From:	Darold Rhodes
To:	Lubliner, Nathan (ECY); Rockett, Derek (ECY); ECY RE Shrimp Control Permit Comments
Cc:	Ryan McReynolds; Tim Romanski; Jay Davis; scott.anderson@noaa.gov; laura.hoberecht@noaa.gov
Subject:	Japanese Eelgrass & Shrimp Management General Permit
Date:	Friday, February 14, 2014 3:32:42 PM
Attachments:	01EWFW00-2012-CPA-0080.pdf

Attached is a copy of the signed letter. A hard copy will be provided to Ecology by mail.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

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FEB 14 2014

In Reply Please Refer To:
01EWFW00-2012-CPA-0080

Donald A. Seeberger
Water Quality Program Manager
Washington State Department of Ecology
ATTN: N. Lubliner / D. Rockett
PO Box 47696
Olympia, Washington 98504-7696

Dear Mr. Seeberger:

On January 2, 2014, the Washington State Department of Ecology (Ecology) Aquatic Pesticide Permits program announced its intent to issue a National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge general permit addressing application of the aquatic herbicide imazamox for the control of Japanese eelgrass (*Zostera japonica*) on commercial clam beds in Willapa Bay, Washington. Ecology requested comments on the draft permit and fact sheet by February 15, 2014.

On January 2, 2014, Ecology also announced that the Willapa-Grays Harbor Oyster Growers Association (WGHOGA) has submitted a NPDES permit application for the use and application of the aquatic pesticide/insecticide imidacloprid to control burrowing shrimp (ghost shrimp, *Neotrypaea californiensis*; mud shrimp, *Upogebia pugettensis*) on commercial shellfish beds in Willapa Bay and Grays Harbor, Washington. Ecology requested comments on a risk assessment prepared with support from the WGHOGA, and on the appropriate scope for an Environmental Impact Statement (EIS).

We appreciate the opportunity to comment and express our concerns regarding these proposals. If you or your staff have any questions, if our comments require further explanation, or you would like to discuss the Aquatic Pesticide Permits program, please contact the staff and/or manager identified at the close of this letter. Thank you.

BACKGROUND: Japanese Eelgrass and Control of Eelgrass with Imazamox

Japanese eelgrass, also known as "dwarf" or "narrow-bladed" eelgrass, is an herbaceous, aquatic monocotyledon (monocot), native to Asia, but introduced to the waters of the Pacific Northwest and California during the 1930s, or earlier (NWCB 2011). Japanese eelgrass grows in intertidal marine waters, though generally "...higher in the intertidal [zone] ... than native *Z. marina*" (common eelgrass)(Fisher et al. 2011, p. 2). Nonnative Japanese eelgrass now inhabits the marine waters of the Pacific coast, from the vicinity of Humboldt Bay, California, north through parts of the Strait of Georgia and British Columbia (NWCB 2011).

The Washington State Noxious Weed Control Board (NWCB), citing the work of Mach et al. (2010), Britton-Simmons et al. (2010), and Shafer (2007), has summarized the patterns of distribution and co-occurrence of native and nonnative eelgrasses in the State of Washington's intertidal waters (NWCB 2011). Fisher et al. (2011) and Ruesink et al. (2010) have reported information describing the complex relationship between native and nonnative eelgrasses, including apparent patterns of colonization, variable responses to abiotic factors, competition, and competitive suppression. These authors report some information to suggest that establishment of nonnative Japanese eelgrass has influenced abiotic factors at some sites, "... facilitating the spread of native eelgrass into shallower waters than it would normally be found" (Fisher et al. 2011, p. 6). Disturbance appears to enhance the productivity and fitness of Japanese eelgrass, which may partially explain its success as an invasive species (Bando 2006, pp. 755, 761).

At the request of commercial shellfish growers, the Washington State Department of Fish and Wildlife modified its Priority Habitat and Species designation to specifically exclude nonnative Japanese eelgrass from its definition of priority intertidal areas consisting of native substrate, vegetation, and habitat-forming aquatic species. Also at the request of commercial shellfish growers, during 2011 the NWCB published a finding and listed Japanese eelgrass as a Class C noxious weed where it occurs on commercially managed shellfish beds (NWCB 2011). During 2013, the NWCB broadened the scope of their determination in finding that Japanese eelgrass warrants listing as a Class C noxious weed wherever it occurs (i.e., not just on commercially managed shellfish beds).

Imazamox, 2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-5-(methoxymethyl)-3-pyridinecarboxylic acid with ammonium salt, is a "reduced risk" herbicide approved by the U.S. Environmental Protection Agency for terrestrial and aquatic uses, and is the first and only organic herbicide granted a food residue tolerance exemption (WDOE 2012b, p. 27). Imazamox is considered a selective herbicide, since dicots are generally less sensitive to the chemical treatment than monocots. Imazamox targets and inhibits the acetolactate synthase enzyme, and, because this biochemical pathway is absent in animals, the compound has an apparent low toxicity in animal taxa (WDOE 2012b, pp. 28, 35, 36). Imazamox is hydrophilic and fast-acting, readily absorbs into foliage, degrades rapidly in light by photolysis and aerobic microbial digestion, does not bind well to sediments, and is unlikely (under most conditions) to accumulate in sediments (WDOE 2012b, pp. 28-31).

Imazamox is one of only three herbicides with a marine/estuarine label under the Federal Insecticide, Fungicide, and Rodenticide Act (WDOE 2012b, p. 88). Glyphosate and imazapyr also have marine/estuarine labels. Ecology issued a NPDES and State Waste Discharge General Permit during 2012 (Aquatic Noxious Weed Management General Permit, Permit No. WAG993000), regulating the application of these herbicides for management of Washington State noxious- and quarantine-listed weeds in freshwater and estuarine environments (WDOE 2012c). Imazapyr and glyphosate have been used extensively to successfully control and remove invasive cordgrass (*Spartina* spp.) from the State's estuarine environments (WSDA 2011).

COMMENTS: Japonica Management on Willapa Bay Clam Beds (Draft General Permit)

Our office previously offered comments to Ecology regarding the application of imazamox for control of Japanese eelgrass on commercial shellfish beds (Letter to Kelly Susewind; March 7, 2012). In that letter, the U.S. Fish and Wildlife Service (Service) emphasized the following:

- We support Ecology's decision that a separate permit should address the issues specific to management and control of Japanese eelgrass on commercial shellfish beds (p. 3).
- We have concern that Japanese eelgrass control practiced on a large-scale could have measurable adverse effects to habitat functions important to native flora and fauna (p. 3).
- Selective chemical treatment with imazamox will require careful planning and implementation at the scale of individual shellfish aquaculture farms and harvest plots, to avoid dispersion into non-treatment areas, and unintended impacts to non-target, native eelgrass (*Z. marina*) and other aquatic vegetation (p. 3).
- We agree that chemical control should be part of a more comprehensive integrated pest management (IPM) program. There is likely still a role for mechanical control of Japanese eelgrass on some commercial shellfish farms (pp. 4, 5).
- We do not support large-scale treatment of mixed native and nonnative eelgrass beds. We acknowledge, however, that some amount of collateral damage to non-target, native eelgrass and other aquatic vegetation will likely be unavoidable (p. 5).
- We recommend that Ecology and the industry further investigate the issue of dispersion into non-treatment areas, the importance of abiotic factors, and the potential for developed resistance and loss of efficacy (p. 5).

Based on our review of the draft permit and fact sheet (dated January 2, 2014) we agree that Ecology has adequately addressed most of our earlier, stated concerns.

Ecology has limited the scope of the proposed general permit to commercial clam beds in Willapa Bay and has excluded farms practicing geoduck culture (*Panopea generosa*). Approximately 6,000 acres of tidelands are designated for clam culture in Willapa Bay (Ecology 2014a, p. 26). The permit does not prohibit treatment on commercial clam beds leased from the

Washington State Department of Natural Resources. For the purposes of the permit, Ecology has determined that the shellfish reserve(s) managed by the Washington State Department of Fish and Wildlife in Willapa Bay do not constitute a commercial clam bed.

Ecology has included a number of special permit conditions (Ecology 2014b; 2014a, pp. 48-59):

- Both the discharger (i.e., an aquatic licensed applicator) and the sponsor (i.e., farm operator making the decision to treat) must obtain coverage under the permit.

- The permit authorizes discharge of the aquatic herbicide imazamox, a federally registered active ingredient, in liquid formulations containing food-grade marker dyes only, with no adjuvants. All applicators must have training in proper techniques, use appropriate methods, and routinely calibrate equipment to ensure correct label treatment rates.

- The permit will be issued for a term of five (5) years. However, Ecology will make a determination after the third year whether to allow continued application of imazamox, or terminate the permit. This determination will depend in-part on satisfactory monitoring and reporting by individual permitees, and on findings from the required program-level Buffer Validation Study. The Buffer Validation Study will include an evaluation of the following at representative, treated sites: a) imazamox concentrations and persistence in sediments; and, b) the adequacy of recommended buffers for avoiding and minimizing collateral damage to non-target, native eelgrass and other aquatic vegetation. A buffer width of 10 meters, measured perpendicular to the parcel boundary, is required for all treatment sites (Ecology 2014b, p. 9).

- Ecology and their permitees will "...ensure that treatment of *Z. japonica* with imazamox does not cause permanent harm to *Z. marina* populations in Willapa Bay ... The goal is no net loss of *Z. marina*, off of commercial clam bed properties, in Willapa Bay ... Buffer and application requirements ... will mitigate impacts, and the monitoring requirements ... will establish if these mitigation requirements are sufficient" (Ecology 2014a, p. 52). If the Buffer Validation Study is not completed at the end of three years, Ecology may decide to terminate the permit and disallow continued application and discharge of imazamox.

- Applicants must submit for permit coverage a minimum of 60 days prior, and must issue a public notice(s), before applying imazamox. Applicants must file an Annual Pre-Treatment Plan; must implement an approved IPM Discharge Management Plan incorporating management options (including mechanical or physical control methods), surveillance procedures, and action thresholds; and, must fully satisfy annual reporting requirements.

- The permit limits application to daylight hours from April 15 through June 30, after the prohibited work time for Tidal Reference Area 17 ("Herring Spawning Beds"). The permit allows for one application per season, per treated area, to avoid unnecessary applications and reduce the potential for developed resistance and loss of efficacy. Permitees may not apply other pesticides to the same beds during the four days before or after application of imazamox.

- The permit allows for direct application of imazamox to Japanese eelgrass growing on commercial clam beds, once they are exposed by the falling tide, and provided that there will be at least one hour of dry time before tidal inundation (at a minimum). Aerial application is prohibited, and broadcast applications are prohibited when wind speeds are greater than 10 miles per hour. "Permitees may not directly apply imazamox into any drainage that contains *Z. marina* and is moving water off the treatment site" (Ecology 2014b, p. 9).

The Service offers its support for the inclusion of these special permit conditions. We agree that the draft permit conditions are warranted and appropriate. We agree that the special permit conditions should function over the term of the permit to avoid and reduce collateral damage to native aquatic vegetation and habitat functions that are important to native flora and fauna. The Service agrees that these draft permit conditions place appropriate emphasis on IPM, and outline and provide a reasonable strategy for managing Japanese eelgrass while not unduly constraining operations on commercial clam farms.

However, not all of the Service's earlier, stated concerns are completely and adequately addressed by the draft permit. On two related points or matters we feel it's important to further explain our concern:

1) We do not support large-scale chemical treatment of mixed native and nonnative eelgrass beds, even where they occur on commercial clam beds.

2) We do not agree that the current draft permit adequately addresses the matter of mitigation for collateral damage to non-target vegetation.

The draft permit does not explicitly prohibit the treatment of mixed native and nonnative eelgrass beds where they occur on commercial clam farms. Ecology has acknowledged (Ecology 2014a, pp. 6, 34, 43, 44, 46, 52, 55, 57), and we also acknowledge that some amount of collateral damage to non-target, native eelgrass and other aquatic vegetation will be unavoidable. However, language from Ecology's draft permit and fact sheet places a repeated emphasis on limiting impacts "...off of the treatment site," "...off of the commercial clam bed property," and to "nearby..." or "off-site *Z. marina.*" To be clear on this important point, the Service does not endorse or support a general permit that would make *Z. marina* a target for chemical treatment or other methods of control, whether located on or off commercial clam beds. And, importantly, where large-scale chemical treatment of mixed native and nonnative eelgrass beds is concerned, we see no way to carry out such a practice without causing unacceptable collateral damage to native flora and priority habitat.

Language from Ecology's fact sheet states more than once, "The goal for *Z. marina* is no net loss, off of commercial clam bed properties, in Willapa Bay due to activities conducted under this permit" (pp. 46, 52). While this may be a worthy goal, it fails to address the potential losses and damage that practices under the general permit would cause to native flora on commercial clam beds.

The Service would argue instead that Ecology and their permitees should establish a permit framework that ensures attainment of the following, revised goal: "No net loss of *Z. marina* in Willapa Bay due to activities conducted under the permit." Attaining this goal would require that Ecology and their permitees: a) discern and document the baseline condition (i.e., pre-treatment) physical extent of native, nonnative, and mixed beds on the farms; b) describe with the IPM Discharge Management Plans how control methods will minimize impacts to native and mixed beds; and, c) quantify, and document with annual reporting, any collateral damage to non-target vegetation both on and off (adjacent to) the treated sites.

Ecology's permit framework should ensure no net loss of native eelgrass and other aquatic vegetation. If this goal is unattainable, or judged inconsistent with the goals of the general permit, then Ecology should evaluate what options are available for more fully mitigating and offsetting collateral damage to non-target vegetation, native flora, and priority habitat.

BACKGROUND: Control of Burrowing Shrimp

The WGHOGA has submitted a NPDES permit application, and has requested permit coverage for the control of burrowing shrimp on commercial shellfish beds (oyster and clam) located in Willapa Bay and Grays Harbor, Washington, with the aquatic pesticide/insecticide imidacloprid. Ecology has requested comments on a risk assessment prepared with support from the WGHOGA (McGaughey et al. 2013), and on the appropriate scope for an EIS.

The two varieties of burrowing shrimp found in Willapa Bay and Grays Harbor, Washington, ghost shrimp and mud shrimp, are each native to these waters. As their name implies, burrowing shrimp rework intertidal and shallow subtidal bottom sediments during the normal course of their feeding, sheltering, and other activities ("bioturbation"). "Although both species are infaunal burrowers, they differ in a number of life-history characteristics ... timing of reproduction and recruitment ... and feeding strategy" (Feldman et al. 2000, p. 147).

"Although they have no importance as a food item for human consumption ... burrowing shrimp play an important role in ecosystem processes and often are a dominant component of the benthic community in terms of abundance and invertebrate production ... [they] influence benthic species composition ... shrimp are prey for a number of species and, as such, are an important link in estuarine trophic pathways" (Feldman et al. 2000, pp. 145, 153, 166). Dungeness crab (*Cancer magister*), a commercially important species, and native coastal cutthroat trout (*Salmo clarkii*) feed on shrimp (Posey 1985, 1986b *in* Feldman et al. 2000, p. 154). With their draft letter to Ecology (NMFS 2014, p. 2), the National Marine Fisheries Service (NMFS) has stated: "Control of burrowing shrimp may reduce habitat quality (i.e., food resources) for ESA listed

North American green sturgeon (*Acipenser medirostris*) ... In Willapa Bay, burrowing shrimp are the preferred prey item for green sturgeon, comprising approximately 50 percent of their diet (Dumbauld et al. 2008)."

The WGHOGA contends that where burrowing shrimp are present in high density and significant numbers, their natural tendency to rework bottom sediments creates substrate conditions that complicate or make impossible the economical farming of oysters and clams.

Since the 1960s, farm operators in Willapa Bay and Grays Harbor, Washington, have applied carbaryl (1-napthol n-methyl carbamate) to control burrowing shrimp on commercial shellfish beds. The practice has long been contentious for reasons that have been discussed in detail elsewhere (Feldman et al. 2000). The NMFS determined during 2009 that "...carbaryl use is likely to jeopardize the continued existence of 22 species of listed Pacific salmonids, and is likely to adversely modify designated critical habitat" (NMFS 2014, p. 1). According to documents currently posted to Ecology's Aquatic Pesticide Permits program website (Ecology 2008; WDOE Permit No. WA0040975 - Expiration Date: June 30, 2011), it would appear that there is no current, valid general permit for the application of carbaryl to commercial shellfish beds in Willapa Bay and Grays Harbor.

The WGHOGA and their research partners have obtained a federal registration and Experimental Use Permit for application of imidacloprid, a non-specific systemic neonicotinoid insecticide, to control burrowing shrimp on oyster beds in Willapa Bay and Grays Harbor.

COMMENTS: Control of Burrowing Shrimp

The Service supports Ecology's and the industry's plans to discontinue entirely the practice of applying carbaryl to commercial shellfish beds.

Due to a lack of available staffing and resources, the Service has not yet reviewed the risk assessment prepared with support from the WGHOGA (McGaughey et al. 2013). The Service and NMFS have not consulted with the U.S. Environmental Protection Agency, Ecology, or any other party regarding proposed estuarine uses for imidacloprid or resulting potential effects. Accordingly, there is presently no agreement on the broad, tentative conclusions reached by the risk assessment, including those regarding potential direct and indirect effects to species listed under the Endangered Species Act and their designated critical habitat (McGaughey et al. 2013, pp. 8, 46-57).

Based on our cursory review of the risk assessment, and other available sources of information, the Service does not agree that "...the overriding weight of evidence indicates that imidacloprid treatment will not significantly impact endemic species or the ecology of Willapa Bay and Grays Harbor..." (McGaughey et al. 2013, p. 8). Burrowing shrimp are native to these waters, are a dominant component of the benthic community at some locations, play an important role in ecosystem processes, and are an important link in estuarine trophic pathways (Feldman et al. 2000, pp. 145, 153, 166). We agree with the claim made by others, "While the debate ... has

focused on impacts to non-target species, virtually no consideration has been given to the ecological impacts of removing burrowing shrimp on such a broad scale" (Feldman et al. 2000, p. 166).

Whether it involves the use of carbaryl or imidacloprid, chemical control of burrowing shrimp will raise several of the same legitimate concerns:

- The chemical agent is a non-specific pesticide. At the environmental exposure concentrations necessary for effective control of burrowing shrimp, the pesticide is lethal to other non-target insect and crustacean species.

- The chemical agent is persistent. Based on our experience with carbaryl, and our understanding of the scope and intensity of proposed imidacloprid applications, there is reason to believe that residual concentrations will persist in treated sediments on the tidelands.

- The experimental field trials that have been performed to date do not adequately address a number of outstanding questions and sources of uncertainty, regarding the effectiveness of imidacloprid applications, effects to non-target species, and environmental persistence.

Ecology and the industry should consult the work of Feldman et al. (2000) as they consider the proper scope for an EIS. These authors discuss the history and development of culturing practices and methods; describe the ecology and life histories of burrowing shrimp, including important differences between ghost and mud shrimp, and species interactions; examine the justifications for and regulation of chemical control methods; and, recommend management alternatives, including potentially viable alternate culturing practices and IPM methodologies. We agree with one of the important, general conclusions reached by Feldman et al. (2000, p. 168): "While ... an effective short-term solution to shrimp control, rapid recolonization of treated beds and altered species distributions favoring expansion of ghost shrimp may create a cycle of more frequent [pesticide/insecticide] use."

We also recommend that Ecology carefully consider whether a NPDES general permit is the appropriate framework for regulating IPM and chemical control methods for burrowing shrimp. The WGHOGA's *2013 Annual Operations Plan* identifies fewer than a dozen commercial co-applicants (WGHOGA 2013, p. 3). Again here, we agree with another of the important, general conclusions reached by Feldman et al. (2000, p. 167): "Distinct differences in shrimp life cycles suggest a species-specific and site-specific management approach that integrates each species unique ecological and behavioral characteristics with the particular location and method of oyster culture."

We strongly encourage that the EIS and permit framework give fair and equal consideration to alternate culturing methods and practices, and a robust IPM methodology. Robust IPM methodologies and protocols hold the prospect of more effective and sustainable control, and a reduced reliance on contentious chemical control methods.

We appreciate the opportunity to comment and express our concerns regarding these proposals. If you or your staff have any questions, if our comments require further explanation, or you would like to discuss the Aquatic Pesticide Permits program, please contact Ryan McReynolds (ryan_mcreynolds@fws.gov; 360.753.6047), or Martha Jensen (martha_l_jensen@fws.gov; 360.753.9000).

Sincerely,

For Ken S. Berg, Manager
Washington Fish and Wildlife Office

cc:
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