Public Comments on the Draft Zostera japonica General Permit

On April 2, 2025 the Washington State Department of Ecology (Ecology) reissued the Zostera japonica Management on Commercial Clam Beds in Willapa Bay National Pollutant Discharge Elimination System and State Waste Discharge General Permit. The permit becomes effective on May 2, 2025, and expires on May 1, 2030.

All the permit documents are available on the permit web site: https://ecology.wa.gov/zjaponicapermit. This includes the revised permit, Fact Sheet and Ecology's response to comments.

Purpose of the Permit

The Zostera japonica Management on Commercial Clam Beds in Willapa Bay General Permit provides coverage for the use of the herbicide imazamox to control the non-native eelgrass Zostera japonica on commercial clam beds in Willapa Bay. The permit is a combined NPDES and State Waste Discharge Permit that limits the discharge of pollutants to surface waters under the authority of the Federal Water Pollution Control Act – Title 33 United States Code (U.S.C.) Section 1251 – and limits the discharge of pollutants to surface and groundwater under the authority of the State Water Pollution Control Act – Chapter 90.48 Revised Code of Washington (RCW).

Public Notice Process and Comments

Ecology accepted public comments on the draft permit from November 21, 2024 through January 14, 2025. Formal public workshops and hearings were hosted during this time with an online webinar on December 30, 2024 and an in-person event on January 7, 2025.

In finalizing this permit, Ecology considered all the public comments received during the public comment period. The following pages are the original written comments received by Ecology, and a summary of the verbal testimony given on January 7, 2025.

Skye Cyr

Hello,
Thank you for providing the opportunity to publicly comment on the Zostera japonica Management General Permit for the Willapa Bay area.

My name is Apo Skye Cyr and I am a Natural Resources student in the bachelor's program at Green River College. I have a degree in Water Quality, but the focus was largely on freshwater streams and rivers, so I am interested in the process for more oceanic endeavors.

From what I recall, public comments from the pre-approved 2019 draft of the plan listed difficulties in testing the effects of Imazamox on marine bacteria. I was wondering if there have been any updates on this front in the past few years. Additionally, in the 2019-2024 period where there any instances of this permit being issued for experimental use? I think that overall, the use of Imazamox aquatic herbicides is not a bad thing (due to its listing as a largely non-impactful herbicide for humans, I believe under National Toxics Rule 40 CFR 131.36) but would like to know if there are any additional permits needed for other chemicals—for example, if the primary ingredient is Imazamox but there is a secondary herbicide that is detrimental to the environment would this product require two permits to be used? Or would the use be covered, as Imazamox is the primary ingredient? Under WAC 173-201A-410 water quality standards are allowed to be exceeded, but I was wondering if there is a hard limit on days that this can occur, or if the temporary limit is assessed on a case-by-case basis.
I apologize if these questions have already been answered somewhere. This is my first time publicly commenting on a project and there may be a learning curve involved in the process.

Thank you for the opportunity to engage in public discourse and to review your draft.

Sincerely,
Apo Skye Cyr

James Kaldy

I recently learned that the Washington Dept. of Ecology is soliciting comments on an update to permit for removing noxious weeds with a focus on controlling *Zostera japonica* on clam beds in Willapa Bay. Thank you for the opportunity to provide comments on this topic again. I continue to oppose the use of herbicides to control *Zostera japonica* in Willapa Bay, especially on clam beds. Back in 2012 I provided extensive comments against listing *Zostera japonica* as a noxious weed and against allowing herbicide control of *Zostera japonica* on clam beds (comments attached). After reviewing that document, most of those comments still have not been addressed by peer reviewed research and are as relevant today as they were 12 years ago.

In addition to those previous comments, I would like to point out new research that indicates the presence of seagrass in general provides a valuable and under appreciated service of reducing pathogenic bacteria in the water column and in shellfish (Lamb et al. 2017, Ascioti et al. 2022, Dawkins et al. 2024). Lamb et al. (2017) found that *Enterococcus* bacterial levels were 3-fold lower when seagrass were present. Ascioti et al. (2022) estimated that the seagrass sanitation effect resulted in about 8 million fewer gastrointestinal cases worldwide. The work of Lamb et al (2017) and Ascioti et al. (2022) was based on mixed species seagrass beds suggesting that the deactivation or removal of pathogens was not dependent on the type of seagrass present. In a German study, eelgrass (*Zostera marina*) the locally dominant seagrass in Washington and the Pacific Northwest was found to suppress pathogens in seawater (Tasdemir et al. 2024). The wieght of evidence is that the presence of seagrass, regardless of species is associated with lower pathogen loads in the environment and fewer cases of gastroenteritis. Work in Puget Sound (Dawkins et al. 2024) found that not only does the presence of seagrass reduce pathogens in the water column, but they also showed a 65% reduction in human bacterial pathogens in marine bivalves in locations with seagrass. Taken together, these publications suggest that seagrass presence, regardless of species, provides a beneficial service by removing pathogenic bacteria from the environment and from shellfish growing in seagrass beds. Unfortunately, none of these studies explain the mechanism of pathogen removal, and additional mechanistic work is required. Actively removing seagrass from clam beds may reduce or limit the efficacy of this important, under-recognized service and could have implications for human health.

I would be interested to learn about how the requirement that "prohibited in drainages that are flowing to areas containing the native eelgrass *Zostera marina*." is evaluated and enforced? Are there records audits and fines associated with inappropriate applications? This seems to rely on the goodwill and self-regulation. Further, I wonder if the application on ~100 acres of clam beds actually justify the "need" for this chemical eradication tool? If this tool is only being used on a small fraction of clam beds in Willapa Bay, is it really needed and do the environmental impacts really justify its continued usage.

Ascioti et al. 2022. The sanitation service of seagrasses – dependencies and implications for the estimation of avoided costs. Ecosystem Services 54: 101418. Doi: 10.1016/j.ecoser.2022.101418

Dawkins et al. 2024. Seagrass ecosystems as green urban infrastructure to mediate human pathogens in seafood. Nature Sustainability. Doi: 10.1038/s41893-024-01408-5

Lamb et al. 2017. Seagrass ecosystems reduce exposure to bacterial pathogens of humans, fishes and invertebrates. Science 355: 731-733.

Tasdemir et al. 2024. Epiphytic and endophytic microbiome of the seagrass Zostera marina: Do the contribute to pathogen reduction in seawater? Science of Total Environment 908: 168422. Doi: 10.1016/j.scitotenv.2023.168422

I recently learned that the Washington State Noxious Weed Board would be considering the listing of dwarf Japanese eelgrass (Zostera japonica Ascher. et Graebn.) as a noxious weed in all Washington State Waters. I would like to make 4 points against the listing of Z. japonica as a "Noxious weed species" in Washington State.

First, it is my opinion that much of the "information" on the environmental and economic impacts of Z japonica colonization is based on unpublished reports. For example, the Weed Board "written findings" with regard to Zostera japonica draw extensively upon unpublished reports, particularly Mach et al. 2010 and Fisher et al. 2011 and anecdotal information. Unpublished reports have not been peer reviewed, do not provide adequate descriptions of methods and assumptions and should not be taken as "definitive" sources. For example, the Fisher et al. (2011) "white paper" presents experiments and socioeconomic analysis but provide insufficient details (e.g. plot sizes, replication, sampling methods, statistical methods, assumptions) to evaluate the data quality and has not been peer reviewed or published. Consequently, it is difficult to evaluate the validity of conclusions reached by these authors. Likewise, the Mach et al. 2010 document was developed as a brief synopsis of ongoing scientific studies (again with insufficient details to critically evaluate the data) to identify data gaps and most of this work has not been published in the peer reviewed literature. As a result, these documents cannot be considered on par with a published scientific study that has undergone peer review.

A thorough evaluation of the ecological and economic impacts associated with Z japonica colonization where methods and assumptions are clearly stated would go a long way toward clarifying the impacts of these interactions. I am not aware of a thorough economic or ecological evaluation of the positive and negatives associated with Z. japonica colonization. There are 2 published studies on interactions between Manila clams and Zostera japonica. Tsai et al. (2010) concluded that Manila clam condition (measured as meat dry weight) was reduced in the presence of *Z. japonica*. Although this decreased condition was statistically significant, the decrease in clam meat weight was about 0.4 mg (Tsai et al. 2010). Assuming a 40 mm adult Manila clam weighs about 600 mg (Tsai et al. 2010) this is less than a 0.1% decrease in meat weight. Just because a difference is "statistically significant" does not mean that it is biologically or economically meaningful. Clam shell growth was not affected by *Z. japonica* presence and plots with *Z. japonica* had increased clam recruitment relative to removal plots (Tsai et al. 2010). This paper suggests that Z. japonica really doesn't have much of a negative effect on clam production. The second study, from Korea, concluded that intensive mechanical Manila clam harvest stimulated *Z. japonica* sexual reproduction and that the seagrass beds

recovered within about 1 year of disturbance (Park et al. 2011). I think that these 2 published studies taken together suggest that Manila clam production and Z. japonica can co-exist the way they do in Asia, without the need for mechanical or chemical control of Z. japonica.

Second, the impacts of Z. japonica on estuarine health and ecosystem services have not been identified or quantified and even more importantly the impacts of mechanical and chemical control measures have not been identified or quantified. There is a fair amount of information available on the biology and ecology of Z. japonica. With the exceptions of Willapa and Padilla Bays, Z. japonica and Z. marina distributions are generally separate, with little chance for competitive interaction between the two species. The presence of Z japonica likely increases the primary production, benthic microalgae colonize seagrasses and in many cases these epiphytes are actually the dominant primary producers (Moncreiff and Sullivan 2001). The leaf surface area of a Z japonica bed provides much more epiphyte substrate than a comparable Z marina bed. One of the critical pieces of information missing in the assessment of Z japonica is a critical evaluation of the species that utilize this habitat relative to Z marina. In a recent peer reviewed report, Lamberson et al. (2011) recently observed bird foraging in seagrass habitat and concluded there was no evidence to suggest that birds are negatively impacted by the presence of Z. japonica. Other recent work concluded that benthic macrofaunal species richness, abundance and biomass in *Z. japonica* habitat was greater than or equal to that in oyster, mud shrimp or *Z. marina* habitat (Ferraro and Cole 2012). Benthic invertebrate community composition, abundance, species richness, and diversity associated with patches of *Z. japonica* and *Z. marina* in Washington were similar (Hahn 2003). Although anecdotal reports suggest Z japonica utilization, I am not aware of any published studies that have critically evaluated fisheries species (e.g. salmonids, herring, Dungeness crab, perch, etc.) utilization of Z japonica in comparison to Z. marina. However, work in Europe with the ecologically similar Z. noltti has found that a variety of species utilize this habitat when flooded including spawning herring (Polte and Asmus 2006a, b). Semmens (2008) concluded that salmonids had a preference for Z. marina over other intertidal habitats but was based on a limited sample size of 17 fish. This brief review of peer reviewed publications suggests that Z. japonica may be an important contributor to estuarine ecosystem services.

Although there has been a fair amount of work on how to kill Z japonica (e.g. mechanical removal, herbicide applications, thermal disruption, etc.), there has been little or no scientific evaluation of the collateral impacts associated with control methods. Mechanical removal by digging clearly has a negative impact on the macrofauna, but this has not been quantified. Additionally, there is little evidence to suggest the long term success of mechanical removal. Despite intensive eradication efforts which have been successful at some sites, Z. japonica continues to increase patch numbers and colonize Humboldt Bay (Ramey et al. 2011). Consequently, when eradication efforts cease, the plant will rebound. Herbicides are usually not target specific and will likely negatively impact other macrophytes (Z marina and algae) as well as benthic and planktonic microalgae. The impacts of herbicide applications in estuarine waters

are very poorly studied (see below). One effective method of controlling Z japonica in Humboldt Bay was to pump hot water into the sediments to kill the plants (Ramey et al. 2011). This likely has a negative impact on all of flora and fauna in the sediments but again the impact has not yet been quantified (Ramey et al. 2011). Additionally, there has been no quantification of the economic costs associated with the California control research. Even more difficult to quantify but equally important are the biogeochemical impacts associated with Z japonica control. Killing all of the animals in the sediments with hot water may turn areas from being a nutrient sinks to nutrient sources which may have its own unique set of issues. For example, the 10 y Brown Tide bloom in Laguna Madre TX is believed to have been triggered by ammonium released from decomposing fish and sediment invertebrates killed in a severe winter freeze (Buskey et al. 1997). It seems prudent to understand the effects that the control measures have not only on the target but also on other components of the system.

Third, listing Z japonica habitat as a noxious weed allows the use of commercial herbicide applications to estuarine areas, despite inadequate testing and quantification of the ecological effects. Because *Z. japonica* is currently listed as a Class C Noxious weed on shellfish beds in Washington, commercial shellfish growers can use industrial methods to control the plant. Washington Department of Ecology is actively working on developing a National Pollutant Discharge Elimination System (NPDES) permit for the use of the herbicide Imazamox to control *Z. japonica* on commercial shellfish beds in estuarine waters[1]. Imazamox is registered for use in the aquatic environment by the US Environmental Protection Agency (US EPA 2008), despite the lack of evidence for efficacy on estuarine plants and major data gaps with regard to effects on estuarine/marine fish, shrimp and mollusks (US EPA 1997). Imazamox inhibits production of acetolactate synthetase, which prevents the formation of the essential amino acids valine, leucine, and isoleucine (Mallory-Smith and Retzinger 2003). This mechanism of action is not specific to *Z. japonica* and may have a negative effect on other photosynthetic organisms (e.g., native eelgrass, macroalgae, phytoplankton, and microphytobenthos). Toxicity tests of Imazamox on a marine diatom species (S*keletonema costatum*) showed an 11% reduction at 40 ppb, the test concentration was below the labeled use application rates of 50 to 500 ppb for aquatic plants (US EPA 1997, 2008, 2012). This report concludes "*Additional aquatic plant growth studies needed to be done to determine if the unicellular species such as diatoms and algae are sensitive to imazamox up to 500 ppb. If they are sensitive, then an EC50 will need to be determined.*" (US EPA 2008; italics added for emphasis). To date, an EC50 has not been determined for diatoms. Recently, Seattle Shellfish LLC., filed a letter report[1] by Dr. Richard Wilson on the importance of marine diatoms to the Willapa Bay food web in general and more specifically for shellfish. Given the sensitivity of diatoms to the herbicide imazamox described above, it seems likely that chemical control of *Z. japonica* will also have adverse impact this important food resource. It is ironic that carbaryl pesticide applications historically used to suppress burrowing shrimp in commercial shellfish grounds may have favored the expansion of

Z. japonica beds in these same areas (Dumbauld and Wyllie-Echeverria 2003). Consequently, the unforeseen impacts of burrowing shrimp control may have exacerbated Z japonica colonization. Interestingly, carbaryl pesticide applications are scheduled to be phased out by the end of 2012 (Schreder 2003). Federal and state resource agencies and citizen groups have expressed concerns about the potential for impacts of Imazamox to non target organisms such as *Z. marina* (considered essential fish habitat by NOAA National Marine Fisheries Service) and listed endangered species (ESA) such as salmonids[1]. Again, it seems prudent to understand the effects and impacts of any management actions taken to control Z. japonica, so that the cure isn't worse than the disease.

Finally, it is important to recognize that this action is diametrically opposed to existing national and international seagrass conservation efforts (Orth et al. 2006) and that control of *Z. japonica* is likely to be an expensive endeavor with limited potential for success. In Humboldt Bay, Cal F&G has had a program to eradicate a small population of Z. japonica; despite almost a decade of intensive effort Zostera japonica continues to persist and expand in the system.

[1] http://www.ecy.wa.gov/programs/wq/pesticides/comments.html

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Chase Metzger

I would like there to be a provision for aerial application of imazamox utilizing drones. All regulations specific to drones and conditional (weather) would be applicable. In addition posting the four corners of the treatment site makes little sense as all applications are coordinated with the shellfish grower and any public access when applicable will also be posted at shore. There isn't anyone anywhere to see the posted four corners and this provides no public purpose.

Christine Barkhurst

For Willapa Bay you have been handling this five year extension request. I am using my Husband's email because my cell phone has failed. ATandT was vandalized so cannot get a new one. I am Christine W. Barkhurst. While I agree with my husband's comments, I am making my comments on birds of the nearshore land. Swallows, hermit thrush, are gone! Plenty before spraying began. Thrush sang every evening, now NEVER! Our family frequented Willapa Bay Area, especially Nemah, since late 1970s. These and other birds were numerous. When we retired in 2002, we moved here full time in a house we built. Our yard and long driveway were covered with birds. When Spruce and later alder seeds fell, birds were all over them. Now alder seeds cover the ground and vehicles heavily. Not one junco! Unreal. Swallows were thick over the Nemah Flats, eating brine flies and getting mud for their nests. After imazamox began, now zero! Swallows built a nest in barn eaves and fought each year with starlings over it. Now no fights, nest never used. All this coincides with onset of imazamox in 2014 and 2015. No Eelgrass, no insects, no birds! Your EIS was defective in not predicting this, and not even addressing the loss of herring spawning beds, which it did not map and to this day does not inventory spawning mass. You apparently rely upon WDFW to advise on above critical habitat issues, they do not, as we all know. Everywhere else on Coast, just not Willapa Bay where you spray. No baseline, no monitoring, no problem!!! Your EIS clearly did not baseline key elements such as ESA and species of concern. ESA Orca, marbled murrelet, and green Sturgeon are or were here and or fed by our food chain. You apparently rely upon WDFW, now independently evaluated by Ruckelhause as " disfunctional". They never baselined Herring spawning mass, and never check it going forward, except for the one South of Nahcotta. 90% loss/ failure there! You cannot continue to remove Eelgrass on this missing foundation. You must charter a real Environmental Impact statement group, including public impacted by these losses, restore what is lost, and utilizing good oceanography which now exists to guide restoration, and see if there is any location where Eelgrass could be removed without the losses staring us in the face right now. Chemical experience and currents tell us the past approach after chemical application only passes inspections that do not take place.
The birds have not survived the previous " no baseline, no monitoring, no problem" approach.

January 12, 2025

To: Shawn Ultican
WA State Dept. of Ecology
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Olympia, WA 98504-7696

From: Brian & Marilyn Sheldon
PO Box 1039
Ocean Park, WA 98640

Re: Zostera japonica management on Commercial Clam Beds in Willapa Bay General Permit

Dear Shawn,

Thank you for the opportunity to provide input to the renewal process for the Zostera Japonica Management on Commercial Clam Beds in Willapa Bay General Permit. This permit is a critical component in the control of this highly destructive invasive species. After years of research beginning in the 1998 timeframe, the state Weed Board agreed with the destructive nature of this invasive and added it to the WSDA list as a Class-C noxious weed in 2012 across the entire state.

At this time the permit limits control to only commercial clam beds in Willapa Bay, which is unfortunate given that this invasive eco engineer has caused immeasurable damage to all areas it has infected throughout the State's marine areas. It has altered the marine lands to provide habitat for other invasive species, such as European Green Crab. It has altered the highly aerobic characteristics of these lands to create anaerobic conditions more suitable for a worm species that predates our clam crops and other species. As we understand, there has been recent work in Willapa Bay to characterize the biota comparison between native eel grass and japonica. At a recent presentation by the principal scientist on this work, it was indicated that japonica harbors mostly invasive species. A report on this work is due out within the next few months. Japonica has altered conditions on all our shellfish beds to trap water at low tide. This trapped water damages our shellfish crops by exposing them to high water temperatures on hotter days, and this results in reduced yields, lower quality meats, increased mortality, etc. This large negative impact to our shellfish crops by this invasive weed is not limited to the boundaries of our commercial clam beds in Willapa Bay. It has been documented that this invasive acts to reduce clam crop densities by over 65%, while at the same time slowing crop growth. This same reduction is seen on all lands including public recreation areas as well as on private tidelands.

Beginning in 2014 we have been covered by an NPDES permit that has allowed voluntary control of this invasive species. The efforts of shellfish growers have resulted in a great service in the battle against invasive species with no charge to the public. We

have participated in the control program most of the years since the permit has been in place. We conduct annual on-site monitoring, and to date have seen no negative effect on native eel grass due to the control of japonica. In fact, studies conducted on native eel grass overall in Willapa have shown no fluctuation in abundance beyond normal season changes.

We offer the following more specific comments on the draft permit based on my long-term direct experience working with invasive weeds in the marine environment, knowledge of permit logistics, on site experience with controlling japonica, and many years of monitoring general impacts in areas around japonica treatment sites.

S3.E.2 (page 8) If multiple permittees are combining efforts to treat under a single DMP per section S3-E, then only one permit fee will be charged for that combined group.

We suggest adding the above language in order to match language we suggest in **G11 (page 25)**

Section S4. Product Use

S4.A.1.a (page-9): "*A properly licensed applicator has direct supervision responsibilities for the use of pesticides during treatment. An unlicensed person can apply under the direct supervision of a properly licensed individual. Direct supervision means the licensee is physically present on site* ***~~and be in voice~~ and in visual contact with the ~~certified~~*** *applicator at all times during the application".*

Due to the logistics and conditions during an application it is not always possible to be in voice contact with the person being supervised. In addition, the person performing the application under the supervision of a licensed applicator is not considered a "certified" applicator. The person may be trained in the application and apparatus, but this does not necessarily equate to them being certified. We request the wording be amended as shown above.

S4.A.2. (page-9): *"Only apply imazamox from May 15 through July 31 (dates inclusive)."*

Amending the permit seasonal treatment window to be from May 15th through July 31st is a positive objective change. It will allow a better assessment to be made when determining what areas require treatment in a given year. We support this change.

S4.B. (page-10): Japonica is a class-C invasive noxious weed and establishing a buffer acts to prohibit the farmer from protecting their crops from this noxious weed. This has large economic impacts on the farm as has been documented thoroughly. For example, if a bed has a total bed line of 1000 feet, and a 10-meter (approx. 30') buffer is protected, then the grower will see crop damage on 30,000 sq ft of the crop land due to this buffer. This equates to a large economic impact to the grower, while at the same time the benign nature of imazamox has been objectively documented through multiple impact studies conducted over multiple years regarding any significant off-site negative

impacts. Results from those studies document well that any potential offsite impact is negligible and well below and threshold. The damage to clam crops caused by japonica has also been objectively documented. I request that setback buffers be eliminated from the permit so growers can protect all their crop lands against this noxious invasive plant.

S4D.3-7. (page-10): The treatment sites covered under this permit are predominantly in remote areas far away from any public access and on private property. Other similar permitting for treatments in this type environment limit posting to public access points, and I request that this permit follow this same pattern. I request posting be required at public access sites within ¼ mile of an actual treatment site, and no other posting be required.

S4D.3 (page-10): I do not support a requirement to post signs at all corners of the treatment site. Treatment sites are located in remote areas away from any public access. In addition, the environmental conditions at these sites are exposed to often harsh water and weather conditions, so holding a sign in place is unpredictable. In reviewing other marine applications of this nature, we see no requirement for the posting of signs on site, so there is no precedent for this requirement. If a treatment site is within ¼ mile of a public access, then posting should be limited to that public access.

S4D.5 (page-10): We oppose requiring signs to be posted 24 hours before treatment. These sites are in remote areas, and access is limited due to tidal inundation twice daily. Making a special trip to the site forces the grower to utilize valuable low tides they need to conduct farm work in other areas. In addition, the conditions in these areas are harsh and not a simple matter of putting a stake in with a sign on it. Holding a sign in place under water with wave and current actions is extremely difficult and about impossible to assure they'll stay in place through multiple tides. We request this requirement be removed from permit language.

S5.A (page-14): During the initial permit implementation, the effects of treating japonica in regard to offsite impacts were documented as insignificant in multiple field studies, and far below the 10% impact threshold developed by WDFW. My on-site observations over many years of treating japonica are in line with those objective studies. There are no significant offsite impacts, and there has been no new objective data provided that disputes this fact. While I understand the need to be vigilant, and to provide some level of feedback annually, the proposed monitoring requirements proposed in the draft permit are over the top regarding level of complication and resource requirement. This proposed plan is far above anything we've seen in any other NPDES permit approved for the control of invasive weeds in the marine environment and will only act to discourage participation in the control of this noxious weed. We request that monitoring be limited to a requirement for the grower to return to the site within 30 to 60 days and provide a statement that reflects the condition of the immediate area of the treatment in regard to any reduction in native eel grass.

S6.A (page-15: I request that the following section be added: S6.A.4: *In the event that a group of permittees are cooperating under a single coordinator, then all records for those cooperating may be housed at the location designated by the coordinator.*

S7.B.1 (page-18): We request that this section be removed from the permit. Again, this is a new requirement above and beyond the standard application of an NPDES requirement for any other marine invasive plant. The permittee is already required to provide public notice to conduct treatments within the permitted treatment window. This additional notification requirement is complicated, and again only acts to discourage the voluntary control of this noxious weed. In addition, this program does not take place in a benign upland environment where most weed control activities take place. The activity takes place in a highly dynamic environment where the grower has no control of what conditions may be on the day of treatment. As someone with years of experience actually doing control in this environment, it is a regular theme that planned treatments are changed the day of based on weather, tide, and other conditions controlled by mother nature.

S7.B.4 (page-18): We request that this new section be removed from the permit. There is no other permit of this kind that has such a requirement around notifying all adjoining landowners. Based on actual treatment history, these treatments all take place in remote locations away from the public. A high percentage of neighbors would need to trespass a long distance to even access a treatment site. This new requirement places an unreasonable burden on growers who are providing a public service by controlling noxious weeds with no cost to the public. Imposing this unnecessary and costly burden on growers is without merit.

In regard to S7 public notice, an option we do support is to place an annual notice in a local publication, or other acceptable public site that provides notice of the control and treatment window. This notice could also direct interested parties to the DOE or other website where they could access permit documents. In this way the interested party would have access to the objective details surrounding the overall invasive weed issue.

G11 (page-25): Those participating in the control of japonica as an invasive noxious weed are performing a public service at substantial cost to themselves. For other similar weed control programs, many of these costs, including the NPDES annual permit fee, are paid by the entity providing oversight. In line with this standard approach, I request that if a group of permittees are participating cooperatively as a group that the group only be assessed a single permit fee to cover all participants. We request that appropriate language be inserted in this section to provide for this.

Again, thank you for the opportunity to provide comment on this critical invasive noxious weed management program.

Sincerely,

Brian & Marilyn Sheldon

Marlisa Williams Dugan

After the meeting and speaking to others about this permit, my request for changes to this proposed permit is as follows:
1. Pre and post Spraying of zostera marina monitoring is required for quality compliance. Without documentation, there is no proof of the damage or lack there of- of areas outside the spray zone. Charge the land owner a fee for the service.
2. Re-evaluation of zostera japonica as to the genuine nature of "noxious weed" classification. If it's providing abundant habitat for marine life in general, It has been miss-classified to suit the needs of the clam growers.
3. My concern for loss of eel-grass in Willapa Bay is shared by many. The small parts of the big picture begin with this permit, it's use in the past and the revalation of 1,500 acres of dead eel-grass in the last 10 years. HOW MUCH DEAD HABITAT IS ENOUGH?
4. Willapa's migrating juvenile salmon of all species need the habitat cover and nutrition both species provide. Until further studies are done on eelgrass mass, and the effects of immazamox in manilla clams , refuse to issue this permit.
It wouldn't take much to hire my own biologist , spray a patch of my own clams and test the mud at a variety of levels along with the clams for food safety. It is just this type of food quality control RFK Jr appears interested in. The build up of chemicals in our soil, water and food are concerns for generations to come. Truthfully, I'm a bit shocked this permit is being considered for renewal at all, let alone for a 5 year period AND with no monitoring required.
Respectfully
Marlisa Williams Dugan
Fishthenemah@gmail.com
253-307-4043

January 13, 2025

Shawn Ultican
WA Department of Ecology
PO Box 47696
Olympia, WA 98504-7696
Submitted via comment portal

Dear Mr. Ultican,

The Pacific Coast Shellfish Growers Association (PCSGA) appreciates the opportunity to comment on the consideration to reissue the Zostera japonica (*Z. japonica*) Management on Commercial Clam Beds in Willapa Bay National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit. PCSGA was founded nearly a century ago to represent the interests of shellfish growers in the states of Washington, Alaska, Oregon, California, and Hawaii. PCSGA works on behalf of its members on a broad spectrum of issues, including environmental protection, shellfish safety, regulations, and technology. Our Washington members grow a wide variety of healthy, sustainable shellfish including oysters, clams, mussels, and geoduck.

Washington State has a rich history of farming shellfish which is critical to coastal counties, such as Pacific County as it provides much needed family-wage jobs and local tax revenue. There are many challenges to farming shellfish, including water quality, conflicting uses, and the growing presence of noxious weeds, including *Z. japonica* which was listed as a class C noxious weed by the WA State Noxious Weed Control Board in 2012. The presence of *Z. japonica* is known to cause significant impacts to benthic invertebrates, impact water and sediment temperatures. It also alters natural tide flats reducing shore bird feeding opportunities and alters natural setting and recruitment of clam seed.

Imazamox, a low-toxicity herbicide with the trade name Clearcast, has proved to be a crucial tool in controlling the spread of *Z. japonica*. Since its approval for use in 2014 it has allowed shellfish farmers to reclaim lands for clam production. Use of Imazamox has not resulted in adverse impacts to native species, including native eelgrass *Zostera marina* through several permit restrictions such as a limited treatment window, wind restrictions during applications, requirement for treatments at low tide and 10-meter buffers to

eliminate non-target impacts. The successful implementation of the general permit for Imazamox has reduced the acreage lands receiving treatment to an average of 82 acres per year and currently only nine farms possess a general NPDES permit to treat *Z. japonica*.

PCSGA supports and strongly encourages the renewal of the General Permit for *Z. japonica* Management on Commercial Clam Beds in Willapa Bay. In absence of a permit to use Imazamox, all the progress that has been made containing a class C noxious weed over the past decade will be reversed, putting the economic and environmental health of Willapa Bay and Pacific County in jeopardy. Thank you for considering these comments. Please don't hesitate to contact me if you need additional information.

Sincerely,

Margaret A. Pilaro
Executive Director

Twin Harbors Waterkeeper

Dear Shawn:

Our law firm represents Twin Harbors Waterkeeper. On behalf of this organization, attached is a comment letter that provides comments on the Washington Department of Ecology's draft 2025 General National Pollutant Discharge Elimination System Permit for Managing Zostera japonica on Commercial Clam Beds in Willapa Bay. Please respond to the attached comment letter in writing and include the letter and its Exhibit A (also attached) in the administrative record for this matter.

Thank you,
Erica Proulx
Kampmeier & Knutsen, PLLC
705 Second Avenue, Suite 901
Seattle, Washington 98104
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206.739.5184
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January 13, 2025

Via Washington Department of Ecology Online Public Comment Form

Shawn Ultican
Washington Department of Ecology
P.O. Box 47696
Olympia, WA 98504-7696

Re: Comments on Ecology's draft 2025 General NPDES Permit for Managing *Zostera japonica* on Commercial Clam Beds in Willapa Bay

Dear Shawn:

Our law firm represents Twin Harbors Waterkeeper ("THW"). On behalf of this organization, this letter provides comments on the Washington Department of Ecology's ("Ecology") draft 2025 General National Pollutant Discharge Elimination System Permit for Managing *Zostera japonica* on Commercial Clam Beds in Willapa Bay ("the Permit"). Please respond to these comments in writing and include these comments and associated attachment in the administrative record for this matter.

THW is a 501(c)(3) non-profit organization based in southwest Washington. The mission of THW is to protect and improve water quality and marine and freshwater habitats on the Washington coast, including in Willapa Bay and Grays Harbor. THW is especially interested in the health of Willapa Bay ("the Bay"), the second largest estuary on the West Coast. Much of the Bay is protected by the Willapa National Wildlife Refuge. The refuge's abundant salt marshes and tidal mudflats, coastal dunes and beaches, grasslands, freshwater wetlands, and old-growth forests are home to many fish, wildlife, and plant species. Over 200 species of birds are documented annually in Willapa Bay, including the endangered marbled murrelet. Additionally, green sturgeon (*Acipenser medirostris*) spend the summer in Washington State coastal estuaries like Willapa Bay where they feed on burrowing shrimp. The southern distinct population segment of green sturgeon is listed as threatened under the Endangered Species Act.

Willapa Bay has suffered from infestations of invasive species due to human activity such as industrial forestry and shellfish aquaculture. Other harms to the Bay caused by industrial forestry include sedimentation and water quality degradation. Because of these and other factors, native species and the ecology of the Bay have been compromised.

Dedicated scientists work to manage invasive plants and invertebrates so that aquaculture can continue to thrive. Additionally, Washington State has expended significant resources in attempts to recover wild salmonid populations. Despite these efforts, salmonid populations and Southern Resident Killer Whales, which depend on these salmonid species, face the threat of extinction.

Although THW understands the need to balance farming the tidelands and protecting native species of the Bay, THW advocates against any actions that pose additional risks to the Bay and to the rare, sensitive, threatened, and endangered species that rely on it, including the application of herbicides such as imazamox to control *Zostera japonica* on commercial clam beds.

For these reasons, we strongly urge Ecology to strengthen the Permit in the following ways:

I. The Draft Permit's Monitoring and Reporting Requirements Are Insufficient.

The Permit does not include sufficient reporting and monitoring requirements, resulting in a lack of transparency and accountability to Ecology and to the public. The Permit should be revised to include additional application, reporting, and monitoring requirements.

Specifically:

- The Permit requires the following submittals: (1) a Discharge Management Plan ("DMP") once per coverage or update; (2) an annual pre-treatment plan; and (3) an annual post-treatment report. *See* p. 1, Table 1. Only "as necessary" are permittees required to submit notices of noncompliance or spill. *Id.*

  In addition to these submittals, the Permit should be revised to require monthly reporting on compliance with (or non-applicability of) Special Condition S3, S4, and S5 requirements during the permissible imazamox application window (currently May through July) regardless of whether treatment has occurred or is planned. Such reporting should be made available to the public through Ecology's Permitting and Reporting Information System ("PARIS").

  This reporting should include, but is not limited to:

  - Proof that application does not cause or contribute to violations of Water Quality Standards, Groundwater Quality Standards, Sediment Management Standards, and human health criteria in the National Toxics Rule. *See* Special Condition S3.A, pp. 6–7.
  - Proof that permittees use All Known, Available, and Reasonable methods of prevention, control, and Treatment ("AKART"), including compliance with the Washington Pesticide Control Act, Washington Pesticide Application Act, Federal Insecticide, Fungicide, and Rodenticide Act, and product labels. *See* Special Condition S3.A and pp. 6–7; *see also* Special Condition S4.

- Proof of compliance with WAC 173-201A-410. *See* Special Condition S3.B, p. 7.
- Proof that treatment does not cause or contribute to further impairment of Willapa Bay for any parameter for which Willapa Bay is listed as impaired. *See* Special Condition S3.C, p.7.
- Proof that treatment does not cause harm to sensitive, threatened, or endangered animal species or rare plant populations. *See* Special Condition S3.D, pp. 7–8. This should include monitoring of and reporting on what species interact with the area before, during, and after application of imazamox.
- Proof of compliance with permittee's DMP. *See* Special Condition S3.E, p. 8.
- Proof of compliance with the product label and all pesticide application requirements mandated by Special Condition S4.A, pp. 8–10.
- Proof that permittee has maintained the required buffer per Special Condition S4.B, including photographic evidence. *See* p. 10.
- Proof that permittee has complied with the posting requirements of Special Condition S4.D, including photographic evidence. *See* p. 10.
- Sample results from a laboratory registered or accredited under Chapter 173-50 WAC, including the following parameters:
  - Date, place, and time of sampling;
  - Date and time of sample analyses;
  - Who performed the analyses;
  - Analytical techniques and methods used;
  - Results of analyses;
  - Flow;
  - Temperature;
  - Settleable solids;
  - Conductivity;
  - pH; and
  - Turbidity

  See Special Condition S5, pp. 11–12.

- Proof that permittee has measured the buffer distance in compliance with Special Condition S5.A, including reporting on any *Zostera* plants affected by treatment beyond the parcel boundary.
  - Photographs required by Special Condition S5.A should be made available to the public.

  See p. 12.

In addition to requiring more detailed and more frequent reporting, and making such reporting available to the public through PARIS, THW urges Ecology to make the following Permit revisions:

- Special Condition S2.C.3 (pp. 3–4) provides that "[p]ermittees renewing their permit coverage are not required to publish a public notice." Public notice should be required for first-time applicants, existing permittees applying to modify permit coverage, *and* for

permit renewals. Thus, THW requests a revision to Special Condition S2.C.3(c) to require public notice so that the public, including organizations like THW, can review permittee's compliance with their current permit and comment prior to Ecology issuing a renewal.

- Proposed revisions and additions for Special Condition S4.A:
    - Informed by what is necessary to protect Willapa Bay from harmful water quality impacts, Special Condition S4.A should specify what spray equipment is permissible for application and what equipment is prohibited.
        - THW attended Ecology's in-person public workshop and hearing on January 7, 2025, at the Willapa Harbor Community Center. There, THW learned that backpack sprayers are required for application of imazamox. This should be specified in the Permit. Additionally, the Permit should specify how applicators are permitted to access the spraying zone and whether application must be done on foot. THW strongly urges Ecology to revise the Permit to prohibit the use of vehicles to assist in the spraying process.
    - Special Condition S4.A.2(e) (p. 9) should be revised to shorten the application window to when application is likely to be most effective, ending in early June. *See* Kim D. Patten, *Imazamox Control of Invasive Japanese Eelgrass (*Zostera japonica*): Efficacy and Nontarget Impacts*, 53 J. Aquatic Plant Mgmt. 185–90, 189 (2015) (attached as Exhibit A).
    - Special Condition S4.A.2(g) (p. 9) should require more than one hour of dry time before tidal inundation. THW proposes six hours of dry time. Additionally, the area should be monitored during the dry time.
    - Special Condition S4.A.2(i) should describe how wind speed must be measured or, in the alternative, require permittees to report on how wind speed was measured and when it was measured relative to application.
    - Currently, Special Condition S4.A.2(j) (p. 10) prohibits application of imazamox directly into drainages that contain *Z. marina* and move water off the treatment site. In order to avoid harm to *Z. marina*, please require that no spraying be allowed near or over pools where it exists and require that no spray be allowed near drainage swales that contain *Z. marina*.
    - As described above, permittees should be required to report on compliance with these and all other parameters in monthly and annual reporting.
- Special Condition S4.B (p. 10) requires a minimum buffer width of 10 meters for all treatment sites. Please require markers such as food-grade dye or flags to mark boundaries and the buffer area.
- In addition, Special Condition S4.B should require exact monitoring requirements to ensure the buffer is protective of adjacent vegetation. THW suggests vegetation plots in the buffer to measure for *zostera spp.* plant kill every 250 feet in the buffer one week

after herbicide application. The results of this monitoring should be a required component of monthly and annual reporting.

- Special Condition S4.D (p. 10) requires permittees to post signs near the treatment site 24 hours prior to treatment. However, most of the treatment sites are not accessible to the public, so there is no way (1) for the public to see the postings and be informed of treatment or (2) to ensure that permittees comply with the posting requirements. Please revise the permit to require signs posted four business days prior to treatment at and around Leadbetter Point, including near and around Leadbetter Point State Park and the Willapa National Wildlife Refuge. In addition to what the draft site signage template already requires (treatment dates, applicator contact information, and permit number), these postings should include:

    - The location of application, including both a written description and a map;
    - The amount of imazamox to be applied;
    - The number of acres to be treated; and
    - Name and contact information of commercial clam bed owner/operator

- Currently, the Permit merely requires the permittee to conduct monitoring and retain records to be made available to Ecology upon request. *See* pp. 11–13. As detailed above, the Permit should instead require permittees to submit Special Condition S5 monitoring (pp. 11–12) to Ecology once per month during the permissible treatment window regardless of whether treatment has occurred or is planned. Such reports should then be made available to the public on PARIS.

- Special Condition S7.B (pp. 13–14) requires permittees to provide notice to Ecology and adjacent landowners "at least 10 days prior to each herbicide treatment." In addition, the notification forms (Ecology Pre-Treatment Notification Form and Landowner Pre-Treatment Notice) should be publicly posted online.

II. <u>The Draft Permit Fails to Ensure Compliance and Accountability</u>.

THW is concerned about current and future compliance with the Permit. Based on information publicly available, it appears Ecology has never inspected or taken any enforcement actions against permit holders.

To address these concerns, THW requests the following information and proposes the following changes to the Permit:

<u>Fact Sheet and Reporting on Past Compliance and Ecology Action:</u>

The Permit's Fact Sheet should detail whether the nine current permit holders have complied with and are in continued compliance with the Permit, including all Special Condition S3, S4, and S5 requirements.

For example:

- Were all applications of imazamox directly supervised by a properly licensed applicator?
- Was all equipment properly calibrated and maintained?
- Were application rates less than 1.4 ounces per acre?
- Did permittees refrain from applying other pesticides to commercial clam beds four days before and after imazamox application?
- Did permittees refrain from applying imazamox unless and until *Z. japonica* levels met or exceeded DMP action thresholds?
- Did permittees allow at least one hour of dry time before tidal inundation?
- Did permittees refrain from application when wind speeds exceeded 10 miles per hour and how was this measured?
- Etc.

If this change is not made, can Ecology please provide this information in response to these comments?

Additionally, the Permit's Fact Sheet should summarize any and all Ecology enforcement actions and inspections under the Permit to date. If this change is not made, can Ecology please provide this information in response to these comments?

Reporting on Compliance with Special Conditions S3 and S4:

As aforementioned, the Permit prohibits violation of Water Quality Standards and requires permittees to use AKART. *See* Special Condition S3.A and pp. 6–7; *see also* Special Condition S4. However, the draft Permit fails to provide any means of ensuring or enforcing compliance with these requirements.

Similarly, the Permit "prohibits treatment that causes oxygen depletion to the point of stress or lethality to aquatic biota from plant die-off, the mortality of aquatic vertebrates, or unintended impacts to water quality or biota"; prohibits application of active ingredient imazamox at a rate of more than 1.4 ounces per acre; and prohibits aerial application, among other requirements and limitations. *See* Special Condition S4, pp. 8–10.

Rather than one annual report, the Permit should require permittees to submit monthly reporting during the permissible treatment window, made available to the public via PARIS, regarding compliance with Special Conditions S3 and S4. Reporting should be required even if no treatment has occurred or is planned.

Inspection:

General Condition G3 gives Ecology the right of entry. *See* p. 18. Instead, Ecology should proactively conduct regular inspections.

Since permittees can only apply imazamox once per year (*see* Special Condition S4.A.2(f), p. 9), and given that there are currently only nine permittees, THW proposes that Ecology conduct two inspections per permittee each year during the permissible treatment

window. One inspection should occur prior to planned treatment and one should occur following treatment. Inspection reports should be made available to the public thirty days following inspection.

THW proposes adding these requirements to Special Condition S5 while leaving General Condition G3 intact.

If Ecology declines to make these revisions, can Ecology please explain, in response to these comments, how it ensures compliance with the Permit?

Who Is Liable?

The draft Permit fails to make clear who is liable for compliance with the Permit.

Special Condition S2.A notes that "[c]overage under this permit is for pesticide applicators . . . and their **Sponsors** who specifically want to use imazamox to control Z. japonica within commercial clam beds in Willapa Bay." *See* p. 2. The Permit defines "applicant" as "[t]he WSDA-licensed Pesticide Applicator with an aquatic pest control category endorsement and their Sponsor applying for permit coverage"; "permittee" as "[a]ny WSDA licensed Pesticide Applicator with an aquatic pest control category endorsement having coverage under this permit"; and "sponsor" as "[a]n individual or entity in the business of commercial production and sale of clams that has the legal authority to decide to apply herbicide to its owned or leased commercial clam beds." *See* pp. 24, 26, 27. The nine current permitholders listed in PARIS are all shellfish growers.

The Permit should make clear that it is the entities in the business of commercial production and sale of clams—i.e., the owners/operators of the permitted facility—that are the permit holders liable for compliance. This aligns with other Ecology NPDES permits where the owner/operator of the discharging facility is liable for permit violations not, for example, third parties hired to help with facility management or permit compliance.

Specifically, THW proposes the following revisions:

- Special Condition S2.A should state: "Coverage under this permit is for individuals or entities in the business of commercial production or sale of clams that have the legal authority to decide to apply herbicide to owned or leased commercial clam beds and want to use imazamox to control *Z. japonica* within commercial clam beds in Willapa Bay ("Permittees"). Coverage under this permit must be obtained before imazamox treatment begins. Permittees are required to apply with a pesticide applicator licensed by the Washington State Department of Agriculture with an aquatic pest control category endorsement ("Sponsors")."
- Applicant should be defined as: "The individual or entity in the business of commercial production or sale of clams applying for permit coverage and the WSDA-licensed Pesticide Applicator with an aquatic pest control category endorsement acting as their Sponsor."

- Permittee should be defined as: "An individual or entity in the business of commercial production and sale of clams that has the legal authority to decide to apply herbicide to its owned or leased commercial clam beds."
- Sponsor should be defined as: "Any WSDA-licensed Pesticide Applicator with an aquatic pest control category endorsement applying with a Permittee under this Permit."
- Changes should be made throughout the Permit to reflect these revisions (e.g., current uses of "permittee" to describe pesticide applicators should be changed to "sponsor," and current uses of "sponsor" to describe clam bed owners/operators should be changed to "permittee").

If Ecology declines to make these revisions, can Ecology please respond to these comments by specifying which party is liable for noncompliance with the Permit?

III. Experimental Use Should Not Be Permitted Under this Permit.

Special Condition S1.A provides that "[p]ermittees may apply chemicals not listed in this permit on a limited basis in the context of a research and development effort under the jurisdiction of the Washington State Department of Agriculture by obtaining a Washington State Experimental Use Permit." *See* p. 2. Special Condition S4.E provides that "[e]xperimental use of chemicals not listed in this permit may occur on a limited basis in the context of a research and development efforts [sic] related to the chemical control of Z. japonica." *See* p. 11.

The experimental use of chemicals should not be allowed under this Permit. Washington State and Federal experimental use permits are not NPDES permits and there is no notice or opportunity under this Permit for the public to participate and ensure that such chemicals do not harm Willapa Bay. Moreover, the Permit does not provide limits or assurances that these experimental chemicals will not cause harm beyond the scope of the Permit.

While THW proposes elimination of these provisions, at a minimum, the Permit should require permittees to report any experimental use and related permits in their application, modification, and renewal materials, giving the public an opportunity to comment on the use of experimental chemicals to control *Z. japonica* in Willapa Bay. Permittees should also be required to report the use of any experimental chemicals in their monthly and annual reports with citations to their experimental use permits.

If Ecology declines to adopt these changes, can Ecology please explain, in response to these comments, why it believes the Permit should allow experimental uses and how these Permit provisions ensure (1) no harm to Willapa Bay and (2) the public's right to be informed and to comment on the use of experimental chemicals in Willapa Bay to control *Z. japonica*?

IV. Conclusion.

Twin Harbors Waterkeeper is concerned that Ecology's Permit, as written, fails to sufficiently protect Willapa Bay and the species that rely on it. Please consider the concerns and suggested revisions expressed in these comments. Please also explain how the current and draft

Permits are effective in regulating imazamox applications, holding permit holders accountable for compliance, keeping the public informed, and protecting Willapa Bay. Please respond to these comments in writing so our clients and others can understand Ecology's views on these issues, and please include these comments and all attachments in the administrative record for this matter.

We appreciate the opportunity to comment on the draft 2025 *Zostera japonica* Management on Commercial Clam Beds in Willapa Bay General Permit. THW supports Ecology's efforts to regulate imazamox. However, the Permit must include stronger mechanisms for permittee accountability, Ecology inspection and enforcement, and public reporting and transparency.

Thank you for taking the time to review and respond to these comments and questions. Please notify me and Twin Harbors Waterkeeper in writing of any subsequent action on this Permit. Please also contact me with any questions or concerns about these comments or to meet with me or my clients to discuss them. You can reach me at the phone number or email address listed in the letterhead or by mail at Kampmeier & Knutsen PLLC, 705 Second Avenue, Suite 901, Seattle, Washington 98104.

Sincerely,

KAMPMEIER & KNUTSEN, PLLC

By: s/ Erica L. Proulx
Erica L. Proulx

cc. Sue Joerger and Lee First, Twin Harbors Waterkeeper

EXHIBIT A

Imazamox control of invasive Japanese eelgrass (Zosters japonica): Efficacy and nontarget impacts

Article *in* Journal of Aquatic Plant Management · July 2015

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3

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Kim Patten
Washington State University
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J. Aquat. Plant Manage. 53: 185–190

Imazamox control of invasive Japanese eelgrass (*Zostera japonica*): Efficacy and nontarget impacts

KIM D. PATTEN*

ABSTRACT

The nonnative eelgrass, Japanese eelgrass (*Zostera japonica* Asch. & Graebn) has infested several West Coast estuaries in North America. In Willapa Bay, WA, coverage has expanded enough to result in deleterious impacts on commercial shellfish production. Research on foliar and subsurface applications of the herbicide imazamox was conducted using replicated field trials to assess the efficacy for control of Japanese eelgrass and potential nontarget effects to the native eelgrass, (*Zostera marina* L.) and several macroalgae species. Foliar applications of imazamox controlled established Japanese eelgrass with or without surfactant, across a range of rates, from 0.03 to 0.84 kg ai ha^{-1}. Control of Japanese eelgrass seedlings was obtained with rates as low as 0.02 kg ai ha^{-1} imazamox. Best efficacy was obtained when tidal waters fully drained off the site, and the eelgrass canopy was dry. When Japanese eelgrass had a thin, protective layer of tidal water over it, rates of imazamox as high as 0.56 kg ai ha^{-1} were required for more consistent control. A foliar application of imazamox at 0.14 kg ai ha^{-1} killed the native eelgrass, whereas a rate of 0.84 kg ai ha^{-1} had no effect on macroalgae. Damage to native eelgrass was minimized when the canopy was protected in the water column. An in-water exposure of , 90 1g ai L^{-1} imazamox for 2 to 3 h had no observed effect on native eelgrass. Movement of imazamox off-site in the water column during the receding or flood tides after treatment was minimal, with a resulting dose and exposure time below what was required to markedly affect nontarget eelgrass.

Key words: Estuary, Willapa Bay, *Zostera japonica*, *Zostera marina*.

INTRODUCTION

Two seagrass congeners in the genus *Zostera* occur on the West Coast of North American estuaries, the native eelgrass (*Zostera marina* L.) and the nonnative Japanese eelgrass (*Zostera japonica* Asch. & Graebn.) (Ruesink et al. 2010, Shafer et al. 2014). The nonnative Japanese eelgrass sustains many of the ecosystem functions of the native eelgrass, including supporting diverse benthic assemblages, providing carbon to the estuarine food web, structural support for other primary producers, and habitat for juvenile salmonids and other fish species (Bulthuis 2013, Shafer et al. 2014). Japanese eelgrass, however, also has noted negative effects (Bando 2006, Tsai et al. 2010, Fisher et al. 2011). In Willapa Bay, WA, it has infested thousands of hectares of commercial Manila clam beds, where it reduces annual clam growth by 15 to 25% and results in a cumulative total net loss of approximately U.S. $47,407 ha^{-1} for each harvest cycle of Manila clams (Patten 2014). Because of its economic impact, the Washington State Noxious Weed Control Board declared Japanese eelgrass a Class C noxious weed (WA State Noxious Weed Control Board 2012). The California Department of Fish and Game has declared an eradication effort for Japanese eelgrass in Humboldt Bay, CA (CA Dept. of Fish and Game 2009).

There are limited nonchemical management options for Japanese eelgrass (Schlosser 2007, WA Dept. of Ecology 2014). The herbicides glyphosate (Bulthuis and Shaw 1993, Patten 2003, Major et al. 2004) and imazapyr (Patten 2003) were partially effective on Japanese eelgrass, but only when the canopy was dry. Both of these chemistries lack tolerance for residue levels on food, however, and would not be suitable for use on commercial clam beds. Imazamox,[1] a recently registered, aquatic herbicide with a use pattern that includes estuarine and marine sites (EPA 2009), is exempt from all uses of food-residue tolerance requirements, including shellfish (WA Dept. of Ecology 2014). Because of its suitability for potential use, imazamox was assessed for the management of Japanese eelgrass across a range of tidal estuary conditions. In addition, studies were conducted to assess nontarget impacts to native eelgrass and macroalgae and to develop environmental concentration data for use in risk assessments under estuarine conditions.

MATERIALS AND METHODS

Study location

Research was conducted on the tideflats of Willapa Bay, WA, at a tidal height zone of 0.75 to 1.5 m between the years 2006 and 2013. Willapa Bay is a large, shallow bar–built estuary with 347 km^2 in surface area at mean higher high water (MHHW) and 191 km^2 at mean lower low water (MLLW). The tidal range between MHHW and MLLW is 2.4 to 3.4 m. More than half of the estuary's surface area and volume is drained at low tide (Hickey and Banas 2003). Approximately 20% of the intertidal area is used for commercial aquaculture of Pacific oysters (*Crassostrea gigas*

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TABLE 1. EXPERIMENTAL CONDITIONS FOR JAPANESE EELGRASS EFFICACY AND NONTARGET IMPACT STUDIES.

Site	Date of Application	Plot Size (m)	No. of Replications	Vegetation Type	Amount of Water Covering Plant Canopy	Time Before Tidal Coverage (h)
1	20 September 2006	4 × 7	3	Japanese eelgrass	Thin layer of water	3.5
2	15 April 2007	3 × 11	3	Japanese eelgrass	Canopy moist; no water cover	4.0
3	3 March 2007	4 × 7	3	Japanese eelgrass	Thin layer of water	3.5
4	27 April 2009	4 × 7	3	Japanese eelgrass	Canopy dry	3.5
5	10 June 2009	2 × 4	3	Japanese eelgrass	Canopy dry	3.5
6	1 January 2007	3 × 7	3	Mixed Japanese eelgrass and native eelgrass	Dry to submerged	2.5
7	28 May 2008	3 × 4	4	Mixed Japanese eelgrass and macroalgae	Canopies dry	2.5
8	7 June 2011	2 × 2	15	Mixed Japanese eelgrass and native eelgrass	0.5–1 cm	2.5
9	7 July 2011	5 × 6	12	Mixed Japanese eelgrass and native eelgrass	Canopies moist, no water cover	2
10	17 June 2013	2 × 2	4	Japanese eelgrass seedlings	Dry	2
11	17 June 2013	2 × 2	4	Japanese eelgrass seedlings	Dry	3
12	17 June 2013	2 × 2	4	Japanese eelgrass seedlings	Dry	1
13	27 May 2010	33 × 33	4	Native eelgrass	0–15 cm	2.5
14	7 May 2012	30 × 70	1	Native eelgrass	0–30 cm	3
15	23 May 2013	9 × 33	1	Japanese eelgrass	Dry	1.5

Thunberg) and Manila clams (*Ruditapes philippinarum* Adams and Reeve) (Feldman et al. 2000).

Trials for efficacy rate and nontarget impacts

Established stands of pure Japanese eelgrass, mixed Japanese eelgrass and native eelgrass, or mixed species of macroalgae were directly oversprayed with imazamox in a series of replicated experiments, using a randomized complete-block design, between the spring and late summer of 2006 and 2013. Depending on the experiment, treatments were applied with a carbon dioxide (CO_2)-powered or hand-powered backpack sprayer, using a boom with varying length equipped with TeeJet 11025 spray nozzles. Imazamox rates ranged from 0.022 to 0.84 kg ai ha^{-1}, with or without the surfactant Competitor,[3] at 2.8 l ha^{-1}. Estuarine water was used as the carrier, and the spray volume was 230 L ha^{-1}. Treatments were applied to Japanese eelgrass once the tidal water had completely drained off the site. For sites with native eelgrass, treatments were made after water had receded off the site, but when there was still a thin (approximately 0.25 to 0.5 cm) layer of water over the top of the canopy. Sites with macroalgae were dry, with no protective water film over the algae. The three algae species present—*Ulva intestinalis* L., *Ulva flexuosa* Wulfen, and *Polysiphonia hendryi* var. *deliquescens* Hollenberg—were affixed in approximately equal amounts to surface gravel at the site. Plot size, replication number, site conditions, and dry time before tidal coverage for each trial are detailed in Table 1 (Sites 1 to 12). Plots were evaluated for efficacy or for nontarget impacts at 1 to 9 mo after treatment (MAT) based on a visual rating of the percentage of cover, or the percentage of change in Japanese eelgrass seedling density or native eelgrass shoot length before and after treatment. Additional nontarget assessments were made for native eelgrass on large sites treated with 0.14 kg ai ha^{-1} imazamox. Sites contained both eelgrass species located on well-drained gently sloping ground, in shallow, isolated pools containing 5 to 15 cm of static water and in shallow tidal-drainage swales that started on-site and moved off-site with water draining off the treated area. At the first location, Site 13 (Table 1) native eelgrass shoot growth was measured in the static pools at 0, 1, and 2 MAT as a function of the depth of water (0, 5, 10, and 15 cm). Plants were marked within each pool to allow for repeated measures of eelgrass shoot length. The mean number of shoots measured per plot was 25. There were four replicated pools per water depth. The calculated in-water exposure concentrations before tidal flooding for the 5, 10, and 15 cm depth pools were 278, 139, and 93 1g ai L^{-1}, respectively. At the second site (Site 14, Table 1) the percentage of reduction in native eelgrass coverage was measured at 21 d after treatment (DAT) in static pools (20 to 30 cm deep, $n = 4$) and in shallow drainage swales at the bottom edge of the treated zone (, 2 cm deep, $n = 7$; and 5 to 10 cm deep, $n = 10$).

Imazamox concentrations in water, sediment, and eelgrass

To assess water concentration of imazamox that could result from a typical treatment, water samples from Site 14 were obtained from a tidal pool, the tidal swale within the treated area, as it drained off the site during the ebb tide, and on the flood/shore side of the plot during the first and second flood tides after treatment. On-site samples were collected immediately after treatment. For the swale that drained the treated area, samples were collected 30 to 45 min after treatment in the middle of the swale at 0, 30, 60, and 120 m from the edge of the treated zone. Sample locations for the first flood tide after treatment were collected at five locations along transects that radiated out from the treatment zone (3 m inside the treatment zone, and 3, 30, 60, and 120 m outside the treatment zone). The transects were laid to run along the middle and outer two edges of the flood water as it moved over and beyond the treated zone. Samples along transects were collected as soon as the incoming flood water reached the 8-cm depth. All other samples were collected from the middle of the water column for that location. Water samples were collected in 60 ml Nalgene amber HDPE bottles.[4] Samples were held on ice in a dark cooler and shipped to the laboratory within 24 h. Samples were analyzed by SePRO Lab Services[5] using a Shimadzu LC-20[6] high-performance liquid chromatography

Table 2. Average Percentage of Cover of established Japanese Eelgrass as a Function of Imazamox Rate with Surfactant.

Imazamox (kg ai ha^{-1})	Site 1	Site 2	Site 3
	Cover (%)[1,2]		
0	100 b	88 b	100 d
0.07	—	—	30 c
0.14	75 ab	10 a	16 bc
0.28	70 ab	7 a	9 ab
0.56	53 a	—	—

[1]Sites 1, 2, and 3 were visually rated 9, 2, and 4 mo after treatment, respectively, for percentage of cover.
[2]Means within a column followed by same letter do not significantly differ (Waller-Duncan, a ¼ 0.05).

Table 3. Average Percentage of Cover of established Japanese Eelgrass as a Function of Imazamox Rate without Surfactant.

Imazamox (kg ai ha^{-1})	Site 4	Site 5
	Cover (%)[1,2]	
0	100 c	100 c
0.035	2 b	8 b
0.07	0 a	2 ab
0.105	0 a	0 a
0.14	0 a	0 a
0.21	0 a	0 a

[1]Sites were visually rated 1 mo after treatment for percentage of cover.
[2]Means within a column followed by same letter do not significantly differ (Waller-Duncan, a ¼ 0.05).

(HPLC), method ISO 17025,[7] within 48 h of their collection. The limit of herbicide detection was 1 1g ai L^{-1}.

To assess imazamox concentrations in sediment and eelgrass, a sandy sediment location, Site 15 (Table 1), was treated with 0.14 kg ai ha^{-1} imazamox. Samples were collected 24 h after treatment. Sediment samples, 0 to 5 cm deep, were obtained using a 7-cm coring device, from six locations across the site, and placed in sample bags. Eelgrass samples were collected from three locations at the site. Samples were triple rinsed in off-site estuarine water to remove any contaminated sediment and placed in sample bags. Sediment and eelgrass samples were immediately placed on ice in a dark cooler after collection, shipped on ice within 2 h, and chemically stabilized in the laboratory within 24 h. Samples were analyzed within 48 h of collection by Pacific Agricultural Laboratory,[8] using U.S. Environmental Protection Agency–approved HPLC methods. The limits of detection were 0.5 and 100 1g ai L^{-1} for sediment and vegetation, respectively.

Statistical analysis

Herbicide efficacy and nontarget plant data were analyzed by one-way ANOVA using SigmaPlot 12 software.[9] For data with homogeneity of variance, mean separation was accomplished by Waller-Duncan *t* test (a ¼ 0.05). Nonparametric data was analyzed by Kruskal-Wallis one-way ANOVA on ranks, and mean separation were analyzed by protected Fisher's Protected LSD test (a ¼ 0.05).

RESULTS AND DISCUSSION

Efficacy

Imazamox controlled established Japanese eelgrass, with or without surfactant, across a range of rates, from 0.035 to 0.84 kg ai ha^{-1} (Tables 2–4). A fall application was less effective than that in spring or early summer, even at very high rates (Table 2). At most sites, a rate of 0.14 kg ai ha^{-1} was adequate for good control, but one site required 0.28 kg ai ha^{-1} (Table 5), and another required 0.56 kg ai ha^{-1} (Table 2). A layer of water over Japanese eelgrass at application decreased efficacy (Table 5). Seedlings were controlled with rates as low as 0.022 kg ai ha^{-1} (Table 5).

These results indicate that control of established Japanese eelgrass or seedlings with imazamox under ideal tidal conditions, when the canopy was completely exposed and dry during low tide, can be obtained with S 0.035 kg ai ha^{-1} imazamox without the need for a surfactant. Under tidal conditions less than ideal, where Japanese eelgrass still had a protective water layer over it, rates of imazamox as high as 0.56 kg ai ha^{-1} imazamox were required for more consistent control.

Nontarget eelgrass and macroalgae effects

The effect of imazamox on native eelgrass was dependent on the conditions at the time of application. Imazamox applied over the top of a fully exposed canopy killed native eelgrass (Sites 6 and 9; Tables 4 and 5). Damage to native eelgrass from imazamox was reduced or minimized with an in-water exposure. This occurred when treatments were made at a site where there was a thin protective layer of slowly flowing water over native eelgrass canopy (Site 8, Table 4). In this situation, only the 0.28 kg ai ha^{-1} rate had a significant effect on the canopy.

Native eelgrass located in well-drained sections of upper intertidal zones would likely have an exposed canopy during a typical low tide and be killed by an application of imazamox. The biological significance of native eelgrass removal in this tidal range is likely to be minor. Native eelgrass doesn't normally occur in this upper tidal range because it lacks tolerance to desiccation. Its existence in these zones is only due to that fact that Japanese eelgrass slows tidal drainage and facilitates the establishment of native eelgrass in higher, normally drier, tidal zones (Ruesink et al. 2010). Without Japanese eelgrass, these sites dewater enough during summer low tides to normally desiccate native eelgrass.

The greatest ecological risk to native eelgrass from imazamox is from short-term, unintentional in-water exposure at locations where it is naturally found. This could occur when the concentration and exposure time (CET) to imazamox in on-site static pools and swales and off-site drainage swales became high enough to cause damage. At Site 13, 1 MAT, after an overspray of static pools 5, 10, and 15 cm deep, corresponding to calculated doses of 280, 140, and 90 1g L^{-1} for 2.5 h, respectively, native eelgrass had 50%, −21%, and 8% changes in mean shoot growth, respectively (Table 6). After 2 MAT, native eelgrass had begun to recover, and there was no statistical difference between water depths. At Site 14, an overspray of static

TABLE 4. AVERAGE PERCENTAGE OF CONTROL OF ESTABLISHED JAPANESE EELGRASS AND NONTARGET SPECIES AS A FUNCTION OF IMAZAMOX RATE WITH SURFACTANT.

	Site 6		Site 7		Site 8		Site 9	
Imazamox (kg ai ha^{-1})	Japanese Eelgrass	Native Eelgrass	Japanese Eelgrass	Macroalgae	Japanese Eelgrass	Native Eelgrass	Japanese Eelgrass	Native Eelgrass
	Cover (%)[1,2]							
0	90 b	90 b	58 b	100	53 b	53 b	100 b	100 b
0.14	4 a	7 a	—	—	53 b	21 b	—	—
0.21	—	—	0 a	100	—	—	—	—
0.28	2 a	—	—	—	29 a	6 a	0 a	0 a
0.42	—	—	0 a	100	—	—	—	—
0.84	—	—	0 a	100	—	—	—	—

[1]Site 6, 7, 8, and 9 were visually rated 3, 5, 2, and 3 mo after treatment, respectively, for percentage of change in cover.
[2]Means within a column followed by same letter do not significantly differ (Waller Duncan, a ¼ 0.05).

pools with 20 to 30 cm of standing water (100 to 200 mg ai L^{-1} nominal concentration, 181 mg ai L^{-1} measured concentration) resulted in no observed reduction in the percentage of native eelgrass cover after 3 h exposure. In shallow drainage swales, at the bottom edge of the treated zone, , 2 cm and 5 to 10 cm deep (541 mg ai L^{-1} measured concentration), there was a mean 6 standard error (SE) 65% 6 5% and 96% 6 2% reductions, respectively, in the percentage of native eelgrass cover. Based on observed and nominal concentrations of imazamox in water, a CET for native eelgrass can be inferred from the above field data. For 2 to 3 h exposure, there is minimal damage at 90 1g ai L^{-1}, suppressed growth at 140 to 280 1g ai L^{-1}, and death at . 400 1g ai L^{-1} or from a direct canopy application.

Native eelgrass provides valuable ecological services and is a protected species (Shafer et al. 2104). Regulatory agencies have expressed concerns over nontarget impacts to native eelgrass that could occur from using an herbicide to control Japanese eelgrass (Bulthuis 2013, Shafer et al. 2014, WA Dept. Ecology 2014). Overall, these results indicate that the nontarget impact of imazamox to native eelgrass could occur if it was directly sprayed, or if water moving off treated areas concentrated imazamox to high enough levels to exceed the dose–exposure threshold. By treating early enough in the season to ensure minimal water on-site during treatments, by not directly spraying pools or drainage swales on-site, and by leaving a 10-m buffer around lower edges of treated sites, nontarget damage to native eelgrass is likely to be negligible. The National Pollutant Discharge Elimination System permit issued for this use contains these precautions and extends the 10-m buffer around the entire treated site (WA State Dept. of Ecology 2014).

Unlike native eelgrass, the risk to microalgae from a direct application of imazamox appears minimal (Table 4). There was no observed effect on *U. intestinalis*, *U. flexuosa*, or *P. hendryi* var. *deliquescens* at rates up to 6-fold beyond the recommended 0.14 kg ai ha^{-1} rate. Similar studies on red algae (*Griffithsia pacifica* Kylin) and marine diatom (*Skeletonema costatum* (Greville) Cleve) (ENVIRON 2012) failed to generate an effect at the anticipated environmental exposure concentrations.

Imazamox concentrations in water, sediment, and eelgrass

Median water concentration in the first on-site flood water was 61 1g ai L^{-1}. After the flood water left the site, the median concentrations at the 3-, 30-, 60-, and 120-m locations were 44, 7, 0, and 0 1g ai L^{-1}, respectively (Table 7). The imazamox concentration in water in the second flood tide to cover the site was 6.0 1g ai L^{-1}. Water sampled within the treated zone from two shallow pools had posttreatment imazamox concentrations of 181 and 541 1g ai L^{-1}. Water moving off the site in a drainage swale had imazamox concentrations of 32, 7.6 and , 1 1g ai L^{-1} at 30, 60, and 120 m. Means 6 SE imazamox concentrations in sediment and Japanese eelgrass, 24 h after treatment, following two tidal flushes, were 5.9 6 2.14 1g ai L^{-1} and 1,016 6 256 1g ai L^{-1}, respectively.

These data were used to determine the environmental exposure in vegetation, sediment, and water for the risk

TABLE 5. AVERAGE PERCENTAGE OF REDUCTION IN JAPANESE EELGRASS SEEDLING DENSITY AS A FUNCTION OF IMAZAMOX RATE WITHOUT SURFACTANT.

	Site 10	Site 11	Site 12
Imazamox (kg ai ha^{-1})	Reduction in seedling density (%) 1 mo after treatement[1,2]		
0	0 b	0 b	0 b
0.022	96 a	100 a	100 a
0.044	94 a	100 a	100 a
0.066	96 a	100 a	100 a
0.088	96 a	97 a	100 a

[1]Percentage of change in seedlings per plot between 0 and 1 mo after treatment.
[2]Means within a column followed by same letter do not significantly differ (Waller-Duncan, a ¼ 0.05).

TABLE 6. PERCENTAGE OF INCREASE IN SHOOT GROWTH OF NATIVE EELGRASS IN TIDE POOLS, 1 AND 2 MONTHS AFTER TREATMENT, WITH IMAZAMOX AS A FUNCTION OF POOL WATER DEPTH.

	Months after Treatment	
	1	2
Depth of water (cm)	% increase in mean shoot length[1,2]	
0	Dead a	Dead a
5	−50 bc	20 b
10	−21 cd	24 b
15	8 d	41 b

[1]Repeated measures of the same shoots 0, 1, and 2 mo after treatment.
[2]Treatment difference was analyzed by Kruskal-Wallis one-way ANOVA on ranks, and means within a column followed by same letter do not significantly differ according to Fisher's Protected LSD test (a ¼ 0.05).

TABLE 7. IMAZAMOX CONCENTRATION IN THE LEADING EDGE OF THE INCOMING TIDAL WATER FOLLOWING A TREATMENT OF A 30- BY 70-METER JAPANESE EELGRASS SITE ON SANDY SEDIMENT, SITE 14.

	Imazamox (1g ai L^{-1})		
Sample Locations	Maximum	Minimum	Median
3 m inside plot upper edge	82	24	61
3 m outside plot upper edge	79	35	44
30 m outside plot upper edge	83	5	7
60 m outside plot upper edge	18	, 1	0
120 m outside plot upper edge	6	0	0

assessment on imazamox during estuarine use (ENVIRON 2012). For consumption of treated eelgrass, the hazard quotient for acute-ingestion exposure, subchronic ingestion dose, and chronic subacute-ingestion dose for three indicator species: mallard (*Anas platyrhynchos* L.), rainbow trout (*Oncorhynchus mykiss* Walbaum), and Dungeness crab (*Metacarcinus magister* Dana), ranged from 0.0001 to 0.003 (ENVIRON 2012). These are several orders of magnitude below what would be considered a hazard. Nevertheless, hunters have expressed concern that certain waterfowl species, like wigeon (*Anas americana* Gmelin), which forage on Japanese eelgrass, could be affected by consuming eelgrass treated with imazamox. The approximately 1 mg ai L^{-1} of imazamox found in Japanese eelgrass 24 h after treatment is three orders of magnitude less than the 1,950 mg ai L^{-1} avian LD_{50} (ENVIRON 2012). In addition, the imazamox residue would be very short-lived. The shoots rapidly degrade posttreatment and, like other aquatic plants, the desorption rate is rapid. Vassios (2010), for example, found that 46% of imazamox was rapidly desorbed in Sago pondweed [*Stuckenia pectinata* (L.) Bo¨ rner] in the first 12 h after treated plants were transferred to water with no herbicides.

A review of the potential risks of imazamox suggests that nontarget aquatic macrophytes could be at risk if imazamox concentrations were to build up in aquatic sediments (New York State Dept. of Environ. Conserv. 2003). These results suggest that concerns about high sediment concentration are not warranted. Because of the high solubility of imazamox in water (. 4000 mg ai L^{-1}), rapid tidal flushing and low binding affinity for sediment (K_{oc} [binding coefficient] ¼ 5.3), the level of sediment imazamox found (5 1g kg^{-1}) is likely to drop below the detection limits (0.5 1g kg^{-1}) within a short period. Overall, the levels of imazamox found in water, sediment, and vegetation in this study were several orders of magnitude lower than the LC_{50} toxicity of imazamox for the most sensitive aquatic organisms (. 100 mg ai L^{-1}) (EPA 2009, ENVIRON 2012, WA Dept. Ecology 2014). Based on these results, the short exposure to the imazamox concentration found in this study is unlikely to present a risk to the aquatic ecosystem.

Conclusions for integrated control

These trials indicate imazamox is an efficacious treatment for invasive eelgrass and, when applied under the right conditions, it is not likely to result in nontarget impacts to estuarine species of concern. The lowest effective doses of imazamox to manage established plants and seedlings are 0.14 and 0.04 kg ai ha^{-1}, respectively. Application too early in the spring would miss controlling newly germinating Japanese eelgrass seedlings, which peak in mid March and tail off into early June (Ruesink et al. 2010). Application later in the season is problematic because of the rapidly growing Japanese eelgrass canopy slowing or preventing tidal dewatering during low tides and ultimately leaving the canopy with a protective water layer. Dense mats of Japanese eelgrass reduce water flow by up to 40% compared with nonvegetated mudflats (Tsai et al. 2010). In addition, application of imazamox to a site that doesn't fully dewater increases the potential of nontarget impact to native eelgrass. In these situations, imazamox more easily drains off-site, thus concentrating in the swales containing native eelgrass. The ideal spray window would be from late April to early June, after most seed germination occurs, but while the tidal flats are still dewatered during low tides. Since these sites are mostly dry during a low tide, applications of imazamox to control Japanese eelgrass during this period would help minimize the risk for nontarget impacts to native eelgrass. Risk to native eelgrass can also be minimized by avoiding spraying near or over pools or near drainage swales containing native eelgrass.

SOURCES OF MATERIALS

[1]TeeJet technologies, P.O. Box 7900, Wheaton, IL 60187-7901.

[2]Imazamox (Clearcast), SePRO Corporation, 11550 N. Meridian St., Suite 600, Carmel, IN 46032.

[3]Competitor, Wilbur-Ellis Co., P.O. Box 16458, Fresno, CA 93755.

[4]Amber HDPE bottles, Nalge Nunc International Corporation, 75 Panorama Creek, Dr., Rochester, MY 14625.

[5]SePRO Lab Services, 16013 Watson Seed Farm Rd., Whitakers, NC 27891-9114.

[6]LC-20 HPLC systems, Shimadzu Scientific Instruments, 7102 Riverwood Dr., Columbia, MD 21046.

[7]ISO 17025 Standard: General requirements for the competence of testing and calibration laboratories, International Organization for Standardization, ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland.

[8]Pacific Agricultural Laboratory, 12505 NW Cornell Rd., #4, Portland, OR 97229.

[9]SYSTAT Software, Inc., 1735 Technology Dr., Suite 430, San Jose, CA 95110.

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Willapa-Grays Harbor Oyster Growers Association
P.O. Box 3 Ocean Park, WA 98640

January 10, 2025

Mr. Shawn Ultican
WA State Department of Ecology
P.O. Box 47696
Olympia WA 98504-7600

Dear Mr. Ultican,

Thank you for the opportunity to comment on the **Zostera Japonica Management on Commercial Clam Beds in Willapa Bay General Permit** for the control of the invasive, state-listed noxious weed *Zostera japonica* (Japanese eelgrass) on commercial clam beds in Willapa Bay, Pacific County.

The Willapa-Grays Harbor Oyster Grower Association (WGHOGA) represents the shellfish farmers in Pacific and Grays Harbor Counties in Washington State. This industry is the largest private employer in Pacific County, and a significant employer in Grays Harbor. The multi-generational businesses of WGHOGA sustainably produce oysters and clams while taking pride not only in the quality of their product but in their role as environmental stewards. In Willapa Bay alone our members farm over 9,000 acres of tidelands for the propagation of oysters and clams. Since its creation over 70 years ago, WGHOGA has faced many invasive pests to aquaculture and has been fighting to keep their once productive farms from being altered or destroyed by *Zostera japonica,* a non-native invasive species that's continued altering of tidelands is being ignored by many state and federal land managers. *Zostera japonica* continues to expand in Willapa Bay and is now providing optimal habitat to harbor a newly emerging invasive, European green crab. This is leading to further crop losses due to additional predation of clams and oysters by European green crabs and declines in open mudflat grazing opportunities for shorebirds.

WGHOGA appreciates Ecology's management of the current NPDES permit and development of a new draft permit, however, we have concerns with several changes in the revised draft permit. Some of the proposed modifications and conditions will limit WGHOGA permittees and sponsors from effectively and economically controlling *Zostera japonica* on their commercial clam beds in Willapa Bay.

We respectfully ask that Ecology reviews and adopts the revisions highlighted below in the final 2025 permit renewal.

> *B. Treatment Buffers*
> *When different Permittees are treating clam beds on properties that share a common border, and both parties agree, a buffer is not required on the connecting parcel boundary. Each Permittee must indicate in their annual Pre-Treatment Plan whom they are cooperating with and on which parcel(s) (Special Condition S7.A). See Appendix D, Figure 2 for an example of this situation.*

This language needs to reflect the fact that adjacent land owners may or may not both be permittees but just adjacent cooperating land owners who agree to forego a buffer between parcels. We suggest the following language:

> When adjacent landowners are treating clam beds on properties that share a common border, and both parties agree, a buffer is not required on the connecting parcel boundary. The permittee must indicate in their annual Pre-Treatment Plan whom they are cooperating with and on which parcel(s) (Special Condition S7.A). See Appendix D, Figure 2 for an example of this situation.

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> *D. Posting Requirements*
> *The Permittee must:*
> *1. Use the template provided on the permit webpage. The Permittee may add additional treatment-related information to the sign, but may not remove required information.*
> *2. Post signs that are at least 8 ½ by 11 inches in size.*
> *3. Post signs at all corners of the treatment site.*
> *4. Post signs at all public access areas on the waterbody that are within 400 feet of a treated area and at all public boat launches on the waterbody within one quarter mile of a treated area.*
> *5. Post signs at least 24 hours before treatment.*

Requiring the posting of signs 24 hours before treatment is not necessary on private property with no public access and no likelihood of anyone coming into contact with applicators or signage. Flexibility is needed when choosing nearby sites for treatments. In instances where an applicator would like to adapt to weather conditions and tidal inundation periods not having the signs placed ahead of time will result in additional down time and the loss of treatment opportunities due to not having the required sign postings in place 24 hours before treatment. We suggest the following language:

> 3. Post signs at all corners of the treatment site if the site is within 1/4 mile of a public access point.
> 4. Post signs at all public access areas on the waterbody that are within 400 feet of a treated area and at all public boat launches on the waterbody within one quarter mile of a treated area.
> 5. Post signs at public access points least 24 hours before treatment

> *A. Monitoring*
> *The Permittee must conduct routine monitoring on all commercial clam beds treated with imazamox as follows.*
>
> *30 days after each treatment the Permittee must measure the distance into the 10 meter buffer that Zostera species plants appear to be affected by treatment. (see Special Condition S4.B) See Appendix D for diagrams of how buffers must be implemented.*
>
> *The distance affected by treatment must be measured from the inner edge of the buffer, perpendicular to the buffer edge, to the first instance of healthy Zostera plants. Permittees must also record any observations of Zostera plants that appear to have been affected by treatment past the parcel boundary.*
>
> *For situations where no eelgrass is naturally present within the buffer area (not absent due to the effects of treatment), no measurements are required.*
>
> *The number of measurements taken will depend on the size of the commercial clam bed treated. Measurements must be spaced approximately equidistant across the parcel edge.*
>
> *Table 2: Buffer Monitoring Requirements Treatment Acreage Up to 5 Acres 5.1 to 10 Acres 10.1 to 20 Acres 20+ Acres (Number of Measurements per Parcel Edge 3, 5, 8, 10, transects)*
>
> *Photographs must be taken at all measured locations to verify the measurement. Each photograph must be labeled by placing a card with the date, Global Positioning System (GPS) coordinates, accuracy of the GPS unit at the time of measurement, sample site and permit number within the photographed area.*

During the development of the initial permit, a buffer validation study was conducted to determine buffer needs to protect native eelgrass. The original study was designed as a worst case scenario and over the following two years, additional surveys demonstrated there was no statistical difference between eelgrass pre-treatment and post-treatment densities and for densities at both years 2 and year 3 after treatment. This study did demonstrate that the highest likelihood of off-site movement was towards the lower elevations of the tideland parcels, but regardless, a 10 meter buffer was sufficient to protect native eelgrass. Realizing that the buffer validation study was only conducted at one location near Nahcotta, on three beds, we are agreeable to additional monitoring to further demonstrate that a 10 meter buffer is sufficient to protect *Zostera marina.*

WGHOGA supports monitoring as currently described in the permit with some changes. We propose the monitoring of each continuous bed or parcels, when a bed is comprised of several parcels, the first time a treatment occurs. Monitoring would occur once during the course of the 5 year permit on each continuous bed or parcels. Monitoring would be

conducted 30 to 60 days post treatment on the lower elevation boundary only, as previous studies indicate this edge is most likely to see any offsite movement. Washington State University Extension will host and organize a training session for permittees and sponsors and will generate a standardized collection protocol for participants to aid in consistent reporting. This will validate on a bed by bed basis the effectiveness of a 10 meter buffer to protect native eelgrass.

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B. Pre-treatment Notifications

The permittee must provide the following notifications at least 10 days prior to each herbicide treatment.
1. Notify Ecology:
a) Use the pre-treatment notification form provided on Ecology's ZJ permit web page.
g) Send an electronic copy of the completed pre-treatment form to Ecology at aquaticpesticideperm@ecy.wa.gov, with a subject line "ZJ Pretreatment Notice – " followed by the applicable permit coverage number.
h) If the treatment is delayed after the original form was sent, email a revised pretreatment form to Ecology with a subject line "REVISED ZJ Pretreatment Notice – " followed by the applicable permit coverage number.

As a permit requirement permittees are required to provide an Annual Pre-Treatment Plan by May 15th of each year even if no treatment is planned. In the Annual Pre-Treatment Plan permittees mush provide Ecology with the locations of acreage planned for treatment, including GPS coordinates of each corner of the area, the size, in acres, of each area planned for treatment and maps delineating the locations of the areas planned for treatment. The addition of a pre-treatment notification form to be emailed to Ecology before treatments occur is redundant, overly burdensome and unnecessarily as Ecology has already received. This information in the Annual Pre-Treatment Plan.

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4. Notify adjacent landowners:
a) Using the template on the ZJ permit web page, the permittee must provide written notice to the owner of record, other than the permittee themselves, of property parcels having a common boundary with the treated parcel(s).
b) In the treatment notification the treatment area must be defined either by a polygon area clearly labeled on a map of the site, or by the latitude and longitude points of the corners of that polygon area, reported in decimal degrees.
c) The Permittee may provide the notice by mail, email, or handbills delivered directly to the landowner(s).
d) The Permittee must retain a copy of the notice, the date of distribution, and a list of addresses to which the notice was delivered. Copies of these records must be retained for a period of 5 years, and provided to Ecology upon request.

Due to the large number of upland parcel owners this notification requirement is extremely burdensome and goes above and beyond any other public notice requirement for aquatic weed management such as, for example, spartina control. This adjacent landowner notification is a higher standard than any other aquatic noxious weed permit an would be hard to adhere to. Additionally in all cases to date no treatments have occurred adjacent to neighbor parcel boundaries and in most cases the buffers have been greater than 100 feet. In lieu of an adjacent landowner notification, WGHOGA proposes to provide public notice of the treatment season window for two consecutive weeks prior to the beginning of the treatment window-by either publishing a notice in the local newspaper or on a public website.

We appreciate Ecology's continued management of the National Discharge NPES permit and hope these proposed modifications are aligned with permit needs.

Sincerely,

David Beugli

David Beugli
Executive Director
Willapa-Grays Harbor Oyster Growers Association

Center for Food Safety

Please see the attached comments for this proposed permit renewal. The two past comment documents are also attached as exhibits.

January 14, 2025

Department of Ecology
Water Quality Program
Attn: Shawn Ultican
PO Box 47696
Olympia, WA 98504-7696

RE: Comments on Proposed Renewal of General Permit for Discharge of Imazamox on Commercial Clam Beds in Willapa Bay

Dear Dept. of Ecology:

Thank you for the opportunity to comment on the proposed renewal of the NPDES Permit for Zostera Japonica Management on Commercial Clam Beds in Willapa Bay, to allow continued spraying of imazamox on clam beds.

Center for Food Safety (CFS) is a national non-profit organization representing nearly 1 million members nationwide and tens of thousands in the Pacific Northwest, including Washington State. CFS uses education, policy and legislation, and impact litigation to address the negative effects to public health and the environment from harmful food production technologies, and supports ecological food production, like organic and beyond. CFS operates in the Pacific Northwest and its members are particularly concerned with the increasingly industrial aquaculture, and particularly the use of pesticides in shellfish aquaculture.

CFS urges Ecology to deny this permit to continue killing eelgrass, whether on or off commercial clam beds. Washington is home to many iconic and endangered species like salmon and the orcas that rely on them, and numerous other fish, birds, and invertebrates. These species, and their prey, rely on eelgrass habitat in Willapa Bay. Washington has a “no net loss” policy for eelgrass given its importance and the decline of eelgrass and other seagrasses worldwide. Thus, Ecology must prevent further intentional destruction of this crucial habitat. As Ecology acknowledges (EIS at 76-78), introduced eelgrass also provides essential ecosystem functions, like food, shelter, and habitat stabilization for numerous species, as well as nutrient cycling and climate change mitigation.

As experts have stated, there is no sound reason to allow the direct spraying of any native eelgrass, including on commercial clam beds (*see* FWS Comments on 2014 Imazamox NPDES Permit). For ten years, Ecology has allowed the unmonitored spraying of eelgrass with the herbicide imazamox. Because of the past permit buffer rules, growers who sprayed imazamox were not required to monitor impacts to eelgrass outside of their plots, so hundreds of acres were sprayed over the last ten years without any monitoring of

off-site impacts. Ecology's buffer validation study in 2016 was fatally flawed, but even then showed negative impacts to native eelgrass, and should never have supported extending the permit for the full five years.[1] Given the benefits of introduced eelgrass, the negative impacts of herbicides to the Bay, native eelgrass, and other species, and the significant data gaps here, this under-studied plan should not move forward.

In this round of permit renewal, Ecology continues to rely on outdated and biased data to formulate the problem and need for this pesticide permit. Further, Ecology failed to conduct any review of the impacts on the ground after the last five years of spraying. While the additional monitoring and public comment period required in the proposed permit is an improvement, the permit, fact sheet, and EIS fail to show how use of synthetic herbicide complies with Washington's "no net loss" of eelgrass policy, water quality laws, or the principles of Integrated Pest Management (IPM), or how IPM principles (herbicide as a very last resort) will specifically be required though this permit. Ecology should not grant this permit, full stop, but if it does, it must do more to analyze the impacts of the last five years of spraying, use up-to-date data, and provide much more clear and strict limits on spraying that will protect *Z. marina,* water quality, and implement IPM.

State Environmental Policy Act

The State Environmental Policy Act ("SEPA") is Washington's core environmental policy and review statute. Like its federal counterpart, the National Environmental Policy Act ("NEPA"), SEPA broadly serves two purposes: first, to ensure that government decision-makers are fully apprised of the environmental consequences of their actions and, second, to encourage public participation in the consideration of environmental impacts. *Norway Hill Preservation and Prot. Ass'n v. King Co*, 87 Wn.2d 267, 279 (1976). For decades, SEPA has served these purposes effectively, requiring full environmental reviews for projects with significant environmental impacts.

SEPA was enacted to "encourage productive and enjoyable harmony between humankind and the environment" and to "prevent or eliminate damage to the environment and biosphere." RCW 43.21C.010. Thus, in adopting SEPA, the Washington legislature declared the protection of the environment to be a core state priority, "recogniz[ing] that each person has a fundamental and inalienable right to a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment." RCW 43.21C.020(3). This policy statement, which is stronger than a similar statement in the federal counterpart of NEPA, "indicates in the strongest possible terms the basic importance of environmental concerns to the people of the state." *Leschi v. Highway Comm'n*, 84 Wn.2d 271, 279–80 (1974).

[1] CFS, Comments on Proposed Modification of General Permit for Discharge of Imazamox on Commercial Clam Beds in Willapa Bay (Jan. 31, 2017); CFS, Comments on Proposed NPDES Permit Renewal (Nov. 4, 2019) (both attached).

SEPA is more than a purely "procedural" statute that encourages informed and politically accountable decision-making. SEPA requires agencies to integrate environmental concerns into their decision-making processes by studying and explaining environmental consequences before decisions are made. *See Stempel v. Dep't of Water Resources*, 82 Wn.2d 109, 117–18 (1973). In enacting SEPA, the state legislature gave decision-makers the affirmative authority to deny projects where environmental impacts are significant, cannot be mitigated, and collide with local rules or policies. SEPA provides substantive authority for government agencies to condition or even deny proposed actions—even where they meet all other requirements of the law—based on their environmental impacts. RCW 43.21C.060.

Because SEPA's purpose is informed decision-making, information is critical, and the regulations direct the lead agency to obtain necessary information, if possible, provided the "costs are not exorbitant." WAC 197-11-080(1). While Ecology drafted an EIS in support of this proposed permit, it relies on old information rather than information from the last five years of imazamox spraying under the prior permit. Even at the outset in the problem formulation section, Ecology relies on a 14-year-old study with one author that had a direct economic conflict and was previously sanctioned.[2] EIS at 7. Ecology relies on a 13-year-old survey of shellfish growers conducted by their own trade group, the same group seeking the permit, to claim that use of imazamox is necessary. *Id.* Given the two iterations of this same permit, Ecology should update its information as things may have changed in the last decade plus. EIS at 7-10. The costs of obtaining such information should not be "exorbitant" as the permittees were required to file annual reports, and information such as the extent of clam aquaculture and *Zostera* beds should be available from other sources, including the U.S. Army Corps of Engineers and National Marine Fisheries Service.

Nowhere in the Fact Sheet or EIS does Ecology clearly lay out the extent to which acres were sprayed under the last permit or any results of monitoring (if there was indeed any monitoring under the last permit). While this EIS again uses the 1,100-acre number for acres of clam aquaculture, that number came from 2012 and has been regurgitated in 2014 and again in 2019, but the actual current acreage that may be impacted by this permit remains unclear. Is *Z. japonica*, given all its admitted benefits to the ecosystem (EIS at 76-78), still truly such a problem for current shellfish aquaculture operations? Ecology continues to rely on an unpublished 2011 study by Kim Patten claiming that *Z. japonica* causes on average a 44% decrease in clam yield. This is unsubstantiated and unscientific, a far cry from the "information reasonable sufficient to evaluate the environmental impacts of a proposal" that SEPA requires. WAC 197-11-335. *See also*

[2] *See* Center for Food Safety Comments on Proposed Renewal of General Permit for Discharge of Imazamox on Commercial Clam Beds (Nov. 4, 2019) (incorporated herein by reference and attached), citing Washington State Executive Ethics Board, Investigative Report and Board Determination of Reasonable Cause, No. 2017-012, Kim Patten, Director WSU Pacific County Ext. (July 20, 2017).

Boehm v. City of Vancouver, 111 Wn. App. 711, 718, 47 P.3d 137 (2002) (internal citations and footnotes omitted). As Ecology notes in its EIS, this same Mr. Patten claimed that waterfowl do not eat *Z. japonica*, downplaying an important impact of using herbicide on this eelgrass, and was proven wrong by a citizen scientist who provided evidence to the contrary, including photographs and not just the word of someone who has economic conflicts. EIS at 77. Further, in Mr. Patten's published 2014 study, the results indicated only a 9-33% increase in yield for young, fast-growing clams, and no significant differences for fully mature clams.[3] The study admits that the "45% increase in commercial yield" is "likely an artifact of the study design" because clams are mobile and will seek more favorable locations (i.e. away from thick *Z. japonica*). *Id.* So Ecology's continued use of the 44% decrease in yield figure in its EIS does not conform to the requirements of SEPA.

Further, while Ecology lists several areas of uncertainty, it also states that a determination of necessary buffer distance to protect *Z. marina* is still "needed." EIS at 18, 90. If Ecology still has not validated to a reasonable certainty the 10m buffers it has imposed in the last two permits, how can Ecology claim that this permit will uphold the state's "no net loss" policy for eelgrass or comply with state and federal water quality laws? Before Ecology can claim that spraying a systemic, synthetic herbicide into aquatic environments will have no significant impacts, much less violate federal and state water quality laws and policies, Ecology must use the best information available, rather than rely on unsubstantiated claims from the very industry that seeks to spray the pesticide.

NPDES and Water Quality Permitting Standards

Ecology must also comply with all Clean Water Act and Washington State water-quality standards when permitting the discharge of pesticides into water. The goal of the Clean Water Act (CWA) is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." 33 U.S.C. § 1251(a). Discharges are prohibited from causing or contributing to violations of water quality standards. 33 U.S.C. §§ 1311(b)(1)(C), 1342(a)(2); RCW 90.48.010, 90.48.520, 90.52.040, and 90.54.020. Water quality standards are defined as the designated beneficial uses of a water body, in combination with the numeric and narrative criteria to protect those uses and an antidegradation policy. 40 C.F.R. § 131.6; Chapter 173-201A WAC. The antidegradation policy is meant to ensure that the highest possible water quality is restored, that existing uses are maintained, and that any human activities that may lower water quality are allowed, at a minimum, with AKART. WAC 173-201A-300-330.

Ecology claims that Integrated Pest Management is AKART and the equivalent of technology-based-effluent limitations but fails to describe how IPM principles will *actually*

[3] K. Patten, *The Impacts of Nonnative Japanese Eelgrass (Zostera japonica) on Commercial Shellfish Production in Willapa Bay, WA*, Agricultural Sciences Vol. 5, No.7 (June 2014).

be used and how they will be effective. As with the last version of this permit, it remains entirely unclear how this permit meets technology-based or AKART standards. In its Fact Sheet, Ecology says that Appendix C of the proposed permit sets out the minimum standards and guidelines for a Discharge Monitoring Plan (required by EPA), but this appendix provides zero guidance of what the thresholds should be for determining when it is appropriate to use imazamox, which as a synthetic herbicide should be a very last resort under IPM principles. Fact Sheet at 50. Ecology claims that DMPs will incorporate IPM to "help reduce pesticide use," Fact Sheet at 69, but never says what these thresholds should be and how it will ensure that a permittee actually takes all non-chemical actions before going to the easiest and cheapest solution (imazamox).

As to surface water quality-based effluent limits, Ecology does not provide what beneficial uses are designated for Willapa Bay or how this permit to spray herbicide into the Bay will maintain those uses, including such things has wildlife habitat. Willapa Bay, as a marine water, is currently considered to be in "excellent" condition for aquatic life and well-suited for wildlife habitat and aesthetics. *See* WAC 173-201A-612. "Wildlife habitat" means waters of the state used by, or that directly or indirectly provide food support to, fish, other aquatic life, and wildlife for any life history stage or activity. WAC 173-201A-020. Habitat therefore *includes* areas used for commercial shellfish aquaculture, it is in no way excluded from this definition. So, Ecology has an obligation to ensure that any pollutants discharged, even on commercial clam beds, will not violate state water quality requirements, including protecting beneficial uses like wildlife habitat. To protect its current integrity and to prevent deterioration, Ecology may only issue a permit that will protect water quality and must show how this permit will be effective at doing that but instead provides no analysis. Ecology admits, as it must, that all eelgrass sprayed will be killed, but shrugs this off as still compliant with the "no net loss" policy because that eelgrass exists on commercial clam beds. EIS at 18. Tidal habitat, and the species it supports, does not stop and start at leased tide beds used for commercial aquaculture.

Under the antidegradation analysis, Ecology must use the information collected from implementation of the permit to revise the permit or program requirements. However, Ecology *has* no monitoring data because the last two permits failed to require monitoring whenever spraying "does not occur up to the 10m property line buffer." 2019 Permit Special Condition S.5.A.1. During the first five years of the permit, only one grower has ever been required to monitor impacts in the 10m buffer (according to self-reported Annual Reports), on a total of 17.9 acres out of the over 1,000 sprayed over the life of the permit.[4] Monitoring on *1.6% of acres treated* is far from enough data to conduct the required analysis. Even if impacts were occurring to native eelgrass within treatment areas, or within the 10m buffer, or off-site, if growers did not spray "up to the 10m buffer"

[4] *See* Ecology, Annual reports and pre-treatments plans, https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Aquatic-pesticide-permits/Zostera-japonica-eelgrass-management#report (last accessed Nov. 4, 2019).

(potentially meaning just inches away under the vague permit language), there was no monitoring. It is an improvement that Ecology is now proposing to require monitoring after *all* use (Draft Permit at 14), but Ecology should not continue this approach of spray now, evaluate later without better information on the actual impact of using this herbicide in the Bay.

Further, the buffer validation study conducted after year three of the first permit suffered from serious flaws (including a small sample size and use of a lower per-acre rate of active ingredient than allowed on the label). *See* Exhibit 1. Despite the problems with the buffer validation studies, they still found an over 20% reduction of eelgrass on lower elevation plots, and 2 of 3 test areas showed impacts to native eelgrass beyond the 10m buffer zone. (Grue & Conquest 2015). These findings, even with the small sample size and low rate of application, indicate that the 10m buffers are not sufficient to avoid impacts to native eelgrass off the property. Ecology calls this "no significant impact" but under a "no net loss" of native eelgrass policy, it is hard to see how a 20% reduction in cover/stem density is acceptable. Fact Sheet at 41. The appears to be *no* actual antidegradation analysis here, or plan to ensure that the water quality of Willapa Bay and its beneficial uses will be maintained.

Ecology Should Say No to Intentional Eelgrass Destruction

As stated above, Ecology has the power under SEPA to say no to projects or permits based on their environmental impacts. Ecology should not assume the public interest in killing eelgrass, native or introduced. Further, even if killing *Z. japonica* is acceptable (it is not), this permit will allow harm to native eelgrass. There are mixed beds of introduced and native eelgrass in Willapa Bay, given how shallow it is, and the two species can look similar. Eelgrass habitat is crucial to many species, including as food and shelter. For example, herring, a key forage fish, spawn at sites near active aquaculture cites on *Z. japonica*. Ecology discounts impacts to native eelgrass, despite evidence that they will happen. And evidence that numerous species are in severe decline, indicates that Ecology *must* take seriously the impacts that allow more eelgrass killing will have on these species, in conjunction with all the other stressors they face from human activities.

Further, much of the mitigation Ecology relies on is the dilution of the imazamox with tidal flushing in Willapa Bay. But recent science indicates this tidal flushing is much slower than previously assumed.[5] Rather, high-tide water flowing over the Willapa Bay flats can take as many as four tidal cycles—or about two days—before it is fully replaced by "new" water. This means that imazamox residues will stick around longer and be

[5] James Urton, *Tides don't always flush water out to sea, study shows*, UW News (Sept. 19, 2019), https://www.washington.edu/news/2019/09/10/tidal-flats-old-water/; Wheat *et al.*, *Multi-day water residence time as a mechanism for physical and biological gradients across intertidal flats*, Estuarine, Coastal and Shelf Science, Vol. 227 (Oct. 31 2019).

moved to other parts of the Bay to impact other eelgrass beds. Ecology must take this study and its implications for where "old" and "new" water concentrate in the Bay into account when determining the environmental impact of the proposed permit. Until it does so, it is relying on old and inaccurate information.

In sum, Ecology should deny this permit based on environmental impacts and the public interest. We applaud Ecology for requiring better monitoring and public notice and comment provisions in this draft permit but allowing the continued destruction of eelgrass habitat is unacceptable, and Ecology has a duty to prevent such degradation of a crucial piece of the near shore ecology. At the very least, the permit should be strengthened in the following ways:

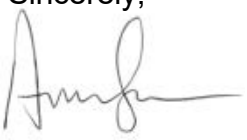
1. Include a more detailed example of what IPM (AKART) is when it comes to removal of *Z. japonica* from commercial clam beds (i.e. using manual or mechanical methods first, pesticides as a last resort).[6]
    a. What are appropriate action thresholds for *Z. japonica* on commercial clam beds? A single sighting of one clump of *Z. japonica* is clearly too low a threshold, so how much must be present before imazamox may be used? CFS suggests it should be a heavy density, and that this threshold should also take into account the available space in a given operation (including however many adjacent plots it controls) for clams to migrate to an area with less dense *Z. japonica*.
    b. In less than heavy density *Z. japonica* beds, mechanical or manual removal methods should be used first. Only when these methods are ineffective at keeping the *Z. japonica* density moderate to low should imazamox control be employed.
    c. Ecology should work with experts to determine what IPM principles are for this type of pesticide use in this aquatic environment before issuing a permit that allows permittees to decide for themselves.
2. Monthly reporting on compliance with Special Condition S3, S4, and S5 requirements during the permissible imazamox application window (currently May through July) regardless of whether treatment has occurred or is planned. Such reporting should be made available to the public through Ecology's Permitting and Reporting Information System (PARIS).[7] Also post notification forms used prior to treatment publicly.
3. Public notice on all permits, including renewing or existing permittees.
4. Prohibit use of vehicles for accessing spray area or spraying imazamox, specify backpack sprayers or other hand-sprayers only.
5. Shorten application window to end in early June.
6. Lengthen dry time from one to six hours and require monitoring during dry time.

[6] *See e.g.,* EPA, How do IPM programs work?, https://www.epa.gov/safepestcontrol/integrated-pest-management-ipm-principles#how_ipm-programs; WSU Extension, Integrated Pest Management, https://ipm.wsu.edu/.
[7] CFS joins the comments by Twin Harbors Waterkeeper.

7. Specify how wind speeds must be monitored for compliance with the wind speed limitations.
8. Prohibit spraying near or over pools where *Z. marina* exists and create a buffer around drainage swales that contain *Z. marina*.
9. Require markers (such as flags) on boundaries of 10m buffer.
10. Specify monitoring requirements for buffers: measure for *zostera spp*. plant kill every 250 feet in the buffer one week after herbicide application.
11. Improve public notice by requiring signs posted four business days prior to treatment at and around Leadbetter Point, including near and around Leadbetter Point State Park and the Willapa National Wildlife Refuge; include additional information like location with description and map, amount of imazamox to be applied, number of acres treated, and name and contact information for the commercial clam bed owner/operator.
12. Remove allowance for Experimental Use of chemicals not listed in the permit: state and federal experimental use permits are not NPDES permits and the current permit does not include any limits to such experiments that ensure they will not cause harm.

Thank you for considering this comment.

Sincerely,



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November 4, 2019

Jon Jennings
Washington State Department of Ecology
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RE: Comments on Proposed Renewal of General Permit for Discharge of Imazamox on Commercial Clam Beds in Willapa Bay

Dear Mr. Jennings and Dept. of Ecology:

Thank you for the opportunity to comment on the proposed renewal of the NPDES Permit for Zostera Japonica Management on Commercial Clam Beds in Willapa Bay, to allow continued spraying of imazamox on clam beds.

Center for Food Safety (CFS) is a national non-profit organization representing nearly 1 million members nationwide and tens of thousands in the Pacific Northwest, including Washington State. CFS uses education, policy and legislation, and impact litigation to address the negative effects to public health and the environment from harmful food production technologies, and supports ecological food production, like organic and beyond. CFS operates in the Pacific Northwest and its members are particularly concerned with the increasingly industrial aquaculture and in particular the use of pesticides in shellfish aquaculture.

CFS urges Ecology to deny this permit to continue killing eelgrass, whether on or off commercial clam beds. Washington is home to many iconic and endangered species like salmon and the orcas that rely on them, and numerous other fish, birds, and invertebrates. These species, and their prey, rely on eelgrass habitat in Willapa Bay. The decline of eelgrass and other seagrasses worldwide, and the call for no net loss and restoration of eelgrass habitat in Washington all point to the need to prevent further intentional destruction of this crucial habitat. As Ecology acknowledges (Fact Sheet at 14-24), introduced eelgrass also provides essential ecosystem functions, like food, shelter, and habitat stabilization for numerous species, as well as nutrient cycling and climate change mitigation.

As experts have stated, there is no sound reason to allow the direct spraying of any native eelgrass, including on commercial clam beds (*see* FWS Comments on 2014 Imazamox NPDES Permit). For five years, Ecology has allowed the unmonitored spraying of eelgrass with the herbicide imazamox. Because of the permit buffer rules, growers who sprayed imazamox were not required to monitor impacts to eelgrass outside of their plots, so thousands of acres were sprayed over the last five years without any monitoring of off-site impacts. Ecology's buffer validation study in 2016 was fatally flawed, but even then showed negative impacts to native eelgrass, and should never have supported extending the permit

for the full five years.[1] Given the benefits of introduced eelgrass, the impacts of herbicides to the Bay, native eelgrass, and other species, and the significant data gaps here, this under-studied plan should not move forward. Ecology failed to evaluate any alternatives that are more environmentally protective than spraying herbicides to kill eelgrass or conduct any review of the impacts on the ground after five years of spraying. Ecology must do more under the Clean Water Act and Washington state water quality protection laws when granting an NPDES permit.

State Environmental Policy Act

The State Environmental Policy Act ("SEPA") is Washington's core environmental policy and review statute. Like its federal counterpart, the National Environmental Policy Act ("NEPA"), SEPA broadly serves two purposes: first, to ensure that government decision-makers are fully apprised of the environmental consequences of their actions and, second, to encourage public participation in the consideration of environmental impacts. *Norway Hill Preservation and Prot. Ass'n v. King Co*, 87 Wn.2d 267, 279 (1976). For decades, SEPA has served these purposes effectively, requiring full environmental reviews for projects with significant environmental impacts.

SEPA was enacted to "encourage productive and enjoyable harmony between humankind and the environment" and to "prevent or eliminate damage to the environment and biosphere." RCW 43.21C.010. Thus in adopting SEPA, the Washington legislature declared the protection of the environment to be a core state priority, "recognize[ing] that each person has a fundamental and inalienable right to a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment." RCW 43.21C.020(3). This policy statement, which is stronger than a similar statement in the federal counterpart of NEPA, "indicates in the strongest possible terms the basic importance of environmental concerns to the people of the state." *Leschi v. Highway Comm'n*, 84 Wn.2d 271, 279–80 (1974).

SEPA is more than a purely "procedural" statute that encourages informed and politically accountable decision-making. SEPA requires agencies to integrate environmental concerns into their decision making processes by studying and explaining environmental consequences before decisions are made. *See Stempel v. Dep't of Water Resources*, 82 Wn.2d 109, 117–18 (1973). In enacting SEPA, the state legislature gave decision-makers the affirmative authority to deny projects where environmental impacts are significant, cannot be mitigated, and collide with local rules or policies. SEPA provides substantive authority for government agencies to condition or even deny proposed actions—even where they meet all other requirements of the law—based on their environmental impacts. RCW 43.21C.060. As one treatise points out, when this premise was challenged by project proponents early in SEPA's history, "the courts consistently and emphatically responded that even if the action previously had been ministerial, it became *environmentally discretionary* with the enactment of SEPA."[2]

[1] CFS, Comments on Proposed Modification of General Permit for Discharge of Imazamox on Commercial Clam Beds in Willapa Bay (Jan. 31, 2017), attached as Exhibit 1.
[2] Richard Settle, *SEPA: A Legal and Policy Analysis*, §18.01[2] (2014) (emphasis added).

Here Ecology, invoking RCW 43.21C.0383, is proposing to proceed with its permitting decision without complying the requirement to develop an Environmental Impact Statement ("EIS"), RCW 43.21C.030(2)(c). Fact Sheet at 47. RCW 43.21C.0383, states that waste discharge permits "(f)or existing discharges, the issuance, reissuance, or modification of a waste discharge permit that contains conditions no less stringent than federal effluent limitations and state rules" are not subject to the EIS requirement. Ecology suggests that because the "proposed permit is at least as stringent as the version of the permit which expires May 2019," this exception applies. Fact Sheet at 47-48. Ecology's reliance on this exception is misplaced.

First, the proposed discharges are not "existing" discharges under the statute. Neither SEPA, nor Ecology's implementing regulations, define "existing discharges." The Pollution Control Hearings Board, however, "has previously ruled that the term 'existing discharge' refers to a discharge existing at the time the rule was adopted creating the categorical exemption." *Save Lake Sammamish v. Ecology, et al.*, 1996 WL 379222, at *6 (citing *Cooper v. Department of Ecology*, PCHB No. 80-173 (1980)). Applying that rule here, the discharge of imazamox cannot be considered an existing discharge. The legislature first passed the exemption in 1996 and amended the law in 2008. Because the request to discharge imazamox did not come until after this exemption was established, it cannot be considered an existing discharge under RCW 43.21C.0383.

Second, the exemption is inapplicable because there are no federal effluent limitation that apply to the proposed discharges, thus there is no meaningful floor against which to judge the permit. Federal effluent limitations for certain types of discharges are set by the Environmental Protection Agency, pursuant to section 306 of the Clean Water Act, 33 U.S.C. § 1316. To date, EPA has not set such limitation or standards for the discharge of imazamox for the purposes intended here. Thus, the exception to the EIS where the proposed permit "contains conditions no less stringent than federal effluent limitations" cannot apply because the intent of the exemption, avoiding duplicate analysis of the necessary minimum permit requirements, is not met. Ecology's insistence that "the proposed permit is at least as stringent as the version of the permit which expires May 2019"—whether true or not—is immaterial.

As such, Ecology must conduct at least a supplemental EIS under SEPA, to evaluate data collected and any new studies or information during the last five years,[3] potential impacts to the environment from continued intentional destruction of eelgrass and discharge of imazamox into Willapa Bay, and more environmentally benign alternatives.

[3] For example, EPA conducted a registration review of imazamox during the time since Ecology conducted its EIS on the permit being renewed. *See* https://www.regulations.gov/docket?D=EPA-HQ-OPP-2014-0395. However, as part of that registration review, EPA failed to consult with the expert Services under Section 7 of the Endangered Species Act. *See* Center for Biological Diversity, Comments on EPA Draft Ecological Risk Assessment – Bispyribac-Sodium, Diclosulam, Florasulam, Flucarbazone, Imazamox, Imazapic, Imazaquin, Imazethapyr (Docket #: EPA-HQ-OPP-2014-0074, EPA-HQ-OPP-2014-0074, EPA-HQ-OPP-2015-0548, EPA-HQ-OPP-2013-0283, EPA-HQ-OPP-2014-0395, EPA-HQ-OPP-2014-0279, EPA-HQ-OPP-2014-0224, EPA-HQ-OPP-2013-0774), https://www.regulations.gov/document?D=EPA-HQ-OPP-2014-0395-0024. Ecology should consider all information available on imazamox, but also the gaps in data, including impacts to endangered species, which apparently no agency, federal or state, will take responsibility for evaluating. Further, a search of Google Scholar shows thousands of hits for eelgrass studies since 2015.

NPDES and Water Quality Permitting Standards

Ecology must also comply with all Clean Water Act and Washington State water-quality standards when permitting the discharge of pesticides into water. The goal of the Clean Water Act (CWA) is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." 33 U.S.C. § 1251(a). Discharges are prohibited from causing or contributing to violations of water quality standards. 33 U.S.C. §§ 1311(b)(1)(C), 1342(a)(2); RCW 90.48.010, 90.48.520, 90.52.040, and 90.54.020. Water quality standards are defined as the designated beneficial uses of a water body, in combination with the numeric and narrative criteria to protect those uses and an antidegradation policy. 40 C.F.R. § 131.6; Chapter 173-201A WAC. The antidegradation policy is meant to ensure that highest possible water quality is restored, that existing uses are maintained, and that any human activities that may lower water quality are allowing, at a minimum, AKART. WAC 173-201A-300-330.

Ecology's Fact Sheet fails to explain its compliance with the above requirements. Ecology ignores AKART based on the nature of pesticides leftover in water after their use, Fact Sheet at 38, and says that Integrated Pest Management (IPM) is the equivalent of technology-based-effluent limitations, but fails to describe by IPM principles will actually be used and how they will be effective. Ecology cites Discharge Management Plans, but these are unavailable on Ecology's website for public review, and Ecology says that its prior EIS from 2014 may be allowed as "substitution" for "some of the DMP plan elements where appropriate" but provides no further explanation of what those might be. It remains entirely unclear how this permit meets technology-based or AKART standards. As to surface water quality-based effluent limits, Ecology does not provide what beneficial uses are designated for Willapa Bay or how this permit to spray herbicide into the Bay will maintain those uses, including such things has wildlife habitat. Willapa Bay, as a marine water, is currently considered to be in "excellent" condition for aquatic life and well-suited for wildlife habitat and aesthetics. *See* WAC 173-201A-612. "Wildlife habitat" means waters of the state used by, or that directly or indirectly provide food support to, fish, other aquatic life, and wildlife for any life history stage or activity. WAC 173-201A-020. Habitat therefore *includes* areas used for commercial shellfish aquaculture, it is in no way excluded from this definition. So Ecology has an obligation to ensure that any pollutants discharged, even on commercial clam beds, will not violate state water quality requirements, including protecting beneficial uses like wildlife habitat. In order to protect its current integrity and to prevent deterioration, Ecology may only issue a permit that will protect water quality, and must show how this permit will be effective at doing that, but instead provides no analysis.

Under the antidegradation analysis, Ecology must use the information collected, from implementation of the permit, to revise the permit or program requirements. However, Ecology *has* no monitoring data because the first permit (and proposed renewal) failed to require monitoring whenever spraying "does not occur up to the 10m property line buffer." Draft Permit Special Condition S.5.A.1. During the five years of the permit, only one grower has ever been required to monitor impacts in the 10m buffer (according to self-reported Annual Reports), on a total of 17.9 acres out of the over 1,000 sprayed over the life

of the permit.[4] Monitoring on *1.6% of acres treated* is far from enough data to conduct the required analysis. Even if impacts were occurring to native eelgrass within treatment areas, or within the 10m buffer, or off-site, as long as growers did not spray "up to the 10m buffer" (potentially meaning just inches away under the vague permit language), there was no monitoring and none will be required under the current proposed permit. Ecology says "if there is a change that show the buffer is no longer working, Ecology may consider alternative options for protecting off-site *Z. marina*, which would take place during the next reissuance process or through a major modification of the permit." Fact Sheet at 42. But without more stringent monitoring it is unclear how Ecology would ever know about impacts to off-site eelgrass.

Further, the buffer validation study conducted after year three of the permit suffered from serious flaws (including a small sample size and use of a lower per-acre rate of active ingredient than allowed on the label). *See* Exhibit 1. Despite the problems with the buffer validation studies, they still found an over 20% reduction of eelgrass on lower elevation plots, and 2 of 3 test areas showed impacts to native eelgrass beyond the 10m buffer zone. (Grue & Conquest 2015). These findings, even with the small sample size and low rate of application, indicate that the 10m buffers are not sufficient to avoid impacts to native eelgrass off the property. Ecology calls this "no significant impact" but under a "no net loss" of native eelgrass policy, it is hard to see how a 20% reduction in cover/stem density is acceptable. Fact Sheet at 41. The appears to be *no* actual antidegradation analysis here, or plan to ensuring that the water quality of Willapa Bay and its beneficial uses will be maintained.

As to sediment quality standards, chapter 173-204 WAC, Ecology appears to rely in part on studies associated with the proposed imidacloprid NPDES permit to kill burrowing shrimp in Willapa Bay, but that permit was *denied based in part on impacts to sediment*.[5] To the extent Ecology is relying on impacts to sediment based on the now-denied imidacloprid permit, Ecology must re-evaluate its conclusions on sediment impacts with updated information.

With the significant data gaps from lack of monitoring of impacts from the last five years, and a lack of any analysis of new information since 2014, this permit cannot satisfy the requirements of federal or state law.

Ecology Should Say No to Intentional Eelgrass Destruction

As stated above, Ecology has the power under SEPA to say no to projects or permits based on their environmental impacts. And any such water discharge permits must comply with all state and federal water quality standards, which this permit does not.

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[4] *See* Ecology, Annual reports and pre-treatments plans, https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Aquatic-pesticide-permits/Zostera-japonica-eelgrass-management#report (last accessed Nov. 4, 2019).

[5] Ecology, Burrowing shrimp control (Imidacloprid), https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Aquatic-pesticide-permits/Burrowing-shrimp-control-Imidacloprid (citing "Significant, unavoidable impacts to sediment quality" as one reason for permit denial).

Ecology should not assume the public interest in killing eelgrass, native or not. Ecology broadly cites RCW 90.48.447[6] and clam growers' claims that they need to kill eelgrass to increase production numbers. In its Fact Sheet, Ecology acknowledges that introduced eelgrass provides the same ecosystem functions as native eelgrass, is "also valued for habitat" and provides food, shelter and habitat stabilization for numerous species, as well as aides in nutrient cycling and improves water quality through oxygen production. Fact Sheet at 14, 24 (unlike most invasive weeds, introduced eelgrass has positive attributes and scientific opinions are mixed as to balance of positives and negatives). *Z. japonica* is the only seagrass designated as "invasive," and even the rationale given by the Weed Board when it designated *Z. japonica* as "invasive" is clear that it only based on the perceived economic benefit of shellfish growers, not because of its other properties, many of which are beneficial. Ecology also acknowledges that *Z. japonica* has been growing in Washington for nearly a century, originally *introduced* by the shellfish industry. Fact Sheet at 15. Moreover, disturbance, such as *by the commercial shellfish industry*, helps to spread *Z. japonica*, which thrives with disturbance unlike *Z. marina. Id.* at 19. Despite the proven positive impacts of *Z. japonica*, including as food for waterfowl and migratory birds, *id.* at 22, Ecology relies on personal communications from industry-conflicted and previously sanctioned[7] Kim Patten for the "fact" that manila clams grow at lower density when *Z. japonica* is present, and other self-serving statements from the commercial shellfish industry. *Id.* at 21. It is not in the public interest to allow the commercial shellfish industry to use herbicides in the Bay to "fix" a problem of their own making and of highly debatable negative impact. Further, eelgrass inhibits burrowing shrimp, another native "problem" species that the industry has been killing with toxic pesticides for decades. Not all introduced species are bad and allowing the continued destruction of *both* introduced and native eelgrass through this permit is *not in the public interest.*

Ecology must step up to protect wildlife habitat in Willapa Bay because other state and federal agencies do not. As Ecology stated, because of the loophole in the Hydraulic Project Approval Program for shellfish growers, WDFW does not claim authority to protect *Z. marina* with respect to private sector shellfish aquaculture. Fact Sheet at 23. And the U.S. Army Corps, the federal agency with authority to issue Clean Water Act Section 404 and River & Harbor Act Section 10 permits, has historically and unlawfully ignored the cumulative impacts of shellfish aquaculture on the environment, including through pesticide use. *See Center for Food Safety v. U.S. Army Corps of Engineers*, 17-1209RSL, 2019 WL 5103309, at *6 (W.D. Wash. Oct. 10, 2019) (holding unlawful and setting aside Nationwide Permit 48 for commercial shellfish aquaculture in Washington). In that case, the federal court recognized the impacts that pesticide use by the shellfish industry might have on the environment and how it was unanalyzed by this federal agency:

> The Corps makes a similarly untenable argument whenever the use of pesticides in a shellfish operation permitted under NWP 48 is discussed.

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[6] Including as a Purpose in the notes that commercial herbicides exist that can kill aquatic noxious weeds without risk to the environment or public health, but making no claim that all use of any pesticide to kill any species, particularly one with beneficial characteristics, is in the public interest under the Antidegradation Policy or any other Washington state law.

[7] Washington State Executive Ethics Board, Investigative Report and Board Determination of Reasonable Cause, No. 2017-012, Kim Patten, Director WSU Pacific County Ext. (July 20, 2017).

> While acknowledging that these substances are used and released into the environment during permitted activities, the Corps declines to consider the environmental impacts of pesticides because they are regulated by some other entity. *See* NWP003077. Even if the Corps does not have jurisdiction to permit or prohibit the use of pesticides, it is obligated to consider "other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." NWP003074 (quoting 40 C.F.R. § 1508.7). The Corps' decision to ignore the foreseeable uses and impacts of pesticides in the activities it permitted on a nationwide basis does not comport with the mandate of NEPA or with its obligations under the CWA. Having eschewed any attempt to describe the uses of pesticides in commercial shellfish aquaculture or to analyze their likely environmental impacts, the decision to permit such activities through NWP 48 cannot stand.

Id. While the Corps must now go back and analyze the impacts, statewide, of pesticide use by the commercial shellfish industry, it is still not the agency responsible for permitting this use and upholding CWA Section 402 and state water quality standards: Ecology is, and it must protect the environment and public health over promoting this commercial industry.

Further, even if killing *Z. japonica* is acceptable (it is not), this permit will allow harm to native eelgrass. There are mixed beds of introduced and native eelgrass in Willapa Bay, given how shallow it is, and the two species can look similar. Fact Sheet at 17-18. With basically no monitoring data from permittees (save on 1.6% of treated acreage over the life of the last permit), and the buffer validation study *showing negative impacts to native eelgrass off-site*, the existing data shows there will be harm to *Z. marina.* The federal court in *Center for Food Safety* found the NWP 48 permit unlawful in large part based on the improperly analyzed and unmitigated impacts to eelgrass habitat from commercial shellfish aquaculture. 2019 WL 5103309, at *5.

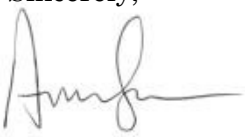
Eelgrass habitat is crucial to many species, including as food and shelter. For example, herring, a key forage fish, spawn at sites near active aquaculture cites on *Z. japonica*. Fact Sheet at 23. The species that rely on eelgrass habitat are key parts of the food web, including for critically-endangered orcas. That is why people are calling for its preservation and restoration, including the Southern Resident Killer Whale Recovery Task Force and Puget Sound Partnership, which does not distinguish between *Z. marina* and *Z. japonica*. Fact Sheet at 24. Ecology discounts impacts to native eelgrass, despite evidence that they will happen (or lack of any monitoring to prove they will not), despite this being Ecology's "greatest concern" with this permit. And evidence that numerous species are in severe decline (including that provided by Ross Barkhurst, *see* Comments on Permit Renewal), indicates that Ecology *must* take seriously the impacts that allow more eelgrass killing will have on these species, in conjunction with all the other stressors they face from human activities.

Further, much of the mitigation Ecology relies on is the dilution of the imazamox with tidal flushing in Willapa Bay. But recent science indicates this tidal flushing is much

slower than previously assumed.[8] Rather, high-tide water flowing over the Willapa Bay flats can take as many as four tidal cycles—or about two days—before it is fully replaced by "new" water. This means that imazamox residues will stick around longer and be moved to other parts of the Bay to impact other eelgrass beds. Ecology must take this study and its implications for where "old" and "new" water concentrate in the Bay into account when determining the environmental impact of the proposed permit. Until it does so, it is relying on old and inaccurate information.

In sum, Ecology should deny this permit based on environmental impacts and the public interest. At the very least, Ecology must go back and conduct a supplemental EIS under SEPA. Should any permit be issued (it should not), Ecology must condition the permit to actually comply with federal and state water quality requirements, including but not limited to further limits on where and when the herbicide is used (after further research is conducted on buffers and all available information is evaluated, including the above-mentioned tidal flushing study), and full monitoring and reporting requirements. We applaud Ecology for saying no to the imidacloprid permit, but allowing the continued destruction of eelgrass habitat is unacceptable, and Ecology has a duty to prevent such degradation in Willapa Bay.

Sincerely,



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[8] James Urton, *Tides don't always flush water out to sea, study shows*, UW News (Sept. 19, 2019), https://www.washington.edu/news/2019/09/10/tidal-flats-old-water/; Wheat *et al.*, *Multi-day water residence time as a mechanism for physical and biological gradients across intertidal flats*, Estuarine, Coastal and Shelf Science, Vol. 227 (Oct. 31 2019).

Exhibit 1

CENTER FOR FOOD SAFETY

January 31, 2017

Nathan Lubliner
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RE: Comments on Proposed Modification of General Permit for Discharge of Imazamox on Commercial Clam Beds in Willapa Bay

Department of Ecology:

Thank you for the opportunity to comment on the proposed modifications to the NPDES Permit for *Zostera Japonica* Management on Commercial Clam Beds in Willapa Bay, and Department of Ecology's proposal to modify the permit to allow continued spraying of imazamox on clam beds for the remaining two years of the permit.

Center for Food Safety (CFS) is a national non-profit organization representing over 800,000 members nationwide and tens of thousands in Washington State. CFS uses education, policy and legislation, and impact litigation to address the negative effects to public health and the environment from harmful food production technologies, and supports ecological food production, like organic and beyond. CFS operates in the Pacific Northwest and is particularly concerned with the increasingly industrial aquaculture and in particular the use of pesticides in shellfish aquaculture.

While CFS supports the concept of monitoring and testing to validate the buffers imposed in the original imazamox permit, based on sound science, unfortunately it does not appear that Ecology can truly validate the 10m buffers based on the studies conducted. Instead, the information presented indicates that Ecology should **not modify** the permit and prohibit further imazamox spraying until more accurate studies can be conducted and the full impacts to the environment are taken into account (through permit renewal in 2019). As noted by

the U.S. Fish & Wildlife Service in 2014, there is no sound reason to allow the direct spraying of any native eelgrass, including on commercial clam beds.[1] While CFS recognizes that Ecology is seeking only comment on the proposed modifications, Ecology has not provided good cause for modifying the permit as proposed. The inadequacy of the entire permit, including the current monitoring and buffer requirements, indicates the prohibition on further spraying in the original permit be allowed to go into effect. Further, because the buffer validation studies did not test the maximum allowed rate of imazamox use, it does not represent the full impacts of imazamox use on off-property native eelgrass. For this reason alone, Ecology should not modify the permit and use the next two years to gather data on the full potential effects of yearly imazamox spraying on commercial clam beds in Willapa Bay. Alternatively, Ecology does have good cause to modify the permit to require better buffers for native seagrasses, set numerical effluent limitations, and require increased monitoring and reporting by permittees, as well as studies that correct the inadequacies of the buffer validation Studies.

A. Buffer Validation Studies Inadequate to Fully Assess Impacts of Imazamox.

The buffer validation Studies are not adequate for several reasons. First, as noted by Washington Department of Natural Resources (WDNR), one of three agencies consulted to review the study data, the sample size (n=3) was too small, making the findings of that study "inconclusive." The Grue 2015 study found negative effects to z. marina after 30 days, but given the small sample size, their finding of statistical insignificance "does not necessarily indicate that there is no impact" to native eelgrass beyond property boundaries.[2]

WDNR also identified problems with the dimensions evaluated in the study (failure to capture the way the tide flows across the test plots) and the failure to monitor impacts to another native seagrass susceptible to imazamox, *Ruppia maritima* (widgeon grass).

Finally, the spraying on test plots in May 2014 used a rate of active ingredient per acre *lower* than the maximum rate allowed in the permit, and lower the rate actually reported by permittees. *See* Clearcast® label (EPA Reg. No. 241-437, most recent label approved Oct. 24, 2016).[3] The permit imposes no limits on the amount of active ingredient allowed per acre, other than the EPA approved labels for imazamox, the active ingredient. However, EPA has approved several

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[1] Ken S. Berg, Washington Fish and Wildlife Office (USFWS) Letter to Donald Seeberger, Department of Ecology, at 5 (Feb. 14, 2014).
[2] Cinde Donoghue, Wash. Dept. of Nat. Resources Comments to Nathan Lubliner, Ecology (July 8, 2016).
[3] Clearcast® Label, Oct. 24, 2016, attached as Exhibit A.

labels for products containing imazamox, including the technical grade active ingredient that is *all* imazamox, as opposed to formulations containing over 80% "inert" ingredients. This aside, the Clearcast® product that specifically addresses Japanese eelgrass has a general maximum rate of 1lb or about 16 oz of active ingredient per acre, and a Japanese eelgrass range of 4 fl oz to 32 fl oz Clearcast/Acre.[4] This Japanese eelgrass-specific rate is expressed as ounces of the *formulation* per acre, not active ingredient. This formulation of imazamox has 12.1% active ingredient, so a maximum rate of 32 oz of formulation would include 3.872 fl oz of active ingredient per acre. While the study reported a rate of 11.5-11.7 oz a.i./acre (Grue 2015 at 6), Ecology has stated that the actual rate was 1.4 oz a.i./acre.[5] So the tested rate was about 1.4 oz a.i./acre, while the maximum labeled rate for Japanese eelgrass is nearly 4 oz a.i./acre, or nearly *three times higher*. Ecology gave a range of reported use rates from 0.72 oz a.i. per acre to 2.26 oz a.i. per acre from 2014-2016.[6] Ecology indicated that about 18% of those applications were above tested rate of 1.4 oz a.i./acre.[7] Thus, not only did the buffer validation Studies use rates three times lower than the maximum rate for Japanese eelgrass, they do not even reflect the highest rate *actually used* by growers. The problem with this design is obvious and means the studies do not reflect the true extent of potential impacts to native eelgrass. For this reason alone, this study does not support or provide sufficient cause to modify the permit to allow continued spraying, because the full effect to native eelgrass off-property is still unknown.

B. Ecology Should Not Modify the Permit or Should Modify it to Include More Protections for Native Seagrass, Numeric Effluent Limitations, and Increased Monitoring and Reporting.

Ecology cannot modify an NPDES permit without cause. 40 C.F.R. § 122.62; WAC 173-226-230; 33 U.S.C. § 1342(b)(1)(C). The flawed studies have not provided any justification for a modification of the permit at this time, and Ecology has not identified any of the enumerated causes for modification listed in 40 C.F.R. § 122.62(a) or (b) that justify its proposal to modify the imazamox permit as proposed. To the contrary, the new information indicates that stronger protections for native seagrasses and more monitoring and reporting are needed. Indeed, federal CWA regulations consider modifications to NPDES permits that "[r]equire more frequent monitoring or reporting by the permittee" to be *minor* modifications, which Ecology could undertake at any time. 40 C.F.R. § 122.63. Thus, while Ecology seeks to limit public comment to its proposed permit modification, Ecology has failed to show good

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[4] *Id.* at 5, 9.

[5] Ecology, Workshop Presentation, *Draft Permit Modification for the Zostera japonica Management on Commercial Clam Beds in Willapa Bay NPDES General Permit* at 12.

[6] *Id.* at 22.

[7] Phone conversation with Nathan Lubliner, Jan. 30, 2017.

cause for modifying the permit as proposed. Instead, it should modify it to include increased monitoring and reporting requirements to respond to the findings of Grue 2015, and make up for the inadequacies in that study (i.e. small sample size, lower applications rates).

Rather than support the modification proposed, the new information indicates that the permit requires more protections for native seagrasses and increased monitoring and reporting. Despite the problems with the buffer validation Studies, they still found an over 20% reduction of eelgrass on lower elevation plots, and 2 of 3 test areas showed impacts to native eelgrass *beyond* the 10m buffer zone. (Grue & Conquest 2015). These findings, even with the small sample size and low rate of application, indicate that the 10m buffers are *not* sufficient to avoid impacts to native eelgrass off the property. Further, in the three years of spraying under this permit, only one grower has ever been required to monitor impacts in the 10m buffer, on a total of 17.9 acres out of the nearly 700 sprayed from 2014-2016. This extremely limited monitoring leaves the public (and Ecology) hamstrung to actually access the impacts of this permit to native seagrasses and the environment.

Part of the cause of confusion and lack of sound science is the lack of numeric effluent standards in the imazamox discharge permit. The only limit is a label approved by EPA, but this does not clearly state any particular rate of active ingredient per acre, as there are different labels for different imazamox products. The CWA defines "effluent limitation" as "any restriction on the quantity, rate, and concentration of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance." 33 USC § 1362(11). These may be non-numeric technology based standards only where numeric standards are *infeasible*. *Citizens Coal Council v. United States Environmental Protection Agency*, 447 F3d 879, 895-96 (6th Cir. 2006). Here, numeric standards are completely feasible, because at least one label (Clearcast® EPA Reg. No. 241-437) includes a range for Japanese eelgrass. However, Ecology should not accept the highest labeled rate without consideration of the impacts from that application rate to native flora and fauna in Willapa Bay. If Ecology is going to modify the permit at all, it should first require/conduct studies with the highest labeled application rate (as allowed by the current permit), evaluate impacts and then select the appropriate application rate as a numerical effluent standard for the permit. Instead, Ecology has put the horse before the cart, allowing three years of imazamox spraying, with application rates up to the highest labeled rate, and basing its current decision to continue that spraying on a one-time application study using rates nearly three times lower than the highest allowable rate and below the *actual* known use rates.

To address the lack of information about impacts to native seagrasses, Ecology can and should adopt all recommendations from WDNR regarding monitoring and reporting by growers as noted in the July 8, 2016 comments. CFS

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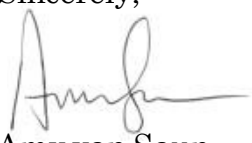
Under both the Clean Water Act and Washington Water Pollution Control Act, Ecology should not modify the permit to allow continued spraying. While Japanese eelgrass has been listed as a noxious weed (as requested by shellfish growers), there is no legitimate reason to allow herbicide use that kills native eelgrass and other seagrasses, and Ecology has a duty to protect Washington's aquatic ecosystems. Ecology should go back to the drawing board and fashion a permit based on sound science, which ensures that valuable native sea grass habitat is not being adversely impacted before allowing any further herbicide spraying in Willapa Bay.

Alternatively, Ecology should modify the permit conditions to require better practices to avoid native eelgrass on mixed beds (including set buffers around drainage swales containing native seagrasses and clear requirements for avoiding native seagrass in mixed beds), numerical effluent limits (i.e. a cap on the amount of active ingredient per acre allowed under the permit), increased monitoring and reporting (as enumerated by WDNR), and further studies to address data gaps due to the flaws outlined above.

Sincerely,



Amy van Saun
Legal Fellow

[8] Kirk L. Krueger, Ph.D., WDFW Comment s to Ecology (Aug. 12, 2016).

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avansaun@centerforfoodsafety.org

January 31, 2017

Nathan Lubliner
Washington Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600
Nathan.lubliner@ecy.wa.gov

RE: Comments on Proposed Modification of General Permit for Discharge of Imazamox on Commercial Clam Beds in Willapa Bay

Department of Ecology:

Thank you for the opportunity to comment on the proposed modifications to the NPDES Permit for *Zostera Japonica* Management on Commercial Clam Beds in Willapa Bay, and Department of Ecology's proposal to modify the permit to allow continued spraying of imazamox on clam beds for the remaining two years of the permit.

Center for Food Safety (CFS) is a national non-profit organization representing over 800,000 members nationwide and tens of thousands in Washington State. CFS uses education, policy and legislation, and impact litigation to address the negative effects to public health and the environment from harmful food production technologies, and supports ecological food production, like organic and beyond. CFS operates in the Pacific Northwest and is particularly concerned with the increasingly industrial aquaculture and in particular the use of pesticides in shellfish aquaculture.

While CFS supports the concept of monitoring and testing to validate the buffers imposed in the original imazamox permit, based on sound science, unfortunately it does not appear that Ecology can truly validate the 10m buffers based on the studies conducted. Instead, the information presented indicates that Ecology should **not modify** the permit and prohibit further imazamox spraying until more accurate studies can be conducted and the full impacts to the environment are taken into account (through permit renewal in 2019). As noted by

the U.S. Fish & Wildlife Service in 2014, there is no sound reason to allow the direct spraying of any native eelgrass, including on commercial clam beds.[1] While CFS recognizes that Ecology is seeking only comment on the proposed modifications, Ecology has not provided good cause for modifying the permit as proposed. The inadequacy of the entire permit, including the current monitoring and buffer requirements, indicates the prohibition on further spraying in the original permit be allowed to go into effect. Further, because the buffer validation studies did not test the maximum allowed rate of imazamox use, it does not represent the full impacts of imazamox use on off-property native eelgrass. For this reason alone, Ecology should not modify the permit and use the next two years to gather data on the full potential effects of yearly imazamox spraying on commercial clam beds in Willapa Bay. Alternatively, Ecology does have good cause to modify the permit to require better buffers for native seagrasses, set numerical effluent limitations, and require increased monitoring and reporting by permittees, as well as studies that correct the inadequacies of the buffer validation Studies.

A. Buffer Validation Studies Inadequate to Fully Assess Impacts of Imazamox.

The buffer validation Studies are not adequate for several reasons. First, as noted by Washington Department of Natural Resources (WDNR), one of three agencies consulted to review the study data, the sample size (n=3) was too small, making the findings of that study "inconclusive." The Grue 2015 study found negative effects to z. marina after 30 days, but given the small sample size, their finding of statistical insignificance "does not necessarily indicate that there is no impact" to native eelgrass beyond property boundaries.[2]

WDNR also identified problems with the dimensions evaluated in the study (failure to capture the way the tide flows across the test plots) and the failure to monitor impacts to another native seagrass susceptible to imazamox, *Ruppia maritima* (widgeon grass).

Finally, the spraying on test plots in May 2014 used a rate of active ingredient per acre *lower* than the maximum rate allowed in the permit, and lower the rate actually reported by permittees. *See* Clearcast® label (EPA Reg. No. 241-437, most recent label approved Oct. 24, 2016).[3] The permit imposes no limits on the amount of active ingredient allowed per acre, other than the EPA approved labels for imazamox, the active ingredient. However, EPA has approved several

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[1] Ken S. Berg, Washington Fish and Wildlife Office (USFWS) Letter to Donald Seeberger, Department of Ecology, at 5 (Feb. 14, 2014).
[2] Cinde Donoghue, Wash. Dept. of Nat. Resources Comments to Nathan Lubliner, Ecology (July 8, 2016).
[3] Clearcast® Label, Oct. 24, 2016, attached as Exhibit A.

labels for products containing imazamox, including the technical grade active ingredient that is *all* imazamox, as opposed to formulations containing over 80% "inert" ingredients. This aside, the Clearcast® product that specifically addresses Japanese eelgrass has a general maximum rate of 1lb or about 16 oz of active ingredient per acre, and a Japanese eelgrass range of 4 fl oz to 32 fl oz Clearcast/Acre.[4] This Japanese eelgrass-specific rate is expressed as ounces of the *formulation* per acre, not active ingredient. This formulation of imazamox has 12.1% active ingredient, so a maximum rate of 32 oz of formulation would include 3.872 fl oz of active ingredient per acre. While the study reported a rate of 11.5-11.7 oz a.i./acre (Grue 2015 at 6), Ecology has stated that the actual rate was 1.4 oz a.i./acre.[5] So the tested rate was about 1.4 oz a.i./acre, while the maximum labeled rate for Japanese eelgrass is nearly 4 oz a.i./acre, or nearly *three times higher*. Ecology gave a range of reported use rates from 0.72 oz a.i. per acre to 2.26 oz a.i. per acre from 2014-2016.[6] Ecology indicated that about 18% of those applications were above tested rate of 1.4 oz a.i./acre.[7] Thus, not only did the buffer validation Studies use rates three times lower than the maximum rate for Japanese eelgrass, they do not even reflect the highest rate *actually used* by growers. The problem with this design is obvious and means the studies do not reflect the true extent of potential impacts to native eelgrass. For this reason alone, this study does not support or provide sufficient cause to modify the permit to allow continued spraying, because the full effect to native eelgrass off-property is still unknown.

B. Ecology Should Not Modify the Permit or Should Modify it to Include More Protections for Native Seagrass, Numeric Effluent Limitations, and Increased Monitoring and Reporting.

Ecology cannot modify an NPDES permit without cause. 40 C.F.R. § 122.62; WAC 173-226-230; 33 U.S.C. § 1342(b)(1)(C). The flawed studies have not provided any justification for a modification of the permit at this time, and Ecology has not identified any of the enumerated causes for modification listed in 40 C.F.R. § 122.62(a) or (b) that justify its proposal to modify the imazamox permit as proposed. To the contrary, the new information indicates that stronger protections for native seagrasses and more monitoring and reporting are needed. Indeed, federal CWA regulations consider modifications to NPDES permits that "[r]equire more frequent monitoring or reporting by the permittee" to be *minor* modifications, which Ecology could undertake at any time. 40 C.F.R. § 122.63. Thus, while Ecology seeks to limit public comment to its proposed permit modification, Ecology has failed to show good

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[4] *Id.* at 5, 9.

[5] Ecology, Workshop Presentation, *Draft Permit Modification for the Zostera japonica Management on Commercial Clam Beds in Willapa Bay NPDES General Permit* at 12.

[6] *Id.* at 22.

[7] Phone conversation with Nathan Lubliner, Jan. 30, 2017.

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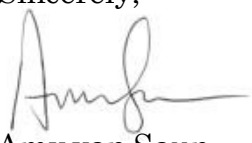

Amy van Saun
Legal Fellow

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2025 Zostera japonica Permit - Summary of Verbal Testimony

The following is a summary of verbal testimony provided to Ecology during a formal public hearing on the draft version of the "Zostera japonica management on commercial clam beds in Willapa Bay" general permit. The public hearing was an in-person event held on January 7, 2025 in South Bend, WA. An audio file of the public hearing is available upon request by contacting the Water Quality Program at aquaticpesticideperm@ecy.wa.gov or 360-407-6600.

Ross Barkhurst, Willapa Basin Ecosystem Review Team

- Map of eelgrass provided by Ecology during the public meeting is misleading
- Studies indicate Imazamox persists in low oxygen bottom sediments, imazamox causes changes in rat livers and pancreas, and we shouldn't be eating it.
- The lack of sampling is a big problem
- With loss of eelgrass, studies show mass transport of sediments in Willapa Bay
- Ecology has stated the imazamox is diluted by tidal exchange, but there is not tidal exchange a foot down in the sediment. Ecology is misleading the public in thinking that it is being diluted by tidal flow.
- Z. japonica rhizomes grow 10 inches deep.
- Ecology can't put out false information, or ignore comments.
- Ecology relies a lot on WDFW to tell you about this, and they don't.

Marlisa Williams Dugan, local resident

- Concerns about why we are allowed to use quantities of imazamox in Willapa Bay when they are not allowed to use it elsewhere, or in Puget Sound.
- Concerns about the designation of Zostera japonica as invasive, and whether it should continue to be sprayed with the loss of native eelgrass and habitat.
- We no longer we have the amount of eelgrass needed to support fish.
- We should not be spraying at all.
- Previous studies are suspect, old, and not done properly.
- Concerned about residual herbicide in the mud, which the ducks eat and affects the health of eelgrass.
- Killing the invasive eelgrass is also killing the native eelgrass
- Concerned about the acreage of eelgrass killed under this permit
- The spraying should not be allowed without better monitoring and better information about the life sustaining properties of Zostera japonica.
- No spraying, no permit

Marilyn Sheldon, Northern Oyster Company

- I support the reissuance of this permit, and changes made to the draft permit
- Supports the revised treatment window
- Concerns about proposed permit language related to monitoring and public notification
- It is important to remember that Zostera japonica is a Class C noxious weed, and has proven to cause economic harm to commercial clam farms.
- Concerned that Z japonica may be harboring newly invasive pest species.
- The permit is a vital control tool.

Lee First, Twin Harbors Waterkeeper

- Concerned about permit compliance information available in PARIS. Ecology has not inspected or taken enforcement actions against permit holders. Why does the PARIS database show reporting violations for all the permit holders.
- Ecology should require more transparency and accountability so the public can state up to date about permit compliance, and Ecology can determine if the permit is effective.
- There is no accountability to the public or Ecology to ensure that the permit requirements are being met. Photos and other documentation should be submitted to Ecology and available on the PARIS website.
- Advanced notice of any herbicide application should be available to the public, and published two weeks in advance.
- The permit requirements to protect the environment don't go far enough. They need to be strengthened.