From:	Dumbauld, Brett
To:	Rockett, Derek (ECY)
Subject:	RE: Announcing the Draft Individual Permit for the Control of Burrowing Shrimp using Imidacloprid on Commercial Shellfish Beds in Willapa Bay and Grays Harbor
Date:	Monday, December 08, 2014 1:40:22 AM
Attachments:	ImidaclopridEIS2014dumbauldcomments.pdf

Hi Derek,

I attach my brief comments on these documents. Sorry for the delay, but I hopefully made the deadline.

Brett

Brett R. Dumbauld Ph.D
USDA-ARS
Hatfield Marine Science Center
2030 SE Marine Science Drive
Newport, Oregon 97365
541-867-0191 FAX 541-867-4049
brett.dumbauld@ars.usda.gov

From: Rockett, Derek (ECY) [mailto:droc461@ecy.wa.gov]
Sent: Friday, October 24, 2014 5:02 PM
To: (building@ci.westport.wa.us); (mayorbruce@ci.westport.wa.us); Holcomb, Lester J (DFW); Dalan (gdalan@co.grays-harbor.wa.us); Batchelder (milesb@wcssp.org); Beasley (crabby@willapabay.org); Dennehy (cdennehy@surfrider.org); Fleck (rodf.forks@forkswashington.org); Horton (mhorton@portgrays.org); Kess (kess-spack@wwest.net); Toste (rltoste@aol.com); Sheldon (oysters@willapabay.org); (dan@willabay.com); (bcfarms@baycenterfarms.com); (bova.cindy@yahoo.com); (independentshellfishgrowerswa@gmail.com); (carol.ervest@gmail.com); Sewell, Steve (COM); Culver, Michele K (DFW); RECHNER, MICHAL (DNR); Kline, Randy (PARKS); pdalton@u.washington.edu; Austin, JT (GOV); (mplackett@gmail.com); (rd@olearycreek.com); (lrotmark@gmail.com); (fluharty@uw.edu); (mvcedergreen@gmail.com); (osborner@uw.edu); (Burgess.Karen@epamail.epa.gov); Kirk Church (kirk.church@southbend-wa.gov); Aimee Code (aimee@xerces.org); Backman (mike.backman4421@gmail.com); Barnes (lbarnes@portgrays.org); Barrett (Jeff.Barrett@hartcrowser.com); Bernthal (carol.bernthal@noaa.gov); Bingaman (dbingaman@quinault.org); Booth (boothswa@comcast.net); Bridges (abridges@osgov.com); Randy.Carman@dfw.wa.gov; Cassinelli (beacon@willapabay.org); Cedergreen (mcedergreen@olynet.com); Cohen (nahcotta2@aol.com); Costanzo (ccostanzo@vesselalliance.com); Crose (tcrose@co.pacific.wa.us); Daniels (mfranklindaniels@gmail.com); Decant (Decant.Joseph@epa.gov); dena_horton@cantwell.senate.gov; DeNike (jesse@plauchecarr.com); Dewey (billd@taylorshellfish.com); Dingler (cdingler@osgov.com); Dumbauld, Brett; Durney (mayor@cityofhoquiam.com); Ehrlichman (tom@salishcommunity.org); GAECKLE, JEFFREY (DNR); Garrow (tgarrow@satsop.com); GH Shellfish Growers Association (pcsga@pcsga.org); Gilles (sp) (d_dgill@willapabay.org); Gray (lgray@co.grays-harbor.wa.us); Grays Harbor Economic Development Council (info@graysharbor.org); Grunbaum (rd@fogh.org); Hall (EricH@taylorshellfish.com); Brock.Hoenes@dfw.wa.gov; Johansen, Erik (AGR); Jungar (mayorraymond@willapabay.org); Kauffman, Bruce E (DFW); Kennedy (jkennedy@surfrider.org); DNR RE SEPACENTER; Leraas (RLeraas@portgrays.org); Lovely (rdmllovely@gmail.com); Martin (arnold6.martin@comcast.net); Maurer (LorenaMaurer@gmail.com); Maxwell, Ted (AGR); McCartan (Sheila_McCartan@fws.gov); McLain, Kelly

(AGR); McMurry (key@keyenvironmentalsolutions.com); Mike Coverdale; Miles (administrator@longbeachwa.gov); Mobbs (MMobbs@Quinault.org); Nelson (EHD@co.grays-harbor.wa.us); Nordin (mnordin@co.pacific.wa.us); Osborne (rosborne@wcssp.org); Patten (pattenk@wsu.edu); Phillips (gphillips@quinault.org); Pokorny (tpokorny@co.jefferson.wa.us); Rasmussen (krasmussen@pacshell.org); Robinson (brobinson@tnc.org); (ByrnyngBryte@frontier.com); Schreder (eschreder@watoxics.org); Schumacker (JSCHUMACKER@quinault.org); Scott (lscott@aberdeenwa.gov); Sharp (FSharp@Quinault.org); Shay (bshay@cityofhoquiam.com); Simpson (mayor@aberdeenwa.gov); Spoon, Amy K (DFW); Swartout (swartom@co.thurston.wa.us); Taylor (BillT@taylorshellfish.com); Tuttle, George (AGR); Urbanski (urbanski.jennifer@epa.gov); Ward (ja.ward@pnnl.gov); Warnberg (warnberg@pacifier.com); Wincewicz (mwincewicz@montesano.us); SEPADesk (DFW)
Subject: Announcing the Draft Individual Permit for the Control of Burrowing Shrimp using Imidacloprid on Commercial Shellfish Beds in Willapa Bay and Grays Harbor

Dear Interested Party:

The Washington State Department of Ecology (Ecology) is proposing a new individual permit (permit) to regulate the use of imidacloprid for management of burrowing shrimp on commercial oyster and clam beds in Willapa Bay and Grays Harbor, a surface water of Washington State. The Willapa/Grays Harbor Oyster Growers Association (WGHOGA) requested development of this permit to control burrowing shrimp on commercial oyster and clam beds in Willapa Bay and Grays Harbor, to aid in the cultivation and harvest of oysters and clams. The applicant has applied for a sediment impact zone (SIZ) as the proposed discharge will likely impact sediment quality on sediments where the pesticide is applied. The draft permit, SIZ applications, draft environmental impact statement (DEIS), and fact sheet are available for review and public comment for forty-five days beginning on October 24 through December 8, 2014. Ecology will host one public workshop and hearing on the draft permit.

Purpose of the Permit: This permit would allow the management of burrowing shrimp on commercial oyster and clam beds in Willapa Bay and Grays Harbor, using the pesticide imidacloprid.

Copies of the Draft Permit: You may download copies of the draft permit, SIZ applications, DEIS, and fact sheet from the following web site: http://www.ecy.wa.gov/programs/wq/pesticides/imidacloprid/index.html. You may request hard copies by contacting Derek Rockett (see contact information below).

Submitting Written Comments: Ecology will accept written comments on the draft permit, SIZ application, DEIS, and fact sheet until 5 p.m. December 8, 2014 (written comments must be postmarked no later than December 8, 2014.) Ecology prefers comments be submitted by e-mail. All comments, including those sent by e-mail, must contain the commenter's name and postal address, and should reference specific permit text when possible.

Submit comments by e-mail to: derek.rockett@ecy.wa.gov.

Submit written, hard-copy comments to: Derek Rockett
Department of Ecology
PO Box 47775
Olympia, WA 98504-7775

Public Workshop and Hearing: The public hearing and workshop on the draft permit is scheduled to be held in South Bend, Washington. At the workshop, Ecology will explain the

proposed permit and answer questions. A hearing will immediately follow the workshop. The hearing will provide the opportunity for formal oral testimony and comments on the proposed permit. Written comments will receive the same consideration as oral testimony.

December 2, 2014 (10 a.m.) – South Bend
Willapa Harbor Community Center
916 West First Street
South Bend, WA 98586
(360) 942-5419

Issuing the Permit: The final permit will be issued after ecology receives and considers all public comments. If public comments cause a substantial change in the permit conditions from the original draft permit, another public notice of draft and comment period may ensue. Ecology expects to issue the permit in the spring of 2015.

Questions: If you have questions, please contact Derek Rockett at derek.rockett@ecy.wa.gov or (360) 407-6697.

This electronic message contains information generated by the USDA solely for the intended recipients. Any unauthorized interception of this message or the use or disclosure of the information it contains may violate the law and subject the violator to civil or criminal penalties. If you believe you have received this message in error, please notify the sender and delete the email immediately.

U.S. Department of Agriculture
Agricultural Research Service
Hatfield Marine Science Center
2030 S.E. Marine Science Drive
Newport, Oregon 97365

12-8-2014

Derek Rockett
Washington State Department of Ecology
Water Quality Program
Southwest Regional Office
PO Box 47775
Olympia, WA 98504

Dear Mr. Rockett,

Thank you for the opportunity to comment on the Draft Environmental Impact Statement for Control of Burrowing Shrimp using Imidacloprid on Commercial Oyster and Clam Beds in Willapa Bay and Grays Harbor Washington and the Draft National Pollution Discharge Elimination System Waste Discharge Permit #WA0039781. Both documents are extensive, but I restrict most of my comments to two sections regarding the ecology of these shrimp and the community they and the chemical influence as that is where my expertise lies. My comments and questions for the Environmental Impact Statement are as follows:

Page 1-8 - under No Action alternative the best reference for the statement that Oysters and clams sink and suffocate in softened sediments… would be Dumbauld et al 2006 not Dumbauld et al 2001.

Pages 1-8 and 1-9 – it is not clear to me why there is a difference between the description of mitigation measures for alternative 2 – carbaryl and alternative 3 imidacloprid for NPDES permit requirements unless it is that the sediment impact zone and sediment standards are already accepted for the former and have not yet been established for imidacloprid?? So much more detail seems to be provided for the latter and these details appear to result in more mitigation and monitoring in the permit.

Page 1-19 and page 1-21 – the statement that Macoma clams (preferred prey for red knot) could be affected following carbaryl treatment is speculation. Macoma clams have generally been shown to be little affected or even enhanced by carbaryl spray (see Dumbauld et al. 2001). The statement that carbaryl could stabilize the sediment and allow these clams to be closer to the sediment surface on page 1-21 is reasonable, but suggests the interaction is more complex and may involves recruitment of these clams to treated areas (also discussed in the above reference). It would also be important to know species since *Macoma balthica* are small and generally closer to the surface anyway.
Page 2-29 – the statement under carbaryl effects that some benthic invertebrates start to recolonize treated areas reasonably quickly but full recolonization happens on a longer time scale is of course reasonable since it is so general. Details are again covered in Dumbauld et al 2001 and not Dumbauld et al 1997 – the McCauley et al reference is unknown to me and not in the literature cited. Burrowing shrimp can be "slow" to recolonize, but again this is to general to make any conclusions. In fact Dumbauld et al 1997 show that ghost shrimp can recruit almost immediately back to the beds although they may take some time to become problematic. Finally the statements about salmonid exposure to carbaryl on this page are outdated. Dr. Chris Grue has studied their response in much more detail and chinook salmon clearly utilize the estuary when carbaryl is applied.

Pages 2-45, 2-46 – I was interested to see that imidacloprid in general appears to be less toxic to invertebrates than carbaryl and that a treatment effect in many cases could not be demonstrated. Also like carbaryl the most significant effects seemed to be on crustaceans – again not surprising given the usual insect targets for this pesticide. Further citations here that lower application rates result in lower exposure concentrations off plot also seem promising. While I see that at the time of writing the 2014 sampling results were not yet available, it is not clear why there seems to be more concern for extensive mitigation and continued monitoring for this pesticide than for carbaryl. Perhaps I should read the Washington State Sediment Management Standards to see what is required for other pollutants.

Page 2-55 – The list of known predators of burrowing shrimp is speculative. I would argue that some of these are not known predators – e.g. bay shrimp, bay pipefish, Pacific herring, threespine stickleback, arrow goby, shiner perch , and yellow shore crab. Perhaps Dr. Bollens documented some of these species via genetic signals in guts, but I'm not convinced. Red rock crabs – not red crabs

Page 2-56 – I would include a paragraph under biological control on the bopyrid isopod parasites here. Part of the impetus for all of the work that Dr. John Chapman and I have

continued to do on these was initially funded under the auspices of biological control. Though this too seems to have low potential for actually implemention via augmentation – one could argue that biological control of mud shrimp has already happened. I could assist with writing this.

Page 3-1 - As noted by the authors the sections on ghost shrimp and mud shrimp characteristics that follow are abstracted from the carbaryl EIS and SEIS. We've completed more recent work in many cases. For example, while the lifespan of both species of shrimp was estimated to be 4-5 years in Dumbauld et al. 1996 , we now think that ghost shrimp can live to be up to 13 years of age (see Bosley and Dumbauld (2011) . Student Katelyn Bosley is still working on this, but mud shrimp may in fact only live to be 4 or 5 years. Statements about maturity and size at egg bearing for ghost shrimp may also be different, but we are working on this as well.

Page 3-2 - The statement citing McCrow about multiple broods (three or four) is unlikely . We think that some populations may produce up to 2 broods per year and we have raised their larvae in a hatchery situation under various temperature regimes – so I would say "lasting 6-8 weeks". The statement about mud shrimp burrows being more complex than ghost shrimp burrows citing Macginitie and Macginitie 68 and usually having 3 openings should be deleted – the statement before this is adequate and Dr. Ted Dewitt has completed multiple burrow casts for these shrimp indicating usually two sometimes 3 openings.

Page 3-3 – the whole paragraph on mud shrimp reproduction and growth should be re-written. They do not necessarily delay reproduction until their third year. Post-larvae settle to the bottom in spring to early summer = April-July and I should check the total length measurements given here – we use carapace length, but Bird's information is dated.

Page 3-4 – last paragraph cites Hosack et al 2006 for burrowing shrimp effects on eelgrass – delete this. There is also some recent work on shrimp eelgrass interaction = (Castorani et al. 2014).

Page 3-27 – the statement about one of the largest eelgrass meadows in the PNW being in WB may be true but the depth range suggested here is not accurate for Willapa Bay. I have not checked the Selleck reference but suspect this is for Puget Sound.

Page 3-36 – the paragraph about Dungeness crab is a little dated as well. The statement that "these population cycles have not been correlated to specific environmental of biological factors" is not true see (Shanks & Roegner 2007, Armstrong et al. 2010, Shanks et al. 2010) . I

would also at least cite (Fernandez et al. 1993, Dumbauld et al. 2000) for the effect of shell and eelgrass as habitat for YOY Dungeness crab.

Page 3-37 – Groundfish – you should at least say something here about Willapa Bay and Grays Harbor being perhaps the most important nurseries on the West Coast for English Sole (Rooper et al. 2003).

Finally only two general comments about the Draft NPDES permit:

Page 9 – The definition of minor effects are interesting. I agree with the term minor because as an ecologist who has studied this system for awhile now they seem to have little relevance to anything but short term acute effects and even if exceeded, I'm not sure what you could say about the changes that would result. My experience with carbaryl, which as noted above in the draft EIS, actually has direct toxic effects, is that the system recovers relatively rapidly and more importantly any long term and therefore important effects are due to the fact that shrimp and perhaps other ecosystem engineers like polychaetes are killed and that shellfish are planted in the system. The resulting community composition is driven by this and other larger scale habitat variables and not the short term effects of the pesticide (Dumbauld et al 2001, Ferraro references). It appears that imidacloprid has even fewer of these effects than carbaryl, so aside from the fact that some standards had to be set, its not clear what repeatedly monitoring these effects will accomplish. I guess I would like to understand what the sediment standards are meant to do. I can understand that if one were continually applying the pesticide (as would be the case for some NPDES permitted activities) then the benthic community would be affected and monitoring necessary. Finally these criteria are so general (e.g. richness and abundance of taxa by phyla) as to be not so useful for community analyses either.

Page 12 – Its not clear how the persistence and benthos monitoring schedule by sample year was established. Do all sediment management schedules involve annual monitoring for 5 years and that for Cedar River has already been accomplished for the first two?? Why the odd monitoring schedule for central Willapa Bay. It seems that with a good design after several years of monitoring one would begin to see a pattern, especially for short term and, as noted above, likely somewhat irrelevant short term effects. More useful it seems would be to establish a longer term monitoring program at several locations that would actually enable all parties to move towards some "best management practices" should chemicals continue to be a necessary tool for shrimp control, but hopefully integrated with other approaches.

Page 15 – Do you really mean 100um mesh? This is extremely fine mesh for most benthic invertebrate sampling, especially if you are only evaluating general taxa groups and it seems would greatly increase sorting costs.

Thanks again for the chance to comment. Let me know if you need any of the references I cited and include below, and I would be happy to assist with further edits to the shrimp biology portion of the EIS text as well.

Sincerely,

Brett R. Dumbauld, PhD.

Tel: 541-867-0191 e-mail: brett.dumbauld@oregonstate.edu

Armstrong DA, McDonald PS, Kruse GH, Hines AH, Orensanz JM (2010) A crab for all seasons: The confluence of fisheries and climate as drivers of crab abundance and distribution. In: Kruse GH, Eckert GL, Foy RJ, Lipcius RN, Sainte-Marie B, Stram DL, Woodby D (eds) Exploited crab populations under climate change. Alaska Sea Grant, Fairbanks, Alaska, p 1-47

Bosley KM, Dumbauld BR (2011) Use of extractable lipofuscin to estimate age structure of ghost shrimp populations in west coast estuaries of the USA. Mar Ecol Prog Ser 428:161-176

Castorani MCN, Hovel KA, Williams SL, Baskett ML (2014) Disturbance facilitates the coexistence of antagonistic ecosystem engineers in California estuaries. Ecology 95:2277-2288

Dumbauld B, Visser E, Armstrong DA, Cole-Warner L, Feldman K, Kauffman B (2000) Use of oyster shell to create habitat for juvenile Dungeness crab in Washington coastal estuaries: Status and prospects. J Shellfish Res 19:379-386

Fernandez M, Iribarne O, Armstrong D (1993) Habitat selection by young-of-the-year Dungeness crab, *Cancer magister* Dana and predation risk in intertidal habitats. Mar Ecol Prog Ser 92:171-177

Rooper CN, Gunderson DR, Armstrong DA (2003) Patterns in use of estuarine habitat by juvenile english sole (*Pleuronectes vetulus*) in four eastern North Pacific coastal estuaries. Estuaries 26:1142-1154

Shanks AL, Roegner GC (2007) Recruitment limitation in Dungeness crab populations is driven by variation in atmospheric forcing. Ecology 88:1726-1737

Shanks AL, Morgan SG, MacMahan J, Reniers AJHM (2010) Surf zone physical and morphological regime as determinants of temporal and spatial variation in larval recruitment. J Exp Mar Biol Ecol 392:140-150