



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
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November 1, 2017

Derek Rockett
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Re: Comments on Draft Supplemental Environmental Impact Statement for Control of Burrowing Shrimp using Imidacloprid on Commercial Oyster and Clam Beds in Willapa Bay and Grays Harbor, Washington

Dear Mr. Rockett:

Thank you for the opportunity to comment on Washington State Department of Ecology's (Ecology) Draft Supplemental Environmental Impact Statement (DSEIS) provided September 18, 2017. The National Marine Fisheries Service (NMFS) recognizes the importance of the final decision Ecology must make regarding the use of the insecticide imidacloprid in Washington State's coastal estuaries. In providing our comments on the DSEIS, NMFS would like to emphasize aquaculture is an important component of our agency's efforts to maintain healthy and productive marine and coastal ecosystems, restore marine habitat, balance competing uses of the marine environment, create employment and business opportunities in coastal communities, and enable the production of safe and sustainable seafood. NMFS appreciates the continued open communication and sharing of information. In particular we appreciated the opportunity to meet with Ecology personnel on August 10, 2017, to discuss new research and analyses along with details of the new permit request prior to the issuance of the DSEIS.

NMFS is providing our comments based on our responsibilities under the Endangered Species Act (ESA) and the Magnuson-Stevens Fishery Conservation and Management Act (MSA), as well as policies of the Department of Commerce and NOAA regarding aquaculture.

The National Pollutant Discharge and Elimination System (NPDES) permit request seeks allowance for the application of imidacloprid in limited areas of Willapa Bay and Grays Harbor to kill two endemic species of burrowing shrimp (*Neotrypaea californiensis* and *Upogebia pugettensis*) on intertidal flats that are used for commercial shellfish operations. If granted, the request would require, for the first time for this purpose, "sediment impact zone" (SIZ) permits. The SIZ permits address the persisting effects to other benthic species in the intertidal habitat area.



NMFS would like to acknowledge changes that were made to the current DSEIS in response to comments we previously provided on December 8, 2014 to Ecology on a similar NPDES permit. In particular, the acreage proposed to be treated has been significantly decreased from 2,000 acres to 500 acres. Additionally, results of a number of new studies (including the efficacy and the benthic and water chemistry study results), have been made available to NMFS staff and are included in the DSEIS. However, NMFS still has concerns about the proposed action as described below.

Based on our review of the document, the DSEIS lacks a full assessment of the potential ecological ramifications of targeting these two species of burrowing shrimp. Burrowing shrimp provide a suite of ecological functions in West Coast estuaries. They rework intertidal and shallow subtidal bottom sediments during the normal course of their feeding, sheltering, and other activities. Burrowing and deposit-feeding by ghost shrimps affect the geochemical properties of the sediments, including grain size, nutrient exchange, and organic deposition. They create a unique habitat beneath the surface that supports more than a dozen different species. The DSEIS does not address the potential effects that burrowing shrimp control might have on these dependent species. The elimination of shrimp may ultimately eliminate the burrows that many other species rely on (e.g., *Nuttallia nuttallii*, *Neotrypaea californiensis*, *Cryptomya californica*, *Tagelus californianus*). In the effectively treated areas, these additional species may also be eliminated. The final SEIS Ecology releases should analyze this perturbation of the ecosystem, and the significance of this potentially adverse ecosystem response by clearly defining the anticipated spatial and temporal scale of impacts.

Based on our review, the DSEIS' analysis does not fully support the need to control the burrowing mud shrimp (*Upogebia pugettensis*). During our meeting with you and other Ecology staff and managers on August 10, 2017, we discussed recent media reports (<http://www.opb.org/news/article/native-shrimp-once-killed-with-pesticides-now-at-risk-from-invasive-parasite/>) and a study by Dumbauld et al. (2011) that *U. pugettensis* has all but disappeared from Willapa Bay and is close to complete extirpation from Washington's coastal estuaries. Ecology indicated they were aware of these reports suggesting *U. pugettensis* is likely being impacted by an invasive parasitic isopod. NMFS encourages Ecology to include in the final SEIS a discussion about the ramifications of targeting this species and more fully discuss the status of this species and whether there is a need to control them in the final SEIS.

Impacts to the untargeted benthic community is likely to be higher than described in the 2015 final EIS and the 2017 DSEIS. The 2014 Field investigations Experimental Trials for Imidacloprid Use in Willapa Bay (Hart Crowser, 2016) described a sampling protocol we believe insufficient to accurately determine the magnitude of effects to benthic invertebrates. These experimental trials included megafauna sampling which focused on Dungeness crab. According to Hart Crowser (2016), "The average across all sites and treatments was 2 affected crab per acre." We believe this number does not accurately represent the total number of crabs affected because the study was not performed throughout the 90 acre sprayed test plot. Instead, observations were taken only on the inside and outside edge of a 7-meter perimeter along the spray zone. Within this smaller peripheral zone, 4 crabs were observed alive, 44 were observed experiencing tetany, and 93 crabs were found dead. It could be anticipated that there would have been much higher numbers if more timely and full systematic surveys were conducted

throughout the test area. The DSEIS addressed this by estimating a high-end value of 18 crabs affected per acre sprayed. We are concerned with the degree of uncertainty surrounding these estimates.

The results of the megafauna survey are concerning because of the high ratio of affected to non-affected crab (133:4) in the limited sample zone, and because it is anticipated that tetany and mortality observations would increase had observations been conducted within the entire 90 acre imidacloprid test plot. Extrapolation of affected crab per acre would have produced a more scientifically defensible number if a systematic survey was conducted and if there would not have been a 24-hour delay before megafauna (crab) counting began. Because observations began two full tidal cycles later, it is likely predation, tidal currents, and wind waves reduced the detection rates of affected crabs. Finally, the megafauna study excluded other important fauna in and on the benthos, as well as adverse effects to zooplankton (including early life stage planktonic forms of benthic mega-fauna) in the water column. The final SEIS should better describe the potential environmental impacts to sediments and surface waters, and extend the analysis to all the animals that depend on these different mediums.

In order to gauge the suitability of applying imidacloprid in the proposed areas, NMFS reviewed multiple EPA-registered labels for the active ingredient imidacloprid. This review found that both liquid and granular formulations had this prohibitive language:

“Highly toxic to aquatic invertebrates. Do not apply directly to water, areas where surface water is present *or to intertidal areas below the mean high water mark.*” (Emphasis added).

Based on our understanding of the label process, the U.S. Environmental Protection Agency (EPA) approved just two labels without this prohibitive language: Protector 0.5G and Protector 2F. Both of these formulated products had the same percentage of the active ingredient as all other product labels reviewed. EPA conditionally registered these two labels and formulations to the oyster growers in Willapa Bay and Grays Harbor to apply in the water and below the mean high water mark. However, while EPA approved these labels, EPA’s ecological risk assessment does not evaluate this use, nor any use that allows direct application to aquatic habitats. The final SEIS should clarify why these products are acceptable to use in intertidal habitats when similar imidacloprid products are not.

The statement found on page 1-7 and on to page 1-8 of the DSEIS is concerning as it infers there is a reduced risk from imidacloprid in the marine environment:

“The more limited studies of imidacloprid in marine environments, including the multiple field trials in Willapa Bay, document that imidacloprid is also toxic to marine invertebrates, but at higher concentrations or longer exposures compared to sensitive freshwater invertebrates.”

There are no citations to support this statement, and NMFS recommends it be removed from the final SEIS. Studies provided elsewhere in the DSEIS suggest imidacloprid toxicities to estuarine and marine invertebrates may be as high as in freshwater invertebrates. Osterberg et al. (2012)

shows that several pesticides were tested on blue crab, a marine invertebrate. Of all tested active pesticide ingredients, imidacloprid was the second-most toxic to this species of crab. EPA's ECOTOX database indicates relatively few marine invertebrate species have been tested using reliable standardized toxicity test protocols and a substantial amount of variability in response is evident in both marine and freshwater species (<https://cfpub.epa.gov/ecotox/>). While field observations suggest impacts to crabs are likely, a large amount of uncertainty exists regarding the potential impacts to the marine invertebrate community, and to species that rely on them.

Since Ecology's Final Environmental Impact statement was issued in 2015 for the previous permit to use imidacloprid, the Health Canada Pesticide Management Regulatory Agency, following their own risk assessment, is currently considering an entire ban of this chemical. They found ambient concentrations of imidacloprid in aquatic environments at levels above that are harmful to aquatic insects. They also found, based on currently available information, the continued high-volume use of imidacloprid in agricultural areas is not sustainable. These concentrations are from drift and run-off pathways to the aquatic environment. Direct application to the aquatic habitat, as proposed by applicants for this permit, will result in much higher concentrations and consequently a greater likelihood of adverse ecological effects and ecosystem-level impacts. Ecology's final SEIS should better incorporate this information in the analyses on the use of imidacloprid on coastal estuaries.

Potential effects to Green sturgeon forage on burrowing shrimp and other benthic organisms are easily discerned in the treated areas (Hart Crowser 2016). However, the impacted area will extend beyond the area directly treated, as the pesticide will clearly be transported off site by water, as has been shown with limited water quality monitoring at Willapa Bay. Additionally, the crab studies, limited as they were, demonstrate effects beyond the perimeter of the treated area. The final SEIS should analyze the entire spatial extent of the area that may be impacted due to site application and by transport. The final SEIS should also calculate the concentrations likely to occur in the marine habitats due to direct application to these habitats.

The DSEIS does not adequately consider impacts of indirect effects such as the reduction in food availability to other species. It characterizes risk to fish, birds, and other organisms based almost exclusively on direct mortality, omitting indirect pathways of effect. Nor does the DEIS consider any sub-lethal effects on species. The final SEIS should address these additional effects.

Delayed, lingering, and latent effects resulting from imidacloprid's persistence in sediments are concerning (Hart Crowser 2016). Studies have found significant effects from persistent, low concentrations of imidacloprid (Van Dijk, et al. 2012). Van Dijk, et al. (2012) study showed that serious concern about the far-reaching consequences of the repeated use of imidacloprid (as proposed by this permit) to aquatic ecosystems is justified. The final SEIS should include an analysis of potential long-term ecosystem effects over the life of the proposed permit.

Direct in-water application of the granular formulation is also concerning. The DSEIS does not adequately describe fate and transport of this formulation. Instead, the draft states the product will be applied "during periods of shallow standing water." This implies applications would occur during a slack tide (see page 1-22) and that the product would stay in the area applied. Yet on this same page the DSEIS states imidacloprid would be applied in water during out-going

tides. These statements are inconsistent. The final SEIS should better describe fate and transport along with persistence of the granular formulation.

With regard to the SIZ, and as mentioned previously to Ecology in our response letter to the 2014 draft NPDES permit, it appears the Puget Sound toxic site recovery standard used by Ecology to determine maximum biological effects is not sufficiently protective of aquatic resources and their habitats (Washington Department of Ecology 2013 - WAC 173-204). By this standard, when a site recovers up to 50% biotic richness and abundance, it meets the “recovered” standard. Applying this standard to the total acres treated and the off-site areas affected could represent a huge and continuing loss in biotic production for several other ecologically important and economically valuable species. The Puget Sound toxic site “clean-up” standard should not be used for this purpose because there is too much variability in sampling between treated sites and control sites to suggest that 50% can be equated with a viably functioning ecosystem. A better representation of recovery would be to use a higher value for return abundance and biotic richness. The value should indicate a trajectory that the site is indeed recovering. The final SEIS should include an analysis that explores the differences in biotic richness and biomass between the 50% standard proposed for a SIZ and a higher value alternative (e.g., 80%) measured on an impact scale that takes into consideration full acreage and offsite effects allowed over the 5-year permit.

NMFS agrees with the concerns raised by Ecology’s Toxics Cleanup Program (TCP) in response to a previous draft of the SEIS (memo dated August 9, 2017) and finds that many of those concerns remain in the current draft SEIS. An example of an additional concern raised by the TCP, shared by NMFS, and not adequately addressed by the current draft SEIS is the potential for chronic effects on invertebrates. In numerous places, the draft SEIS describes potential adverse effects as being ‘short-lived.’ However, several lines of evidence demonstrate that effects may be more chronic. For example, field studies cited in the draft SEIS show that recovery from exposures in high dissolved organic content sediment is not complete even at 28 days. The DSEIS (page 1-17) states the half-life of imidacloprid as being greater than one year. Additionally, as reported in citations pointed out in the TCP memo, imidacloprid binds irreversibly to the receptor. This means that an individual’s recovery is likely prolonged and any sublethal impacts may last well beyond 1 day (i.e. not ‘short lived’). Animals may, therefore, not be observed dead or immobilized after 1 day, but nonetheless, be impaired in ways critical to their survival. Importantly, any sublethal effects could still be lingering when subsequent exposures occur.

In closing, while significant concerns remain about the unintended biological effects of controlling burrowing shrimp as described above, NMFS is also concerned about possible economic impacts the Willapa Bay Grays Harbor Oyster Growers Association (WGHOGA) is experiencing. In order to assist WGHOGA in investigating alternative types of oyster culture that would not require the control of burrowing shrimp, but could still maintain oyster production value, NMFS offers a number of funding opportunities. We recommend that WGHOGA work directly with the NMFS Office of Aquaculture staff and the West Coast Region Aquaculture Coordinator who can provide technical assistance to help develop proposals for such investigations. NMFS also encourages Ecology to seek state or other federal (e.g., EPA) funding sources that could help with alternative practices. Sources of funding we have identified include:

- **NMFS' Saltonstall-Kennedy Grant Program** - The Saltonstall-Kennedy Grant Program includes aquaculture as a priority to fund projects that encourage the development of environmentally and economically sound aquaculture as well as relieve fishing pressure and improve market availability of U.S. seafood products.
http://www.nmfs.noaa.gov/mb/financial_services/skhome.htm
- **NOAA Sea Grant's Marine Aquaculture Grant Program** - Informally referred to as the "National Marine Aquaculture Initiative (NMAI)," this national competitive grant program encourages demonstration projects and research targeted to the development of sustainable marine aquaculture in the United States. The competition is designed to foster dynamic partnerships that channel resources toward the development of sustainable aquaculture technologies. Projects often involve partnerships among commercial companies, research institutions, universities, state governments, and coastal communities.
<http://www.nmfs.noaa.gov/aquaculture/funding/nmai.html>
- **NOAA Small Business Innovation Research (SBIR) Program** - Investment in aquaculture research and development is supported by NOAA's SBIR program, which encourages small businesses to leverage federal funds to invest in innovative technologies and next-generation products and processes.
<http://techpartnerships.noaa.gov/SBIR.aspx>
- **NMFS' Finance Program** - The Fisheries Finance Program provides long-term financing (up to 25 years) in the form of direct loans for up to 80 percent of the cost of construction, reconstruction, expansion, and purchase of aquaculture facilities. The program also may refinance existing loans. There are no early repayment penalties and the fees for a new loan are 0.5 percent. Aquaculture is considered a high priority in this program.
http://www.nmfs.noaa.gov/mb/financial_services/ffp.htm

At this point, there has been no consultation under the ESA addressing aquatic application of imidacloprid, and there is no valid, current ESA coverage for the application of imidacloprid to control burrowing shrimp. To date, no federal action agency has requested consultation with NMFS to address the practice and its potential effects to ESA-listed species. Without a valid, current incidental take permit or statement addressing the effects of this practice on ESA-listed species, parties engaging in aquatic application of imidacloprid lack ESA coverage.

We look forward to continued dialogue with Ecology as the agency moves toward its final determination. We also look forward to a resolution that will allow continued shellfish culture in a manner consistent with the protection of other important resources.

If you have questions regarding funding opportunities described, please contact our Regional Aquaculture Coordinator, Laura Hoberecht by phone, 206-526-4453, or email, laura.hoberecht@noaa.gov. All other questions should be directed to Scott Anderson by phone, 360-753-5828, or email, scott.anderson@noaa.gov; or Thom Hooper by phone, 360-753-9453, or email, thomas.hooper@noaa.gov.

Sincerely,



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References:

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