

From: "Jeff Fisher" <jfisher@Environcorp.com>
Subject: RE: WSG geoduck literature review
Date: January 23, 2008 6:43:19 PM PST
To: "Penny Dalton" <pdalton@u.washington.edu>
Cc: "Raechel Waters" <rlwaters@u.washington.edu>, "BRENT A VADOPALAS" <brentv@u.washington.edu>, "Karl Mueller" <kmueller@environcorp.com>

Thanks Penny,

We appreciated the opportunity and would look forward to the opportunity to collaborate with SeaGrant and the U of W at the appropriate time. I am admittedly a bit frustrated in that we did not get a grant application in for the SeaGrant funded geoduck env. effects that has been earmarked. We managed applications for the NOAA aquaculture initiative grants, but then the geoduck opportunity came right on the heels of that, and with a highly pregnant wife at the time, I got sidetracked, and we just missed applying. Hopefully there will be more opportunities, as any day on the beach (no matter what the weather) sure beats crunching the numbers in the office! I will be presenting some of the preliminary work we have been conducting on geoduck intertidal effects at the south sound research symposium in late March (just an FYI).

Best regards,

Jeff

Jeffrey P. Fisher, Ph.D. | Principal

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From: Penny Dalton [<mailto:pdalton@u.washington.edu>]
Sent: Wednesday, January 23, 2008 6:22 PM
To: Jeff Fisher
Cc: Raechel Waters; BRENT A VADOPALAS
Subject: WSG geoduck literature review

Dear Dr. Fisher:

Many thanks for the constructive comments from yourself and Mr. Mueller on the draft literature review prepared for Washington Sea Grant to summarize scientific information on effects of geoduck aquaculture on the environment. We forwarded your comments to the science team that authored the report for use in revising the document. The team has completed their revisions based on all the comments we received and a final document will be posted on the WSG website before the end of the month. I am attaching their response to the specific issues that you raised.

We sincerely appreciate your participation in both the September workshop and in development of the literature review.

Best,

Penny Dalton

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Dear Jeff and Karl,

Thank you for your valuable comments and suggested revisions on the draft review entitled "Effects of geoduck aquaculture on the environment: a synthesis of current knowledge."

Due to project time constraints and the need to ensure that it met established scientific standards, we established well-defined criteria for inclusion of information in the review. We restricted our review to current existing peer-reviewed literature, published either online or in print through July 31, 2007, that directly pertained to the effects of cultured geoducks (*Panopea abrupta*) and associated culture activities on water quality, substrate characteristics, community structure, and wild conspecifics. Where gaps in the literature on geoduck existed, we incorporated examples of relevant literature on other temperate marine and estuarine molluscan species.

Our searches comprise the following scientific literature databases: Aquatic Sciences and Fisheries Abstracts, Biosis, Web of Science, Current Contents, and Agricola, using the search terms below, both singly and in combination:

abrupta, age estimation, aggregation, anatomy, aquaculture, bivalve, carrying capacity, community structure, consumption rates, culture practices, disease, disease prevalence, dispersal, distribution, embryogenesis, gear, generosa, geoduck, Glycimeris, habitat, harvest, interaction, intertidal, life cycle, macrofauna, mariculture, mollusc, mollusk, biota, Panope, Panopea, parasite, population, quality, density, genetics, size, recovery, reproduction, reduction, risk, sediment, shell, spatial, structure, substrate, taxonomy, temporal, triploid, water

We have made necessary changes in the final draft, which will be made available online later this month by Washington Sea Grant. Our actions and/or responses regarding your specific comments are listed below.

Section 1.3 and 1.4

No published figure was available that specifically identifies geoduck shell morphology; we included text directing the reader to Coan et al. 2007 for detailed anatomical diagrams and a glossary of terms.

Section 1.6

We were unable to compare general molluscan veliger behavior with geoduck veligers as suggested. We changed the text to state, "Studies on the behavior of geoduck veliger larvae are depauperate."

Section 2.4

We added text “within these beds, aggregations contained an average of 109 animals and there was an average of 0.64 aggregations per 41.8m² quadrat.” We changed the sentence as recommended.

Section 2.5

The text, “recruitment to a particular bed is not related to the reproductive capacity of geoduck within that bed (Orensanz et al. 2004)” suggests that increased local densities at farm sites have little effect on overall recruitment of geoduck clams within the vicinity of the farm. Given the long larval period of geoducks and the circulation patterns in the Sound, it is unknown where larvae produced in a farm will settle. Increased densities on farms may increase densities elsewhere. We did not change the text as we feel this section is clear. As you suggest, data are not adequate to determine the effects of farm densities on localized recruitment to the wild population at this stage.

Section 2.6

DNR’s BMPs are beyond the scope of this work, and yes, the scale of farming is on a scale at which apparent panmixia occurs.

Sections 3.1 and 3.2

Comments were essentially research questions that are pertinent but beyond the scope of this review.

Section 4.3

We reduced detail on siphon cropping.

Section 5.2

First sentence 2nd paragraph we removed “dramatically.” Our review primarily discusses local changes that have been documented, and mentions the SF bay as a larger scale. We do not indicate that impacts from farms would be localized or basin-wide, as peer reviewed studies on this subject were not found in our search. We refer to the Puget Sound subbasins recognized in the literature in section 3.3.

Section 5.3

We added information about density available in the one of three papers. Crawford et al. 2003 indicate that densities of cultured shellfish are lower in Tasmania than elsewhere but do not indicate what the densities were.

Section 5.4

Chris Pearce’s work was not included as it had not yet been published in the peer-reviewed literature.

Section 5.5

We added information from, and cited Powers et al. 2007, and changed the first sentence in paragraph 5.

Section 5.6

We agree that even at a large scale, Hall & Harding found that benthic fauna recovered within 3 months. We are not addressing BMPs as they are not appropriate for a literature review.

Section 6.2 and 6.4

We did not address WDFW shellfish disease, pest and predator control WACs as they are not appropriate for a literature review; we added a citation in the last paragraph that addresses steps necessary to control the spread of infectious disease.

General comments

We thank the reviewers for their constructive comments. We will be submitting a shorter version of this review for publication in the peer-reviewed literature, and will make further use of your suggestions at that time.

Regarding your suggested additions from on-going research and grey literature, unfortunately, many of the suggestions were either not yet published or not peer-reviewed.

We removed non-specific descriptive terms as noted.

Sincerely,

Kristina M. Straus
Lisa Crosson
Brent Vadopalas