1 reporting period included collection of aquaculture farm production records and individual shellfish species metrics for size and weight, by harvest season. Team members met with Mindy Roberts, Washington Dept. of Ecology (WDOE), to review south Puget Sound nutrient and dissolved oxygen models and examine model outputs for integration with the Farm Aquaculture Resource Management (FARM) model. Joao Ferreira also met with the team members and presented a template of the proposed model and model outputs at an informational session held in Olympia in mid-2013. Research related to nitrogen removal and focusing on natural recruitment of shellfish was initiated at sites in Budd Inlet in spring 2013. That work is ongoing and will continue through Year 2. See Table 3 in the project proposal for other data types being gathered to be employed in model development.

Objective 2: Evaluate ecological carrying capacity at the ecosystem scale

Task 1: Model the effects of shellfish production on key ecological variables.

Most of the Year 1 activities addressed the development of FARM model outputs that will be incorporated into the EcoWin2000 ecosystem model in Year 2. This dynamic model will be used to simulate shellfish production over a 10 year period, and assess the interactive effects of water quality parameters.

Task 2: Integrate the results of ecosystem models with available water circulation and nutrient data/models for eutrophication management

Proposed for Year 2 this task will employ the output of EcoWin2000 combined with available SPS water circulation, nutrient, and socio-economic data, and use the ASSETS assessment model to create a set of eutrophication indices for the current and projected shellfish aquaculture production conditions in south Puget Sound. Completion of this task will be the joint responsibility of team members with Dr. Suzanne Bricker, NOAA National Ocean Service taking the lead.

Task 3: Utilize the developed models to simulate the effects of shellfish production on other marine organisms.

Our Year 1 effort on this task involved a wide range of activities required to parameterize Ecopath with EcoSim (EwE) models which will be used to simulate marine organism interactions beyond shellfish cultivation. Initially team members from PSI and WDOE met with project consultant, Dr. David Preikshot to discuss the Ecopath/Ecosim modeling portion of the project. During this two-day meeting, Dr. Preikshot provided an overview of the modeling process and the project team identified species of interest and data needs. In March 2013, a workshop was facilitated by Teri King, Washington Sea Grant, and held in Olympia to introduce the modeling process to representatives of county, state, federal and tribal resource agencies, and shellfish growers. Dr. Preikshot presented an extended overview of the models and examples of model runs, based in part on his past work in south Puget Sound. Workshop participants were asked to describe material and data that could be provided through their own sources or through related links that would be used to refine Ecopath biomass and energy flow projections. They were also queried as to how they might use Ecopath in guiding regulatory policy and marine planning. This workshop was followed up with discussions and information exchanges between the participants and Dr. Preikshot, as well as additional literature searches by PSI staff, and collection of data needed to populate specific elements of the Ecopath model. During Year 2 the Ecopath/Ecosim model simulations will be tested with the same stakeholder group, and presented to other ecosystem modeling specialists for review and critique before being made available for general use.

Objective 3: Examine the social carrying capacity for bivalve shellfish aquaculture

Task 1: Review local priorities, planning documents, and policies and regulations

Information on constraints and incentives for shellfish aquaculture in the region was gathered in Year 1 through PSI and shellfish industry assessments of aquaculture-related policies and

regulations. This information will be updated in Year 2 to conform to the latest shoreline management guidance currently being finalized for south Puget Sound counties.

Task 2: Engage stakeholders from the SPS area in ecological carrying capacity modeling.

Three stakeholder meetings were proposed for this task. The first was completed in March 2013 as part of the informational session described for Objective 2, Task 3. Two additional stakeholder meetings are proposed during Year 2. All meetings will be facilitated by Teri King, University of Washington Sea Grant.

Task 3: Survey public values, attitudes, beliefs and behavior in relation to shellfish.

During this reporting period, WSU Social and Economic Sciences staff developed both an online and a paper survey instrument to explore two overarching research questions: “Are these communities opposed to or supportive of continued or expanded shellfish aquaculture?” and “What are the implications for aquaculture planning and development?” The survey instrument was sent out for review by project staff and partners, including Teri King of Washington Sea Grant, David Landkamer of Oregon Sea Grant, Paul Olin of California Sea Grant, Bill Taylor of Taylor Shellfish, and David Fyfe of the Northwest Indian Fisheries Commission. This survey was then sent during fall 2013 to 400 residential addresses from each of 10 counties in 3 states to obtain information to assist in a companion project “Planning for Sustainable Shellfish Aquaculture: Identifying Current Activities, Public Perceptions, Conflicts, and Compatibilities” and gather more localized responses from south Puget Sound residents for this project. Of the 4,000 posted questionnaires, we achieved a 34% response rate, and an excellent suite of answers for a wide range of issues.

Objective 4: Develop a methodology to use these models, regulatory and social data for multi-use spatial planning that includes shellfish aquaculture

Task 1: Develop and disseminate a regional-applicable guidance document for managers

This task is scheduled for Year 2.

2. IMPACTS

No impacts to report during this period.

3. PUBLICATIONS

Please refer to instructions for hardcopy reprint requirements and citation formats.

Peer-reviewed journal articles

Peer-reviewed book chapters

Conference/Workshop activity (talk or poster), Presentation/Seminar (e.g., invited)

Workshop seminars/sessions held in March 2013 and July 2013 with presentations by Dr. David Preikshot and Dr. Joao Ferreira, to explain ecosystem modeling tools and sample outputs to government and tribal staff, and shellfish growers.

A preliminary report describing the survey findings from Task 3 will be presented in early March 2014 to a shellfish growers meeting sponsored by Washington Sea Grant.

Theses and dissertations

Technical reports

Media placements of your WSG-funded work

An article ('Determining Social and Ecological Carrying Capacity for Shellfish Aquaculture in South Puget Sound, Washington') describing the project plan and objectives was published in the Pacific Coast Shellfish Growers Association (PCSGA) newsletter in January 2013.

A one page informational flyer entitled "Determining social and ecological carrying capacity for South Puget Sound" as prepared in September 2013 for distribution at the annual PCSGA/National Shellfisheries Association meeting held in Bend, Oregon.

Other (please use citation guidelines to identify the category of publication and proper citation format)

4. STUDENTS SUPPORTED BY OR AFFILIATED WITH THIS PROJECT

Student Name: Lisa Abdulghani

Degree track (Ph.D., M.S., M.A., B.S., B.A., J.D., etc.): M.S.

Whether degree was **completed** during the reporting window (YES or NO): NO

New or continuing student on WSG support (NEW or CONTINUING): NEW

Department: Evergreen State College

Major/Degree field: Environmental Science

Major Professor:

Date of graduation (actual or anticipated): 2014

Student Name: Derek King

Degree track (Ph.D., M.S., M.A., B.S., B.A., J.D., etc.): B.S.

Whether degree was **completed** during the reporting window (YES or NO): YES

New or continuing student on WSG support (NEW or CONTINUING): NEW

Department: Evergreen State College

Dissertation/Thesis title (actual or anticipated): NA

Date of graduation (actual or anticipated): 2013