WASHINGTON STATE RECREATION AND CONSERVATION OFFICE
Washington Invasive Species Council

Meeting Agenda
Washington Invasive Species Council

June 15, 2023
Hybrid Meeting

This meeting is being held in-person and virtually.

Physical Location: Room 172, Natural Resources Building, 1111 Washington Street SE, WA 98501. Facility information and visitor parking.

Online Participation: If you wish to participate online, please click the link below to register and follow the instructions in advance of the meeting. You will be emailed specific instructions upon registering. Technical support for the meeting will be provided by the Recreation and Conservation Office (RCO) board liaison, Julia McNamara, who can be reached at Julia.McNamara@rco.wa.gov.

Online Registration Link:
https://us06web.zoom.us/webinar/register/WN_oA18gN6CR2SHzUfqPxZHkw

Phone Option: You may also access the webinar using a phone only. This can be completed by calling (669) 900-6833 at or shortly before the start of meeting. You will then be prompted for a meeting ID. The meeting ID is 861 6056 0536.

Time: Opening session will begin as shown; all other times are approximate.

Public Comment: General public comment is encouraged to be submitted in advance to the meeting in written form. If you wish to comment, you may e-mail your request or written comments to Julia.McNamara@rco.wa.gov.

COVID Precautions: Masks and hand sanitizer will be made available.

Special Accommodations: People with disabilities needing an accommodation to participate in RCO public meetings are invited to contact Leslie Frank by phone (360) 789-7889 or e-mail Leslie.Frank@rco.wa.gov. Accommodation requests should be received by June 1, 2023, to ensure availability.

Thursday, June 15

OPENING AND WELCOME

9:00 a.m.	**Welcome and Call to Order** • Hybrid Meeting Ground Rules • Roll Call and Determination of Quorum • Review and Approval of Agenda (***Decision***) • Approval of March 2023 Minutes (***Decision***)	*Chair Blain Reeves, Julia McNamara*

HOT TOPIC AND STAFF REPORTS

9:10 a.m.	**1. Council Staff Report**	*Justin Bush,*
9:40 a.m.	**2. A NiMiiPuu Perspective and Nez Perce Tribe Aquatic Invasive Species Program**	*Anthony Capetillo*

10:10 a.m.	**3. Update on the National Invasive Species Council and Invasive Species Advisory Committee**	*Member Lizbeth Seebacher, Dr. Stas Burgiel*
10:40 a.m.	**4. Washington State Northern Pike Response Plan**	*Jesse Schultz, Dr. Erika Rubenson*

DISCUSSIONS, DECISIONS, AND UPDATES

11:10 a.m.	**Break**	
11:20 a.m.	**5. OsHV-1 Update and Safeguard Our Shellfish Campaign**	*Nam Siu*
11:40 a.m.	**6. Recognition of Justin Bush and Next Steps for the Washington Invasive Species Council**	*Chair Blain Reeves, Brock Milliern, All*
12:00 a.m.	**Lunch**	
1:00 p.m.	**7. Watercraft Inspections and Invasive Mussel Interceptions Update**	*Captain Eric Anderson*
1:20 p.m.	**8. The Mission of Trout Unlimited and Membership on the Washington Invasive Species Council** • Review and discuss request to join Washington Invasive Species Council • Council decision on member appointment (***Decision***)	*Chair Blain Reeves, Alexei Calambokidis*
1:40 p.m.	**Break**	
1:50 p.m.	**9. European Green Crab Update and State Fiscal Year 2023 Funding**	*Member Allen Pleus*
2:10 p.m.	**10. Spotted Lanternfly Action Plan Update and Invasive Pest Interagency Work Group Concept**	*Jessica La Belle*
2:30 p.m.	**11. Future Meeting Planning Roundtable Discussion** • September 28, 2023, Meeting Topics	*Chair Blain Reeves*
2:50 p.m.	**General Public Comment** *Please limit comment to three minutes*	
3:00 p.m.	**ADJOURN**	

Next regular meeting: September 28, 2023, Room 172, Natural Resources Building, 1111 Washington St SE, Olympia, WA 98501.

WASHINGTON INVASIVE SPECIES COUNCIL MEETING MINUTES

March 23, 2023

Natural Resources Building, Room 172, 1111 Washington Street SE, Olympia, WA, 98501

Invasive Species Council Members Present:

Blaine Reeves, Chair	Washington Department of Natural Resources
Todd Murray, Vice Chair	Washington State University
Joe Maroney, Past Chair	Kalispel Tribe of Indians
Marcie Clement	Avista Utilities
Adam Fyall	Benton County
Steve Burke	King County
Stacy Horton	Northwest Power and Conservation Council
Todd Hass, Ph.D.	Puget Sound Partnership
LCDR[1] Alex Mostrom	United States Coast Guard
Branch Chief Roy Hamblin	United States Customs and Border Protection
Yolanda Inguanzo	United States Department of Agriculture
Heidi McMaster	United States Department of the Interior
Carrie Cook-Tabor	United States Fish and Wildlife Service
Karen Ripley	United States Forest Service
Brad White, Ph.D.	Washington State Department of Agriculture
Shawn Ultican	Washington State Department of Ecology
Allen Pleus	Washington State Department of Fish and Wildlife
Ray Willard	Washington State Department of Transportation
Mary Fee	Washington State Noxious Weed Control Board
Andrea Thorpe, Ph.D.	Washington State Parks and Recreation Commission

Guests & Alternates:

Regan McNatt	United States Fish and Wildlife Service (Alternate)
Sven-Erik Spichiger	Washington State Department of Agriculture (Alternate)
Caleb Maki	Washington Department of Natural Resources
Celeste Williams	Just Language
Tova Tillinghast	Underwood Conservation District
Jesse Schultz	Washington State Department of Fish and Wildlife
Katie Buckley, Ph.D.	Washington State Department of Agriculture

Recreation and Conservation Office Staff:

Justin Bush	Executive Coordinator
Julia McNamara	Board Liaison
Maria Marlin	Outreach and Education Specialist

[1] LCDR – Lieutenant Commander

Jessica La Belle	Invasive Species Program Specialist
Megan Montgomery	Board and Administrative Assistant

Welcome and Call to Order

Chair Blain Reeves called the Washington Invasive Species Council (WISC) meeting to order at 9:00 a.m. before inviting **Julia McNamara**, Recreation and Conservation Office (RCO) Board Liaison, to provide an overview of the meeting ground rules. Ms. McNamara introduced **Megan Montgomery**, the new Board and Policy Administrative Assistant at the Recreation and Conservation Office and then performed a roll call, determining quorum.

Motion: Approval of March 23, 2023, Agenda
Moved by: Member Allen Pleus
Seconded by: Member Karen Ripley
Decision: Approved

Motion: Approval of December 7, 2022, Meeting Minutes
Moved by: Member Ray Willard
Seconded by: Member Mary Fee
Decision: Approved as amended

Member Pleus noted that on page 6 where it reads "overall departmental allocation of $88 million" an amendment needs to be made so that it reads "$8.6 million" instead. **Member Fee** seconded this amendment.

Item 1: Council Staff Report and New Staff Introductions

Justin Bush, WISC Executive Coordinator, reported that during invasive species awareness week council planned and held a series of six educational, news, and social media events. Mr. Bush highlighted three webinars: Safeguard our Shellfish, African Clawed Frog, and an introduction to the new Aquatic Invasive Species detection dog. **Member Pleus** pointed out that Puddles, Fin's predecessor, and his handler, Sargent Pam Taylor, both retired at the end of last year. The council discussed these retirements and directed staff to honor Puddles' and Sargent Taylor's contribution and dedication to invasive species management.

There were six other events hosted by council staff in the last quarter, including a Clean, Drain, Dry, Dispose (CD3) unit displayed at the Seattle Boat Show and a teacher workshop on March 7th in partnership with the Pacific Education Institute, which taught

middle school teachers to use the council's lesson plans on impacts and prevention of invasive species.

Mr. Bush shared that the council staff developed a communications network to share invasive species messaging across departments. The council sponsored a National Invasive Species Awareness Week collaborative national webinar addressing feral swine/wild pigs. Additionally, the council is working with the United States Department of Agriculture's National Feral Swine Damage Management Program and a graphic designer, to create new graphics for the Squeal on Pigs! campaign in multiple languages.

Mr. Bush shared upcoming events including a 2023 Invasive Species Workshop and Webinars for Tribal Audiences on March 28th and 30th with follow up weekly webinars beginning in April, a Coastal Invasive Species and Exotic Pest Workshop on April 6th, and a virtual Invasive Snail and Slug workshop on April 27th where Member Inguanzo will present.

Overall social media engagement is up, and Mr. Bush credited Maria Marlin for her work creating posts, and increasing reach by 12.4 percent on Facebook. The two most popular posts were about the 12th Annual Invasive Species and Exotic Pest workshop and Safeguard our Shellfish workshop. He noted that during Invasive Species Awareness Week alone, they were able to reach over 40,000 people through Facebook. Mr. Bush highlighted a Twitter post of Past Chair Maroney and new Chair Reeves together before moving onto his Instagram update that indicates engagement is up there, and the council page has almost 3,000 followers.

Mr. Bush summarized the invasive species sighting reports made using the council's website and app. There was a total of 265 reports made last quarter, the majority of which were for insects and terrestrial plants. Mr. Bush anticipates amphibian reports to increase over the next quarter. He noted that the public is continuing to report Tree-of-Heaven locations and that the Washington State Department of Agriculture is compiling data across all platforms that will inform the Spotted Lantern Fly Action Plan that will likely be discussed at the next meeting.

As a final note in his report, Mr. Bush spoke about the last remaining member of the original council that was developed in 2006, Dr. Clinton Campbell, stepping down from his role on the council and **Member Yolanda Inguanzo** will fill his seat representing the United States Department of Agriculture.

Item 2: Washington Department of Natural Resources Committee on Geographic Names

Caleb Maki, Executive Secretary, for the Washington Committee on Geographic Names at the Washington Department of Natural Resources (DNR), described the state and federal process of naming and renaming geographic places as an example process of what the council could use when naming species in an equitable way. The United States Board on Geographic Names (BGN) standardizes names throughout the country, is responsible for keeping these names in the Geographic Names Information System (GNIS) database. Names must not be derogatory, cannot be commercial enterprises, and commemorate the deceased before five years after departure. Additionally, names are encouraged to be short and not include a possessive apostrophe.

The first step in Washington's renaming process is initial consideration which allows the Committee on Geographical Names (CGN) to decide which of the proposed names will move forward for staff to do follow-up research and outreach on. Outreach includes collecting comments from local communities, tribal nations, and other groups. If the name is approved by CGN, it moves to the second phase and the Washington State Board on Geographic Names as part of the Washington State Natural Resources Board. If the board approves of the name, then it is official in the state of Washington. The committee then sends the changed names onto the US BGN names for a similar approval process.

Member Pleus asked how the DNR assesses name changes when the interest to a tribal nation. Mr. Maki clarified that if a feature is entirely on a federally recognized reservation, then choosing the name is deferred to that tribe. If the feature is in their usual and accustomed areas outside of the reservation, then they are consulted. Tribes are welcome to bring changes to the committee.

Chair Reeves asked where the effort behind renaming "sq__" and other offensive names originated. Mr. Maki shared that was part of the US BGN Order Number 3404 which declared "sq__" a derogatory word and implemented procedures to remove the term from federal use. In Washington, these places were primarily renamed by the tribes.

The council discussed names and name changes, including administrative feature name changes such as the renaming of Priest Point Park to Squaxin Park and the intentionally named "No Name" creek, which is not a place holder for a geographic feature without a name. The council also discussed what constitutes a derogatory name, and Mr. Maki explained that the US BGN is the standard, where intent to cause harm is considered derogatory.

Member Ripley asked if an archive is kept of the history of a geographic feature's names and the reasoning of name changes. Mr. Maki shared that there is an archive kept, and part of the form requests to know why the name is being changed. He noted that if a name is changed because it was derogatory that original name is kept as a variant for historical purposes but is not the "primary" name on that feature. Commemorative feature names can be changed if it is determined the person it is named after has engaged in derogatory behavior.

Item 3: Reexamining the Language of Invasive Species through the Intersection of Science, History, Social Justice, and Theater

Celeste Mari Williams, playwright, and television animation professional with a Master of Science degree in Biology, discussed the Just Language Project, a grass-roots organization that strives to create language that is holistic, non-polarizing, and culturally sensitive to historically underrepresented and excluded communities. She uses theater as a tool of inquiring and engagement to foster empathy and emotional connection for all species: human, plant, and animal. Words have the power to incite xenophobia, racism, and negative perceptions, and through entertaining arts, people of all backgrounds can witness underrepresented perspectives of demonizing language. Additionally, militaristic language to address invasive animals, plants, and pathogens with names that include the country of origin can have negative implications, for example pairing Asian, Chinese, Japanese, African, or Mexican with enemy, evil, menace, or foreign.

Ms. Williams provided historical context of "Asian invasion" rhetoric, using historical examples from Chinese and Japanese immigrants. Chinese immigrants arrived during the Gold Rush in the mid-nineteenth century, often being imported as low-paid laborers to build the Transcontinental Railroad. They were scapegoated as carriers of disease, blamed for stealing jobs, and lived in subhuman conditions for low wages. Congress and the Supreme Court used invasion rhetoric and fearmongering to justify the Chinese Exclusion Act of 1882. The act was the first to target a specific nationality, suspended all Chinese immigration for ten years and barred any Chinese person from becoming a citizen. Immigrants from Japan faced similar prejudices. She explained that the Japanese Beetle was used to demonize Japanese immigrants as public health threats, particularly with the rise of Japanese agriculturalists in America. This fueled anti-immigration laws such as the 1924 Immigration Act, which banned immigration from all Asian countries. In 1942 President Franklin D. Roosevelt signed Executive Order 9066 which forced

Americans of Japanese ancestry into concentration camps where members of Ms. Williams' family were interned across the country during this time.

Ms. Williams noted that perceptions of unwelcome insects from Asia parallel historical dehumanization of undesirable human communities referred to as pests and vermin, and spurred fear. As part of a graduate school thesis, Ms. Williams wrote a play called *Queens of Insect Purgatory* which gives voice and perspective to the Northern giant hornets and other invasive insects. This was intended as a creative tool to foster engagement in critical thinking and create awareness, empathy, and connection to the impacts of demonizing language in a broader social justice context. Ms. Williams believes that outdated names should be changed while critically examining the historical language and social contexts to create alternative language to describe invasive species that is holistic, non-polarizing, culturally sensitive, and inclusive.

The council discussed the importance of addressing non-inclusive language to be successful in its mission and agreed that names should be used for educational purposes to engage the public with the organism rather than the country of origin or a derogatory word (e.g.: using physical descriptions in the name). It was clarified that the country of origin can be seen positively or negatively depending on the context. For example, Japanese cherry blossoms are beautiful and welcomed in the spring, while Asian giant hornet or murder hornet aligns with a negative connotation. The council further discussed the importance of process and statewide harmony when a new name is adopted on a local level. For noxious weeds, anyone can propose a name change which goes to the State Noxious Weed Control Board for evaluation to be adopted in a public hearing. **Alternate Member Sven-Erik Spichiger**, State Entomologist for the Washington State Department of Agriculture, commented that the process of renaming needs to be streamlined to reduce confusion, citing months of delay between removing "Gy____" moth and announcing spongy moth.

Item 4: Discussion on the Role of the Washington Invasive Species Council and the Language and Ideas of Invasive Species

Justin Bush discussed the council's role in name changes before facilitating questions and conversation among members. He began by asking if a leadership role on invasive species language should be filled by the council.

During discussion, there was overall agreement that this role could be filled by the council. What that role specifically looks like varied from being responsible for developing parameters and guidance for naming/renaming species, deciding what

should be renamed and renaming them, providing the public with information on how to name species to eliminate use of derogatory names and a place for them to suggest name changes. It was noted that there are many biological societies, such as the Entomological Society of America, that have a formal naming process, in which this discussion is currently happening.

At the request of **Chair Reeves**, Mr. Bush moved on to the next question, acknowledging that some naming conventions already exist in state statutes. What organizations have authority of common names at the state scale?

Member Fee stated that the Washington Noxious Weed Board has common names in their Noxious Weed list, however it is her understanding that the board has authority over scientific names, but she does not believe that extends to common names, which are easier to change. **Member Cook-Tabor** suggested a subcommittee of council members to create a list of existing organizations and societies to help inform an action plan to address language so that naming issues do not continue to repeat.

The council discussed the instance of some people thinking a name is acceptable, and others think it is not, how would the council address that? How do we consult others to determine what is and is not acceptable? The council discussed options, including a survey of community organizations.

Continuing the discussion, members noted the impacts of time and historical perspective has on naming, phasing out militaristic language, the need to raise awareness of negative connotations surround place of origin, and suggested that the council advise on the best practices.

Vice Chair Murray pointed out that the council is in a unique position with diverse membership to help inform other organizations consistently.

Member Thorpe left the room at 10:58, Member Pleus and Member Ultican left at 11:00, Member Horton left at 11:03 – all returned at 11:05.

Item 5: Bingen/White Salmon Tree-of-Heaven Control Pilot Project

Tova Tillinghast, District Director with the Underwood Conservation District, updated the council on tree-of-heaven control work being done in Bingen and White Salmon, noting that Tree-of-Heaven has a dense distribution in Klickitat and Skamania Counties. In these areas there is overlap of spotted lanternfly suitability and tree-of-heaven distribution. This is of notable geographical significance, as there is heavy traffic of cargo ships travelling upstream on the Columbia River toward agricultural lands.

Public outreach was a priority, including tree-of-heaven identification, control methods, and reporting avenues. Outreach included attending city council meetings, online workshops, YouTube videos, signage, and flyers. Local students were educated and in turn provided presentations to fellow students, city councils, the rotary club, parents and neighbors, and a website, www.ucdwa.org/current-news/tree-of-heaven-control-project.

Underwood Conservation District worked with 26 private landowners to educate them on the proper way to remove Tree of Heaven and treated 1,180 trees, plus 400 trees in public land spaces. Foliar spray and "hack and squirt" methods were used, and the group is still assessing the effectiveness of these methods. Signage was added to treatment sites for public education. Treated areas will continue to be monitored through the spring and replanted with native species once Tree of Heave has successfully been removed.

Ongoing challenges include having few licensed herbicide applicators in the area, barriers to the general public to update and report, and one unhappy landowner which highlighted the importance of thorough communication, permission, and waivers.

The enthusiasm of the community, increased understanding on why removal of Tree of Heaven matters, impressive control work, and better understanding of effective control methods were all highlighted successes.

Vice Chair Murray commented that this sort of program could help address other problem species, like the brown marmorated stink bug, which originates from the same geographic location as the spotted lanternfly.

Member Anderson asked if they encountered any concerned landowners that were opposed to herbicide treatment, and how that was handled. Ms. Tillinghast explained that through education and conversation even the most hesitant landowners came around to using the "hack and squirt" method to help control this species.

Lunch: 11:40 AM – 12:31 PM

Item 6: Washington State Department of Fish and Wildlife Invasive Species Management Protocols

Jesse Schultz, Lead Prevention Biologist for the Aquatic Species Unit, spoke to the council about the invasive species prevention protocols of the Washington State Department of Fish and Wildlife (WDFW). WDFW is the lead regulatory agency for managing invasive species of the animal kingdom statewide, with an emphasis in Aquatic Invasive Species (AIS). WDFW Policy and Procedure 5310 provides direction and

authority for preventing invasive species spread and created a committee to develop Invasive Species Management Protocols (ISMP) that set the standards for operating procedures and thresholds for decontamination. In September 2022 Version 4 was finalized, which is a living document that changes with the best science available.

These protocols can be broken down into two levels of contamination. Level one decontamination is intended to be simple, feasible, and automatic and is the standard practice between sites to reduce the risk of spreading AIS (clean, drain, dry). Level two decontamination is for all situations involving prohibited species to eradicate AIS (hot water treatment, chemical methods, freezing).

There are a variety of AIS in Washington, however, New Zealand mud snails are what inspired the latest reassessment as they are a significant risk with their small size, varied locations, and undetermined vectors and pathways for establishment.

ISMP implementation is done through education and training both internally and externally. Mr. Schultz noted two upcoming Washington State Department of Transportation integrated roadside vegetation management spring trainings, on April 25th in Leavenworth, and May 3rd in the Olympia/Shelton area. There will be an overview of ISMP and general information on AIS. Additionally, WDFW staff are undergoing internal training and developing an ISMP certification course, which would be an online course with in-person training for level two decontamination methods.

WDFW is also providing outreach to the public to empower boaters on how to use the Clean Drain Dry Dispose (CD3) power stations to reduce the risk of spreading AIS. The CD3s, currently unavailable at all launches, are a critical resource for boaters. There are four different types of CD3 units ranging from roadside or outpost units to stationary units to mobile trailer units. The mobile unit is available to the public on request. WDFW staff deliver them with training videos for proper use. WDFW will be installing three to six more CD3 units across the state.

The council noted that a high number of aquatic weeds are removed by the CD3 units. The council can support this work by providing information to their agencies about these protocols. **Member Pleus** thanked the Bureau of Reclamation in assisting the purchase of the original CD3s.

Item 7: Pollinator Task Force Recommendations and Update on Implementation

Dr. Katie Buckley, Washington State Department of Agriculture (WSDA), updated the council on the Recommendations of the Pollinator Health Task Force (PHTF) for

Pollinator Health in Washington report to legislature that was published and submitted to legislature in November 2020, and included around 40 recommendations. This report led to Pollinator Bill – Senate Bill (SB) 5253, which implemented around 30 of those 40 recommendations and was passed unanimously with full funding. An implementation plan for SB 5253 and a report on the risk of neonicotinoid pesticides to pollinators were due to legislature in December 2021.

SB 5253 continued the PHTF until at least 2024, made it illegal to use non-native bumble bees for open field agriculture (RCW 17.24.081), and made it so that all public works projects that include landscaping must have at least 25 percent of that landscape be pollinator habitat when feasible. This bill also established a Washington State University (WSU) pollinator extension and outreach program complete with a fully funded position that has been filled by Kelly Kulhanek in June 2022.

Dr. Buckley informed the council of the eastern bumble bee which is now invasive to the Seattle area and spreading. The western bumble bee was just listed as a candidate species in Washington as endangered, threatened, or sensitive by WDFW and a federal Endangered Species Act listing may soon follow. These non-native species compete with native bees and spread diseases.

SB 5253 mandated that the WSDA pesticide management division must continue to update pollinator protection training, include pollinator protection in drift reduction training, support WSU pesticide education programs, coordinate with Dr. Buckley and WSU on pesticide investigations and share findings, update the penalty matrix, provide credits for pesticide courses focused on pollinator protection measures, and write a report on neonicotinoid pesticides and treated seeds with recommendations to mitigate risks to pollinators by the end of 2021. Many of these items are completed and implemented. WDFW began work on updating their riparian habitat recommendations to encourage the development of pollinator habitat. The Washington State Conservation Commission's Sustainable Farm and Fields grant program implemented prioritizing grant applications that concurrently create or maintain pollinator habitat.

There are two teams from WSDA and WSU that are putting together all known bee species data from Washington state by digitizing WSU's collection and retrieving data from other digitized collections (museums, USDA, private collections). The goal of this work is to create lists of known species, areas that have been under sampled, and bee taxa that have been under sampled or under studied. This work will contribute to the Washington Bee Atlas that will be published later this year. Dr. Buckley is working with the creators of the Oregon Bee Atlas to use as a template for a Washington version.

WSDA is putting together a report on how noxious weeds and pollinators interact with each other to provide better guidelines on timing of control to support pollinators if they rely on that plant as a food source. Additionally, WSDA completed one part of their education through plant nurseries. Feedback from nurseries indicated that they are interested in a pollinator feed course.

Dr. Buckley showed examples of pollinator postcards, brochures, and handouts. She shared that the WSDA Pollinator website is being updated. She ended her presentation with examples of native plants for pollinators and hopes that this information will be more widely available through the completion of the Washington Bee Atlas.

Chair Reeves asked Dr. Buckley to elaborate on the effect of neonicotinoids. She explained that they are chronic toxins to pollinators, which may cause behavioral effects, rather than instant death. This non-acute toxicity is hard to clearly determine whether it is having an effect. **Member Burke** asked what the primary concern of neonicotinoids is, and Dr. Buckley clarified that deciding what is and is not toxic to bees is the concern. She noted that the application needs to be done before the plant flowers, or directly after flowering before it sets seed.

Break 1:15 PM to 1:30 PM

Item 8: Preventing the Introduction of International and Domestic Pests – Focused Group Discussion

The state of Oregon has created the "Don't Move a Pest" white paper which was funded by the 2019 Plant Protection Act and summarizes, acknowledges, and strategizes the risks and pathways of invasive pests into Oregon. In her presentation, **Maria Marlin**, WISC Community Outreach and Environmental Education Specialist, discussed this paper that identifies four pathways of introduction into Washington: household and temporary relocation into the state, travel and events, commercial movement of goods, and commercial agriculture and nursery. Ms. Marlin further summarized the current mitigation efforts, the recommended four-step process to behavior change, and phases and strategies for outreach, which can be found in more detail in the white paper included in the materials for this meeting.

The WISC has adopted a national campaign called "Don't Pack a Pest", which focuses on international travel. However, it does not currently include educational material for domestic travelers. Ms. Marlin asked the council to discuss how best to shape future efforts to address this gap, applying what was learned from the Oregon white paper.

The council agreed that a gap does exist with a general unawareness by the public. Discussions with Kitsap Bangor Naval Base to educate the people transporting and operating equipment indicate notable gaps in information. The council acknowledged that the public is often unaware how normal activities impact movement of invasive species, and there is room to expand education here in Washington and that highways and household moves are some of the greatest vectors.

Member Hamblin commented that the national "Don't Pack a Pest" campaign has been adopted by several states and municipalities and suggested manipulating the current program into a domestic side-program.

Ms. Marlin asked the council whether they should continue to explore this topic and develop interagency resources, and if not, which organization they feel should take the lead. Opinions varied from the council taking the lead, to utilizing existing efforts (like the Pacific Northwest Economic Region (PNWR)) because neighboring states share these issues, to recognizing the responsibility each agency has and already does in addressing this issue and have the council keep track of those efforts.

Chair Reeves addressed the council's role of thinking broadly about invasive species. He asked the council to consider whether a domestic movement campaign should remain broad in scope or provide more focused information (i.e., should the campaign include information on noxious weeds and aquatic animals, or keep it specific to invasive insects). **Member Fee** believes the role should remain broad, citing that each agency is addressing specific species and suggested information be included on the package provided by the post office when you move. This prompted discussion about a general moving checklist that anyone could use. **Member Ultican** noted the challenge there is in educating the public before they move into Washington, which needs to be addressed on a national scale.

Other recommendations for where educational information could be shared included private and commercial movers, RV parks, safety rest areas, highway signage like existing AIS regulatory signs, and targeted campaigns towards organizations that are moving people into Washington (the military, college campuses, and large companies), noting that people are willing to do the right thing when they are informed.

The council discussed the geographic scale that would be most relevant to the target audience. **Member Ripley** appreciates the shared work done by the partners in PNWR but would like to see individual information from each jurisdiction. **Member Fee** commented that the public tends to get overwhelmed when information is too broad

and supports something at the state level. **Member Pleus** supports starting local to develop a standard checklist for people coming to Washington and emphasized the importance of each agency being responsible for sharing information.

Member Fyall left the online meeting at 2:02 pm.

Item 9: Council Staffing Review and Recommendations

In response to the council's request to develop a staffing plan to build and maintain current capacity **Chair Reeves**, along with **Vice Chair Murray** met with **Justin Bush** and executive leadership from the Recreation and Conservation office. **Mr. Bush** shared that since this direction, RCO has hired two new staff members and reiterate statutory language that the council will be staffed by RCO and WISC. Initial discussions between RCO and WISC leadership indicate the need to determine gaps and resource needs, document short- and long-term actions, and develop strategies for securing short- and long-term funding. **Chair Reeves** mentioned that leadership at RCO is supportive of developing and fulfilling these recommendations, noting that additional resources will help to make staff more sustainable in the long run. The recommendations will be discussed further at future meetings.

Item 10: Washington Invasive Species Council By-Laws

Chair Reeves invited **Justin Bush** to speak to the council about the new by-laws that were drafted in the fall of 2022 and reviewed and discussed by the council between then and now. Mr. Bush emphasized the importance of council members having a firm understanding of their role and purpose of the council and reminded the council of the discussions that happened and changes that were made during the review process.

The Executive Committee will meet between council meetings and comprised of the Chair, Vice Chair, and Past Chair along with three additional seats, which many state agencies have held over the years. **Past Chair Maroney** asked if Brock Milliern or Director Megan Duffy had input on how these bylaws are put together for other boards, and Mr. Bush shared that they are supportive of these bylaws. He then informed the council that there will need to be three nominations for the remaining seats on the Executive Committee, and **Chair Reeves** asked for nominations.

Motion:	Move to approve the accepted nominations of Member Fee, Member White, and Member Willard as members of the Washington Invasive Species Council's executive committee as of March 23, 2023. These folks will serve until March 23, 2027, before reappointment by the council, or replacement by another member, or retirement.
Moved By:	Member Thorpe
Seconded By:	Member Ripley
Decision:	Approved

Motion:	Move to adopt the by-laws as amended by Member Pleus and Seconded by Member Fee.
Moved By:	Member Thorpe
Seconded By:	Member Ripley
Decision:	Approved with proposed edits

Member Pleus pointed the disconnect of language between the use of "WISC" and "council" throughout the document. Additionally, under the Staff Support, Host and Administration section, in the third paragraph, the designation in the following is unclear to him: *execute the duties and achieve the goals of the council meetings and between meeting the council delegates authority to the Executive Coordinator to speak on its behalf*. Member Pleus would like to clarify the terms of the delegation and noted that the by-laws need to be blind to personality.

Chair Reeves recommended that the Chair, through the advice of the council, directs the Executive Coordinator to act on behalf of the council, and until that occurs the executive coordinator is not empowered to act on behalf of the council.

Member Pleus recommends two amendments: the first would be to allow council staff to amend any technical wording (e.g. clarifying the use of "*WISC*" and "*council*" throughout the document), and the second is specifically under the aforementioned section that it first removes the word "*host*" because it is not used anywhere else in the document and change it from "*the council delegates*" to "*the chair may delegate authority.*" **Chair Reeves** asked for the amendment to be seconded. Member **Fee** seconded this amendment.

Before a final vote on the motion, **Member Pleus** asked for clarification on the voting ability of the United States Customs and Border Protection member, as the language

currently excludes federal agencies. **Mr. Bush** clarified that some federal agencies are non-voting in statute, but additional federal agencies added by the council may vote unless the organization does not allow them to be a voting. U.S. Customs and Border Protection is non-voting and the clerical error in the existing language will be changed.

Member Horton left the in-person meeting at 2:29 PM.

Item 11: Future Meeting Planning Roundtable Discussion

Chair Reeves invited **Justin Bush** to discuss future meeting topics. Mr. Bush recommended that the September travel meeting be moved to June. The council discussed possible locations for the meeting. **Member Willard** offered the Department of Transportation facility as a venue in Walla Walla. **Member Thorpe** suggested a facility in Chelan that she knows to be free to public agencies. **Member McMaster** suggested Lake Roosevelt and Grand Coulee where the council could take a facilitated dam tour and both northern pike and flowering rush could be topics discussed. **Chair Reeves** directed staff to explore these possibilities and report back quickly so that arrangements could be made.

Mr. Bush then reviewed potential items for the next agenda, including recognizing Puddles' retirement, and discussing **Member Seebacher's** new role advising the National Invasive Species Council. Mr. Bush asked for additional suggestions from the council. **Member Pleus** recommended discussing the European Green Crab. **Member McMaster** suggested discussing the northern pike round up that is happening this spring, as well as a flowering rush status update. **Member Maroney** would like to spend time discussing how to recognize citizens that are combatting invasive species, and have the recognition align with next year's Invasive Species Week. **Chair Maroney** asked the council to contact Mr. Bush with other suggestions.

The next meeting will be held June 15, 2023.

General Public Comment

Paul Rudnick, from growafrog.com, asked the council to request that the Washington Fish and Wildlife Commission reconsider allowing frogs to be observed by elementary school students through the metamorphosis from tadpole to frogs, citing a decision by the commission that currently prohibits this activity. He argued that the specific frogs they use are not an invasive species and once the frogs have fully metamorphosed, they can be kept as pets, or the school is provided with breathable bags for the frogs to be returned to growafrog.com to be rehomed.

Jill Silver, executive director of 10,000 Years Institute, shared ideas for solutions to the carbon, climate, ecosystem services, forest health, and workforce conversations that have been happening at the DNR regarding Scotch broom. Ms. Silver suggested an update to the 2017 Invasive Species Economic Impact Analysis Report to include fire hazard and forest health risk data. She recommended that an aerial photography flight take place in May when Scotch broom is in full bloom for a better understanding of where it is for developing a response and offered to provide a presentation for the council for a future meeting.

Member Burke commented that widespread invasive species like Scotch broom should be considered by the council.

Chair Reeves thanked the council and guests for participating.

Adjourn 2:59 PM.

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STATE OF WASHINGTON

RECREATION AND CONSERVATION OFFICE

April 12, 2023

Rachel Dawson
Program Director, National Programs
National Fish and Wildlife Foundation
1133 Fifteenth Street NW, Suite 1100
Washington, DC 20005
Submitted via e-mail to Oregon Department of Agriculture

RE: Support for Building Capacity for Invasive Aquatic Weed Management in Oregon (Grant # 80293)

Ms. Dawson,

I am writing on behalf of the State of Washington Invasive Species Council in support of the America the Beautiful Challenge proposal submitted by the Oregon Department of Agriculture to fund the implementation of a statewide aquatic weeds management plan. The department is the state authority for the regulation and management of all noxious weeds in Oregon, including aquatic species, and the state of Oregon is in desperate need of capacity to address the myriad of threats that noxious weeds present to aquatic resources.

The Washington State Legislature established the Washington Invasive Species Council in 2006 to develop and implement a strategic approach to prevent and control invasive species that threaten Washington's environment and economy. Preventing invasive species from spreading into new areas is the most efficient and cost-effective approach to protecting the resources of our state and region. When prevention fails, invasive species are often unable to be eradicated or contained. Nationally, invasive species cost hundreds of millions in damages and losses annually.

The work within this proposal will complement efforts by tribal, federal, state, regional, and local in Oregon and beyond to manage aquatic invasive species; it will strengthen the state and regional network of expertise and protect the cultural resources, habitats, clean water, and ecosystem services that Pacific Northwestern communities depend on. Implementation of a statewide aquatic weeds management plan, and the projects therein, will provide protection to aquatic resources in neighboring states through prevention, collaborative implementation, outreach, and education.

Furthermore, the position supported by this proposal will coordinate the Columbia Basin Cooperative Weed Management Area (CWMA), which was initially developed through a 2016 agreement with the National Fish and Wildlife Foundation's Pulling Together Program. The CWMA is a multi-state and international consortium of aquatic experts from academia, tribal, state and federal government agencies that are dedicated to managing invasive weeds in the Columbia River Basin. This coordination will facilitate increased collaboration between members and stakeholders across the region and allow Oregon to participate in a way that has not been possible in the past.

In summary, the Washington Invasive Species Council strongly supports your funding of this proposal. If you have questions about our support of this project, please contact Justin Bush, executive coordinator of the Washington Invasive Species Council at justin.bush@rco.wa.gov or 360-704-0973.

Sincerely,

Blain Reeves

Blain Reeves, Chair
Washington Invasive Species Council

EasyGrantsID: 80683

National Fish and Wildlife Foundation – America the Beautiful Challenge 2023, Pre-Proposal

Title: Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West

Organization: Washington Recreation and Conservation Office

Grant Request Information

Title of Project	Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West
Project Description	The proposed project is intended to provide support for conservation and recovery of at-risk species across the West by supporting managers in addressing the threat posed by invasive frogs, including American bullfrogs, African clawed frogs, Cuban tree frogs and others. This work will build on the foundations of two successful partnerships–the Collaborative Conservation and Adaptation Strategy Toolbox and the American Bullfrog Action Team–to address priorities identified by the hundreds of federal, state, and local agency, Tribal, non-governmental, and private participants in these groups: communication, capacity-building, and development of a vision ("action plan") to address invasive frogs. This project will achieve these goals through 1) a west-wide invasive frog summit, 2) in-person field training and workshops, and 3) development of a Western Invasive Frog Action Plan.
Abstract	Non-native frogs in western North America threaten remaining native amphibian populations and can preclude successful repatriation of native species. They compete for resources, but more importantly, species such as American bullfrogs (Rana catesbeiana) and African clawed frogs (Xenopus laevis) readily prey on a wide range of native species, from frogs to birds. Non-native frogs can introduce diseases such as ranavirus infection and chytridiomycosis, which more acutely affect native frog species. While often desired and prioritized in management and recovery plans, controlling invasive frogs is a daunting task. However, a handful of success stories demonstrate that control is possible and benefits native at-risk and federally listed species. Successful strategies and techniques need to be shared in order to increase the foundational knowledge and capacity of resource managers to effectively manage invasive frogs. This project will build upon and merge the foundations and momentum of existing partnerships to provide federal, state, and local agencies, Tribes, and non-governmental and private organizations in the West with the tools to address invasive frogs where they threaten at-risk and listed amphibians and more. This goal will be achieved through 1) a west-wide invasive frog summit, 2) in-person field training and workshops, and 3) development of a Western Invasive Frog Action Plan.
Project Location Description	West-wide–federal, state, Tribal, and private lands with invasive frogs. We anticipate engagement in in-person workshops in Washington, Arizona, New Mexico, California, Montana, and Utah, and participation in all western U.S. states and several international geographies in the summit and workshops.

EasyGrantsID: 80683

National Fish and Wildlife Foundation – America the Beautiful Challenge 2023, Pre-Proposal

Title: Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West

Organization: Washington Recreation and Conservation Office

Total Amount Requested	$266,334.00
Matching Contributions Proposed	$148,612.44
Proposed Grant Period	01/01/2024 - 12/31/2026
Organization	Washington Recreation and Conservation Office
Organization Type	State or Local Government
City, State, Country	Olympia,Washington,North America - United States
Primary Contact	Justin Bush
Position/Title	Executive Coordinator
Phone and E-mail	13607040973 Ext: ; justin.bush@rco.wa.gov

Additional Contacts

Role	Name
Principal	Maria Marlin

Matching Contributions

Matching Contribution Amount:	$6,753.24
Type:	Cash
Status:	Pledged
Source:	Washington Recreation and Conservation Office
Source Type:	Non-Federal
Description:	108 hours salary and benefits program manager (Washington Invasive Species Council Executive Coordinator) $48.10/hour X 108 hours + benefits 30% of salary.

Matching Contribution Amount:	$14,000.00
Type:	In-kind
Status:	Pledged
Source:	Washington Department of Fish and Wildlife
Source Type:	Non-Federal
Description:	See attached letter of support -- pledged staff support and coordination, volunteers, workshop materials development, site tours, and presentations.

Matching Contribution Amount:	$82,195.20
Type:	In-kind
Status:	Pledged
Source:	Workshop Attendee In-Kind Contributions
Source Type:	Non-Federal
Description:	28.54 (federally accepted volunteer rate) X (8 hours X 3 days) X 20 attendees per workshop X 6 workshops

Matching Contribution Amount:	$45,664.00
Type:	In-kind
Status:	Pledged
Source:	Summit Attendee In-Kind Contributions
Source Type:	Non-Federal

Description:	28.54 (federally accepted volunteer rate) X (8 hours X 2 days) X 100 attendees

Total Amount of Matching Contributions:	$148,612.44

The following pages contain the uploaded documents, in the order shown below, as provided by the applicant:

Upload Type	File Name	Uploaded By	Uploaded Date
ATBC Pre Proposal Narrative Template 2023	80683-Pre_Proposal_Narrative_Template_ATBC 2023.pdf	Bush, Justin	04/20/2023
Letters of Support	80683-Letters-of-Support.pdf	Bush, Justin	04/19/2023

The following uploads do not have the same headers and footers as the previous sections of this document in order to preserve the integrity of the actual files uploaded.

2023 America the Beautiful Challenge – Pre-Proposal Project Narrative

Instructions: Save this document on your computer and complete the narrative in the format provided. The final narrative should not exceed three (3) pages; do not delete the text provided below. Once complete, upload this document into the on-line application as instructed.

Project Type: Please select the ATBC grant category for the proposed project.
☐ - Implementation Grants
X - Planning Grants
☐ - Sentinel Landscape Grants
☐ - National Forest Grants
☐ - Private Forests, Rangeland and Farmland Grants

1. Which Program Priorities listed in the RFP will be addressed by the project?

   This proposal represents an opportunity to address America the Beautiful (AtBC) program priorities across multiple states in western North America. This project will support capacity building, promote conservation actions within existing plans and develop a new Western Invasive Frog Action Plan to advance landscape-scale conservation ultimately resulting in on-the-ground conservation action that: **benefits at-risk, fish, wildlife, and plant species** by supporting capacity-building and planning to address invasive frog threats to dozens of at-risk and listed species; **expands habitat connectivity** by increasing capacity of managers to improve habitat quality and connectivity for native amphibians and others through removal of biological barriers presented by invasive frogs; **strengthens ecosystem and community resilience** by building capacity to address invasive species that degrade ecosystem condition and impair ecosystem resilience; **engages local communities** across all levels, from federal agencies to municipalities to community-level partnerships through in-person events; **supports Tribally led conservation and restoration priorities** by addressing a threat identified as priority for several Tribal nations (e.g., Kootenai Tribe of Idaho, Lower Kootenay, Confederated Salish, Kalispel Tribe of Indians). Tribal representatives and managers will be encouraged to attend and provide their perspectives at the summit and all workshops; and **advances sentinel landscape partnership priorities** through capacity building to address American bullfrogs, a priority for eradication on military installations outside of its native range, an invasive species control priority for the Fort Huachuca Sentinel Landscape, and a threat for many other military installations (e.g., Camp Pendleton, California).

2. What are the primary project outcomes (the intended result of the project)?

   Enhanced partnerships, improved coordination, and capacity-building across western North America – enabling and empowering prevention of non-native frog establishment and removal of existing populations where they preclude native species conservation or recovery. The project will culminate in the development of a Western Invasive Frog Action Plan, a prioritization framework for future actions to address invasive frogs in the Western U.S. Strengthening our base of natural resource managers who are equipped with the knowledge and techniques needed to implement invasive frog control and monitoring programs, paired with a prioritization framework for future action, will not only increase the likelihood of securing funding for future implementation of monitoring and removal projects, but also ensure that investments in conservation result in the greatest returns for native species.

3. What are the major project activities that will lead to the outcomes provided above (actions and tasks)?

   We propose building upon the foundations provided by the Collaborative Conservation and Adaptation Strategy Toolbox (CCAST), American Bullfrog Action Team (ABAT), and previously funded AtBC grants (e.g., Easy Grants # 77319), to provide managing agencies and partners with tools to address invasive frogs. Major proposed activities: **a west-wide remote/in-person summit** to foster landscape-scale coordination, share relevant tools (including frog control program guidance currently under development) and experiences, develop an inventory of existing and desired removal programs, and

refine needs for workshops; **in-person field trainings and workshops** in at least six states to provide guidance on program development and training for invasive frog monitoring and control techniques; and the **development of a Western Invasive Frog Action Plan** to address challenges identified by summit and workshop attendees and serve as a prioritization framework for future actions to address invasive frogs in the Western U.S.

4. How will the project address established plans (e.g., management, conservation, species recovery, Indigenous Traditional Knowledge) or an identified conservation planning need?

   State Wildlife Actions plans for Arizona, New Mexico, California, Nevada, Washington, Montana, Oregon, Idaho, and Colorado mention invasive frogs as a factor limiting native species conservation or recovery. Across these states, bullfrogs are known to impact more than twenty species of Greatest Conservation Need (SGCN) in the West. These include ranid frogs (*Lithobates* and *Rana* spp.), garter snakes (*Thamnophis* spp.), several fishes (from Desert Pupfish to Coho Salmon), and even birds. This project will equip state agency managers with the knowledge, tools, and techniques required to successfully complete SWAP conservation actions that include monitoring and removal. This project would also support recovery of more than ten federally listed species, including the Endangered (emergency listed) Dixie Valley toad (*Anaxyrus williamsi*) and the Threatened Chiricahua leopard frog (*Rana chiricahuensis*) and Oregon spotted frog (*rana pretiosa*), which include bullfrog control in their recovery.

5. Who are the partners working on this project? (e.g., organizations, agencies, landowners, community groups)

   Washington Invasive Species Council, U.S. Fish and Wildlife Service, ABAT/British Columbia Ministry of Water, Land and Resource Stewardship, Washington Department of Fish and Wildlife, Colorado Fish and Wildlife Department, Montana Fish, Wildlife, and Parks, Wyoming Game and Fish Department, Arizona Game and Fish Department, New Mexico Department of Game and Fish, National Park Service, U.S. Forest Service, and Association of Fish and Wildlife Agencies.

6. Who was or will be engaged in project development and implementation? (e.g., communities, user groups, affected/impacted constituencies)

   Bullfrogs have been introduced nationwide and internationally. Federal and state agencies, Tribal nations, local governments, and universities have been working for decades in a handful of landscapes to control bullfrogs. Collaboration through CCAST's American Bullfrog Working Group has broadened stakeholder engagement, provided inspiration through case studies, and led to the co-development of tools to support bullfrog control. More than 300 individuals and dozens of organizations have actively participated. ABAT serves a similar role for the Pacific Northwest and southwestern Canada, with 40 members representing over 20 agencies, including federal, indigenous, state, provincial entities, non-governmental organizations, and research organizations. ABAT meets bi-annually to collaborate across multiple jurisdictions to achieve bullfrog management goals. Administered by the State of Washington Recreation and Conservation Office (RCO), the Washington Invasive Species Council was created by the state legislature in 2006 and is tasked with providing policy-level coordination and direction to all organizations involved with invasive species management. The council unites all organizations, including federal, state, and local agencies, Tribal nations, universities, industry, and conservation groups. Because of its broad scope and partnerships that exceed state lines, the council and administrative host are well-poised to take a leading role in this project. Since its creation in 1964, the RCO has awarded more than $2.6 billion in grants and agreements funding over 10,000 projects within Washington and beyond. Members of each of these partnerships have identified the need to improve coordination and build capacity, providing the foundation for this proposal.

7. What is the demographic information of the engaged community(ies)? Use table below (only one factor needed per community(ies)).

Community(ies)	Race/Ethnicity	Poverty Rate	Low Income %	Annualized Unemployment Rate
Spokane County, WA	White: 83.1%; Black: 2.1%; American Indian and Alaska Native: 1.9%; Asian, Native Hawaiian and other Pacific Islander: 3.2%; Hispanic or Latino: 6.6%	11.2%		6.5%
Phoenix, AZ	White: 41.4%; Black: 7.3%; American Indian and Alaska Native: 2.1%; Asian, Native Hawaiian and other Pacific Islander: 4.1% Hispanic or Latino: 42.7%	15.4%		2.9%
Albuquerque, NM	White: 37.4%; Black: 3.2%; American Indian and Alaska Native: 4.8%; Asian, Native Hawaiian and other Pacific Islander: 3.2%%; Hispanic or Latino: 49.8%	16.2%		3.4%
Oakland, CA	White: 28.6%; Black: 22.0%; American Indian and Alaska Native: 1.0%; Asian, Native Hawaiian and other Pacific Islander: 16.2% Hispanic or Latino: 27.2%	13.5%		4.20%
Missoula, MT	White: 86.7%; Black: 0.6%; American Indian and Alaska Native: 2.0%; Asian, Native Hawaiian and other Pacific Islander: 1.9% Hispanic or Latino: 4.2%	12.9%		3.0%
Summit County, UT	White: 84.4%; Black: 1.0%; American Indian and Alaska Native: 0.6%; Asian, Native Hawaiian and other Pacific Islander: 2.3% Hispanic or Latino: 10.9%	3.2%		1.9%

8. Is this project connected to another ATBC 2023 proposal? If yes, please provide the 5-digit Easygrants ID number.

   No, this project is not connected to another ATBC 2023 proposal.

9. Did you apply to any other currently open NFWF RFP with this project? If yes, please provide the 5-digit Easygrants ID number.

   No, we did not apply to any other open NFWF RFP with this project.

10. Did you include additional uploads (e.g., letters of support, photos)? If yes, please list them.

    Yes. We included 11 letters of support from federal agencies, state agencies, and non-governmental organizations.

11. Anything else we should know?

    In 2022, ARC received AtBC funding to help manage invasive species across several National Forests through community-based invasive species management. In 2022, the Borderlands Restoration Network (BRN) was also awarded an AtBC award to enhance climate and watershed adaptation strategies in the Fort Huachuca Sentinel Landscape, which included American bullfrog eradication. This project will build upon these projects and existing coordination bodies, merging networks to increase our collective capacity to prevent and manage frog invasions in support of native amphibians across western North America. This project will create a bridge to connect partners on federal, state, Tribal, and private lands across multiple states. We will coordinate efforts among projects to ensure non-duplicity and leverage capacity and partner networks.

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STATE OF WASHINGTON

RECREATION AND CONSERVATION OFFICE

April 19, 2023

The following letters of support have been provided for National Fish and Wildlife Foundation Proposal, "Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West (Easygrants # 80683)."

Matching Contributions

- Washington Department of Fish and Wildlife

Significant Partners

- New Mexico Department of Game and Fish (New Mexico)
- Arizona Game and Fish Department (Arizona)
- Montana Fish, Wildlife & Parks (Montana)
- American Bullfrog Action Team and the Ministry of Water, Land and Resource Stewardship (British Columbia, Canada)
- Yosemite National Park (California)
- Wyoming Game and Fish Department (Wyoming)
- U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office (New Mexico)
- Amphibian and Reptile Conservancy
- U.S. Fish and Wildlife Service, Pacific Region Aquatic Invasive Species Program (Idaho, Oregon, Washington, Hawaii, and other Pacific Islands)
- U.S. Fish and Wildlife Service, Conboy Lake National Wildlife Refuge (Washington)

State of Washington
DEPARTMENT OF FISH AND WILDLIFE
Mailing Address: PO Box 43200, Olympia, WA 98504-3200 · 360 902-2200 · TDD 360 902-2207
Main Office Location: Natural Resources Building, 1111 Washington Street, Olympia, WA

19 April 2023

Rachel Dawson
Program Director, National Programs
National Fish and Wildlife Foundation
1133 Fifteenth Street NW, Suite 1000
Washington, DC 20005

Submitted via email to the State of Washington Invasive Species Council

Re: Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West–Easy Grant # 80683

I am writing on behalf of Washington Department of Fish and Wildlife in support of the America the Beautiful Challenge proposal submitted by the State of Washington's Invasive Species Council to support the conservation and recovery of listed and at-risk species in western North America by addressing invasive frogs.

Invasive frogs, including but not limited to American bullfrogs (*Rana catesbeiana*), African clawed frogs (*Xenopus laevis*), and Cuban tree frogs *(Osteopilus septentrionalis*), pose a significant threat to native amphibian populations in Washington state. Non-native frogs – especially bullfrogs – are a pervasive and ongoing challenge in listed species recovery actions that our agency and partners take for Oregon spotted frog (federal threatened, state endangered), northwestern pond turtle (state endangered, federal status assessment underway), and northern leopard frog (state endangered, with at risk populations in the western U.S.). Bullfrogs are prolific breeders and highly predacious in areas where we are doing on-the-ground work in rare frog and turtle restoration, monitoring, and reintroductions. In the last ten years, WDFW has spent more than $125,000 in stopgap bullfrog detection surveys and eDNA work, all lifestage removal where we have had donations and volunteer support, and ongoing monitoring and management which has had mixed effectiveness and success. This opportunity could provide WDFW and our conservation partners with an informed community of practice, better methods, and more effective bullfrog management actions to better support our recovery actions.

The Collaborative Conservation and Adaptation Strategy Toolbox team and their Non-Native Aquatic Species Community of Practice has been facilitating information exchange across western North America on the impacts of American bullfrogs, effective monitoring and control techniques, and implementation of landscape-scale programs, since 2020. The American Bullfrog Action Team serves a similar role for the Pacific Northwest and southwestern Canada. This proposal presents an opportunity to leverage the foundations of these groups and coordination by the Washington Invasive Species Council to build invasive frog management capacity and develop a coordinated approach to address shared threats to dozens of native species across at least twelve states.

The work within this proposal will support efforts by tribal, federal, state, regional, and local organizations and agencies to manage invasive frogs by building a network of expertise. Furthermore, the development of a Western Invasive Frog Action Plan will address barriers to management and control and serve as a prioritization framework for future actions to address invasive frogs in the Western U.S.

WDFW believes this project will improve West-wide coordination and increase our capacity to prevent invasive frog establishment and remove existing populations in support of native amphibians. In addition to attending the summit and at least one regional workshop, we are committed to helping the Washington Invasive Species Council with this project, including the in-person host workshop. With details to be worked out, WDFW can provide in-kind match for knowledgeable staff support and coordination, volunteers, workshop materials development, site tours, and presentations with a value of $14,000 exclusively for this project's non-federal match requirement.

In summary, WDFW strongly supports your funding of this proposal. This grant truly presents an opportunity to benefit at-risk fish and wildlife species at a large-scale, multi-state landscape level. If you have questions about our support of this project, please contact Wendy Connally, Endangered Species Recovery Section Manager, at wendy.connally@dfw.wa.gov or (360) 902-2694.

Thank you for this opportunity,

Hannah Anderson, Wildlife Diversity Division Manager
Washington Department of Fish and Wildlife

Cc: Justin Bush, Washington Invasive Species Council
Karlee Jewell, US Fish and Wildlife Service, Science Applications
Allen Pleus, WDFW's Aquatic Invasive Species (AIS) Policy Coordinator
Jesse Schultz, WDFW AIS Lead Prevention Biologist

GOVERNOR
Michelle Lujan Grisham

DIRECTOR AND SECRETARY
TO THE COMMISSION
Michael B. Sloane

STATE OF NEW MEXICO
DEPARTMENT OF GAME & FISH

One Wildlife Way, Santa Fe, NM 87507

Tel: (505) 476-8000 | Fax: (505) 476-8180

For information call: (888) 248-6866

www.wildlife.state.nm.us

17 April 2023

Rachel Dawson
Program Director, National Programs
National Fish and Wildlife Foundation
1133 Fifteenth Street NW, Suite 1000
Washington, DC 20005
Submitted via email to the State of Washington Invasive Species Council

Re: Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West–Easy Grant # 80683

My name is Leland Pierce and I oversee the conservation of amphibians and reptiles for the state of New Mexico, under the New Mexico Department of Game and Fish. I write to you in support of the America the Beautiful Challenge proposal submitted by the State of Washington's Invasive Species Council to support the conservation and recovery of listed and at-risk species in western North America by addressing invasive frogs.

Invasive frogs, in particular American bullfrogs (*Rana catesbeiana*), pose a significant threat to native amphibian populations in New Mexico. Bullfrogs are well established here and are, in fact, so well established as invaders that they have swamped out the few native populations that were known for the extreme eastern portions of the state. Along with being known vectors for the lethal chytrid fungus, bullfrogs have proven to be direct threats through predation for various Species of Greatest Conservation Need, as identified under the current State Wildlife Action Plan for New Mexico. Such species include but are not limited to northern leopard frog, chiricahua leopard frog, and northern Mexican gartersnake.

The Collaborative Conservation and Adaptation Strategy Toolbox team and their Non-Native Aquatic Species Community of Practice has been facilitating information exchange across western North America on the impacts of American bullfrogs, effective monitoring and control techniques, and implementation of landscape-scale programs, since 2020. The American Bullfrog Action Team serves a similar role for the Pacific Northwest and southwestern Canada. This proposal presents an opportunity to leverage the foundations of these groups and coordination by the Washington Invasive Species Council to build invasive frog management capacity and develop a coordinated approach to address shared threats to dozens of native species across at least twelve states.

The work within this proposal will support efforts by tribal, federal, state, regional, and local organizations and agencies to manage invasive frogs by building a network of expertise.

Furthermore, the development of a Western Invasive Frog Action Plan will address barriers to management and control and serve as a prioritization framework for future actions to address invasive frogs in the Western U.S.

Other agencies within my state have expressed the desire to better understand how to manage the threat of bullfrogs and I feel that this project will improve West-wide coordination and increase our capacity to prevent invasive frog establishment and remove existing populations in support of native amphibians and other Species of Greatest Conservation Need. Therefore, I would be interested in helping the Washington Invasive Species Council with this project by serving as an in-person host workshop location.

In summary, I strongly support your funding of this proposal. This grant truly presents an opportunity to benefit at-risk fish and wildlife species at a large-scale, multi-state landscape level. If you have questions about our support of this project, I may be contacted at leland.pierce@dgf.nm.gov or at 505-476-8094.

Thank you for your consideration.

Sincerely

Leland J Pierce

Leland Pierce, administrator, amphibians and reptiles
New Mexico Department of Game and Fish

April 18, 2023

Rachel Dawson
Program Director, National Programs
National Fish and Wildlife Foundation
1133 Fifteenth Street NW, Suite 1000
Washington, DC 20005
Submitted via email to the State of Washington Invasive Species Council

Re: Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West–Easy Grant # 80683

I am writing on behalf of the Arizona Game and Fish Department (AZGFD), Amphibians and Reptiles Program to support enthusiastically the America the Beautiful Challenge proposal submitted by the State of Washington's Invasive Species Council to support the conservation and recovery of listed and at-risk species in western North America by addressing invasive frogs.

In Arizona, invasive frogs, especially American bullfrogs (*Rana catesbeiana*) and Rio Grande leopard frogs (*R. berlandieri*), pose a significant threat to our native amphibian and reptile populations, largely through predation, competition, and disease transmission. Our agency has been involved in several effective efforts to eliminate invasive frogs in support of recovery of federally threatened Chiricahua leopard frog (*R. chiricahuensis*) and Mexican gartersnake (*Thamnophis eques*), and federally endangered Sonoran tiger salamander (*Ambystoma mavortium stebbinsi*). Invasive species management has also contributed to conservation of Species of Greatest Conservation Need, including lowland leopard frog (*R. yavapaiensis*) and Sonoran mud turtle (*Kinosternon sonoriense*). Invasive frogs also negatively affect a variety of other native species, including invertebrates, fishes, birds, and mammals, although perhaps not as dramatically as they do native amphibians and reptiles. Therefore, landscape scale approaches to invasive species management have much more far reaching benefits.

The Collaborative Conservation and Adaptation Strategy Toolbox team and their Non-Native Aquatic Species Community of Practice has been facilitating information exchange across western North America on the impacts of American bullfrogs, effective monitoring and control techniques, and implementation of landscape-scale programs, since 2020. The American Bullfrog Action Team serves a similar role for the Pacific Northwest and southwestern Canada. This proposal presents an opportunity to leverage the foundations of these groups and coordination by the Washington Invasive Species Council to build invasive frog management capacity and develop a coordinated approach to address shared threats to dozens of native species across at least twelve states.

The work identified in this proposal will support efforts by tribal, federal, state, regional, and local organizations and agencies to manage invasive frogs by building a network of expertise. Furthermore, the development of a Western Invasive Frog Action Plan will address barriers to management and control and serve as a much-needed prioritization framework for future actions to address invasive frogs in the Western U.S. This project will undoubtedly improve West-wide coordination and increase our collective capacity to prevent invasive frog establishment, and to remove existing populations in support of native amphibians and reptiles. In addition to

attending the summit and at least one regional workshop, the AZGFD Amphibians and Reptiles Program is committed to host an in-person workshop.

In summary, the Arizona Game and Fish Department strongly urges you to fund this proposal. This grant presents an unprecedented opportunity to benefit at-risk fish and wildlife species at a large-scale, multi-state, landscape level. If you have questions about our support of this project, please do not hesitate to contact me at tjones@azgfd.gov or 623-236-7735.

Sincerely,

Thomas R. Jones, Ph.D.
Amphibians and Reptiles Program Manager

Montana Fish, Wildlife and Parks
1420 East 6th Avenue
P.O. Box 200701
Helena, MT 59620-0701
(406) 444-2535

Date: 04/15/2023

Rachel Dawson
Program Director, National Programs
National Fish and Wildlife Foundation
1133 Fifteenth Street NW, Suite 1000
Washington, DC 20005
Submitted via email to the State of Washington Invasive Species Council

Re: Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West– Easy Grant # 80683

I am writing on behalf of the Montana Department of Fish, Wildlife and Parks (MFWP) in support of the America the Beautiful Challenge proposal submitted by the State of Washington's Invasive Species Council to support the conservation and recovery of listed and at-risk species in western North America by addressing invasive frogs.

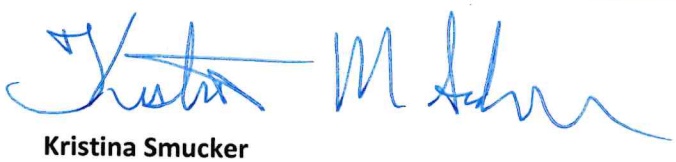
Invasive frogs, including but not limited to American bullfrogs (*Rana catesbeiana*), African clawed frogs (*Xenopus laevis*), and Cuban tree frogs *(Osteopilus septentrionalis*), pose a significant threat to native amphibian populations in Montana. Large and expanding populations of American bullfrogs in Montana pose a significant challenge to native species conservation due to their ability to outcompete and replace almost all native amphibian species in wetlands where bullfrogs are established. Amphibians are a key focus of MFWP's Nongame Program as a changing climate, ongoing drought, introduction of non-native pathogens, and habitat alterations have resulted in reduced populations and range constrictions in the past 50 years. Invasive bullfrogs are another major threat and one that is very difficult to address without substantial resources and expertise on control and eradication strategies. The proposed project would be highly valuable to our efforts to contain and reduce the spread of American bullfrogs in Montana's aquatic communities.

The Collaborative Conservation and Adaptation Strategy Toolbox team and their Non-Native Aquatic Species Community of Practice has been facilitating information exchange across western North America on the impacts of American bullfrogs, effective monitoring and control techniques, and implementation of landscape-scale programs, since 2020. The American Bullfrog Action Team serves a similar role for the Pacific Northwest and southwestern Canada. This proposal presents an opportunity to leverage the foundations of these groups and coordination by the Washington Invasive Species Council to build invasive frog management capacity and develop a coordinated approach to address shared threats to dozens of native species across at least twelve states.

The work within this proposal will support efforts by tribal, federal, state, regional, and local organizations and agencies to manage invasive frogs by building a network of expertise. Furthermore, the development of a Western Invasive Frog Action Plan will address barriers to management and control and serve as a prioritization framework for future actions to address invasive frogs in the Western U.S.

MFWP believes this project will improve West-wide coordination and increase our capacity to prevent invasive frog establishment and remove existing populations in support of native amphibians. We are eager to engage in this project through attending the summit and regional workshops.

In summary, MFWP strongly supports your funding of this proposal. This grant truly presents an opportunity to benefit at-risk fish and wildlife species at a large-scale, multi-state landscape level. If you have questions about our support of this project, please contact Kristina Smucker, Nongame Bureau Chief for Montana Fish, Wildlife and Parks, at ksmucker@mt.gov or 406-444-5209.



Kristina Smucker
Wildlife Division
Nongame Bureau Chief

April 17, 2023

Rachel Dawson
Program Director, National Programs
National Fish and Wildlife Foundation
1133 Fifteenth Street NW, Suite 1000
Washington, DC 20005
Submitted via email to the State of Washington Invasive Species Council

RE: Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West–Easy Grant # 80683

Dear Rachel Dawson,

I am writing on behalf of the American Bullfrog Action Team and the Ministry of Water, Land and Resource Stewardship in British Columbia, Canada. We are in support of the America the Beautiful Challenge proposal submitted by the State of Washington's Invasive Species Council to support the conservation and recovery of listed and at-risk species in western North America by addressing invasive frogs.

Invasive frogs, including but not limited to American bullfrogs (*Rana catesbeiana*), African clawed frogs (*Xenopus laevis*), and Cuban tree frogs *(Osteopilus septentrionalis*), pose a significant threat to native amphibian populations in British Columbia.

The Collaborative Conservation and Adaptation Strategy Toolbox team and their Non-Native Aquatic Species Community of Practice has been facilitating information exchange across western North America on the impacts of American bullfrogs, effective monitoring and control techniques, and implementation of landscape-scale programs, since 2020. The American Bullfrog Action Team serves a similar role for the Pacific Northwest and southwestern Canada. We have 40 individual members representing over 20 agencies, including multiple levels of government (federal, indigenous, state, provincial), non-governmental organizations, and research organizations. This proposal presents an opportunity to leverage the foundations of these groups and coordination by the Washington Invasive Species Council to build invasive frog management capacity and develop a coordinated approach to address shared threats to dozens of native species across at least twelve states.

The work within this proposal will support efforts by indigenous/tribal, federal, state/provincial, regional, and local organizations and agencies to manage invasive frogs by building a network of expertise. Furthermore, the development of a Western Invasive Frog Action Plan will address barriers to management and control and serve as a prioritization framework for future actions to address invasive frogs in the Western U.S.

Ministry of Water, Land and Resource Stewardship
Land Use Policy, Planning and Ecosystems
Mailing Address: PO BOX 9367 Stn Prov Govt Victoria, BC V8W 9M3
Tel: 778-974-5804
Website: www.gov.bc.ca/WLRS

The American Bullfrog Action Team believes this project will improve West-wide coordination and increase our capacity to prevent invasive frog establishment and remove existing populations in support of native amphibians. We are eager to engage in this project through attending the summit and regional workshops.

In summary, the American Bullfrog Action Team strongly supports your funding of this proposal. This grant truly presents an opportunity to benefit at-risk fish and wildlife species at a large-scale, multi-state landscape level. If you have questions about our support of this project, please contact me at the email below.

Sincerely,

Emily Lomas, MSc, RPBio
Terrestrial Invasive Fauna Specialist
Chair, American Bullfrog Action Team
BC Ministry of Water, Land and Resource Stewardship
Emily.Lomas@gov.bc.ca

United States Department of the Interior

NATIONAL PARK SERVICE
Yosemite National Park
P. O. Box 577
Yosemite, California 95389

IN REPLY REFER TO:

Rachel Dawson
Program Director, National Programs
National Fish and Wildlife Foundation
1133 Fifteenth Street NW, Suite 1000
Washington, DC 20005

17 April 2023

Submitted via email to the State of Washington Invasive Species Council

Re: Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West–Easy Grant # 80683

I am writing on behalf of Yosemite National Park in support of the America the Beautiful Challenge proposal submitted by the State of Washington's Invasive Species Council to support the conservation and recovery of listed and at-risk species in western North America by addressing invasive frogs.

Invasive frogs, including American bullfrogs (*Rana catesbeiana*), pose a significant threat to native amphibian populations in greater Yosemite bioregion as they have displaced many native species including the federally threatened California red-legged frog (*Rana draytonii*) and California State endangered Foothill yellow-legged frog (*Rana boylii*).

The Collaborative Conservation and Adaptation Strategy Toolbox team and their Non-Native Aquatic Species Community of Practice has been facilitating information exchange across western North America on the impacts of American bullfrogs, effective monitoring and control techniques, and implementation of landscape-scale programs, since 2020. The American Bullfrog Action Team serves a similar role for the Pacific Northwest and southwestern Canada. This proposal presents an opportunity to leverage the foundations of these groups and coordination by the Washington Invasive Species Council to build invasive frog management capacity and develop a coordinated approach to address shared threats to dozens of native species across at least twelve states.

The work within this proposal will support efforts by tribal, federal, state, regional, and local organizations and agencies to manage invasive frogs by building a network of expertise. Furthermore, the development of a Western Invasive Frog Action Plan will address barriers to management and control and serve as a prioritization framework for future actions to address invasive frogs in the Western U.S.

The National Park Service believes this project will improve West-wide coordination and increase our capacity to prevent invasive frog establishment and remove existing populations in support of native amphibians. We are eager to engage in this project through attending the summit and regional workshops.

In summary, Yosemite National Park strongly supports your funding of this proposal. This grant truly presents an opportunity to benefit at-risk fish and wildlife species at a large-scale, multi-state landscape level. If you have questions about our support of this project, please contact Rob Grasso, Aquatic Ecologist – Yosemite National Park at (209) 379-1438 or rob_grasso@nps.gov.

ROBERT GRASSO
Digitally signed by ROBERT GRASSO
Date: 2023.04.17 07:32:38 -07'00'

WYOMING GAME AND FISH DEPARTMENT

5400 Bishop Blvd. Cheyenne, WY 82006
Phone: (307) 777-4600 Fax: (307) 777-4699
wgfd.wyo.gov

April 18, 2023

Rachel Dawson
Program Director, National Programs
National Fish and Wildlife Foundation
1133 Fifteenth Street NW, Suite 1000
Washington, DC 20005
Submitted via email to the State of Washington Invasive Species Council

Re: Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West–Easy Grant # 80683

As the Herpetological Coordinator for the Wyoming Game and Fish Department (WGFD), I am writing this letter in support of the America the Beautiful Challenge proposal submitted by the State of Washington's Invasive Species Council. The proposed project aims to provide managing agencies and partners in western North America with tools to address invasive frogs that threaten native sensitive and federally protected species.

The American Bullfrog is not native to Wyoming but now occurs in many areas in eastern Wyoming and in a thermal spring just outside of Grand Teton National Park. American Bullfrogs in Wyoming have been documented consuming multiple species of native wildlife and outcompeting Species of Greatest Conservation Need including the Northern Leopard Frog. However, the WGFD has yet to attempt concerted control or eradication due to a lack of effective and efficient removal techniques. Further barriers to effective implementation of American Bullfrog control in Wyoming include the significant resources and funding needed.

The Collaborative Conservation and Adaptation Strategy Toolbox (CCAST) team and their Non-Native Aquatic Species Community of Practice have been instrumental in facilitating information exchange across western North America on the impacts of American Bullfrogs, monitoring and control techniques, and strategies for landscape-scale management. These strategies and tools will be critical to planning American Bullfrog control and/or eradication efforts in Wyoming and across the region. The proposed work will expand the foundations of CCAST and similar groups to support efforts by tribal, federal, state, regional, and local organizations and agencies to manage invasive frogs by building a network of expertise. Furthermore, the development of a Western Invasive Frog Action Plan will work to address the aforementioned barriers faced by management entities and serve as a prioritization framework for future actions to address invasive frogs in the Western U.S.

For this reason, the WGFD strongly supports the proposed project. Agency biologists would greatly benefit from engaging in field trainings, workshops and the summit in order to develop

strategic approaches to American Bullfrog control in Wyoming and help ensure the success of efforts to manage this destructive and prolific non-native species. The results of the proposed project will directly aid our agency in dealing with this otherwise overwhelming conservation challenge.

Sincerely,

Wendy A. Estes-Zumpf, Ph.D.
Herpetological Coordinator
Wyoming Game & Fish Department
1212 S. Adams St.
Laramie, WY 82070
(307) 721-1380

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New Mexico Ecological Services Field Office
2105 Osuna Road NE
Albuquerque, New Mexico 87113
Telephone 505-346-2525 Fax 505-346-2542
www.fws.gov/southwest/es/newmexico/

April 17, 2023

Rachel Dawson
Program Director, National Programs.
National Fish and Wildlife Foundation
1133 Fifteenth Street NW, Suite 1000
Washington, DC 20005

Re: Letter of Support for the Conservation and Adaptation Resources Toolbox program and Washington's Invasive Species Council proposal "*Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West*" (Easy Grant #: 80683)

Dear Ms. Dawson:

We reviewed the planning grant proposal from Conservation and Adaptation Resources Toolbox (CCAST) program and Washington's Invasive Species Council (WISC) entitled "*Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West*" (Easy Grant #: 80683) and offer this letter of support for the outlined objectives of the proposal, especially as they contribute to conservation and recovery efforts for species listed under the Endangered Species Act of 1973, as amended.

The main objective of the proposal is to improve American bullfrog (*Rana catesbeianus*; "bullfrog") management in the western United States. Bullfrogs are a nonnative species that impact multiple federally listed species including the Chiricahua leopard frog (*Rana chiricahuensis*; "leopard frog"), narrow-headed gartersnake (*Thamnophis rufipunctatus*), and northern Mexican gartersnake (*Thamnophis eques megalops*; both "gartersnakes"). All three species occur in New Mexico and in Arizona. The leopard frog utilizes shallow, warmer, slow moving streamsides for foraging, breeding, and tadpole development. The gartersnakes are fish-eating specialists that hunt underwater, utilizing stream edges and stream bottoms, often waiting in ambush. All three species face a variety of threats including but not limited to pollution, dewatering of aquatic habitat, and proliferation of nonnative species (including bullfrogs). This proposal will build upon and merge foundations provided by CCAST, the American Bullfrog Action Team (ABAT), and WISC to provide managing agencies and partners with the tools to address both established (bullfrog) and emerging (African clawed frogs [*Xenopus laevis*] and Cuban tree frogs [*Osteopilus septentrionalis*]) threats to native amphibians and additional taxonomic groups.

The proposal specifically seeks to accomplish the main objective by: 1) hosting a west-wide hybrid summit to foster landscape-scale coordination across organizations, share relevant tools, and refine needs/components for on-the-ground trainings, 2) implementing regional in-person field trainings and workshops in six western U.S. states that provide on-the-ground training for invasive frog monitoring and control techniques, and lastly, 3) developing a Western Invasive Frog Action Plan to address the challenges and barriers identified by summit and workshop attendees and to serve as a prioritization framework for future actions to address invasive frogs in the western U.S.

Additionally, since the bullfrog is expanding its range into several western states, multiple federal agencies (Bureau of Land Management, Bureau of Reclamation, National Park Service, US Fish and Wildlife Service, US Forest Service), state natural resource agencies (including but not limited to Arizona Game and Fish Department and New Mexico Department of Game and Fish), tribal governments, and many other partners will benefit from the products this proposal seeks to develop and distribute.

In closing, we support CCAST and WISC's proposal "*Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West*" that includes increasing coordination among organizations across the western U.S., planning and hosting invasive species workshops and trainings, and developing and distributing invasive species control materials. These actions will support conservation and recovery efforts for federally listed species in New Mexico and in other western U.S. states. If you have any questions, please contact Clinton Smith of my staff at the letterhead address, by phone at (505) 761-4743, or by electronic mail at clinton_smith@fws.gov.

Sincerely,

SHAWN SARTORIUS

Digitally signed by SHAWN SARTORIUS
Date: 2023.04.17 11:37:03 -06'00'

Shawn Sartorius
Field Supervisor

ARC
Amphibian and Reptile Conservancy

6844 Bardstown Rd Ste 677, Louisville, KY 40291 (502) 208-9858
www.arcprotects.org

Rachel Dawson
Program Director, National Programs
National Fish and Wildlife Foundation
1133 Fifteenth Street NW, Suite 1000
Washington, DC 20005

April 17th, 2023

Re: Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West–Easy Grant # 80683

Greetings,
I am writing on behalf of the Amphibian and Reptile Conservancy (ARC) to support the America the Beautiful Challenge proposal submitted by the State of Washington's Invasive Species Council to support the conservation and recovery of listed and at-risk species in western North America by addressing invasive frogs.

Invasive frogs, including but not limited to American bullfrogs (*Rana catesbeiana*), African clawed frogs (*Xenopus laevis*), and Cuban tree frogs *(Osteopilus septentrionalis*), pose a significant threat to native amphibian populations in the western states. One of ARC's biggest primary focal areas in the Southwest is on rivers and ponds, where bullfrogs threaten numerous imperiled species through out-competition, predation, and spreading of amphibious disease. ARC was recently awarded an America the Beautiful Challenge award to help manage invasive species across several National Forests – the Collaborative Conservation and Adaptation Strategy Toolbox (CCAST) and its partners have been critical in coordinating these efforts and tying our strategies together into a more effective landscape approach.

CCAST and their Non-Native Aquatic Species Community of Practice have been facilitating information exchange across western North America on the impacts of American bullfrogs, effective monitoring and control techniques, and implementation of landscape-scale programs, since 2020. The American Bullfrog Action Team serves a similar role for the Pacific Northwest and southwestern Canada. This proposal presents an

opportunity to leverage the foundations of these groups and coordination by the Washington Invasive Species Council to build invasive frog management capacity and develop a coordinated approach to address shared threats to dozens of native species across at least twelve states.

The work within this proposal will support efforts by tribal, federal, state, regional, and local organizations and agencies to manage invasive frogs by building a network of expertise. Furthermore, the development of a Western Invasive Frog Action Plan will address barriers to management and control and serve as a prioritization framework for future actions to address invasive frogs in the western U.S. This proposal will not duplicate ARC's efforts for invasive species, but rather compliment it by bringing together a larger network of partners.

ARC believes this project will improve West-wide coordination and increase our capacity to prevent invasive frog establishment and remove existing populations in support of native amphibians. We are eager to engage in this project by attending the summit and regional workshops. In summary, ARC strongly supports the funding of this proposal. This grant truly presents an opportunity to benefit at-risk fish and wildlife species at a large-scale, multi-state landscape level. If you have questions about our support of this project, please don't hesitate to contact me.

Joseph Apodaca
Executive Director
Amphibian and Reptile Conservancy

United States Department of the Interior

FISH AND WILDLIFE SERVICE
911 NE 11th Avenue
Portland, Oregon 97232-4181

In Reply Refer To:
FWS/R1/FAC

Ms. Rachel Dawson
Program Director, National Programs
National Fish and Wildlife Foundation
1133 Fifteenth Street NW, Suite 1000
Washington, DC 20005
Submitted via email to the State of Washington Invasive Species Council

Re: Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West–Easy Grant # 80683

Dear Ms. Dawson:

As the Regional Aquatic Invasive Species Coordinator for the U.S. Fish and Wildlife Service Pacific Region, I support the America the Beautiful Challenge proposal submitted by the State of Washington's Invasive Species Council entitled "Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West." The proposed project will enhance ongoing work addressing aquatic invasive species like American bullfrog (*Rana catesbeiana*) that have the potential to dramatically impact freshwater habitats and species of ecological, cultural, and economic significance. Invasive frogs in particular pose a significant threat to native amphibian populations in the Pacific Region and could impact the conservation and recovery for several listed and at-risk species. The proposed work complements existing efforts to enhance state-federal-tribal coordination to better protect the West from invasive species.

Outcomes of the proposed work, including a network of expertise and a Western Invasive Frog Action Plan, will address barriers to species management and serve as a prioritization framework for future actions to address invasive frogs in the West. Results from this project can be immediately available and incorporated into very active groups and management teams such as the Collaborative Conservation and Adaptation Strategy Toolbox team, the Non-Native Aquatic Species Community of Practice, and the American Bullfrog Action Team which serves the Pacific Northwest and southwestern Canada. This proposal presents an opportunity to leverage the foundations of these groups and coordination by the Washington Invasive Species Council to build and enhance invasive frog management capacity.

The U.S. Fish and Wildlife Service is actively engaged and invested in this work. This proposal presents an opportunity to benefit aquatic species and habitats at a landscape level. If you have questions about our support of this project, please contact me, Theresa Thom, Regional Aquatic Invasive Species Coordinator at theresa_thom@fws.gov or (971) 278-8029.

Sincerely,

Theresa A. Thom, Ph.D.
Regional Aquatic Invasive Species Coordinator

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Central Washington National Wildlife Refuge Complex
64 Maple Street
Burbank, WA 99323
Phone: (509) 546-8300 Fax: (509) 546-8303

Date: April 17, 2023

Rachel Dawson
Program Director, National Programs
National Fish and Wildlife Foundation
1133 Fifteenth Street NW, Suite 1000
Washington, DC 20005
Submitted via email to the State of Washington Invasive Species Council

Re: Addressing Invasive Frogs to Support Conservation and Recovery of At-Risk Species in the West–Easy Grant # 80683

I am writing on behalf of the U.S. Fish and Wildlife Service, Conboy Lake National Wildlife Refuge in support of the America the Beautiful Challenge proposal submitted by the State of Washington's Invasive Species Council to support the conservation and recovery of listed and at-risk species in western North America by addressing invasive frogs.

Invasive frogs, including but not limited to American bullfrogs (*Rana catesbeiana*), African clawed frogs (*Xenopus laevis*), and Cuban tree frogs *(Osteopilus septentrionalis*), pose a significant threat to native amphibian populations in the Pacific Northwest. In fact, Conboy Lake National Wildlife Refuge is currently in the fourth year of a long-term American bullfrog eradication effort to benefit the federally threatened Oregon spotted frog (*Rana pretiosa*). American bullfrogs directly prey on Oregon spotted frogs at the Refuge and are a primary threat to the Oregon spotted frog population. U.S. Fish and Wildlife Service has invested more than $1.1M in the project to date to address this priority resource concern, with additional investment planned for the future.

The Collaborative Conservation and Adaptation Strategy Toolbox team and their Non-Native Aquatic Species Community of Practice has been facilitating information exchange across western North America on the impacts of American bullfrogs, effective monitoring and control techniques, and implementation of landscape-scale programs, since 2020. The American Bullfrog Action Team serves a similar role for the Pacific Northwest and southwestern Canada. Conboy Lake National Wildlife Refuge is a participating member of both these teams, and our project has greatly benefited from the information exchange with both groups over the last several years. This proposal presents an opportunity to leverage the foundations of these groups and coordination by the Washington Invasive Species Council to build invasive frog management capacity and develop a coordinated approach to address shared threats to dozens of native species across at least twelve states.

The work within this proposal will support efforts by tribal, federal, state, regional, and local organizations and agencies to manage invasive frogs by building a network of expertise.

Furthermore, the development of a Western Invasive Frog Action Plan will address barriers to management and control and serve as a prioritization framework for future actions to address invasive frogs in the Western U.S.

Conboy Lake National Wildlife Refuge believes this project will improve West-wide coordination and increase our capacity to prevent invasive frog establishment and remove existing populations in support of native amphibians. We are eager to engage in this project through attending the summit and regional workshops.

In summary, U.S. Fish and Wildlife Service, Conboy Lake National Wildlife Refuge strongly supports your funding of this proposal. This grant truly presents an opportunity to benefit at-risk fish and wildlife species at a large-scale, multi-state landscape level. If you have questions about our support of this project, please feel free to contact me at trevor_sheffels@fws.gov or 509-364-3667.

Sincerely,

Trevor R. Sheffels

Trevor Sheffels, Ph.D.
Refuge Manager
Conboy Lake National Wildlife Refuge
U.S Fish and Wildlife Service

U.S. Forest Service Region: 6
State/Territory: WA

Project Name: Protecting Washington's Sagebrush Biome Through Prevention Activities and Public Behavior Change

Project Description – Provide an overview of the project, the proposed project duration, and which regional priority, or priorities, the project aligns with. (1250 characters)
The Washington Invasive Species Council will partner with tribal, federal, state, and local governments, non-profits, and landowners to protect Washington's Sagebrush Biome through the prevention of movement and establishment of invasive plants and noxious weeds. This project is aligned with several regional and state priorities including: 1) Western Weed Coordinating Committee 2019 Western Weed Action Plan; Coordination, Collaboration, and Data Sharing; Action 3; Sub-Action 3; Prevention of invasive plants/noxious weeds in uninvaded areas to protect high-value resources. 2) Western Governors' Association Policy Resolution 2022-11 Biosecurity and Invasive Species, Item 21, Western Governors support proactive and adaptive management, including landscape scale approaches, fuel treatments, and defensive prevention of intact cores as critical components of invasive annual grass management regimes.; and 3) Washington Invasive Species Council 2020-2025 Strategy, Prevention, Harmonize agency prevention protocols and encourage public participation in prevention.

Activity – What action is proposed, and what measurable outcomes are expected? (2500 characters)

The Washington Invasive Species Council is charged with policy-level direction, planning, and coordination to prevent and stop invasive species statewide. The council is comprised of tribal, state, federal, and local governments, academic institutions, conservation partners, and industry. Prevention of invasive species is key, as in Washington alone, 22 invasive species are projected to spread 5-15% annually without prevention or control, equating to damage and loss of over $1.3 billion annually. These costs do not include damage to habitat and the environment, which often cause irrevocable impacts. Washington's Sagebrush Biome is a high priority habitat, requiring action to prevent noxious weed and invasive plant populations from increasing as well as to prevent new populations. Together, the council and partners will protect Washington's Sagebrush Biome from invasive plants and noxious weeds. To achieve this objective, the council and partners will identify key sites and locations, invasion pathways such as trailheads, recreation areas, or campgrounds, for the purpose of installing boot brushes and educational signage. Using information from the Washington Department of Fish and Wildlife and other organizations, key areas of protection within Washington's Sagebrush Biome will be identified. Using information on outdoor recreational use, areas such as trailheads, campgrounds, and other pathways for noxious and invasive plant introduction will be identified and compared to Sagebrush Biome information and locations of known invasive plant and weed populations. Using this information, the council and committee will develop a ranked list of sites most benefitted by installation of PlayCleanGo® Stop Invasive Species In Your Tracks® Original Boot Brush Stations and interpretive signage on weed prevention and the importance of the Sage Brusbiome. Suitable locations will be selected over a variety of ownerships including tribal lands, state and local parks, federal lands, and state wildlife and recreation areas. Upon installation by recipient organizations, the council will assist with collecting use information and survey users to determine behavior change and public use. A final report will include

information on ownership and sites for 50 boot brush stations, an online map and static map of locations, use and public behavior change survey data, and recommendations for expansion or replication in other states within the Sagebrush Biome.

Partnerships – Explain if the work is to be done with or through others, any leverage or additional partner funding that will be attracted to the project, and if it crosses ownership boundaries or regions. (1250 characters)

The council will work with the following organizations to implement this program: U.S. Forest Service, U.S. Bureau of Indian Affairs, Washington State Department of Fish and Wildlife, Washington State Department of Agriculture, State Parks and Recreation Commission, Washington State Department of Natural Resources, Washington State University Extension, and others. The council will convene an interagency advisory committee for this project with the following organizations, tasked with high-level oversight of the project. Additionally, through the U.S. Bureau of Indian Affairs and Washington State University NATIVE project funded by the U.S. Department of Agriculture Animal and Plant Health Inspection Service, the council will work with multiple tribal nations within Washington's Sagebrush Biome. The council will also work through the Washington State Noxious Weed Control Board and Washington State Department of Agriculture to engage county governments, including county noxious weed control boards and parks departments. Partner in-kind contributions will leverage an estimated amount of 50% of the total amount requested. In-kind matching contribution information will be collected by the council and reported upon project completion.

Amount Requested: $133,462

NISC
NATIONAL INVASIVE SPECIES COUNCIL

U.S. DEPARTMENT OF THE INTERIOR · OFFICE OF THE SECRETARY
1849 C STREET NW · WASHINGTON, DC 20240

www.invasivespecies.gov

National Invasive Species Council Annual Work Plan
FY 2023

Approved October 20, 2022

In line with Executive Orders 13112 and 13751, the mandate of the National Invasive Species Council (Council) is to provide the vision and leadership to coordinate, sustain, and expand federal efforts to safeguard the interests of the United States from the negative impacts of invasive species. The following document outlines the core activities that the Council staff will implement in cooperation with Council member agencies over the course of FY 2023. These activities are intended to build on the mechanisms and responsibilities outlined in the Council's Terms of Reference with the goal of advancing a coordinated, whole-of-government approach to priority invasive species issues that require inter-agency or intergovernmental collaboration.

Council staff develop Annual Work Plans (Work Plans) under the guidance of the Council Co-Chairs, or their Principals, in consultation with the other Principals and Senior Advisers, and with input from relevant federal interagency committees. These Work Plans direct the efforts of Council staff and are implemented in collaboration with relevant personnel from Council member agencies as well as other stakeholders through the Invasive Species Advisory Committee (ISAC). The conduct of NISC activities should take into account the principles of equity, diversity, and inclusion, including, as appropriate, representation in task teams and ISAC, consideration of indigenous knowledge and perspectives, and identification of opportunities for historically underserved communities to fully access and benefit from NISC outputs.

Work Plans are approved according to the relevant policies and procedures of the Co-Chair agencies: the Departments of Agriculture, Commerce, and the Interior. Support for Council staff coordination activities is generally provided through the Office of the Secretary of the Interior, although other agencies may contribute personnel or fiscal resources as available and appropriate.

Work Plans include both general coordination responsibilities that are consistent from year to year as well as select, thematic activities for that year based on priorities identified by the Council. Overall, Work Plans aim to advance efforts to:

- Facilitate institutional leadership and priority setting by Council members;
- Achieve effective interagency coordination and cost-efficiency;
- Raise awareness and motivate action;
- Remove institutional and policy barriers;
- Assess and strengthen capacities; and
- Foster scientific, technical, and programmatic innovation.

Core Coordination Activities

The Council staff play a coordination role to ensure effective and efficient communication and collaboration across Council member agencies on issues related to invasive species. The goals of such higher-level engagement are to benefit and facilitate the efforts of federal agencies to address invasive species and their impacts. The Council staff also liaise with other relevant federal interagency committees and non-federal partners as appropriate to further support coordination efforts and implementation of priority activities.

The following activities reflect the general coordination responsibilities of Council staff. Specific coordination actions are also tailored to the thematic priority activities and depend on staff capacity and ongoing dialogue with Principals and Senior Advisers:

- Coordinate meetings of the Council, as directed by the Co-Chairs or their Principals, and develop meeting summaries, compile action items, and distribute information regarding the meetings as applicable.
- Coordinate meetings of the Senior Advisers on a regular basis to share information and provide input and guidance on current and future Council activities. Representatives of relevant federal interagency committees are invited to participate as observers.
- Provide regular updates to Senior Advisers and representatives of relevant federal interagency committees on policy developments including Congressional activities, Council member activities and outputs, and other relevant information.
- Coordinate with other relevant federal interagency committees addressing invasive species, including through participation in their meetings and collaboration on mutual priority activities where appropriate.
- Coordinate with Council member agencies to facilitate engagement with non-federal stakeholders in relevant meetings.
- Develop the annual crosscut summary report on federal invasive species-related expenditures through collection and compilation of agency budget data, and regularly monitor for opportunities to enhance the value of interagency coordination on relevant budgetary issues.
- Liaise with Council member agencies to identify nationally significant, emerging issues applicable to invasive species management and facilitate information sharing and collaborative efforts as appropriate.
- Manage the Invasive Species Advisory Committee (ISAC), including facilitating nomination processes, convening meetings, and soliciting advice relevant to NISC priorities.
- Engage with stakeholder groups and the public. Enhance engagement with Tribes, Alaskan native corporations, native Hawaiian organizations, U.S. Territories and Freely Associated States, and underserved communities as appropriate.
- Organize and convene webinars and workshops, as needed and in consultation and coordination with Council member agencies, to facilitate conversations on timely invasive species issues.
- Convene and coordinate task teams, as needed and in consultation and coordination with Council member agencies, to address thematic priority activities with specific, discrete deliverables.

- Maintain the Council's online presence and help organize, provide, and/or coordinate content with the National Invasive Species Information Center and other federal invasive species websites.
- Respond to requests for assistance from Council members on relevant activities as resources allow, including materials and briefings for new agency staff and administration transitions.
- Coordinate the development of Annual Work Plans.

Thematic Priority Activities

Thematic priorities include a select number of activities where Council staff engages with federal agency experts to advance work in particular areas of importance.[1] Priority activities will include discrete outputs from NISC developed through interagency task teams (e.g., white papers, briefing papers) and/or facilitated dialogue across relevant agencies that advance individual agency interests but may not result in a defined NISC product (e.g., Community of Practice). In addition to the details provided below, each area of activity is guided by the development of an operational planning table that specifies clear objectives, activities, or outputs to be delivered, quality standards, key targets, performance indicators, risk management considerations, staffing and resource requirements, implementation timetables, and a process for monitoring progress.

1. **Climate Change**

Objective:	Address the intersection between climate change and invasive species with a focus on identifying and evaluating appropriate management tools as well as risks (including both environmental and human-health risks) associated with species movement and pathways.
Output (a):	Community of Practice: Facilitation of a NISC Community of Practice (CoP) for interested federal experts, resource managers, and invasive species experts to share information and identify strategic opportunities related to invasive species and climate change.
Partners:	DOC, DOI, HHS, NASA, USAID, USDA, CEQ, OSTP, ANSTF, FICMNEW, ITAP
Output (b):	Disaster Preparedness and Response: Collation of tools and information resources that can assist the evaluation of risks of and response to the potential introduction and spread of invasive species from natural disasters and extreme weather events. This could include ways to improve engagement with the broader disaster response community.
Partners:	DHS, DOC, DOI, USDA
Output (c):	Managed Relocation: Guidance on harmonizing terminology and addressing invasive species risks associated with managed relocation as a conservation strategy.
Partners:	DOC, DOI, USDA

[1] Note: references to specific agencies as activity partners indicate potential interest of that agency and do not imply or confer any additional budgetary obligation on those agencies to support that activity.

2. Wildland Fire and Invasive Species

Objective: Advance landscape scale and coordinated approaches to the management of invasive species and wildland fire.

Output: Implementation of priority opportunities identified by the NISC/Wildland Fire Leadership Council (WFLC) partnership, including those intended to advance regional prioritization, national and regional coordination, and scientific research and information exchange.

Partners: DOC, DOD, DOI, HHS, USDA, FICMNEW, WFLC

3. Early Detection and Rapid Response (EDRR)

Objective: Build capacity for a national EDRR framework, including enhanced interagency preparedness and collaboration.

Output (a): Aquatic Invasive Species at Ports of Entry: Coordination of interagency discussions on preventing the introduction of aquatic invasive species associated with imported goods. This includes enhancing protocols for interagency coordination related to the detection of aquatic species at ports of entry; establishing processes for engaging relevant federal agency leadership in the response to new, potentially invasive wildlife contaminants requiring additional interagency coordination; and identifying gaps in federal agency authorities and capacities to address aquatic invasive species detected in imported plant commodities.

Partners: DHS, DOC, DOI, USDA, ANSTF

Output (b): National EDRR Framework: Support for agency and interagency efforts to operationalize a national EDRR framework with a particular focus on addressing capacity needs and integrating the Council's past outputs on EDRR.

Partners: DOC, DOI, USDA, ANSTF

4. Information Management

Objective: Advance the collation, analysis, and distribution of information and data related to invasive species and their management by federal programs.

Output (a): National Invasive Species Information Center: Support for the National Invasive Species Information Center, including input on long-term site sustainability as well as on the structure and curation of site content.

Partners: DOC, DOI, HHS, USDA, ANSTF, FICMNEW

Output (b): Federal Information, Data, and Innovation Programs: Briefing paper highlighting the types of information and data relevant for invasive species management (e.g., occurrence locations, abundances, treatments, operational guidance), how such data and information are used in decision-making; and relevant federal data, information, and innovation programs and resources.

Partners: DOC, DOD, DOI, USDA, HHS

Output (c): Forecasting and Horizon Scanning: Information sharing on data sources for and outputs of federal agency efforts related to forecasting and horizon scanning processes for invasive species where possible and appropriate (e.g., with managers, law enforcement). This includes information on new species of concern, emerging pathways of introduction, and geographical hotspots for invasion.

Partners: DOC, DHS, DOI, USAID, USDA

5. **Outreach and Engagement**

Objective: Advance engagement with non-federal partners to improve invasive species management efforts.

Output (a): Recreation.gov: Support for agency efforts to include invasive species outreach messaging on Recreation.gov to improve public awareness and modify the behavior of federal land users to reduce invasive species risks.

Partners: DOC, DOD, DOI, USDA

Output (b): Underserved Communities: Internal briefing paper on the impacts of invasive species on underserved communities with a view to identifying opportunities for future work. This could include identifying particularly vulnerable communities and addressing related issues such as human health, safety, and local livelihoods (e.g., fisheries, aquaculture).

Partners: DOC, DOD, DOI, USDA

6. **Interagency Dialogues**

Objective: Support coordination across federal agencies on select topics related to invasive species with a view to advancing ongoing agency and/or interagency activities and identifying potential opportunities for future work.

Output: Engagement in agency and interagency discussions related to:

- Public health, OneHealth, and zoonotic pathogens
- Island biosecurity and invasive species management

Partners: DOC, DOD, DOI, EPA, HHS, USDA, USTR, ANSTF

Criteria for Inclusion of Actions

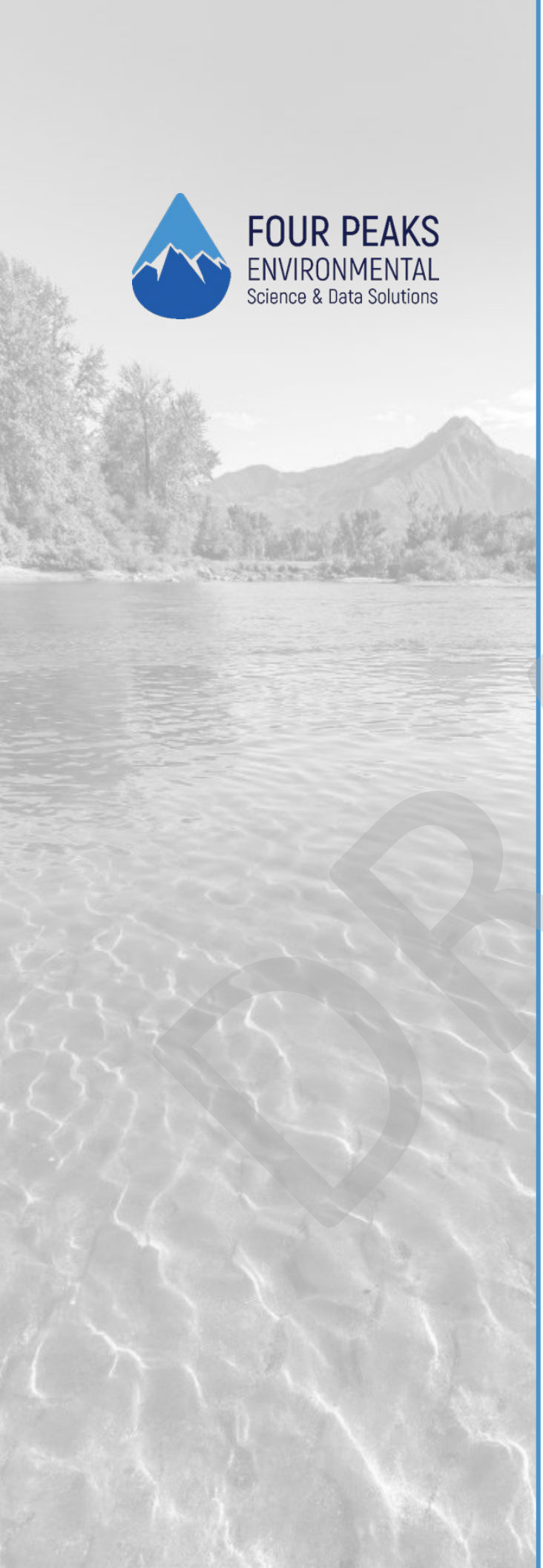
A set of strategic decision-making criteria shall be used in the development of Work Plans to identify priority activities for implementation that:

- Address a pressing invasive species issue or opportunity identified by one or more Council member agencies that could be advanced by interagency cooperation.
- Have a commitment for federal agency engagement and/or leadership from two or more Council member agencies.
- Identify a beneficial role for Council staff participation as agreed upon by engaged federal agencies.

- Align with administration and Council member agency goals.
- Are feasible given the capacity of Council staff coupled with human or financial resources contributed by engaged agencies.
- Align with one or more objectives from Executive Order 13751
    - Provide institutional leadership and priority setting,
    - Achieve effective inter-agency coordination and cost-efficiency,
    - Raise awareness and motivate action,
    - Remove institutional and policy barriers,
    - Assess and strengthen capacities, and
    - Foster connections to the latest scientific, technical, and programmatic innovation.
- Follow "USMART" principles (Useful, Specific, Measurable, Achievable, Relevant and Time-Based).

Acronyms

ANSTF – Aquatic Nuisance Species Task Force
CEQ – Council on Environmental Quality
DHS – Department of Homeland Security
DOC – Department of Commerce
DOD – Department of Defense
DOI – Department of the Interior
EPA – Environmental Protection Agency
FICMNEW – Federal Interagency Committee on the Management of Noxious and Exotic Weeds
HHS – Department of Health and Human Services
ITAP – Federal Interagency Committee on Invasive Terrestrial Animals and Pathogens
NASA – National Aeronautics and Space Administration
OSTP – Office of Science and Technology Policy
USAID – U.S. Agency for International Development
USDA – U.S. Department of Agriculture
USTR – Office of the U.S. Trade Representative
WFLC – Wildland Fire Leadership Council



FOUR PEAKS ENVIRONMENTAL
Science & Data Solutions

DRAFT STATE OF WASHINGTON INTERAGENCY NORTHERN PIKE RAPID RESPONSE PLAN

June 2023

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Abbreviations

Abbreviation	Definition
AIS	Aquatic Invasive Species
CRITFC	Columbia River Inter-Tribal Fish Commission
CTCR	Confederated Tribes of the Colville Reservation
eDNA	environmental deoxyribonucleic acid
ECY	Washington Department of Ecology
EMI	Emergency Management Institute
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FIFRA	Federal Insecticide Fungicide Rodenticide Act
GPS	Global Positioning System
IAP	Incident Action Plan
ICS	Incident Command System
ISAB	Independent Scientific Advisory Board
MAC Group	Multi-Agency Coordination Group
ND	No Data
NPDES	National Pollutant Discharge Elimination System
NWIFC	Northwest Indian Fisheries Commission
Plan	Washington State Interagency Northern Pike Rapid Response Plan
RCW	Revised Code of Washington
SitRep	Situation Report
SOP	Standard Operating Procedure
UCUT	Upper Columbia United Tribes
USGS	U.S. Geological Survey
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WGA	Western Governors' Association
WISC	Washington Invasive Species Council
WRIA	Water Resource Inventory Area
WRP	Western Regional Panel
WSDA	Washington State Department of Agriculture

1 Introduction

The Northern Pike *Esox Lucius* is a non-native aquatic invasive species (AIS) that has invaded multiple habitats within the State of Washington. Illegal stocking in the 1950s in Montana rivers[1] outside its native range led to establishment of Northern Pike in the Columbia River Basin (McMahon and Bennett 1996; Vashro 2018). By the 1970s, they had expanded their range into the Flathead River system and a separate illegal introduction also occurred in the Coeur d'Alene River system (Bernall and Moran 2005). Since that time, Northern Pike have steadily expanded their distribution downstream to include the Pend Oreille River, Spokane River (Bennett and Rich 1990; Scholz et al. 2009), and the Columbia River upstream of Grand Coulee Dam (CTCR et al. 2018). Northern Pike have also been introduced and become established in Lake Washington with the first detection occurring in 2017 (Yuasa 2017).

Northern Pike are highly piscivorous, can live over 20 years, and can grow to over 45 pounds (Wydoski and Whitney 2003). They mature at 2-3 years of age, are highly fecund, and can consume substantial quantities of native salmonids, causing substantial declines in prey populations (Craig 2008; Sepulveda et al. 2014). Northern Pike also have broad physiochemical tolerances allowing them to invade waterbodies with a wide range of water quality conditions (Haugen and Vollestad 2018; Dunker et al. 2022). Given their population dynamics and physiology, it is likely that Northern Pike will eventually expand their distribution into waters throughout the State of Washington. Areas that are at especially high risk of invasion, due to proximity to currently established populations, include portions of the Columbia River downstream of Grand Coulee and Chief Joseph dams and waterbodies connected to Lake Washington. Minimizing negative impacts of Northern Pike where they are currently established and preventing further spread within the State of Washington is critically important for protection of native and important gamefish species, including Endangered Species Act (ESA)-listed salmonids, as negative impacts to these populations could have dramatic deleterious ecological, cultural, and socioeconomic effects across the Pacific Northwest (Naiman et al. 2012; ISAB 2019). Thus, concerns about the potential impacts of Northern Pike have led the Western Governors' Association to designate them as a "Top 25" AIS (WGA 2018).

1.1 Plan Purpose

The purpose of this Interagency Northern Pike Rapid Response Plan (Plan) is to provide a coordination document and technical resource to enhance the efficiency and effectiveness of Northern Pike prevention efforts, detection, early response, and long-term management activities. These efforts are necessary to minimize environmental, economic, and cultural resource impacts of Northern Pike where they are currently established and prevent further invasion of waterbodies within Washington State to protect native and important gamefish species.

[1] https://wdfw.wa.gov/species-habitats/invasive

1.1.1 Plan Goals

1. Minimize the probability of further Northern Pike invasion.
2. Minimize the impact of Northern Pike on native and important gamefish species.

1.1.2 Plan Objectives

1. Minimize the likelihood of Northern Pike establishment in additional waterbodies of the State of Washington because of human-transport or volitional movement.
2. Increase public awareness of the invasive Northern Pike issue and support for management efforts.
3. Maximize the probability of early detection of Northern Pike in new waters.
4. Establish clear requirements to enable action within the first 48 hours of a Northern Pike detection.
5. Provide a systematic approach to verify a detection and investigate reported observations of Northern Pike in new waters.
6. Provide clear communication and reporting guidance to trigger extended response activities within 6 weeks of initial detection.
7. Implement scientifically sound management to detect, eradicate, contain, and/or suppress invasive Northern Pike populations.

1.2 Plan Overview

The Plan is divided into three general activity classifications: 1) Prevention and Early Detection 2) Rapid Response Activities, and 3) Extended Response Activities (Figure 1). The Plan is organized sequentially to address the following topics:

- Prevention and Early Detection
  - Prevention (Section 3)
  - Routine Monitoring (Section 4.2)
  - Detection Verification (Section 4.3)
- Rapid Response Activities (Section 5)
  - Request and Establish Incident Command System (ICS; Section 5.1)
  - Initial Scoping (Section 5.2)
  - Range Delimitation (Section 5.3)
  - Data Collation (Section 5.4)
  - Multi-Agency Coordination (MAC) Group Meeting (Section 5.5)
- Extended Response Activities (Section 6)
  - Eradication (Section 6.1)
  - Containment (Section 6.2)
  - Long-Term Management (Section 6.3)

Additional technical information is included in the appendices to supplement each topic.

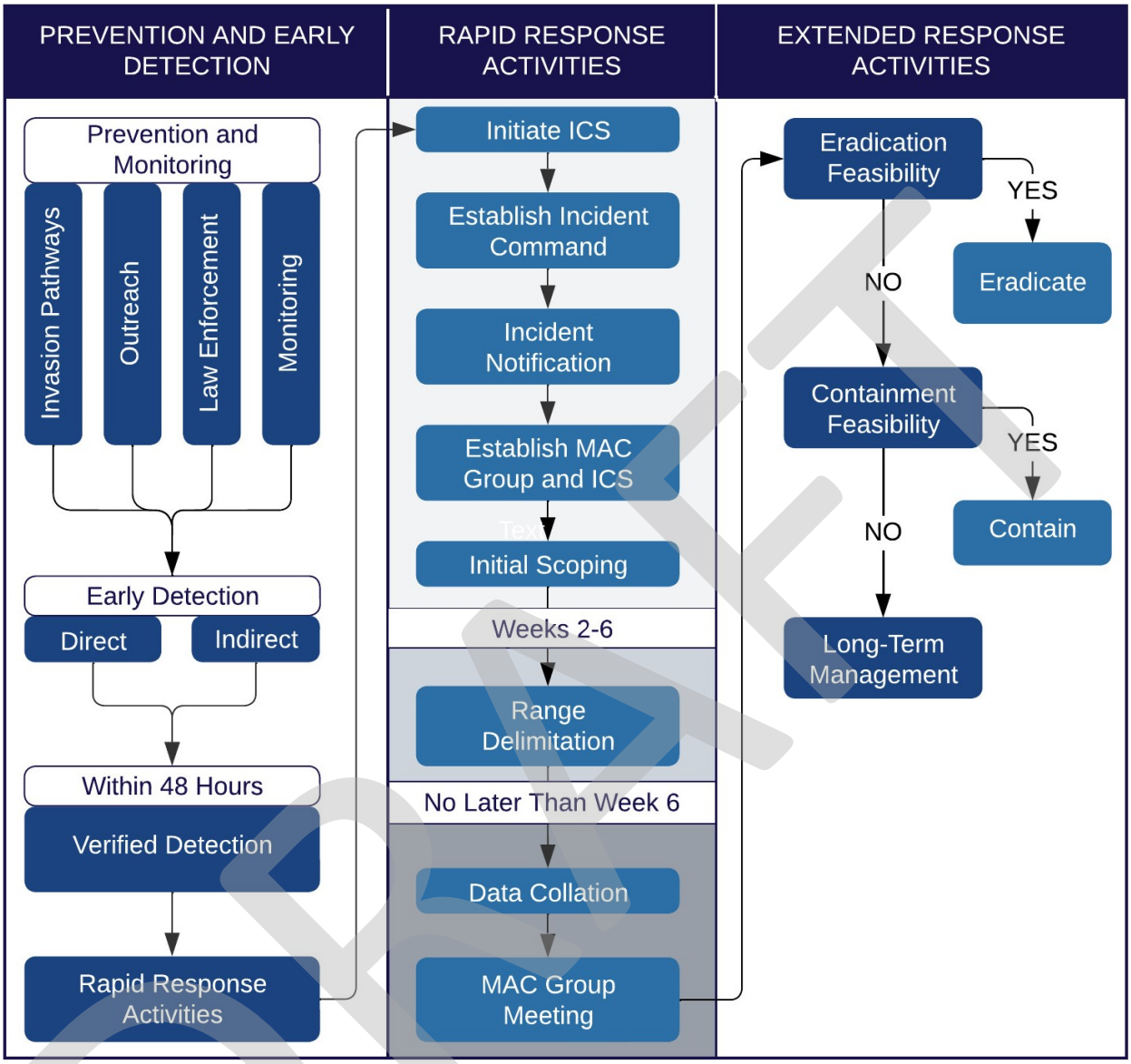


Figure 1. Overview of the State of Washington Northern Pike Management Plan.

1.3 Incident Command System

Incident Command System (ICS) is a standardized approach to incident management developed by the Federal Emergency Management Agency Emergency Management Institute (FEMA EMI). ICS training and resources are available from the FEMA EMI ICS Resource Center,[2] which have been referenced throughout this document. Washington Department of Fish and Wildlife (WDFW) may implement an ICS for rapid response management actions where Northern Pike are detected in a waterbody (Washington

[2] https://training.fema.gov/emiweb/is/icsresource/

Senate Bill 6040, Section 108), and standardized ICS protocols should be used in all multi-agency (federal, state, and local) or multi-jurisdictional incidents and Governor-proclaimed emergencies (RCW 38.52). The benefit of ICS is to provide field-based tactical responses to an incident, provide clear command structure, standardize communications and management action implementation across the state, and provide support to federal and tribal participants while they retain their autonomy in management decisions and actions.

If Northern Pike are verified in a new waterbody (Section 4.3), ICS protocols will be used to conduct Rapid Response Activities. Revised Code of Washington (RCW) 77.135.020 states that WDFW is the lead agency for managing invasive species of the animal kingdom where they have management authority. If a Northern Pike is detected in waterbodies where WDFW does not have management authority (e.g., within tribal reservations, national wildlife refuges, etc.), leadership will be with the associated entity, and they have the option to establish a Unified Command. In these cases, WDFW will work with the Tribe or Federal Agency to implement ICS, if desired. In co-managed waterbodies, WDFW will request ICS and invite tribal co-managers to participate through a Unified Command, on the MAC Group, and/or directly through established co-management channels.

1.3.1 Incident Types

There are five incident types based on the complexity of the incident. The types range from the most complex (Type 1) to the least complex (Type 5; Table 1). Invasive species incidents would normally be classified as Type 5, 4, or 3. If required, the incident response should be broken down into specific operational periods, with each period scheduled for the execution of a given set of tactical actions specified. Operational periods can be of various lengths depending on operation actions required. If the response is anticipated to extend to multiple operational periods, it is advised that an Incident Action Plan (IAP) be developed. The IAP formally documents incident goals, the operational period objectives, and the response strategy defined by Incident Command. It should provide clear directions and include a comprehensive listing of the tactics, resources, and support needed to accomplish the objectives.

Table 1. Incident types and resource requirements based on incident complexity, as adapted from the U.S. Fire Administration.

Type	Complexity
5	• Incident can be handled with one or two single resources with up to six personnel • Command and General Staff positions (other than Incident Command) are not activated • Incident is contained within a few hours • No written Incident Action Plan (IAP) is required
4	• Several resources are required to mitigate the incident • Command and General Staff functions activated as needed • The incident is usually limited to one operational period • No IAP is required
3	• Significant resources are required to mitigate the incident • Command and General Staff functions activated as needed • The incident may extend to multiple operational periods • A written IAP may be required for each operational period
2	• Out-of-region or out-of-state resources are required to mitigate the incident • Most Command and General Staff functions are activated • Many functional units are needed and staffed • The incident is expected to go into multiple operational periods • A written IAP is required for each operational period

1	• National resources are required to mitigate the incident • All Command and General Staff functions are activated • Many functional units are needed and staffed, total personnel will usually exceed 1,000 • The incident is expected to go into multiple operational periods

1.3.2 ICS Command and General Staff Functions

Within each ICS, there are five major functional areas to organize and manage an incident, commonly referred to as Sections (FEMA 2019). These include:

- Command (Incident Commander or Unified Command)
  - Sets the incident objectives, strategies, and priorities and has overall responsibility for the incident.
- Operations Chief
  - Develops tactical organization and directs all resources to carry out the Rapid Response Activities.
- Planning Chief
  - Supports the incident action planning process by tracking resources, collecting/analyzing information, and maintaining documentation.
- Logistics Chief
  - Arranges for resources (e.g., personnel, equipment, teams, supplies, and facilities) and needed services to support achievement of the incident objectives.
- Finance/Administration Chief
  - Monitors costs related to the incident. Provides accounting, procurement, time recording, and cost analyses.

The leaders of these Sections are referred to as Chiefs and are members of the ICS General Staff (Figure 2). Only one person should be designated to lead each General Staff position and positions may be filled by qualified persons from any agency or jurisdiction. Additional information about specific tasks associated with each General Staff position can be found in the ICS Review Document (FEMA 2019).

In addition to General Staff, Command should delegate specific functions to Command Staff personnel (Figure 2). During a Northern Pike Rapid Response, these functions may include, but are not limited to:

- Public Information Officer
- Safety Officer
- Liaison Officer
- Legal Officer

Once established, ICS General Staff should work collaboratively to identify specific entities to provide staff, equipment, and other resources to support Rapid Response Activities, from which a Responding Entity Lead (Section 5.1.3) will be designated. Entities should have a combination of one or more of the following attributes: fisheries management authority, proximity to the affected waterbody, and/or the capability to provide staff, equipment, and other resources to support Rapid Response Activities.

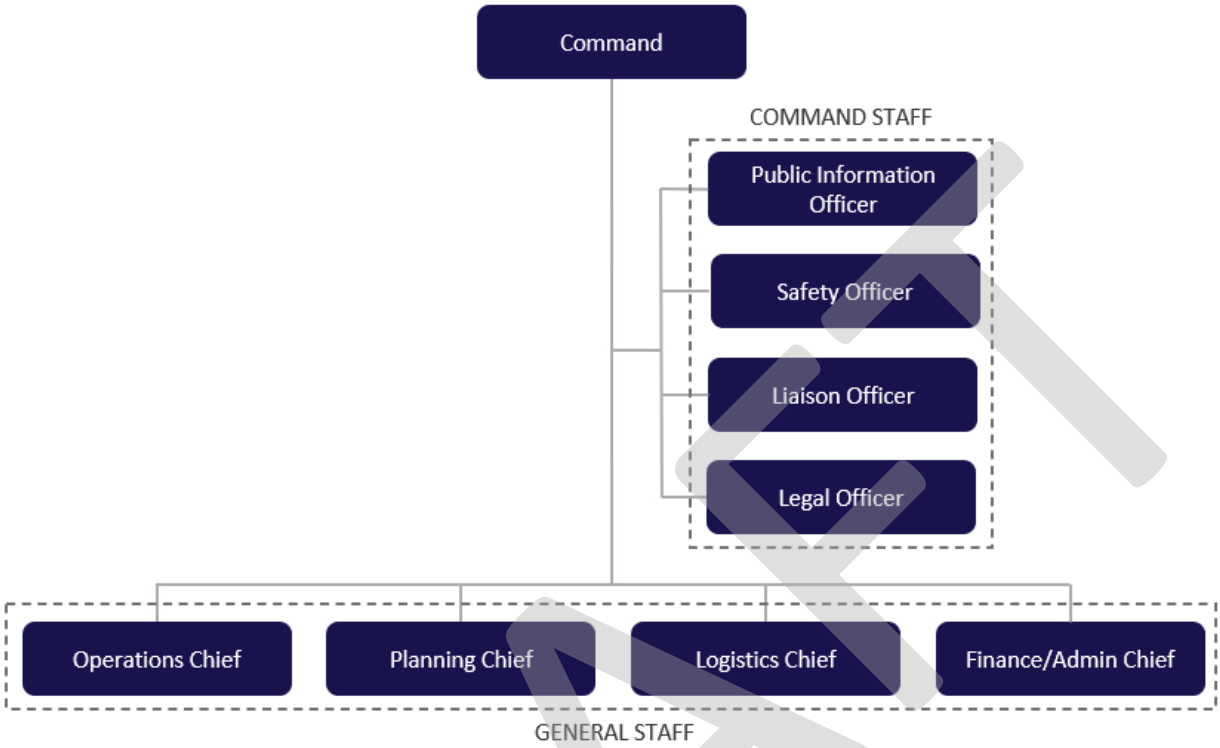


Figure 2. Standard organizational structure for Incident Command System, including Command, Command Staff, and General Staff.

1.3.3 ICS Forms

To support ICS operations, a series of standardized forms are available from the FEMA EMI website: (https://training.fema.gov/emiweb/is/icsresource/icsforms/) to use as provided or as a baseline to develop species-specific forms. These forms can be used as is or modified to meet incident needs.

1.3.4 ICS Situational Reports

Situational Reports (SitReps) will be used to communicate activities and accomplishments of the ICS for each operational period. SitReps will include a summary of actions taken, funding allocations, detection events, fish sampling efforts, and other relevant information for dissemination among ICS participants, tribal co-managers, state and federal partners, the Governor's Office, and interested state or Congressional Legislators. This information will be solicited from Responding Entity Leads at the conclusion of each operational period using a Status Summary Report template (e.g., ICS Form 209)[3]. SitReps are not public-facing reports. Instead, Public Affairs will synthesize information ascertained from the SitReps into a public-facing outreach report to be posted on the WDFW website.

[3] All communications to and from the WDFW are subject to Public Disclosure Requests

1.3.5 Termination of ICS

An Incident Commander or a Unified Command, as applicable, has the authority to terminate the incident when deemed appropriate. This may include returning to baseline prevention and early detection or the establishment of a long-term management plan. Key milestones that may influence this decision are eradication, containment, or control of Northern Pike without need for further management action, or when long-term monitoring and suppression activities are established.

1.4 Rapid Response Oversight

1.4.1 Command

In the event an ICS is initiated, an Incident Commander or Unified Command (Section 5.1.1) will be established depending on whether there is a single or multiple jurisdictions associated with the waterbody from which a Northern Pike was captured. If the incident occurs in a waterbody within a single jurisdiction (i.e., where one organization or agency has the authority and/or resources to manage the incident on its own) an Incident Commander is designated. In situations where there are multiple jurisdictions, a Unified Command is generally designated comprising Commanders from each agency or organization with jurisdictional authority. In situations where there are five or more jurisdictional authorities, those entities will need to determine how large the Unified Command can be to remain effective. In most cases, only the most critical jurisdictions should be on the Unified Command and the rest represented on the Multi-Agency Coordination Group.

1.4.2 Multi-Agency Coordination Group

In addition to ICS implementation, a non-field-based Multi-Agency Coordination (MAC) Group should be convened by Command to implement ICS protocols together. MAC Groups act as a policy-level body supporting resource prioritization and allocation while enabling decision-making among elected and appointed officials with Command. Specifically, the MAC Group allows for input from other local, state, tribal, and federal agencies that have legal responsibility for the protection of natural resources to establish priorities among multiple competing incidents, provide coordinated decision-making for resource allocation, harmonize agency policies, and offer strategic guidance and direction to support Rapid Response Activities. MAC Groups should consist of administrators or executives, or their designee, who are authorized to commit agency resources and funds. A full list of entities that have fisheries management responsibilities and their associated waterbodies is provided in APPENDIX A.

1.5 Funding Considerations

Resources to support Rapid Response Activities (initial 6 weeks of response) in a focal waterbody will be requested from entities with fisheries management responsibilities or other interested stakeholders. Depending on the involved entities, these funds would likely need to be directly related to aquatic invasive species management plans, other related activities (e.g., Northern Pikeminnow removal funds, eDNA budgets), or federal funds such as from the Water Resource Development Act. If the WDFW Director finds that current resources are not sufficient to meet response needs, they will request the governor to order emergency measures to prevent or abate the prohibited species under RCW 77.135.090 and make available associated emergency funding to support these efforts. Additional funding sources for Extended Response Activities (i.e., eradication, containment, or long-term

management) should be researched and coordinated by ICS staff and MAC Group members throughout the response process.

2 Invasive Northern Pike in the State of Washington

2.1 Northern Pike Regulations

WDFW classifies prohibited species according to three levels:

- Level 1: High invasive risk and a priority for prevention and expedited rapid response management actions.
- Level 2: High invasive risk and a priority for long-term infested site management actions.
- Level 3: Moderate to high invasive risk and may be appropriate for prevention, rapid response, or other prohibited species management plan actions.

Northern Pike is classified as a Level 1 prohibited species under WAC 220-640-030. This classification indicates that Northern Pike are considered to have a high risk of becoming an invasive species and may not be possessed, introduced into state waters, or trafficked except as provided under RCW 77.135.040. The unlawful use of a prohibited aquatic animal species is a gross misdemeanor and a second violation within five years is a class C felony. In addition to criminal penalties, a court may order a person to pay all costs in capturing, killing, or controlling the invasive species, including its progeny. WDFW may also bring a separate civil action to recover habitat restoration costs necessitated by the person's unlawful use of invasive species (RCWs 77.15.250, 77.15.809, 77.15.811).

2.2 Waterbody Classification

Waterbody classification is based on the detection history of Northern Pike and is adapted from the guidelines set forth by the Western Regional Panel on Aquatic Nuisance Species (WRP 2020). A waterbody is defined as body of water forming a physiographical feature, for example a lake or a reservoir, but may include jurisdictional or managerial divisions where appropriate such as on sovereign tribal or federal waters or based on the species' habitat.

- **Status Unknown** – Waterbody has not been monitored.
- **Undetected/Negative** – Waterbody sampling/testing is ongoing and nothing has been detected, or nothing has been detected within the timeframes for de-listing.
- **Inconclusive** (temporary status) –Waterbody has not met the minimum criteria for verified suspect detection and no physical specimen collected. Verification Sampling is initiated (Section 4.3).
- **Suspect** – Waterbody that has met the minimum criteria for likely detection of Northern Pike by a single verified detection (e.g., at least two independent positive confirmations of a single eDNA sample, or conclusive photographic or video evidence), but no physical Northern Pike specimen has been captured. Verification Sampling is continued (Section 4.3). Rapid Response may be considered but is not recommended without a physical specimen.
- **Positive** – Multiple (2 or more) verified detections from subsequent sampling events meeting Suspect classification plus at least one Northern Pike specimen is verified using scientifically accepted techniques (e.g., DNA analysis, taxonomic identification). Rapid Response is initiated (Section 5)**.**
- **Infested** – A waterbody has an established population of Northern Pike based on evidence of a reproducing population such as multiple age classes.

Waterbody classification is primarily a tool for consistent communication of Northern Pike detection status and a guide to what management actions should be considered. A waterbody will not be considered positive or infested until a verified Northern Pike specimen is collected.

2.2.1 Waterbody Reclassification to Undetected/Negative

In situations where a waterbody was initially verified as inconclusive, suspect, positive, or infested and subsequent management actions no longer detect Northern Pike, a waterbody may be reclassified to Undetected/Negative (i.e., de-listed) after additional sampling and/or eradication or suppression has occurred. The protocol to reclassify a waterbody to Undetected/Negative depends on the initial waterbody classification and is defined in Table 2.

Table 2. Criteria required to reclassify a waterbody to Undetected/Negative based on the initial waterbody classification.

Initial Classification	Criteria for Reclassification to Undetected/Negative
Inconclusive	1 year of negative testing including at least one negative eDNA sample collected in the same month of the subsequent year as the previous inconclusive sample and no Northern Pike collected.
Suspect	3 years of negative testing and no Northern Pike collected.
Positive	5 years of negative testing and no Northern Pike collected.
Infested	Following a successful eradication or extirpation event as determined by a minimum of 5 years post-event testing and monitoring with negative results and no Northern Pike collected.

2.3 Washington State Natural Resource Agencies with Invasive Species Roles

The entities in this section will be relied upon to handle various aspects of a response to a Northern Pike introduction or establishment. Each entity's unique role regarding Northern Pike is described below.

Washington Invasive Species Council

The Washington Invasive Species Council (WISC), created in 2006 by the Legislature is administered by the Washington Recreational and Conservation Office. It is tasked with policy-level direction, planning, and coordination for combating harmful invasive species throughout the state and preventing the introduction of others that may be potentially harmful. WISC is comprised of twenty-one members representing federal, state, and local agencies, Eastern and Western Washington Tribes, and nonprofit organizations.

Washington Department of Fish and Wildlife

Charged with managing wildlife by preventing the depletion of indigenous species while providing optimum recreational benefits, WDFW is the lead state agency tasked with managing invasive animals, excluding pests, domesticated animals, livestock managed by the Department of Natural Resources, and mosquito and algae control and shellfish sanitation managed by the Department of Health. Primary lead agency responsibilities include developing and implementing invasive species programs, establishing and maintaining outreach and education programs, managing invasive species, providing technical assistance, researching and developing management tools and standards to decontaminate aquatic conveyances, and controlling or eradicating invasive species.

Washington Department of Ecology

The Washington Department of Ecology (ECY) is the delegated authority for National Pollutant Discharge Elimination System (NPDES) permitting in the State of Washington, which provides for the use of chemical treatments of waters of the state to manage AIS.

Washington State Department of Agriculture

The Pesticide Management Division of the Washington State Department of Agriculture (WSDA) is responsible for ensuring that pesticides are used safely and legally. To accomplish this responsibility, WSDA registers pesticides, licenses pesticide applicators, and investigates complaints of possible misuse. These duties are performed under the authority of the Washington Pesticide Control Act (RCW 15.58), the Washington Pesticide Application Act (RCW 17.21), and the General Pesticide Rules (WAC 16-228). WSDA is the lead authority for regulating pesticides in the State of Washington.

Washington Department of Natural Resources

The Washington Department of Natural Resources (WDNR) manages an AIS Program.[4] The goals of this program are to (1) preserve the value and ecological integrity of state-owned aquatic lands by eliminating small noxious weed infestations through Early Detection and Rapid Response, (2) to eradicate or reduce large-scale infestations to a scale that no longer threatens fish and wildlife habitat, native plants, agriculture, industry, and other ecological and human values, (3) to restore aquatic lands where possible, (4) to increase public awareness about sustainable natural resource management and the value of aquatic lands to Washington's communities and economy, and (5) to build partnerships within DNR and with individuals, organizations, and governments to leverage efforts to achieve a shared vision of healthy habitats for all living creatures, including humans.

2.4 Tribal Fisheries Coordinating Bodies in Washington

There are three major tribal fisheries coordinating bodies in the State of Washington. The Columbia River Inter-Tribal Fish Commission (CRITFC) and the Upper Columbia United Tribes (UCUT) support waterbodies in the Columbia River Basin, whereas the Northwest Indian Fisheries Commission (NWIFC) supports Puget Sound and other western Washington waterbodies.

CRITFC member tribes include the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Nez Perce Tribe. CRITFC's mission is "ensuring a unified voice in the overall management of the fishery resources." Its staff of legal experts, biologists, hydrologists, enforcement officers, and public information specialists supports fisheries management, fishery science, fisheries enforcement, policy development, outreach, and watershed restoration. The CRITFC AIS Coordinator collaborates with federal, state, and local government partners on a variety of invasive species issues through forums, such as the Western Regional Panel, state invasive species councils, Pacific Northwest Economic Region, and the 100th Meridian Initiative Columbia River Basin Team.

[4] https://www.dnr.wa.gov/programs-and-services/aquatics/habitat-conservation/invasive-species-control

UCUT member tribes include the Coeur d'Alene Tribe of Indians, the Confederated Tribes of the Colville Reservation, the Kalispel Tribe of Indians, the Kootenai Tribe of Idaho, and the Spokane Tribe of Indians. UCUT's mission is to "unite Upper Columbia River Tribes for the protection, preservation, and enhancement of Treaty/Executive Order Rights, sovereignty, culture, fish, water, wildlife, habitat and other interests and issues of common concern in our respective territories through a structured process of cooperation and coordination for the benefit of all people." UCUT takes a proactive, collaborative, and science-based approach to promoting fish, water, wildlife, diverse habitat, and Indian culture in the Northwest. In 2021, UCUT began hosting the Northwest Regional Northern Pike Coordination Forum to share information and collaborate with other fisheries managers, researchers, and the public on Northern Pike information, management strategies, and actions. UCUT members either have or are in the process of determining Northern Pike AIS Coordinators, are developing Northern Pike Rapid Response Plans, and are securing funds for implementing rapid responses. UCUT continues to be proactive co-managers and members of the community committed to addressing preventative actions aimed at stopping the downstream advance of Northern Pike.

NWIFC is a natural resources management support service organization for 20 treaty Indian tribes in western Washington. NWIFC member tribes include Lummi, Nooksack, Swinomish, Upper Skagit, Sauk-Suiattle, Stillaguamish, Tulalip, Muckleshoot, Puyallup, Nisqually, Squaxin Island, Skokomish, Suquamish, Port Gamble S'Klallam, Jamestown S'Klallam, Lower Elwha Klallam, Makah, Quileute, Quinault, and Hoh. The NWIFC assists member tribes in their role as natural resources co-managers, providing direct services to tribes in areas such as biometrics, fish health, and salmon management. It provides a forum for tribes to address shared natural resources management issues and enables the tribes to speak with a unified voice. The NWIFC could play a crucial role in coordinating a multi-tribal response to illegal introduction of Northern Pike into the Puget Sound and/or coastal areas of Washington.

2.5 History of Northern Pike Management

Established populations of Northern Pike in the State of Washington are currently limited to the Columbia River upstream of Grand Coulee Dam (i.e., Lake Roosevelt), Spokane River, Pend Oreille River, and Lake Washington (Figure 3). These populations occur in WDFW Regions 1 and 4. Additionally, three populations of Northern Pike have been eradicated from state waters (Figure 3).

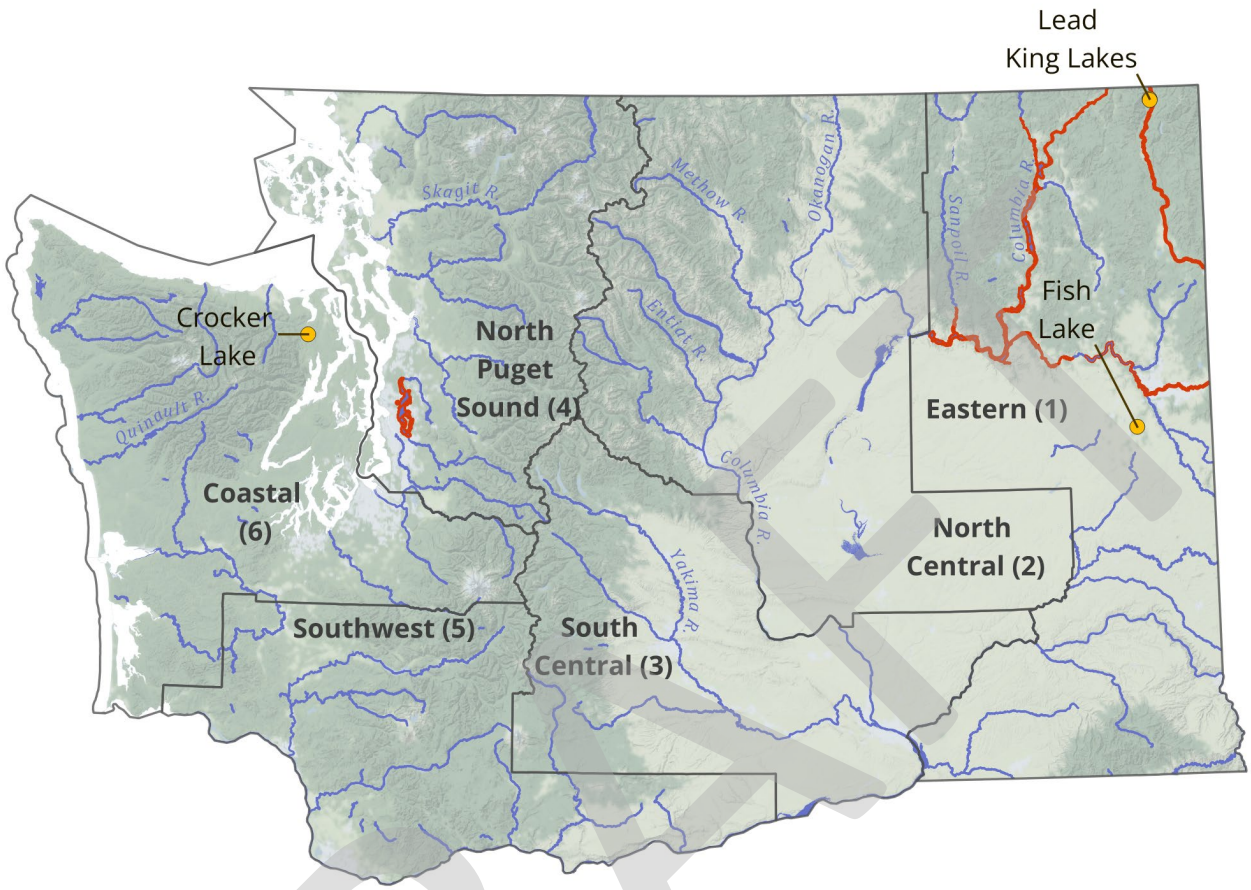


Figure 3. The distribution of established (red) and eradicated (orange) populations of Northern Pike in the State of Washington and the associated Washington Department of Fish and Wildlife management regions.

2.5.1 Eradications

Northern Pike have been detected and subsequently eradicated in three State of Washington lakes (Table 3). In all cases, lakes were treated with rotenone (Section 6.1.1).

- Upper and Lower Lead King lakes (Pend Oreille County)
- Fish Lake (Spokane County)
- Crocker Lake (Jefferson County)

Table 3. Overview of historical Northern Pike eradication efforts in the State of Washington.

Year	Waterbody	County	Volume (Ac-Ft)	Quantity	Rotenone Concentration	Detoxification Time	Application Method
2012	Fish Lake	Spokane	1357	54 gal CFT[1] + 8,621 lbs of powder	3.6 ppm	4.5 months[2]	Boat
2015	Upper Lead King Lake	Pend Oreille	110.5	129 gal + 5 lbs of powder	3.6 ppm	1.5 months	Helicopter, Backpack Spray
2015	Lower Lead King Lake	Pend Oreille	65.8	77 gal + 5 lbs of powder	3.6 ppm	5.5 months[2]	Helicopter, Backpack Spray
2015	Beaver Pond adjacent to Lead King Lakes	Pend Oreille	3.4	4 gal CFT	3.6 ppm	5.5 months[2]	Helicopter, Backpack Spray
1998	Crocker Lake	Jefferson	ND[3]	ND	ND	ND	ND

Notes:
1. CFT –Liquid CFT Legumine EPA Reg # 75338-2; Rotenone Cube powdered Fish Toxicant EPA Reg # 6458-6
2. Ice-over prevented bioassays from being conducted during winter months, thus detoxification time is a maximum estimate.
3. No Data (ND)

2.5.2 Suppression Efforts

Established populations of Northern Pike exist within Columbia, Spokane, and Pend Oreille rivers in the State of Washington, and eradication is not feasible due to size and unacceptable negative impacts on non-target fish species. Thus, long-term management and suppression programs have been established on each of these waters. A summary of programs is listed in Table 4.

Table 4. Overview of Northern Pike suppression in the State of Washington.

Project Years	Waterbody	Site	Organizations	Suppression Methods	Project Season	References
2012-Present	Pend Oreille River	Box Canyon Reservoir	Kalispel Tribe of Indians, WDFW	Gill nets, fishing derbies[1]	February-April	a
2016-Present	Pend Oreille River	Boundary Reservoir	Kalispel Tribe of Indians, WDFW	Gill nets	February-April	a
2020-Present[2]	Spokane River	Lake Spokane	WDFW	Gill nets	March-June	b
2015-Present	Columbia River	Lake Roosevelt	Confederated Tribes of the Colville Reservation, Spokane Tribe of Indians, WDFW	Gill nets, electrofishing, seine nets, fyke nets, setlines, reward program	February-November	b

Notes:
1. Fishing derbies ended in 2013.
2. Gillnetting efforts from 2017-2019 targeted Common Carp *Cyprinus carpio carpio*, during which Northern Pike were removed when encountered by Spokane Tribe of Indians, Avista, and WDFW.
References:
a. https://wdfw.wa.gov/species-habitats/invasive/esox-lucius
b. https://www.cct-fnw.com/northern-pike

2.5.3 Monitoring and Research

Annual monitoring programs of Northern Pike populations within the State of Washington are summarized in Table 5.

Table 5. Overview of historical Northern Pike monitoring and research in the State of Washington.

Project Years	Waterbody	Site	Organizations	Monitoring Methods	Season	References
2005-Present[1]	Pend Oreille River	Box Canyon Reservoir	Kalispel Tribe of Indians, WDFW	Gill nets	May	a
2005-Present[2]	Pend Oreille River	Boundary Reservoir	Kalispel Tribe of Indians, WDFW	Gill nets	May	a
2001; 2015[3]	Spokane River	Lake Spokane	Spokane Tribe of Indians, WDFW	Gill nets, electrofishing, fyke nets	March; November	b
2022-Present	Spokane River	Little Falls Pool	Spokane Tribe of Indians, WDFW	Gill nets	March; November	c
2015-Present	Columbia River	Lake Roosevelt	Confederated Tribes of the Colville Reservation, Spokane Tribe of Indians, WDFW	Gill nets, eDNA, DNA, microchemistry, stranding surveys, angler creel survey, telemetry, diet study, age, and growth	March; November	c
2017-Present	Lake Washington	Lake Washington	Muckleshoot Indian Tribe, WDFW	Gill nets, trap nets, boat electrofishing	Various[4]	d

Notes:
1. Standardized Spring Pike Index Netting (SPIN) survey methods began in 2010.
2. Standardized Spring Pike Index Netting (SPIN) survey methods began in 2016.
3. Annual Common Carp removal efforts have been conducted since 2017, and creel surveys were conducted by Avista in Lake Spokane March-November in 2011, 2016, 2018, 2020, and 2022.
4. Test Fishery (April-June); Ship canal (April-July); South half (February-April); North half (March-June); Whole lake (September-October)

References:
a. https://wdfw.wa.gov/species-habitats/invasive/esox-lucius
b. Osborne R.S., Divens, M.J., and Baldwin C. 2003. 2001 warmwater fisheries survey of Lake Spokane, Spokane and Stevens Counties, Washington. Washington Department of Fish and Wildlife. Olympia, Washington.
c. https://www.cct-fnw.com/northern-pike
e. Annual Co-Manager's List of Agreed Fisheries (wdfw.wa.gov)

3 Prevention

3.1 Invasion Pathways

A comprehensive study of invasion pathways was not conducted for this Plan. However, generically the likely invasion pathways in the State of Washington include:

Columbia River:

- Downstream volitional expansion from Lake Roosevelt via Rufus Woods Reservoir
- Downstream volitional expansion from Lake Roosevelt via adjacent lakes, reservoirs, and irrigation channels (e.g., Banks Lake, Moses Lake, Potholes Reservoir, Crab Creek)
- Illegal introductions (human transport)

Cedar-Sammamish watershed (i.e., Water Resource Inventory Area [WRIA]-8):

- Volitional expansion from Lake Washington
- Illegal introductions (human transport)

Rest of State:

- Illegal introductions (human transport)

Key monitoring locations to maximize early detection near known populations include tributary mouths, irrigation channel inlets, hydropower facilities, and lakes and reservoirs adjacent to the infested waterbodies.

3.1.1 Expected Habitats

Primary Northern Pike habitat has been identified as habitat with maximum depths ≤12.2 m and slopes ≤23.9°; however, Northern Pike have been captured at depths up to 30 m (CTCR et al. 2018). Rivers with low velocity stream reaches or access to backwater sloughs with aquatic vegetative communities are likely conducive to Northern Pike establishment after introduction.

3.2 Outreach

Public awareness can increase the likelihood that the public will assist with early detection of new Northern Pike introductions. Effective outreach campaigns can also help prevent further illegal introductions. WDFW participates in several outreach campaigns. Key methods include stickers, hosting booths at boat shows, installing Northern Pike signs at water access sites throughout the State of Washington, and paid advertisements on social media outlets. Some examples of signs, stickers, and pamphlets commonly distributed can be found in APPENDIX B.

Public outreach is a critical component of a successful invasive species prevention and response plan. The Public Information Officer designated by the ICS should lead public outreach efforts. One of the key duties of this role is to correct and prevent the dissemination of false information. Typical information provided to the public regarding the nature and status of a new invasion includes:

- Information about Northern Pike
- The current understanding of its new distribution
- When it was first detected in the waterbody
- Its likely origin, if known

- The risks it poses to local fisheries
- Potential control options in consideration
- Likelihood of success of control options
- Potential interruptions to local fisheries

3.3 Law Enforcement

If an illegal Northern Pike introduction is suspected (e.g., presence detected in waters with no surface water connection to known populations) in state-managed waterbodies, WDFW law enforcement should be contacted at WILDCOMM@dfw.wa.gov or 360-902-2936, Option 1. WDFW Enforcement Officers are primarily responsible for enforcing RCW Title 77. RCW 77.15.250 specifies that knowingly releasing, planting, possessing, or placing Northern Pike within the state is a class C felony. The law also specifies that WDFW shall order a guilty person to pay all costs incurred in capturing, killing, or controlling the fish or its progeny, which does not affect the existing authority of WDFW to bring a separate civil action to recover these costs or the costs of habitat restoration necessitated by the felony action.

4 Early Detection

Early detection of Northern Pike in a waterbody may provide managers with more options to prevent further spread and reduce harm. Detections may come from the public or from routine monitoring efforts conducted by fisheries experts. Given the variety of sources and levels of expertise, rigorous detection verification should always occur.

4.1 Reporting Protocol for Alleged Detection

In the State of Washington, there are three key avenues for reporting sightings of all AIS, including:

- The WDFW AIS hotline 1-888-WDFW-AIS
- The WISC online AIS reporting form found at invasivespecies.wa.gov or smartphone app ('WA Invasives')
- Email the WDFW AIS Coordinator at ais@dfw.wa.gov

This information is also available on WDFW's invasive species website (wdfw.wa.gov/species-habitats/invasive). Additionally, all WDFW Regional offices will accept AIS reports (https://wdfw.wa.gov/about/regional-offices).

The following information should be communicated for all reported detections:

- Name, agency, and contact information of the person making the report
- Date and time of the report
- Date and time of the sighting(s)
- Details of the location of the suspected detection
  - State
  - County
  - Name/ description of the waterbody
  - GPS coordinates (if possible)
  - Landmarks, highway mile, and other identifying details
- Digital or other photographs or video (with scale indicator and multiple angles)
- A detailed description of organism (size, coloration, behavior, etc.)

WDFW maintains a centralized data repository of eDNA sample results and an internal aquatic invasive animal database. Each year, these data get reviewed and vetted, and follow-up inquiries are made as necessary.

4.2 Routine Monitoring

Routine monitoring in Undetected/Negative waterbodies is classified into two categories: 1) explicit efforts to detect Northern Pike, and 2) monitoring of species other than Northern Pike that may result in a Northern Pike detection.

4.2.1 Routine Northern Pike-Specific Monitoring in Undetected/Negative Waterbodies

Annually, WDFW prioritizes waterbodies for eDNA monitoring based on an assessment of relative risk of introduction and potential establishment of zebra and quagga mussels, in which they also analyze samples for Northern Pike DNA (personal communication, Jesse Schultz April 2023; WDFW 2022).

Sampling occurs across the state (APPENDIX C; Figure 4) and results are stored in a centralized data repository. Other entities contributing to these data currently include Public Utility District No. 2 of Grant County, Public Utility District No. 1 of Chelan County, Public Utility District No. 1 of Douglas County, and the Confederated Tribes of the Colville Reservation. If other entities conduct eDNA sampling for Northern Pike and wish to contribute to this centralized data repository, please contact the WDFW AIS Coordinator at ais@dfw.wa.gov.

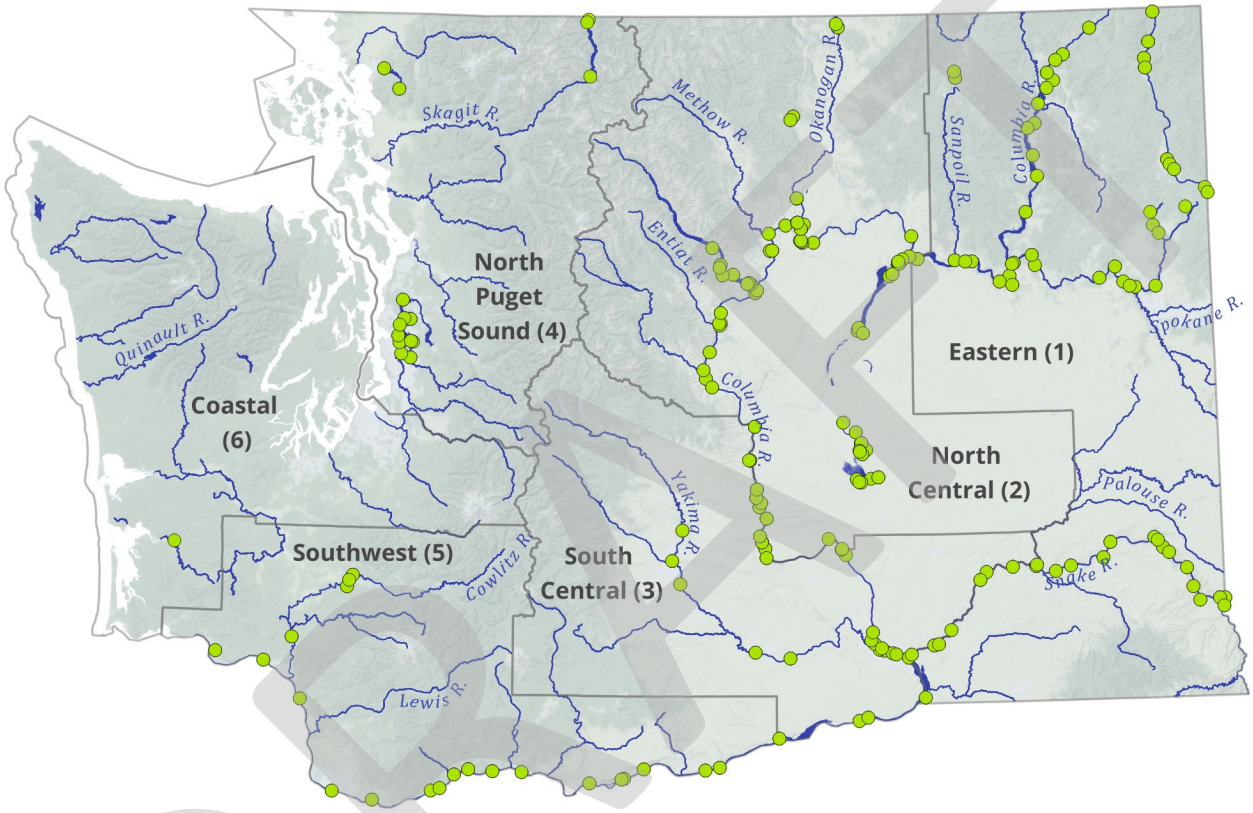


Figure 4. Routine Northern Pike eDNA sampling locations throughout the State of Washington.

4.2.2 Other Routine Fish Monitoring

Routine fish monitoring for species other than Northern Pike may result in a Northern Pike detection. Examples include long-term monitoring programs, fish community surveys, hatchery broodstock collection efforts, creel surveys, fishing derbies, fish counts at hydropower facility fish passage ladders, etc.

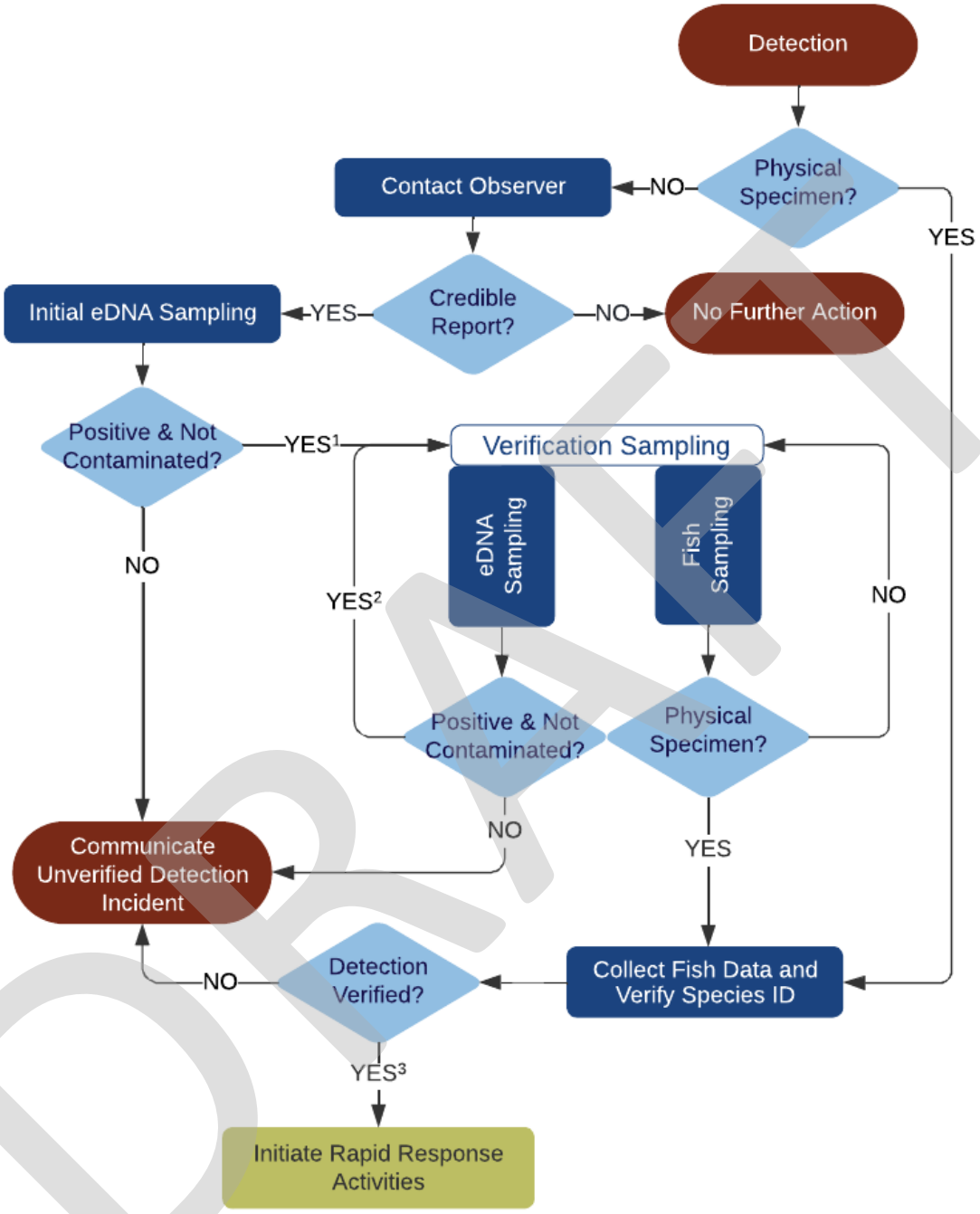
4.3 Detection Verification

Two types of detection data are expected from monitoring activities: direct and indirect. A direct detection enables an external entity with identification expertise to verify the fish identification (e.g., carcass in hand, photograph, or fish count video). While a photograph or fish count video provides evidence to verify fish identification, the certainty of the evidence should be evaluated prior to initiating ICS for a rapid response. If the quality of the image is adequate to conclusively verify species identity and/or if eDNA data support the presence of Northern Pike, initiation of ICS for a rapid response may be considered. By contrast, indirect detections do not enable external entities to immediately verify fish identification (e.g., visual sighting or single positive eDNA result).

A positive Northern Pike eDNA result (as separate from a Positive waterbody classification) is any result that is not 0/3.[5] A result of 0/3 means no DNA was detected. A result of 1/3 or 2/3 indicates that a small amount of DNA was detected. These results should be interpreted with caution as DNA contamination can easily occur while collecting samples and animals can move DNA throughout the environment. A result of 3/3 typically means that a substantial amount of DNA was detected, and Northern Pike are likely present but evidence does not yet support a positive waterbody classification.

Waterbody classification based on Northern Pike detection history is provided in Section 2.2. Prior to verification of a detection, the waterbody will be classified as Inconclusive. Following verification, the waterbody classification will change to either Suspect or Positive. An overview of the detection and verification process is depicted in Figure 5.

[5] Each eDNA sample is analyzed in three replicate wells and results are provided as the number of wells with positive amplification out of the total wells analyzed (i.e., # positive amplification out of 3 total wells).



Notes:
1. The waterbody classification will change to Inconclusive with one positive eDNA result. Verification Sampling should continue for 1 year of all negative results with no Northern Pike captured to be reclassified to Undetected/Negative. Sampling frequency should be determined by the involved entities based on the circumstances of the incident.
2. The waterbody classification will change to Suspect with two or more positive eDNA results and a Notification of Suspected Northern Pike should be sent to entities with fisheries management responsibilities. Verification Sampling should continue for 3 years of all negative results with no Northern Pike captured to be reclassified to Undetected/Negative.
3. The waterbody classification will change to Positive, and a Notification of Positive Northern Pike should be sent.

Figure 5. Overview of Northern Pike Detection Verification Process.

4.3.1 Verification of a Physical Specimen

1. Collect the following data from Northern Pike carcass (Northern Pike Capture worksheet in APPENDIX D):

    a. Photo
    b. Total length (mm)
    c. Weight (g)
    d. Sex
    e. Otolith
    f. DNA tissue sample

2. Verify species identification.

    a. Send photo to ais@dfw.wa.gov, upload to the WISC online AIS reporting form, and, if available, deliver fish carcass to the nearest WDFW office. Here, two independent fisheries experts shall:

        i. determine if the specimen is a Northern Pike using keying characteristics (APPENDIX E) and
        ii. ensure all fish data properly collected (APPENDIX D).

4.3.1.1 Verification of a Physical Specimen Decision Tree

- If both fisheries experts verify that the specimen is a Northern Pike, then initiate Rapid Response Activities (Section 5). In this instance, the waterbody will be classified as Positive and a Notification of a Positive Northern Pike waterbody will be sent by WDFW (Section 4.4).
- If the specimen is not verified to be a Northern Pike, then make an Unverified Detection Incident Report (Section 4.4). If no associated positive eDNA results, the waterbody would remain in an Undetected/Negative status because the collected specimen can be confirmed not to be a Northern Pike.
- If there is disagreement between fisheries experts, a third fisheries expert shall be consulted to make the conclusive determination.

4.3.2 Verification of a Detection without a Physical Specimen

- If a Northern Pike observation is reported to an entity other than WDFW or WISC, the recipient of the observation report shall ensure that the information is reported to WDFW or WISC (Section 4.1).
- Once a Northern Pike observation is reported to WDFW or WISC (Section 4.1), the WDFW AIS Coordinator will contact the person who made the report to verify:
    - Date of observation
    - GPS Location or, if unavailable, a description of the general location
    - That observation was of a Northern Pike versus commonly confused species (e.g., Redfin Pickerel *E. americanus americanus* or Tiger Muskellunge *E. masquinongy x E. lucius;* APPENDIX E)

    – If the report is deemed credible by the WDFW or WISC representative, coordinate the collection of an initial eDNA Sample (if not already collected by an eDNA station).

- If the initial eDNA sample returns a positive result, the entity who collected the sample shall complete the following steps:
  - If a control sample is available, confirm there was no evidence of contamination.
  - If no contamination is evident or there was no control, the entity shall conduct Verification Sampling (Section 4.3.3). If the entity cannot conduct Verification Sampling internally, WDFW should be notified via ais@dfw.wa.gov to coordinate Verification Sampling.
- If the initial eDNA sample returns a negative result, communicate Unverified Detection Incident (Section 4.4).

– If the report is not credible, no further action is required.

4.3.3 Verification Sampling (within 48 hours of indirect detection)

An overview of the Verification Sampling process is depicted in Figure 5. Verification Sampling should be executed within 48 hours of the positive eDNA result and occur within 250 m upstream and downstream (streams) or in opposing directions (lakes) of the reported detection location. Verification should always include eDNA sampling but may also include fish sampling depending on the habitat, environmental conditions, and available permits. The entity that collected the initial eDNA sample is responsible for conducting or coordinating Verification Sampling.

4.3.3.1 eDNA Sampling Protocol

1. Using the standard protocol of the entity conducting the sampling, five eDNA samples should be collected from the immediate area.

   In streams or reservoirs with detectable flow, one sample from each of the following locations relative to the detection location:

   a. Site of detection
   b. 100 m upstream
   c. 250 m upstream
   d. 100 m downstream
   e. 250 m downstream

   In lakes or ponds with no detectable flow, samples should be collected in opposite directions away from the site of detection.

2. Samples should be preserved and shipped overnight to the eDNA processing lab used by the entity conducting the sampling.

4.3.3.2 Fish Sampling Protocol

- Fish sampling should include at least two of the sampling gear types listed in Section 7.1 for Verification Sampling. Appropriate gear types will vary depending on site conditions (e.g., water depth, flow, substrate) and other constraints such as presence of ESA-listed species or permit availability at the detection location.
  - Ideally, sampling would occur within 500 m of the detection location. However, if habitat attributes, land access, or permitting are restrictive in the detection location, sampling

should be conducted in preferred-type Northern Pike habitat as close to the detection location as feasible.
  - Expected effort is annotated in Section 7 and the data collection worksheets in APPENDIX D.

4.3.3.3 Verification Sampling Decision Tree

- If Verification Sampling produces all negative eDNA results and no observations of Northern Pike during fish sampling, make an Unverified Detection Incident Report (Section 4.4). Verification Sampling should be repeated for 1 year with all negative results and no Northern Pike captured to reclassify the waterbody as Undetected/Negative. Sampling interval should be determined by the involved entities based on the circumstances of the incident.
- If Verification Sampling produces at least one positive eDNA result (1/3, 2/3, or 3/3) but no Northern Pike specimens are collected, report detection results (Section 4.1) and conduct or coordinate monthly eDNA Verification Sampling at the site for a minimum of 3 years. At this point, the waterbody would be classified as Suspect and a Notification of Suspected Northern Pike should be sent by WDFW (Section 4.5).
  - The waterbody will remain in Suspect status until a Northern Pike is collected (changes to Positive) or after 3 years of negative testing with no Northern Pike collected (changes to Undetected/Negative; Section 2.2.1).
- If a Northern Pike is captured, conduct Verification of a Physical Specimen (Section 4.3.1).

4.4 Unverified Detection Incident Reports

Unverified Detection Incident Reports provide an opportunity to identify trends and patterns that might indicate presence of Northern Pike at low abundance that might otherwise be missed (e.g., increased frequency of unverified detections, spatial patterns that suggest presence at low abundance). Thus, it is recommended that every Unverified Detection Incident be declared to the WDFW AIS Coordinator (ais@dfw.wa.gov).

Critical information to include in an Unverified Detection Incident Report includes:

- Date of reported Unverified Detection
- Method(s) of Unverified Detection (e.g., eDNA, angler report, sighting)
- Location of Unverified Detection (waterbody name and GPS coordinates)
- Summary of Verification Sampling conducted
- Declaration of unverified detection

4.5 Notification of Suspected Northern Pike

Should a waterbody classification change to Suspect from either Undetected/Negative or Inconclusive, a notification will be sent out to all entities with fisheries management responsibilities in the State of Washington (APPENDIX A). A Notification of Suspected Northern Pike template is provided in APPENDIX F to assist with communications. Critical information to include in the Notification of Suspected Northern Pike includes:

- Date of first positive detection

- Method(s) of detection (e.g., eDNA)
- Dates of subsequent positive detections
- Locations of all positive detections (waterbody name and GPS coordinates)
- Summary of Verification Sampling conducted
- Summary of planned monitoring, to include type of sampling, entity conducting sampling, and a point of contact

4.6 Notification of Positive Northern Pike Waterbody

Should a waterbody classification change to Positive (i.e., a verified Northern Pike is captured), a notification will be sent out to all entities with fisheries management responsibilities in the State of Washington (APPENDIX A). A Notification of Positive Northern Pike template is provided in APPENDIX F to assist with communications. Critical information to include in the Notification of Positive Northern Pike is:

- Date of first positive detection
- Method of detection(s) (e.g., capture, eDNA, observation)
- Date Northern Pike captured
- Location where Northern Pike was captured (waterbody name and GPS coordinates)
- Picture(s) of specimen
- Attestation that two independent fisheries experts identified specimen as a Northern Pike
- Attestation that ICS has been requested and that rapid response is being coordinated

In addition, a public notice will be generated by the WDFW Public Information Officer. All verified detections of AIS are reported to the national U.S. Geological Survey (USGS) aquatic invasive database (https://nas.er.usgs.gov/) by WDFW.

5 Rapid Response Activities

The intent of the Rapid Response Activities is to identify Northern Pike colonization or range expansion events within a short period of time (6 weeks). The following sampling schemata were developed to confirm the presence of one or more Northern Pike in a new waterbody and to determine if Northern Pike are localized or expanding into connected waterbodies. Understanding the extent of a newly discovered invasion will be essential to determine requirements for Extended Response Activities.

The 6-week Rapid Response Activities include the following steps (Figure 1):

1. Week 1
    a. Request ICS (Section 5.1)
    b. Establish Command (Section 5.1.1)
    c. Send out Notification of Rapid Response (Section 5.1.2)
    d. Establish MAC Group and ICS Staff (Section 5.1.3)
    e. Conduct Initial Scoping (Section 5.2)
2. Weeks 2–6
    a. Conduct Range Delimitation and update ICS Type, as required (Section 5.3)
3. Week 6 (or sooner contingent on range delimitation effort required)
    a. Data Collation (Section 5.4)
    b. MAC Group meeting (Section 5.5)

5.1 Requesting ICS and Designating Rapid Response Leadership

Adherence to a clear and repeatable organizational structure will ensure that all Rapid Response Activities are coordinated effectively. As such, ICS should be requested immediately upon the verification of a captured Northern Pike specimen. Per Washington State Law (RCW 77.135.020), WDFW will be the lead agency for managing invasive species of the animal kingdom statewide unless the land is within tribal or federal lands. If a Northern Pike is detected on federal or tribal lands, ICS may still be requested from WDFW. To request ICS from WDFW, other entities should submit an ICS Request to WDFW at ais@wa.dfw.gov. The email should include the following details:

- Name and contact information for the entity that captured the Northern Pike specimen.
- Names and contact information for the entities that verified the specimen to be a Northern Pike.
- Date of Northern Pike capture.
- Location of Northern Pike capture (waterbody name, county, and GPS coordinates).
- Date of initial Northern Pike detection if different than capture date.
- Location of initial Northern Pike detection if different than capture location.
- A description of any Verification Sampling conducted and associated results.

Once received, the WDFW AIS coordinator will verify the information and, if appropriate, elevate the request to the AIS Unit Manager who will request ICS from the WDFW Director.

5.1.1 Establishing Command and Requesting Emergency Measures

If ICS is approved by the WDFW Director, an Incident Commander or the WDFW Representative Commander within a Unified Command will be assigned (Section 1.4.1). Additionally, the WDFW

Director will, in accordance with RCW 77.135.090, request the governor to order "emergency measures to prevent or abate the prohibited species" under RCW 43.06.010(14). If an emergency is declared, WDFW may consult the WISC to advise the governor regarding necessary emergency measures. According to RCW 77.135.090, WISC "must involve owners of the affected water body or property, state and local governments, federal agencies, tribes, public health interests, technical service providers, and environmental organizations, as appropriate."

If a Unified Command is required, the WDFW Representative Commander will identify Commanders from each applicable organization and form the Unified Command.

5.1.2 Notification of Rapid Response

Once ICS has been approved and Command (i.e., the Incident Commander or Unified Command) established, Command will send out the Notification of Rapid Response to all entities with fisheries management responsibilities (APPENDIX A). A Notification template is provided in APPENDIX F to assist with communications.

Simultaneously, the WDFW Communications Division will generate a press release to notify the public of Northern Pike presence, the initiation of Rapid Response Activities, and other associated information. Suggested information about a new invasion includes:

- Information about Northern Pike
- The current understanding of its new distribution
- When it was first detected in the affected waterbody
- Its likely origin, if known
- The risks it poses to local fisheries
- Potential control options in consideration
- Likelihood of success of control options
- Potential interruptions to local fisheries

5.1.3 Establishing the MAC Group and ICS Staff

Following Notification of Rapid Response, the Incident Commander or Unified Command, as applicable, will immediately convene a MAC Group (Section 1.4.2) and designate General and Command Staff according to Section 1.3.2. The Operations Chief (Section 5.1.3.1) will then designate Responding Entity Leads (Section 5.1.3.2) for specified waterbodies from selected applicable entities that have a combination of one or more of the following attributes: fisheries management authority, proximity to the affected waterbody, and/or the capability to provide staff, equipment, and other resources to support Rapid Response Activities. Each Responding Entity Lead will designate Field Leads (Section 5.1.3.3) from their organization, as applicable, to oversee sampling teams. All information should be provided to Command via the designated chain of command (Figure 6).

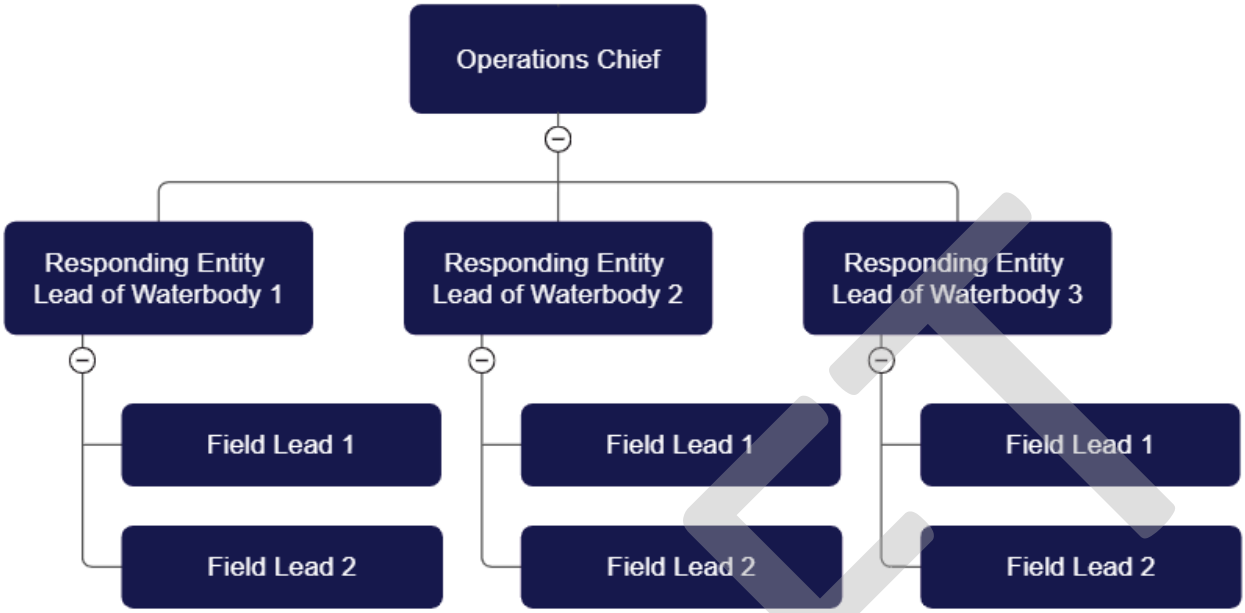


Figure 6. An example Rapid Response organizational chart for the scenario where there are detections in waterbodies spanning three jurisdictions.

5.1.3.1 Operations Chief Responsibilities

The Operations Chief is responsible for the following activities associated with a Rapid Response:

- Assure safety of tactical operations.
- Initiate and supervise the execution of operations portion of the Rapid Response.
- Manage the Rapid Response timeline, tracking the progress of Rapid Response sampling.
- Coordinate with Responding Entity Leads.
- Communicate to Command about the progress of Rapid Response efforts.
- Approve the release of resources.
- Provide guidance at decision points.
- Provide data from the Rapid Response sampling to the Planning Chief (Section 1.3.2).

5.1.3.2 Responding Entity Lead Responsibilities

The Responding Entity Lead is a designated point of contact responsible for the following activities associated with a Rapid Response:

- Designate Field Leads to conduct sampling according to guidance from the Operations Chief.
- Coordinate and manage individual Field Leads.
- Manage the timelines and track the progress of individual field campaigns.
- Summarize data collected from Field Leads and provide data to the Operations Chief.
- Participate in the stakeholder meeting discussion.

5.1.3.3 Field Lead Responsibilities

The Field Lead is responsible for managing a group of people designated to conduct Rapid Response sampling in assigned waterbodies. Field Leads are responsible for the following activities:

- Conduct sampling and collect data according to Rapid Response Activities (Section 5) in assigned waterbodies using data collection worksheets provided in APPENDIX D.
- Provide a summary of executed sampling protocols and data to the Responding Entity Lead by the end of the 6-week Rapid Response period.
- Support the Responding Entity Lead.

5.2 Initial Rapid Response Scoping

Initial scoping activities (Figure 7) should begin within 7 days of a verified Northern Pike capture, preferably sooner. These activities include a combination of eDNA sample collection, review of fish count videos (as applicable), and fish sampling for Northern Pike within preferred-type habitats. Sampling gear (Section 7) utilized will depend on the habitat, season, sampling permit stipulations, and professional knowledge of the Field Lead.

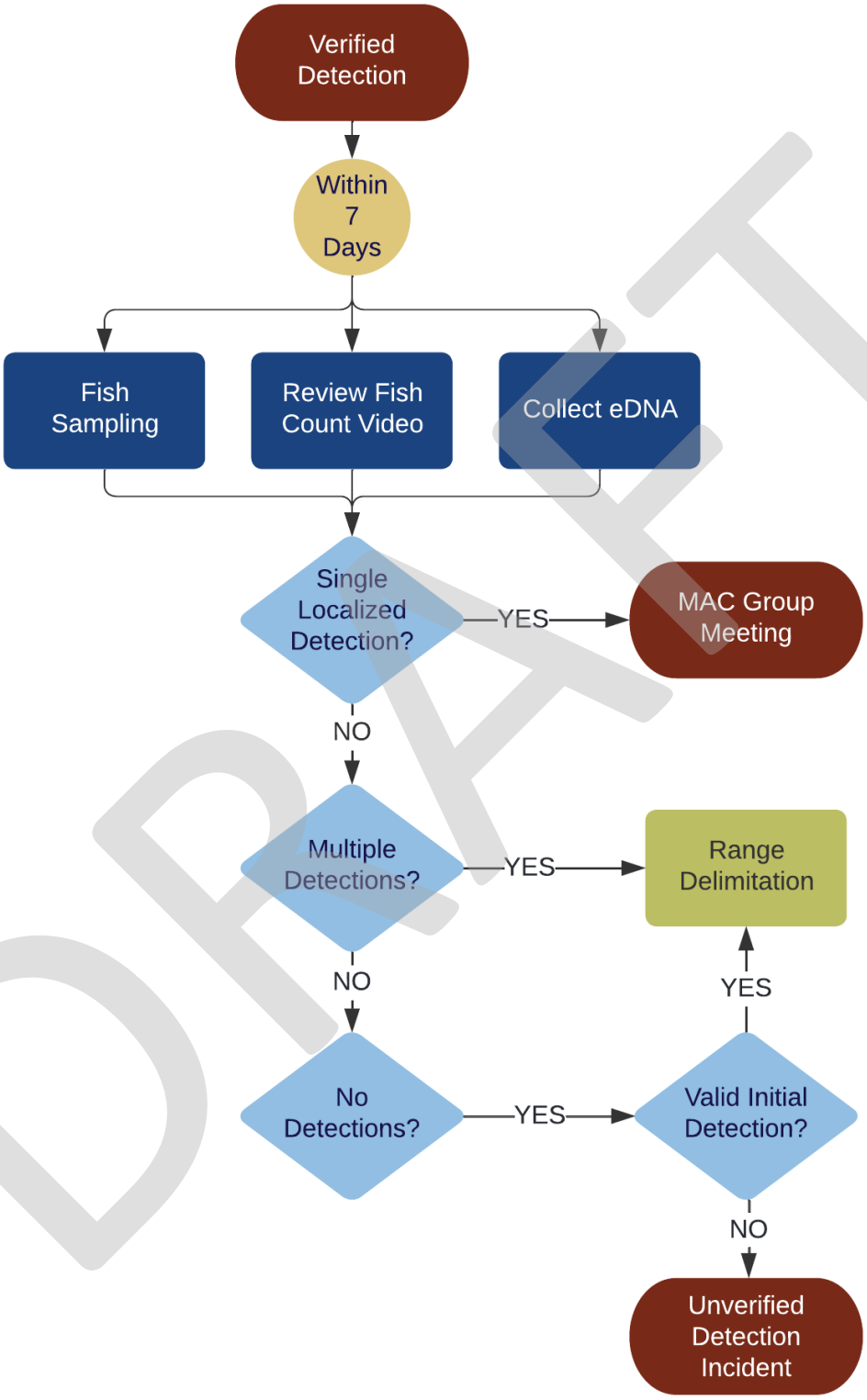


Figure 7. Overview of Initial Scoping Process Flow.

5.2.1 Initial Rapid Response Scoping Process

1. Conduct eDNA Sampling

    a. Rivers:

        i. Collect 3 samples (one from each shoreline and the middle of the river) at five locations using the Responding Entity's standard protocol.

        · Site of detection
        · 1 km upstream
        · 5 km upstream
        · 1 km downstream
        · 5 km downstream

    b. Lakes:

        i. Collect 2 samples at five locations using the Responding Entity's standard protocol.

        · Site of detection
        · 1 km away (both sides of detection site)
        · 5 km away (both sides of detection site)

2. Review fish count video from previous 7 days at all count windows, as applicable.
3. Conduct fish sampling in preferred-type habitat within 10 km of detection location as permit stipulations allow (Section 7).
4. Inform Operations Chief of future sampling permits or take authorizations that may be required for further Range Delimitation activities.

5.2.2 Initial Rapid Response Scoping Decision Tree

- Single, Localized Detection
    – If the boundaries of the current range extent are clear after Initial Rapid Response Scoping, further Range Delimitation efforts are unnecessary. Proceed directly to Data Collation (Section 5.4) in preparation for the MAC Group Meeting (Section 5.5).
- Multiple Detections
    – Each positive detection should be recorded as a presence location to demarcate the centroid(s) of follow-on Range Delimitation efforts (Section 5.3).
- No Detections
    – Re-verify and validate the data from the initial detection.
        · If the initial detection is valid, continue to Range Delimitation (Section 5.3).
        · If the initial detection is deemed unverified, initiate an Unverified Detection Incident Report (Section 4.4).

5.3 Range Delimitation

If the Initial Rapid Response Scoping effort results in ambiguous information about the range occupied by Northern Pike (e.g., no positive detections after a verified Northern Pike specimen captured) or

positive detections to the outer geographic limits of where sampling was conducted, Range Delimitation efforts should be conducted (Figure 8). Range Delimitation efforts should be initiated during Week 2 of Rapid Response Activities and continue, as necessary, through Week 6, for a maximum of 5 weeks of sampling. This timeline provides sufficient time to garner a general understanding of the limits of the current invasion and relative abundance (i.e., single fish, multiple fish, established population with confirmed reproduction) while minimizing the cost and burden to involved entities prior to the establishment of a regional monitoring, suppression, and/or eradication plan. Range Delimitation efforts may be discontinued sooner than Week 6 if the limits of the current invasion are determined earlier.

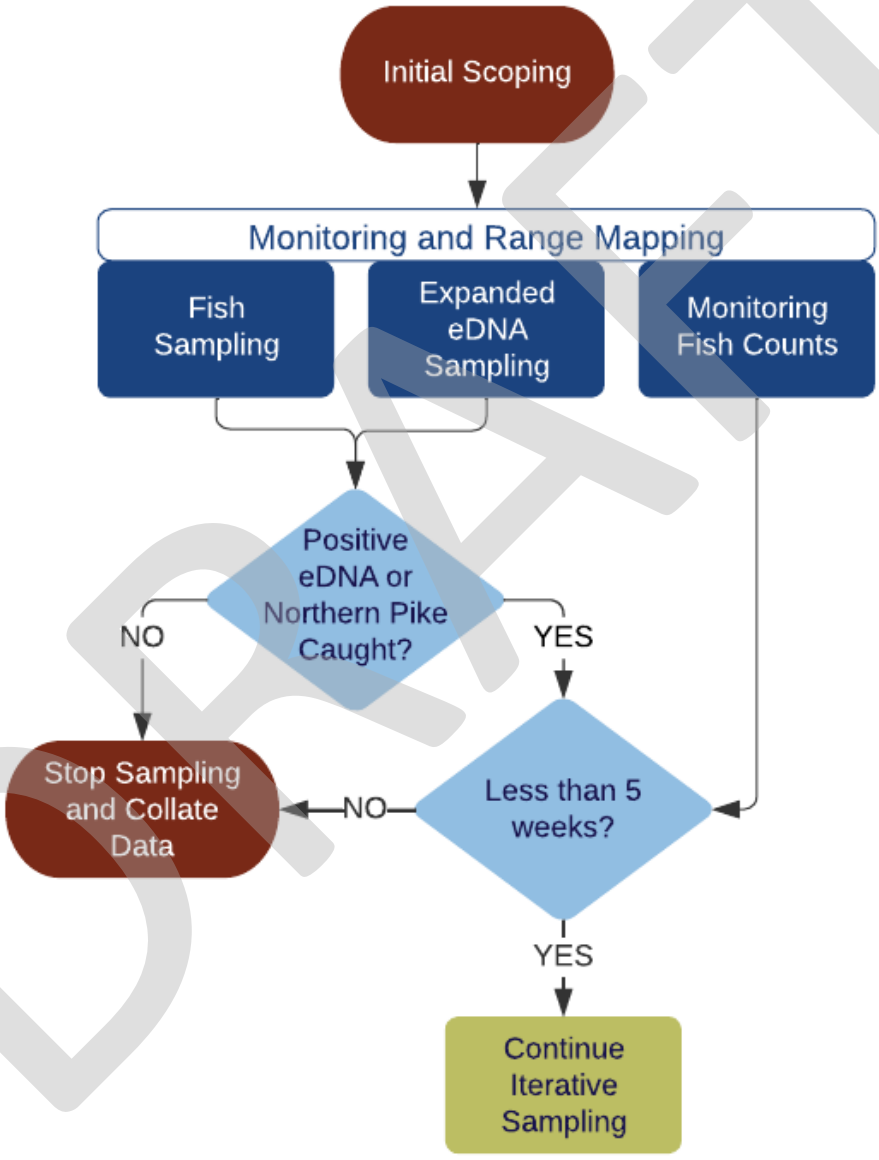


Figure 8. Overview of Range Delimitation Process Flow.

5.3.1 Range Delimitation Process Flow

If jurisdictional boundaries are met at any point during Range Delimitation efforts, the Operations Chief should be informed, and an additional Responding Entity Lead designated for the proximate waterbody to conduct additional sampling (Figure 6).

1. Expand eDNA sampling outward from nearest presence point at 10 km increments until range is delimited or water boundaries are met.
2. As permits allow, expand fish sampling in preferred-type habitats outward from nearest presence point at no more than 10 km increments until range is delimited or water boundaries are met (Section 7).
    a. If a Northern Pike is captured, collect fish data (APPENDIX D) and verify species identification (Section 4.3.1).
3. Continue daily monitoring of fish count videos, as applicable, for Northern Pike detections.

5.3.2 Range Delimitation Decision Matrix

Iteratively sample until

1. Week 6 of Rapid Response Activities; or
2. presence is detected across 3 or more proximate waterbodies (i.e., broad invasion); or
3. current spatial extent of presence points is reasonably identified (i.e., no detections bounding presence points or in proximate waterbodies).

5.4 Data Collation

All field teams conducting eDNA sampling, fish sampling, or review of fish count window data in association with Rapid Response Activities should use the data collection worksheets in APPENDIX D. Once complete, all data collection worksheets should be provided to Responding Entity Leads who will collate the data from their respective organization and provide it to the Operations Chief. The Operations Chief will, in turn, provide the combined data from all Responding Entity Leads to the Planning Chief (Section 1.3.2), who will organize and compile data to share with Command and the MAC Group.

5.5 MAC Group Meeting

A MAC Group meeting should be convened and hosted by Command no later than 6 weeks after the initiation of Rapid Response Activities. This meeting will serve two key purposes: 1) to disseminate the information collected to date to the MAC Group and 2) to begin coordinating Extended Response Activities.

5.5.1 Deliverables

Prior to the meeting, relevant documentation should be distributed to the MAC Group. This should include:

- A map depicting sampling and detection information, and
- Summary of detection, verification, initial rapid response scoping, and range delimitation efforts (Data Summary Form provided in APPENDIX G)
    - Initial detection date

  - Dates of sampling
  - Gear used
  - Effort
  - Results of each sampling event

5.5.2 Agenda

The MAC Group meeting agenda should cover the documentation described above and establish a general plan for next steps and subsequent communications. The following topics are recommended for the meeting agenda:

- Present the Data Summary Form to provide an overview of the Rapid Response effort (APPENDIX G)
- Map review to describe invasion range and relative abundance (e.g., localized fish, multiple fish with potential for reproduction, established population with confirmed reproduction)
- Public outreach information
- Future monitoring
- Roles
- Available gear and gear procurement needs
- Trained personnel and training requirements
- Funding resources
- Permit requirements
- Transition to suppression/eradication plans
- Emergency Declaration Request status

6 Extended Response Activities

The appropriate management strategy to employ during Extended Response Activities depends on a combination of the extent of the infestation, habitat accessibility complexity and connectivity, eradication feasibility, permit and resource availability, funding, and the biological communities within the affected waterbody. An Invasive Northern Pike Situation Assessment (APPENDIX H) should be completed to guide feasibility of potential Extended Rapid Response Activities (i.e., eradication, containment, or long-term management).

6.1 Eradication

When feasible, eradication (i.e., complete removal of all individuals in a population) of Northern Pike is the preferred management option in the State of Washington. This approach allows for the rapid restoration of native and/or important game fish assemblages, and minimizes costs associated with long-term suppression. Eradication tools considered by WDFW include the use of the piscicide rotenone and complete de-watering of waterbodies.

6.1.1 Rotenone

Rotenone is currently available and registered by the U.S. Environmental Protection Agency (EPA) as a restricted-use pesticide for fish management (EPA 2007). Rotenone is a product of the Legume (bean) family and is the only piscicide currently approved for use in the State of Washington (Hisata 2002; Finlayson et al. 2018). When used at recommended concentrations for invasive fish eradications, rotenone is expected to be lethal to fish, zooplankton, many macroinvertebrates, and frog tadpoles, but not harmful to birds, mammals, or adult stages of most amphibians (Vinson et al. 2010; Finlayson et al. 2018; Dunker et al. 2022).

If it is determined that rotenone will be required to meet the eradication objectives, applicators must adhere to product label restrictions and follow the protocols and procedures specified in the Rotenone Standard Operating Procedures (SOP) Manual 2nd Edition (Finlayson et al. 2018), as well as laws and regulations of all jurisdictions. Pesticide applications to waters of the state must also meet the terms and timelines identified by the Clean Water Act which is administered by ECY via a National Pollutant Discharge Elimination System (NPDES) pesticide general permit.

ECY is currently developing a new Aquatic and Invasive Species Control (AISC) general permit[6] for the control of fish, animals, and insects, which is anticipated to be issued in 2023. This new permit combines previous NPDES permits issued to WDFW, including the AIS Management[7] and Fisheries Resource Management permits.[8] The new permit is a combined NPDES and State Waste Discharge general permit and ensures that applicators of chemicals and other control products comply with the Federal Clean

[6] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Aquatic-pesticide-permits/aquatic-invasive-species-control-general-permit; https://fortress.wa.gov/ecy/ezshare/wq/permits/AISC-GeneralPermit-Draft.pdf

[7] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Aquatic-pesticide-permits/Aquatic-invasive-species-management

[8] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Aquatic-pesticide-permits/Fisheries-resource-management

Water Act and with state law (RCW 90.48.080). This permit does not apply outside of state managed lands. If an infestation were to be found in federally managed waters where the federal agency is the decision maker or in tribal waters, then the pesticide application would have to occur under the EPA pesticide General Permit.[9]

6.1.2 De-watering and Drawdown

Complete de-watering of a waterbody is a potential alternative to rotenone treatments, allowing for eradication of Northern Pike via desiccation. Incomplete drawdowns may also be used to lower the water level, reducing the amount of rotenone required to treat the waterbody. Impacts to non-target species should be considered and managers must ensure that all requisite permits are acquired prior to drawdown.

6.1.3 Other Pesticides

Currently, rotenone is the only piscicide approved for use in controlling Northern Pike. If another pesticide is deemed necessary, it would be considered a "New Use" of a currently registered pesticide and would have additional permitting requirements. For new uses of currently registered pesticides, a registrant must apply to WSDA for a Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Section 24(c) Special Local Need pesticide registration.[10] Alternatively, if it is assessed that there are inadequate tools to address the Northern Pike incident (including a New Use application), an application for a FIFRA Section 18 emergency exemption from federal registration may be submitted to WSDA.[11]

6.2 Containment

To prevent or slow the spread of Northern Pike, it may be necessary to mobilize a quarantine or emergency closure of an affected waterbody. Under RCW 77.135.050, WDFW is authorized to implement a quarantine against a waterbody, property, or region within the state. Here, options could be explored to eliminate illegal transport of Northern Pike to other waterbodies, including instituting closures or controlling access to an affected waterbody until an acceptable management plan has been implemented.

Containment of Northern Pike may also be necessary to prevent volitional movement into connected waterbodies. In some situations, construction of a barrier to prevent or slow the movement of Northern Pike outside the infested waterbody may be warranted. Effectiveness of movement barriers is contingent on the complexity and connectivity of the infested waterbody, barrier design, and whether there is a requirement to allow for passage of other fish species. Furthermore, it is difficult to prevent downstream passage with barriers due to the propensity for downstream movement during high water events and potential larval drift. Recent research on the swimming and leaping performance capabilities of Northern Pike found that the likelihood of successful passage was influenced by Northern Pike size,

[9] https://www.epa.gov/npdes/pesticide-permitting
[10] https://agr.wa.gov/services/licenses-permits-and-certificates/summary-descriptions/special-local-need; https://www.epa.gov/pesticide-registration/guidance-fifra-24c-registrations
[11] https://agr.wa.gov/departments/pesticides-and-fertilizers/pesticides/section-18-emergency-exemption-from-registration

barrier height, and pool depth, but did not vary with flow rates (Cubbage 2022). Here, higher barriers, more shallow pool depths, and smaller body sizes were associated with reduced passage success. While more research is still required to fully understand the effectiveness of barriers in containing Northern Pike, the Alaska Invasive Species Partnership has developed gear recommendations and methods for potential use of barriers for Northern Pike containment (Dunker et al. 2022 [SOP 11]). Managers must ensure all requisite permits are acquired prior to barrier installation.

6.3 Long-Term Management

Although eradication may be the foremost goal of any rapid response plan, it may not always be feasible in aquatic systems. In these cases, ICS staff and the MAC Group will likely need to determine which goals are attainable and cost effective. Management action goals other than eradication or containment may include suppression (i.e., reduction of population densities to reduce negative impacts to fish communities and slow the rate of spread) or development of other strategies to minimize the impact of an established population of Northern Pike. Suppression techniques include (but are not limited to) fish removal via gill nets, electrofishing, beach seining, trap/pound nets, angling, baited set lines, and targeted drawdowns during spawning to disrupt spawning or during the egg and larval life-history stages to negatively impact recruitment (CTCR et al. 2018; Dunker et al. 2022). In addition to suppression activities and long-term management plans, monitoring strategies should be developed in parallel. Generally, annual monitoring surveys are recommended. Managers must ensure all requisite permits are acquired prior to initiation of suppression or monitoring activities.

7 Fish Sampling Guidelines

Selection of gear type for Northern Pike sampling is at the discretion of the Field Lead and is dependent on gear availability, training of personnel, physical habitat conditions, season, and available permits. For all field sampling activities, the Responding Entity Lead is responsible for ensuring that the gear and timing of activities are authorized by the appropriate sampling permits and ESA take authorizations. The ICS Logistics Chief should assist Responding Entity Leads in coordinating gear and permits required for sampling.

Habitat attributes of water depth and bottom slope are useful predictors of where Northern Pike are likely to occur. Suppression and monitoring efforts from Lake Roosevelt capture Northern Pike at greatest efficiency in habitats with depths ≤12.2 m and slopes ≤23.9° (CTCR et al. 2018).

7.1 Sampling Gear Types for Rapid Response

This section provides a summary of habitat and permitting considerations that should be evaluated prior to fish sampling and an overview of different gear types that are likely to be implemented during Rapid Response Activities. Data collection worksheets are provided for each gear type in APPENDIX D.

7.1.1 Gill nets

Gill nets are the preferred method to capture adult and sub-adult Northern Pike where Northern Pike are established in the State of Washington (Table 4), however may be restricted in some waterbodies due to bycatch concerns. Gill net type (monofilament and multifilament), mesh size, and set duration (e.g., 4-hour short-sets vs. overnight sets) can be adjusted to improve Northern Pike capture efficiency and reduce bycatch. Suppression efforts in the Upper Columbia River suggest that multifilament gill nets with 2-inch stretch mesh maximize Northern Pike catch while minimizing bycatch; however, low densities of Northern Pike compared to non-target species may reduce the efficiency of gill netting and result in complications clearing and repairing nets. Consideration should be given to using gill nets during periods when ESA-listed species are rare or absent in the waterbody. The Alaska Invasive Species Partnership also offers gill net procedures that may help inform early detection surveys or long-term suppression efforts (Dunker et al. 2022 [SOPs 2 and 13]).

For Detection Verification or Rapid Response Activities:

- It is recommended that 500 m of shoreline be sampled
- It is recommended that a multifilament or monofilament gill net with a variety of mesh sizes be used in order to capture all age classes of Northern Pike, including young of year fish The net is recommended to be at least 30 x 1.8 m (100 x 6 ft)
- Northern Pike are active during the day, therefore short (4-hour) daylight sets are appropriate and will reduce bycatch of non-target fish

- For reference, deployment methods used for Northern Pike suppression in Lake Roosevelt are available in CTCR et al. 2018 and Monitoring Resources Protocol No. 3354[12]

7.1.2 Boat Electrofishing

Boat electrofishing can be an effective tool to capture Northern Pike while minimizing bycatch mortality. Boat electrofisher settings and effort may be adjusted in real-time to minimize detrimental effects on observed non-target species in the area. Boat electrofishing can be used for all age-classes but is most effective at targeting juvenile Northern Pike. Boat electrofishing may be advantageous compared to other gear types during times of high debris loading, low visibility conditions, or high abundance of aquatic macrophytes.

For Detection Verification or Rapid Response Activities:

- It is recommended that a 500 m sampling area be electrofished by boat with 10-minute, 100-m transects
- This effort should take at least 1 hour
- For reference, the following equipment and settings are used for Northern Pike suppression in Lake Roosevelt (CTCR et al. 2018):
  - Gear: An aluminum motorized Smith-Root electrofishing boat equipped with a 5.0 Generator Powered Pulsator (GPP)
  - Deployment:
    - Boat electrofishing follows standard methodologies described in Monitoring Resources Protocol No. 3355 and in Reynolds and Lawrence (2012)
    - Electrofishing settings are standardized to 340 volts DC, 40% duty cycle, 120 pulse/sec; 3-7.5 amps, and adjusted to maximize catch of Northern Pike

7.1.3 Snorkeling

Snorkeling may be an effective tool to survey shallow, non-turbid habitat for presence of Northern Pike during periods of time when mechanical sampling is restricted due to bycatch concerns. Benefits of snorkeling include limited coordination requirements (thus increasing response time), minimal impact on non-target species, an increased probability (compared to capture techniques) of observing a species at low abundance levels, and the ability to observe fish behaviors (e.g., spawning). However, there is a higher probability of misidentifying species and snorkeling does not provide the ability to measure, weigh, sex, and analyze the origin of the observed individual.

For Detection Verification or Rapid Response Activities:

- It is recommended that the entire 500 m sampling area be snorkeled in 100 m long sections

[12] Elliott Kittel. TBD. Northern Pike Juvenile Suppression v1.0. MonitoringResources.org https://www.monitoringresources.org/Document/Protocol/Details/3355

- If the sampling area cannot be observed by a single snorkeler due to width or physical obstructions impeding visibility, it may be necessary to have two snorkelers in adjacent lanes or multiple passes be conducted
- In rivers, snorkeling should occur from downstream to upstream with an observer walking along the shoreline to record data
- Each section should take a minimum of 20 minutes to snorkel

The Alaska Invasive Species Partnership also offers snorkel survey procedures that may help inform early detection surveys (Dunker et al. 2022 [SOP 5]).

7.1.4 Beach Seining

Beach seines may be an effective tool to target juvenile Northern Pike in shallow habitats during the late summer and early fall while minimizing lethal bycatch. Impacts to bycatch can be further minimized by providing coolers and battery-operated air bubblers to hold captured individuals while species are identified and sorted. Should juvenile salmonids be observed during sampling, beach seine efforts can be halted or moved to habitats where salmonids are not present.

For Detection Verification or Rapid Response Activities:

- It is recommended that a 500 m sampling area be divided into at least five 100 m seining transects, with a minimum of three tows per transect
- A variety of seine nets may be used depending on habitat type. For reference, the following are used for suppression efforts in Lake Roosevelt (CTCR et al. 2018):
  - Seine 1:
    - Used in large bays (≥183 m wide)
    - 91.4 x 1.83 m (300 x 6 ft)
    - ½ inch square #126 knotless nylon netting
    - Top rope is 3/8-inch braided ploy with SB-6 floats every 24 inches
    - Bottom rope is 3/8-inch braided poly with #10 leads every 12 inches
    - Breast line is 1/8-inch solid braid nylon
    - Hung using #15 twine
  - Seine 2:
    - Used in smaller bays (≤183 m)
    - 45.7 x 1.83 m (150 x 6 ft)
    - ¼ inch square #44 knotless nylon netting
    - Top rope is 3/8 braided poly with SB-6 floats every 24 inches
    - Bottom rope is 3/8 braided poly with #10 leads every 12 inches
    - Breast line is 1/8-inch solid braid nylon
    - Hung using #15 twine
  - Beach seines are deployed following the standard methods described in Monitoring Resources Protocol No. 3355 and in Hayes et al. (1996)

7.1.5 Fyke Nets (Or Other Trap/Pound Nets)

Fyke nets offer opportunities to target all age-classes of Northern Pike while minimizing lethal bycatch of non-target species. Fyke nets are generally deployed in shallow (<2 m) habitat. Consideration, however, should be given to macrophyte abundances and the likelihood of lethal bycatch of aquatic mammals (e.g., river otters, beavers) prior to deploying fyke nets.

For Detection Verification or Rapid Response Activities:

- It is recommended that a 500 m sampling area should be divided into at least five 100 m transects
- In each transect, a minimum of one fyke net with at least 15.2 x 1.2 m deep (50 x 4 ft) leads, 1.5 m opening, and mesh size less than 6.4 mm (¼-inch) stretched should be set for one night
- Sets should follow the methods detailed in Monitoring Resources Protocol No. 3355 and Hubert (1996)
- Nets should be checked at least twice daily to minimize lethal bycatch of aquatic mammals

7.1.6 Baited Set lines

Set lines may be effective at catching Northern Pike in deeper water relative to other methods. Set lines are typically fished over a 24- to 48-hour period. Line weight, material, hook size, and bait can be adjusted to target Northern Pike. Rigs that have been successful for capturing Northern Pike used sizes 6, 4, 2, and 1 treble hooks, and 2/0 and 4/0 circle hooks on 30-pound steel leaders with fish bait. Some hooks were fished on the bottom, and some were suspended with floats 3 m off the bottom. While effective at capturing Northern Pike, these setups would also likely target adult salmonids.

7.1.7 Angling

Angling may offer opportunities to sample key habitat during times of inclement weather, but it is not considered sufficiently robust for rapid response sampling. This method is considered a useful monitoring and potential future suppression tool.

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APPENDIX A Fisheries Management Responsibilities in the State of Washington

Appendix Table A-1. Agencies and entities with AIS or fisheries management responsibilities or interests in Washington and/or regionally.

Water Body Entities
Anderson Island Parks and Recreation District
Asotin County
Avista Corporation
Chehalis River Basin Flood Authority
Chelan County
City of Aberdeen
City of Anacortes
City of Bellevue
City of Bellingham
City of Black Diamond
City of Bonney Lake
City of Bremerton
City of Centralia
City of Chelan
City of Everett
City of Everett, Public Works
City of Federal Way
City of Ilwaco
City of Kennewick
City of Kent
City of Lakewood
City of Leavenworth
City of Longview
City of Lynnwood
City of Maple Valley
City of Medical Lake
City of Monroe
City of Mountlake Terrace
City of Naches
City of Newcastle
City of Ocean Shores
City of Puyallup
City of Rock Island
City of Sammamish
City of SeaTac
City of Seattle
City of Seattle, Seattle Public Utilities
City of Sequim
City of Shoreline
City of Snohomish
City of Spokane
City of Springdale
City of Tacoma, Tacoma Public Utilities
City of Walla Walla

Water Body Entities
City of Woodland
Clallam County
Clark County
Confederated Tribes and Bands of the Yakama Nation
Confederated Tribes of the Chehalis Reservation
Confederated Tribes of the Colville Reservation
Fairchild Air Force Base
Fort William Symington Division 5 Homeowners' Association
Grays Harbor County
Harder Farms
Island County
ITT Rayonier
Jamestown S'Klallam Tribe
Jefferson County
Kent Parks, Recreation & Community Services
King County
King County Parks and Recreation Division
King County Water and Land Resources Division
Kitsap County
Lacey Parks and Recreation Department
Lake Chelan Reclamation District
Lake Symington Community Club Homeowners' Association
Lewis County
Lower Elwha Klallam Tribe
Lummi Island Scenic Estates Community Club
Makah Tribe
Mason County
Muckleshoot Indian Tribe
National Park Service
Nooksack Tribe
Oregon Department of Fish and Wildlife
Pacific County Department of Public Works
PacificCorp
Pierce County
Point No Point Treaty Council
Private Entity
Public Utility District No. 1 of Chelan County
Public Utility District No. 1 of Douglas County
Public Utility District No. 1 of Pend Oreille County
Public Utility District No. 1 of Skagit County
Public Utility District No. 1 of Snohomish County
Public Utility District No. 2 of Grant County
Puget Sound Energy
Puyallup Tribe of Indians
Quileute Nation
Quinault Indian Nation

Water Body Entities
Riley Creek Timber
Seattle City Light
Seattle Parks and Recreation
Skagit County Parks and Recreation
Skokomish Indian Tribe
Snohomish County
Snohomish County Parks, Recreation & Tourism
Spokane County
Spokane Tribe of Indians
Squaxin Island Tribe
Stemilt Irrigation District
Stillaguamish Tribe
Tacoma Metro Parks
Thurston County Parks & Recreation
Tulalip Tribes
U.S. Army Corps of Engineers
U.S. Army Corps of Engineers Portland District
U.S. Army Corps of Engineers Walla Walla District
U.S. Bureau of Land Management
U.S. Bureau of Reclamation
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
Washington Department of Enterprise Services
Washington Department of Fish and Wildlife
Washington Department of Natural Resources
Washington Department of Social and Health Services
Washington State Parks and Recreation Commission
Water Resource Inventory Area 8 Salmon Recovery Council
Water Resource Inventory Area 9 Salmon Recovery Council
Wenatchee Heights Reclamation District
Whatcom County

Appendix Table A-2. Washington lacustrine waterbodies and associated entities with AIS or fisheries management responsibilities or interests.

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
406	Admiralty Bay Pond East	Pond	N/A	48.164323	-122.63822	Island	4	Western	WDFW & WSPRC
407	Admiralty Bay Pond West	Pond	N/A	48.164365	-122.640212	Island	4	Western	WDFW & WSPRC
1	Aeneas Lake	Lake	N/A	48.678856	-119.511161	Okanogan	2	Eastern	WDFW
408	Albright Lake	Lake	N/A	48.542119	-119.608755	Okanogan	2	Eastern	WDFW
2	Alder Lake	Reservoir	Alder	46.7984	-122.2926	Pierce	6	Western	WDFW & Tacoma Power
409	Aldrich Lake	Lake	N/A	47.432625	-123.08225	Mason	6	Western	WDFW & WDNR
410	Alkali Lake	Lake	N/A	47.528527	-119.488081	Grant	2	Eastern	WDFW & WSPRC
3	Alta Lake	Lake	N/A	48.0275	-119.9355	Okanogan	2	Eastern	WDFW & WSPRC
411	Amber Lake	Lake	N/A	47.3479	-117.7146	Spokane	1	Eastern	WDFW & WDNR
4	American Lake	Lake	N/A	47.1220092	-122.5693366	Pierce	6	Western	WDFW & City of Lakewood
412	Ancient Lake South	Lake	N/A	47.148509	-119.943755	Grant	2	Eastern	WDFW
5	Anderson Lake	Lake	N/A	48.015881	-122.800699	Jefferson	6	Western	WDFW, Skokomish Indian Tribe, PNP Treaty Council & Jefferson County
6	Angle Lake	Lake	N/A	47.427512	-122.286785	King	4	Western	WDFW, City of SeaTac & KCWLR
7	Antilon Lake Lower	Lake	N/A	47.967512	-120.157567	Chelan	2	Eastern	WDFW, WDNR & LCRD
413	Antilon Lake Upper	Lake	N/A	47.97575	-120.160764	Chelan	2	Eastern	WDFW, USFS & LCRD
414	Apex Lake	Lake	N/A	48.2418	-118.213	Ferry	2	Eastern	WDFW
8	Ashes Lake	Lake	N/A	45.673526	-121.914129	Skamania	5	Western	WDFW
415	Asotin Headgate County Park Pond	Pond	N/A	46.325859	-117.212087	Asotin	1	Eastern	Asotin County
416	Aspen Lake	Lake	N/A	48.409144	-120.212161	Okanogan	2	Eastern	WDFW
9	Badger Lake	Lake	N/A	47.3423418	-117.6369987	Spokane	1	Eastern	WDFW
10	Baker Lake	Reservoir	Baker	48.7266	-121.6555	Whatcom	4	Western	WDFW & USFS
11	Ballinger Lake	Lake	N/A	47.782021	-122.326817	Snohomish	4	Western	WDFW & City of Mountlake Terrace
12	Banks Lake	Reservoir	Banks	47.8634586	-119.1178923	Grant	2	Eastern	WDFW & Reclamation
417	Barclay Lake	Lake	N/A	47.784586	-121.426684	Snohomish	4	Western	WDFW & USFS
418	Baseline Lake	Lake Manmade	N/A	47.0893	-119.8442	Grant	2	Eastern	Private
13	Bass Lake	Lake	N/A	47.254853	-121.995621	King	4	Western	WDFW & KCWLR
14	Battle Ground Lake	Lake	N/A	45.804756	-122.494045	Clark	5	Western	WDFW & WSPRC
15	Bay Lake	Lake	N/A	47.244207	-122.757943	Pierce	6	Western	WDFW
16	Bayley Lake	Lake	N/A	48.420209	-117.662316	Stevens	1	Eastern	WDFW & USFWS
17	Bead Lake	Lake	N/A	48.288824	-117.110072	Pend Oreille	1	Eastern	WDFW & USFS
419	Bear Lake	Lake	N/A	47.925425	-117.355156	Spokane	1	Eastern	WDFW & Spokane County

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
420	Beaver Lake	Lake Manmade	N/A	46.283607	-117.654194	Columbia	1	Eastern	Private
19	Beaver Lake	Reservoir	N/A	48.850535	-118.972252	Okanogan	2	Eastern	WDFW & USFS
20	Beaver Lake	Lake	N/A	48.112174	-124.245833	Clallam	6	Western	WDFW & Quileute Nation
18	Beaver Lake	Lake	N/A	48.448756	-122.218729	Skagit	4	Western	WDFW & WDNR
21	Beaver Lake	Lake	N/A	47.589592	-121.999614	King	4	Western	WDFW, City of Sammamish & KCWLR
421	Beda Lake	Lake	N/A	47.046326	-119.541041	Grant	2	Eastern	WDFW & Reclamation
22	Beehive Reservoir	Reservoir	Beehive	47.326567	-120.399643	Chelan	2	Eastern	WDFW & USFS
23	Bennington Lake	Reservoir	N/A	46.065562	-118.260595	Walla Walla	1	Eastern	WDFW & USACE
24	Benson Lake	Lake	N/A	47.3373	-122.9215	Mason	6	Western	WDFW
25	Big Bow Lake	Lake	N/A	47.383246	-120.160413	Douglas	2	Eastern	WDFW & Chelan PUD
422	Big Buck Lake	Lake	N/A	48.395525	-120.184783	Okanogan	2	Eastern	WDFW
423	Big Four Lake	Lake	N/A	46.260185	-117.66534	Columbia	1	Eastern	WDFW & USFS
26	Big Lake	Lake	N/A	48.37921	-122.23304	Skagit	4	Western	WDFW
27	Big Meadow Lake	Lake	N/A	48.727765	-117.557637	Pend Oreille	1	Eastern	WDFW & USFS
28	Big Twin Lake	Lake	N/A	48.446238	-120.194755	Okanogan	2	Eastern	WDFW
29	Billy Clapp Lake	Reservoir	Billy Clapp	47.4528891	-119.2520288	Grant	2	Eastern	WDFW, Reclamation & WSPRC
30	Bitter Lake	Lake	N/A	47.726624	-122.35235	King	4	Western	WDFW, Seattle Parks & KCWLR
33	Black Lake	Lake	N/A	46.98314	-122.97438	Thurston	6	Western	WDFW
31	Black Lake	Lake	N/A	48.561744	-117.626181	Stevens	1	Eastern	WDFW
424	Black Lake	Reservoir	Black	47.303782	-120.334751	Chelan	2	Eastern	WDFW & WHRD
32	Black Lake	Lake	N/A	46.315314	-124.040612	Pacific	6	Western	WDFW & City of Ilwaco
34	Black Pine Lake	Lake	N/A	48.311182	-120.277515	Okanogan	2	Eastern	WDFW & USFS
425	Blackbird Island Pond	Pond	N/A	47.593037	-120.662047	Chelan	2	Eastern	WDFW & City of Leavenworth
35	Blackmans Lake	Lake	N/A	47.932269	-122.094003	Snohomish	4	Western	WDFW & City of Snohomish
426	Blue Creek	Creek	N/A	46.492613	-122.724828	Lewis	5	Western	WDFW
38	Blue Lake	Lake	N/A	47.5713854	-119.4359765	Grant	2	Eastern	WDFW
36	Blue Lake	Lake	N/A	48.906835	-119.491883	Okanogan	2	Eastern	WDFW
37	Blue Lake	Lake	N/A	48.687127	-119.694673	Okanogan	2	Eastern	WDFW
427	Blue Lake	Lake	N/A	48.566949	-119.612742	Okanogan	2	Eastern	WDFW
428	Blue Lake	Lake	N/A	46.323879	-117.670915	Columbia	1	Eastern	WDFW
39	Blythe Lake	Lake	N/A	46.958207	-119.2832	Grant	2	Eastern	WDFW & USFWS
40	Bonaparte Lake	Lake	N/A	48.80019	-119.054356	Okanogan	2	Eastern	WDFW
41	Bonney Lake	Lake	N/A	47.189008	-122.185772	Pierce	6	Western	WDFW & City of Bonney Lake
429	Bonnie Lake	Lake	N/A	47.28183	-117.558588	Spokane	1	Eastern	WDFW & WDNR

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
430	Borderline Lake	Lake Manmade	N/A	48.95561	-122.68294	Whatcom	4	Western	Private
42	Bosworth Lake	Lake	N/A	48.043358	-121.970741	Snohomish	4	Western	WDFW
43	Boundary Reservoir	Reservoir	Boundary	48.8529253	-117.3856592	Pend Oreille	1	Eastern	WDFW & SCL
431	Bourgeau Lake	Lake	N/A	48.2311	-118.2168	Ferry	2	Eastern	CTCR
432	Bow Lake	Lake Manmade	N/A	48.58562	-122.35614	Skagit	4	Western	Private
44	Box Canyon Reservoir	Reservoir	Box Canyon	48.3167	-117.2761	Pend Oreille	1	Eastern	WDFW, Pend Oreille PUD, Kalispel Tribe of Indians
433	Broho Lake	Lake Manmade	N/A	46.99332	-122.25333	Pierce	6	Western	Private
45	Browns Lake	Lake	N/A	48.438173	-117.192565	Pend Oreille	1	Eastern	WDFW & USFS
47	Buck Lake	Lake	N/A	48.604092	-120.200825	Okanogan	2	Eastern	WDFW & USFS
46	Buck Lake	Lake	N/A	47.910657	-122.559429	Kitsap	6	Western	WDFW & Kitsap County
434	Buffalo Lake	Lake	N/A	48.063	-118.8888	Okanogan	2	Eastern	CTCR
48	Bumping Lake	Reservoir	Bumping	46.8634761	-121.3023	Yakima	3	Eastern	WDFW, USFS & Reclamation
49	Burke Lake	Lake	N/A	47.1347	-119.9256	Grant	2	Eastern	WDFW & Reclamation
435	Butterworth Reservoir	Reservoir	Butterworth	47.2067	-122.6911	Pierce	6	Western	Pierce County & WDSHS
436	Buzzard Lake	Lake	N/A	48.418705	-119.715081	Okanogan	2	Eastern	WDFW
437	Cady Lake	Lake	N/A	47.426342	-123.051357	Mason	6	Western	WDFW
50	Cain Lake	Lake	N/A	48.649705	-122.329306	Whatcom	4	Western	WDFW
438	Caldwell Lake	Lake	N/A	48.650799	-117.337691	Pend Oreille	1	Eastern	WDFW
51	Campbell Lake	Lake	N/A	48.442031	-120.066884	Okanogan	2	Eastern	WDFW
52	Canal Lake	Lake	N/A	46.92596	-119.183532	Grant	2	Eastern	WDFW & USFWS
439	Capitol Lake	Reservoir	Capitol	47.0359	-122.9096	Thurston	6	Western	WDES & Squaxin Island Tribe
53	Carlisle Lake	Lake	N/A	46.579893	-122.727066	Lewis	5	Western	WDFW
54	Carls Lake	Lake	N/A	48.6604	-117.441216	Pend Oreille	1	Eastern	WDFW & USFS
55	Carney Lake	Lake	N/A	47.403298	-122.760955	Pierce	6	Western	WDFW
440	Carrie BLake Park Pond	Pond	N/A	48.083863	-123.083778	Clallam	6	Western	WDFW, Jamestown S'Klallam Tribe & City of Sequim
56	Cascade Lake	Lake	N/A	48.6516	-122.8555	San Juan	4	Western	WDFW & WSPRC
441	Cases Pond	Pond	N/A	46.677111	-123.716561	Pacific	6	Western	WDFW
57	Cassidy Lake	Lake	N/A	48.052035	-122.095196	Snohomish	4	Western	WDFW
442	Castle Lake	Lake	N/A	46.250352	-122.275074	Cowlitz	5	Western	WDFW & USFS
443	Cattail Lake	Lake	N/A	46.94429	-119.224895	Grant	2	Eastern	WDFW & USFWS
58	Cedar Lake	Lake	N/A	48.9415	-117.5894	Stevens	1	Eastern	WDFW
59	Chain Lake	Lake	N/A	47.903786	-121.970839	Snohomish	4	Western	WDFW

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
60	Chambers Lake	Lake	N/A	47.025949	-122.841233	Thurston	6	Western	WDFW & Thurston County Parks
444	Chambers Lake	Lake	N/A	46.466595	-121.534791	Lewis	5	Western	WDFW & USFS
445	Chance Lake	Reservoir	N/A	46.665822	-119.031235	Franklin	3	Eastern	WDFW & Reclamation
446	Chaplain Lake	Reservoir	Chaplain	47.9614	-121.8467	Snohomish	4	Western	Everett Public Works
447	Chapman Lake	Lake	N/A	47.3558	-117.568	Spokane	1	Eastern	WDFW & WDNR
61	Chehalis River	River	N/A	46.962226	-123.601197	Grays Harbor	6	Western	WDFW, CRBFA, QIN & Chehalis Tribes
448	Chelan Golf Course Pond West	Pond	N/A	47.851579	-120.028134	Chelan	2	Eastern	City of Chelan
449	Cherry Lake	Lake	N/A	47.765571	-121.826886	King	4	Western	WDFW, WDNR & KCWLR
450	Chester Morse Lake	Reservoir	Chester Morse	47.3873	-121.6963	King	4	Western	SPU
451	Chitwood Lake	Lake	N/A	48.083855	-121.885424	Snohomish	4	Western	WDFW
62	Chopaka Lake	Lake	N/A	48.917747	-119.69997	Okanogan	2	Eastern	WDFW, BLM & WDNR
452	Chukar Lake	Lake	N/A	46.957525	-119.274008	Grant	2	Eastern	WDFW & USFWS
453	Clara Lake	Lake	N/A	47.428232	-123.064159	Mason	6	Western	WDFW & WDNR
63	Clark Pond	Pond	N/A	46.521249	-119.071278	Franklin	3	Eastern	WDFW
64	Cle Elum Lake	Reservoir	Cle Elum	47.2816	-121.0921	Kittitas	3	Eastern	WDFW, Reclamation & USFS
69	Clear Lake	Lake	N/A	47.5392	-117.6853	Spokane	1	Eastern	WDFW, Fairchild AFB & WDNR
66	Clear Lake	Lake	N/A	46.823	-122.4734	Thurston	6	Western	WDFW
67	Clear Lake	Lake	N/A	46.9313	-122.2803	Pierce	6	Western	WDFW
65	Clear Lake	Lake	N/A	48.4602	-122.2252	Skagit	4	Western	WDFW & Skagit County Parks
454	Clear Lake	Lake	N/A	47.2971	-120.3017	Chelan	2	Eastern	WDFW & Stemilt Irrigation District
68	Clear Lake	Reservoir	Clear	46.6259	-121.2705	Yakima	3	Eastern	WDFW & USFS
455	Cliff Lake	Lake	N/A	47.133993	-119.940169	Grant	2	Eastern	WDFW
70	Coffee Pot Lake	Lake	N/A	47.492847	-118.563408	Lincoln	1	Eastern	WDFW, Private Entities & BLM
456	Coffin Lake	Lake	N/A	48.576514	-117.553742	Stevens	1	Eastern	WDFW, WDNR, Private Entity & USFWS
71	Coldwater Lake	Lake	N/A	46.302863	-122.240325	Skamania	5	Western	WDFW & USFS
457	Columbia Basin Hatchery Creek	Creek	N/A	47.18502	-119.25105	Grant	2	Eastern	WDFW
458	Columbia Park Pond	Pond	N/A	46.218275	-119.142696	Benton	3	Eastern	WDFW, City of Kennewick, & USACE
72	Columbia River	River	N/A	45.6122	-122.634	Clark	5	Western	WDFW, ODFW, USFWS & USACE
73	Conconully Lake	Reservoir	Conconully Lake	48.563477	-119.719804	Okanogan	2	Eastern	WDFW & WSPRC
74	Conconully Reservoir	Reservoir	Conconully	48.544925	-119.750935	Okanogan	2	Eastern	WDFW, Reclamation & WSPRC
459	Conger Pond 1	Pond	N/A	48.386282	-117.388674	Pend Oreille	1	Eastern	WDFW & USFS
460	Conger Pond 2	Pond	N/A	48.38221	-117.385395	Pend Oreille	1	Eastern	WDFW & USFS
75	Conners Lake	Lake	N/A	48.749041	-119.663027	Okanogan	2	Eastern	WDFW
461	Cook Lake	Lake	N/A	48.2884	-119.5291	Okanogan	2	Eastern	CTCR

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
76	Cooks Lake	Lake	N/A	48.34329	-117.172458	Pend Oreille	1	Eastern	WDFW & USFS
77	Cooper Lake	Lake	N/A	47.426187	-121.176924	Kittitas	3	Eastern	WDFW & USFS
462	Coot Lake	Lake	N/A	46.921174	-119.205624	Grant	2	Eastern	WDFW & USFWS
78	Corral Lake	Lake	N/A	46.96393	-119.302999	Grant	2	Eastern	WDFW & USFWS
463	Cottage Lake	Lake	N/A	47.7556	-122.0873	King	4	Western	WDFW, King County Parks & KCWLR
464	Cougar Lake	Lake	N/A	48.4776	-120.09517	Okanogan	2	Eastern	WDFW
465	Council Lake	Lake	N/A	46.2667	-121.6294	Skamania	5	Western	WDFW & USFS
466	Cow Lake	Lake	N/A	47.132084	-118.158123	Adams	2	Eastern	WDFW & WDNR
79	Cowlitz River	River	N/A	46.278164	-122.911193	Cowlitz	5	Western	WDFW & Tacoma Power
467	Cox Lake	Lake	N/A	48.206	-118.8947	Okanogan	2	Eastern	CTCR
80	Crabapple Lake	Lake	N/A	48.131372	-122.273778	Snohomish	4	Western	WDFW
81	Cranberry Lake	Lake	N/A	48.394095	-122.655777	Island	4	Western	WDFW & WSPRC
468	Crater Lake	Lake	N/A	48.882158	-117.262408	Pend Oreille	1	Eastern	WDFW & USFS
82	Crawfish Lake	Lake	N/A	48.481654	-119.215954	Okanogan	2	Eastern	WDFW, USFS & CTCR
84	Crescent Lake	Lake	N/A	48.986787	-117.312662	Pend Oreille	1	Eastern	WDFW & USFS
469	Crescent Lake	Lake	N/A	47.812355	-122.003426	Snohomish	4	Western	WDFW
83	Crescent Lake	Lake	N/A	47.391862	-122.568558	Pierce	6	Western	WDFW & Pierce County
763	Crocker Lake	Lake	N/A	47.9363	-122.8843	Jefferson	6	Western	WDFW, Skokomish Indian Tribe, PNP Treaty Council & WSPRC
470	Crystal Lake	Lake	N/A	47.129911	-119.93512	Grant	2	Eastern	WDFW
471	Cup Lake	Lake	N/A	47.131451	-119.936315	Grant	2	Eastern	WDFW
472	Curl Lake	Lake	N/A	46.2545	-117.672	Columbia	1	Eastern	WDFW
85	Curlew Lake	Lake	N/A	48.721378	-118.6626392	Ferry	1	Eastern	WDFW & WSPRC
86	Dalton Lake	Lake	N/A	46.297145	-118.800111	Franklin	3	Eastern	WDFW & USACE
473	Dam Pond	Pond	N/A	46.583043	-118.016208	Columbia	1	Eastern	WDFW
87	Davis Lake	Lake	N/A	48.2301	-117.2898	Pend Oreille	1	Eastern	WDFW
88	Davis Lake	Lake	N/A	48.438172	-120.120724	Okanogan	2	Eastern	WDFW
475	Davis Lake	Lake	N/A	48.738422	-118.23071	Ferry	1	Eastern	WDFW & USFS
474	Davis Lake	Lake	N/A	46.541317	-122.250822	Lewis	5	Western	WDFW
476	Dayton Pond	Pond	N/A	46.3135	-117.9734	Columbia	1	Eastern	WDFW
477	Deception Lake	Lake	N/A	48.727581	-117.336089	Pend Oreille	1	Eastern	WDFW & USFS
478	Decoursey Pond	Pond	N/A	47.18676	-122.321837	Pierce	6	Western	WDFW & City of Puyallup
89	Deep Lake	Lake	N/A	48.8626	-117.6033	Stevens	1	Eastern	WDFW
90	Deep Lake	Lake	N/A	47.5886	-119.3238	Grant	2	Eastern	WDFW & WSPRC

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
91	Deep Lake	Lake	N/A	46.909	-122.9157	Thurston	6	Western	WDFW & WSPRC
479	Deep Lake	Lake	N/A	47.273605	-121.939852	King	4	Western	WDFW, WSPRC & KCWLR
92	Deep River	River	N/A	46.3141	-123.7132	Wahkiakum	5	Western	WDFW
93	Deer Lake	Lake	N/A	48.108274	-117.6052139	Stevens	1	Eastern	WDFW
480	Deer Lake	Lake	N/A	46.305305	-117.652497	Columbia	1	Eastern	WDFW
94	Deer Lake	Lake	N/A	47.974244	-122.384032	Island	4	Western	WDFW & Island County
481	Deer Springs Lake	Lake	N/A	47.473034	-118.617065	Lincoln	1	Eastern	WDFW & Private Entities
95	Depression Lake	Lake	N/A	48.659828	-121.694718	Whatcom	4	Western	WDFW & USFS
482	Desert Lake Chain	Lake	N/A	47.009833	-119.485882	Grant	2	Eastern	WDFW & Reclamation
96	Devereaux Lake	Lake	N/A	47.405965	-122.848095	Mason	6	Western	WDFW
97	Diablo Lake	Reservoir	Diablo	48.69006	-121.09527	Whatcom	4	Western	WDFW, NPS & SCL
98	Diamond Lake	Lake	N/A	48.1293	-117.1869443	Pend Oreille	1	Eastern	WDFW
483	Dibble Lake	Lake	N/A	48.432904	-120.170624	Okanogan	2	Eastern	WDFW
484	Dickey Lake	Lake	N/A	48.110702	-124.507741	Clallam	6	Western	WDFW & Quileute Nation
485	Dickinson Lake	Reservoir	N/A	48.6815	-122.6443	San Juan	4	Western	WDNR & LISECC
99	Dog Lake	Lake	N/A	46.657375	-121.359731	Yakima	3	Eastern	WDFW & USFS
486	Doheny Lake	Lake	N/A	48.585219	-119.664681	Okanogan	2	Eastern	WDFW
487	Dohman Reservoir	Reservoir	Dohman	46.3468	-123.9964	Pacific	6	Western	Pacific County Public Works
488	Domke Lake	Lake	N/A	48.1774	-120.588	Chelan	2	Eastern	WDFW & USFS
489	Donnie Lake	Lake	N/A	46.236285	-117.700049	Columbia	1	Eastern	WDFW & USFS
100	Downs Lake	Lake	N/A	47.279381	-117.808298	Spokane	1	Eastern	WDFW & Private Entities
490	Dream Lake	Lake	N/A	48.5796	-123.0839	San Juan	4	Western	WDFW
491	Drunken Charlie Lake	Lake	N/A	47.763881	-121.813686	King	4	Western	WDFW, WDNR & KCWLR
101	Dry Falls Lake	Lake	N/A	47.603663	-119.359123	Grant	2	Eastern	WDFW & WSPRC
102	Dry Lake	Lake	N/A	47.911558	-120.173843	Chelan	2	Eastern	WDFW & LCRD
103	Duck Lake	Lake	N/A	46.997423	-124.147699	Grays Harbor	6	Western	WDFW, QIN & City of Ocean Shores
492	Duley Lake	Lake	N/A	48.1655	-119.4938	Okanogan	2	Eastern	CTCR
493	Dusty Lake	Lake	N/A	47.139093	-119.949076	Grant	2	Eastern	WDFW
104	Duwamish River	River	N/A	47.5196	-122.3069	King	4	Western	WDFW, USACE, Muckleshoot Indian Tribe, Suquamish Indian Tribe, WRIA 9 SRC, USEPA & KCWLR
494	Easton Ponds	Pond	N/A	47.234701	-121.168984	Kittitas	3	Eastern	WDFW
495	Echo Lake	Lake	N/A	47.992356	-121.796537	Snohomish	4	Western	WDFW & USFS
496	Echo Lake	Lake	N/A	47.771421	-122.343184	King	4	Western	WDFW, City of Shoreline & KCWLR

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
105	Echo Lake Maltby	Lake	N/A	47.78634	-122.051413	Snohomish	4	Western	WDFW
497	Eden Creek Reservoir	Reservoir	Eden Creek	47.2011	-122.6962	Pierce	6	Western	Pierce County & WDSHS
765	Eells Spring Hatchery	Spring	N/A	47.3096	-123.2395	Mason	6	Western	WDFW
498	Egg Lake	Lake	N/A	48.566628	-123.081596	San Juan	4	Western	WDFW
499	Elbow Lake 1	Lake	N/A	48.950609	-117.985032	Stevens	1	Eastern	WDFW & USFS
500	Elk River	River	N/A	46.85866	-124.04079	Grays Harbor	6	Western	WDNR & QIN
501	Ell Lake	Lake	N/A	48.604481	-119.11741	Okanogan	2	Eastern	WDFW
106	Eloika Lake	Lake	N/A	48.0188691	-117.3676775	Spokane	1	Eastern	WDFW
502	Elton Pond North	Pond	N/A	46.6579	-120.493382	Yakima	3	Eastern	WDFW
503	Emma Lake	Lake	N/A	46.328842	-118.77205	Franklin	3	Eastern	WDFW & USACE
504	Empire Lake 1	Lake	N/A	48.809836	-118.712834	Ferry	1	Eastern	WDFW & USFS
107	Evergreen Reservoir	Reservoir	Evergreen	47.1329	-119.9273	Grant	2	Eastern	WDFW & Reclamation
108	Failor Lake	Lake	N/A	47.108	-123.9586	Grays Harbor	6	Western	WDFW & QIN
505	Falcon Lake East	Lake	N/A	46.980711	-119.290055	Grant	2	Eastern	WDFW & USFWS
506	Falcon Lake West	Lake	N/A	46.980141	-119.291368	Grant	2	Eastern	WDFW & USFWS
109	Fan Lake	Lake	N/A	48.055395	-117.405988	Pend Oreille	1	Eastern	WDFW
110	Fanchers Dam Reservoir	Reservoir	Fanchers Dam	48.827544	-119.259193	Okanogan	2	Eastern	WDFW & CTCR
507	Fargher Lake	Lake	N/A	45.88628	-122.519197	Clark	5	Western	WDFW
508	Fawn Lake	Lake	N/A	47.1644	-123.0706	Mason	6	Western	WDFW
111	Ferry Lake	Lake	N/A	48.522063	-118.813084	Ferry	1	Eastern	WDFW & USFS
509	Fiorito Pond North	Lake	N/A	46.938561	-120.50463	Kittitas	3	Eastern	WDFW
510	Fiorito Pond South	Lake	N/A	46.935771	-120.502576	Kittitas	3	Eastern	WDFW
511	Firing Center Pond 1	Pond	N/A	46.674537	-120.445278	Yakima	3	Eastern	WDFW & USACE
512	First Thought Lake	Lake	N/A	48.90388	-118.169269	Stevens	1	Eastern	WDFW & USFS
513	Fish Hook Pond	Pond	N/A	46.308285	-118.763212	Walla Walla	1	Eastern	WDFW & USACE
113	Fish Lake	Lake	N/A	47.518953	-117.521433	Spokane	1	Eastern	WDFW & Spokane County
114	Fish Lake	Lake	N/A	47.834435	-120.704719	Chelan	2	Eastern	WDFW & USFS
515	Fish Lake	Lake	N/A	48.50515	-118.80812	Ferry	1	Eastern	WDFW & USFS
112	Fish Lake	Lake	N/A	48.613598	-119.70359	Okanogan	2	Eastern	WDFW, WDNR & USFS
514	Fish Lake	Lake	N/A	47.270693	-121.956131	King	4	Western	WDFW & KCWLR
115	Fishtrap Lake	Lake	N/A	47.3549	-117.8238	Lincoln	1	Eastern	WDFW, Private Entity & BLM
516	Fivemile Lake	Lake	N/A	47.272799	-122.285686	King	4	Western	WDFW, King County Parks & KCWLR
116	Florence Lake	Lake	N/A	47.167228	-122.687371	Pierce	6	Western	WDFW & Anderson Island Parks
117	Flowing Lake	Lake	N/A	47.947196	-121.987578	Snohomish	4	Western	WDFW & Snohomish County Parks

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
118	Forde Lake	Lake	N/A	48.736591	-119.66736	Okanogan	2	Eastern	WDFW
517	Fort Borst Lake	Lake	N/A	46.723118	-122.978059	Lewis	5	Western	WDFW & City of Centralia
119	Fourth of July Lake	Lake	N/A	47.25243	-117.975721	Adams	2	Eastern	WDFW & WDNR
518	Frank's Pond	Pond	N/A	47.8177	-119.974	Chelan	2	Eastern	WDFW
519	Frater Lake	Lake	N/A	48.6551	-117.4846	Pend Oreille	1	Eastern	WDFW & USFS
520	Frozen Lake	Lake	N/A	46.9193	-121.6671	Pierce	6	Western	WDFW & NPS
521	Gadwall Lake	Lake	N/A	46.944724	-119.229159	Grant	2	Eastern	WDFW & USFWS
120	Garfield Pond	Pond	N/A	46.997848	-117.191985	Whitman	1	Eastern	WDFW
522	Gibbs Lake	Lake	N/A	47.972125	-122.814382	Jefferson	6	Western	WDFW, Skokomish Indian Tribe, PNP Treaty Council & Jefferson County
523	Gilchrist Pond	Pond	N/A	46.788131	-117.398094	Whitman	1	Eastern	WDFW
524	Gissburg Ponds	Pond	N/A	48.142131	-122.191541	Snohomish	4	Western	WDFW & Snohomish County Parks
525	Gold Course Pond	Pond	N/A	46.414379	-117.08938	Asotin	1	Eastern	WDFW
121	Goose Lake	Lake	N/A	45.941185	-121.764446	Skamania	5	Western	WDFW & USFS
122	Gorge Lake	Reservoir	Gorge	48.70045	-121.191189	Whatcom	4	Western	WDFW & NPS
123	Grande Ronde River	River	N/A	46.041	-117.2529	Asotin	1	Eastern	WDFW, ODFW & USFS
124	Grandy Lake	Lake	N/A	48.565773	-121.799509	Skagit	4	Western	WDFW & Skagit County Parks
526	Granger Pond	Pond	N/A	46.334887	-120.19432	Yakima	3	Eastern	WDFW
125	Green Lake	Lake	N/A	48.445821	-119.629553	Okanogan	2	Eastern	WDFW
527	Green Lake	Lake	N/A	47.678114	-122.338465	King	4	Western	WDFW, King County Parks & KCWLR
528	Grimes Lake	Lake	N/A	47.731304	-119.590418	Douglas	2	Eastern	WDFW & BLM
529	H & H Reservoir/Pascal Pond	Reservoir	H & H	47.332396	-120.39832	Chelan	2	Eastern	WDFW, Chelan County & USFS
530	Halfmoon Lake	Lake	N/A	48.410696	-117.216789	Pend Oreille	1	Eastern	WDFW & USFS
531	Haller Lake	Lake	N/A	47.719898	-122.333801	King	4	Western	WDFW & KCWLR
126	Hammond Lake	Lake	N/A	47.36952	-120.123582	Douglas	2	Eastern	WDFW & Chelan PUD
127	Hampton Lake Lower	Lake	N/A	46.928247	-119.221725	Grant	2	Eastern	WDFW & USFWS
532	Hampton Lake Upper	Lake	N/A	46.933717	-119.226877	Grant	2	Eastern	WDFW & USFWS
533	Hanson Lake	Lake	N/A	48.057051	-121.851339	Snohomish	4	Western	WDFW
534	Hanson Pond Lower	Pond	N/A	47.184571	-120.911085	Kittitas	3	Eastern	WDFW
535	Hanson Pond Upper	Pond	N/A	47.185801	-120.915949	Kittitas	3	Eastern	WDFW
128	Harts Lake	Lake	N/A	46.893296	-122.469339	Pierce	6	Western	WDFW
536	Hatch Lake	Lake	N/A	48.498159	-117.807077	Stevens	1	Eastern	WDFW
129	Haven Lake	Lake	N/A	47.456523	-122.983041	Mason	6	Western	WDFW
537	Hayes Lake	Lake	N/A	46.722914	-122.974227	Lewis	5	Western	WDFW

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
131	Heart Lake	Lake	N/A	46.930498	-119.185858	Grant	2	Eastern	WDFW & Reclamation
130	Heart Lake	Lake	N/A	48.47604	-122.630665	Skagit	4	Western	WDFW & City of Anacortes
132	Heritage Lake	Lake	N/A	48.63295	-117.528244	Stevens	1	Eastern	WDFW & USFS
538	Herman Lake	Lake	N/A	46.900575	-119.199157	Adams	2	Eastern	WDFW
539	Heron Lake Lower	Lake	N/A	46.980125	-119.28077	Grant	2	Eastern	WDFW & USFWS
540	Heron Lake Upper	Lake	N/A	46.981313	-119.28171	Grant	2	Eastern	WDFW & USFWS
541	Hess Lake	Lake	N/A	48.505331	-119.641611	Okanogan	2	Eastern	WDFW
133	Hicks Lake	Lake	N/A	47.0221	-122.8021	Thurston	6	Western	WDFW & Lacey Parks
542	Hideaway Lake	Lake	N/A	47.38436	-120.147184	Douglas	2	Eastern	WDFW & Chelan PUD
543	Hilltop Lake	Lake Manmade	N/A	48.11263	-122.12673	Snohomish	4	Western	Private
134	Hog Canyon Lake	Lake	N/A	47.3738	-117.8097	Spokane	1	Eastern	WDFW & BLM
544	Holiday Lake	Reservoir	N/A	48.6805	-122.6413	San Juan	4	Western	Whatcom County
135	Holm Lake	Lake	N/A	47.302913	-122.126733	King	4	Western	WDFW & KCWLR
545	Homestead Lake	Lake	N/A	47.292714	-119.318527	Grant	2	Eastern	WDFW & Reclamation
546	Hood Park Ponds	Pond	N/A	46.214731	-119.010788	Walla Walla	1	Eastern	WDFW & USACE
547	Horseshoe Lake	Lake	N/A	48.5692	-122.8133	San Juan	4	Western	WDFW
138	Horseshoe Lake	Lake	N/A	45.9012	-122.7442	Cowlitz	5	Western	WDFW & City of Woodland
136	Horseshoe Lake	Lake	N/A	48.111488	-117.41657	Pend Oreille	1	Eastern	WDFW
548	Horseshoe Lake	Lake	N/A	47.764068	-117.756784	Spokane	1	Eastern	WDFW & WDNR
137	Horseshoe Lake	Lake	N/A	47.408221	-122.664339	Kitsap	6	Western	WDFW & Kitsap County
549	Horseshoe Lake	Lake	N/A	47.897153	-122.753616	Jefferson	6	Western	WDFW, Skokomish Indian Tribe & PNP Treaty Council
139	Horsetheif Lake	Lake	N/A	45.6423127	-121.1034861	Klickitat	5	Eastern	WDFW & WSPRC
550	Hourglass Lake	Lake	N/A	46.940588	-119.225413	Grant	2	Eastern	WDFW & USFWS
551	Howard Hanson Reservoir	Reservoir	Howard Hanson	47.2734	-121.7637	King	4	Western	WDFW, USACE, Tacoma Power, Muckleshoot Indian Tribe, Suquamish Indian Tribe & KCWLR
552	Howell Lake	Lake	N/A	47.430345	-122.991059	Mason	6	Western	WDFW & WDNR
140	Hummel Lake	Lake	N/A	48.519957	-122.890262	San Juan	4	Western	WDFW
553	Hunsinger Lake	Lake	N/A	48.44492	-119.601261	Okanogan	2	Eastern	WDFW
141	Hutchinson Lake	Lake	N/A	46.8772	-119.2974	Adams	2	Eastern	USFWS
554	Hyas Lake	Lake	N/A	47.566452	-121.120522	Kittitas	3	Eastern	WDFW & USFS
555	I-82 Pond 1	Pond	N/A	46.483178	-120.408652	Yakima	3	Eastern	WDFW
556	I-82 Pond 2	Pond	N/A	46.47949	-120.403738	Yakima	3	Eastern	WDFW

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
557	I-82 Pond 3	Pond	N/A	46.466724	-120.382767	Yakima	3	Eastern	WDFW
558	I-82 Pond 4	Pond	N/A	46.437258	-120.347319	Yakima	3	Eastern	WDFW
559	I-82 Pond 5	Pond	N/A	46.4334	-120.3468	Yakima	3	Eastern	WDFW
560	I-82 Pond 6	Pond	N/A	46.420253	-120.321726	Yakima	3	Eastern	WDFW
561	I-82 Pond 7	Pond	N/A	46.411388	-120.295347	Yakima	3	Eastern	WDFW
562	Ice House Lake	Lake	N/A	45.662279	-121.906296	Skamania	5	Western	WDFW
563	Indian Flat Pond	Pond	N/A	46.982502	-121.13171	Yakima	3	Eastern	WDFW & USFS
142	Isabella Lake	Lake	N/A	47.171335	-123.116084	Mason	6	Western	WDFW & WSPRC
564	Island Lake	Lake	N/A	47.681874	-122.66028	Kitsap	6	Western	WDFW & Kitsap County
143	Island Lake	Lake	N/A	47.248735	-123.11793	Mason	6	Western	WDFW & WSPRC
144	Jackson Lake	Lake	N/A	47.287684	-122.774062	Pierce	6	Western	WDFW
145	Jameson Lake	Lake	N/A	47.681736	-119.625147	Douglas	2	Eastern	WDFW & BLM
565	Janet Lake	Lake	N/A	46.942654	-119.205701	Grant	2	Eastern	WDFW & Reclamation
566	Jay Lake	Lake	N/A	47.9158	-121.688469	Snohomish	4	Western	WDFW & WSPRC
567	Jefferson Park Pond	Pond	N/A	46.055302	-118.34555	Walla Walla	1	Eastern	WDFW & City of Walla Walla
568	Judy Reservoir	Reservoir	Judy	48.4743	-122.183	Skagit	4	Western	Skagit PUD
146	Jump Off Joe Lake	Lake	N/A	48.1368	-117.686	Stevens	1	Eastern	WDFW
569	June Lake	Lake	N/A	46.945154	-119.176121	Grant	2	Eastern	WDFW & Reclamation
147	Kachess Lake	Reservoir	Kachess	47.347938	-121.250499	Kittitas	3	Eastern	WDFW, Reclamation, & USFS
148	Keechelus Lake	Reservoir	Keechelus	47.3766231	-121.3872739	Kittitas	3	Eastern	WDFW, Reclamation & USFS
570	Kellogg Lake	Lake	N/A	47.902927	-121.76283	Snohomish	4	Western	WDFW
149	Kettle River	River	N/A	48.7347	-118.1166	Stevens	1	Eastern	WDFW & USFS
571	Kidney Lake	Lake	N/A	45.662923	-121.947424	Skamania	5	Western	Private
150	Kitsap Lake	Lake	N/A	47.5722	-122.7086	Kitsap	6	Western	WDFW & City of Bremerton
572	Kiwanis Pond	Pond	N/A	47.186806	-120.919742	Kittitas	3	Eastern	WDFW
573	Klineline Pond	Pond	N/A	45.70791	-122.656174	Clark	5	Western	WDFW & Clark County
574	Klone Lake 1	Lake	N/A	47.47216	-123.543874	Grays Harbor	6	Western	WDFW, QIN & USFS
575	Klone Lake 2	Lake	N/A	47.47564	-123.541311	Grays Harbor	6	Western	WDFW, QIN & USFS
576	Koeneman Lake	Lake	N/A	47.409757	-122.784485	Kitsap	6	Western	WDFW
577	Koppert Lake	Lake Manmade	N/A	46.48731	-122.85745	Lewis	5	Western	Private
151	Kress Lake	Lake	N/A	46.04705	-122.850953	Cowlitz	5	Western	WDFW
152	Lacamas Lake	Lake	N/A	45.616843	-122.425798	Clark	5	Western	WDFW
578	Lafleur Lake	Lake	N/A	48.4063	-118.2568	Ferry	2	Eastern	CTCR
153	Lake Aberdeen	Lake	N/A	46.984113	-123.742329	Grays Harbor	6	Western	WDFW, City of Aberdeen & WSPRC

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
154	Lake Alice	Lake	N/A	47.5325	-121.8842	King	4	Western	WDFW & KCWLR
155	Lake Armstrong	Lake	N/A	48.226467	-122.123942	Snohomish	4	Western	WDFW
156	Lake Beth	Reservoir	N/A	48.859356	-118.988903	Okanogan	2	Eastern	WDFW & USFS
157	Lake Bonneville	Reservoir	Bonneville	45.6940965	-121.8776181	Skamania	5	Western	USACE
579	Lake Boren	Lake	N/A	47.5325	-122.1637	King	4	Western	WDFW, City of Newcastle & KCWLR
158	Lake Bradley	Lake	N/A	47.161091	-122.284218	Pierce	6	Western	WDFW & City of Puyallup
159	Lake Bryan	Reservoir	Bryan	46.61583	-117.79712	Whitman	1	Eastern	WDFW & USACE
160	Lake Campbell	Lake	N/A	48.440314	-122.609411	Skagit	4	Western	WDFW & WSPRC
161	Lake Cavanaugh	Lake	N/A	48.3115	-121.98824	Skagit	4	Western	WDFW
162	Lake Celilo	Reservoir	Celilo	45.68289	-120.82044	Klickitat	5	Eastern	WDFW, ODFW & USACE
163	Lake Chelan	Lake	N/A	47.8417	-120.0244	Chelan	2	Eastern	WDFW, USFS, Chelan PUD & NPS
580	Lake Clyde	Lake	N/A	48.619	-123.0176	San Juan	4	Western	WDFW
164	Lake Crescent	Lake	N/A	48.0589	-123.7867	Clallam	6	Western	NPS, Quileute Nation & Makah Tribe
165	Lake Cushman	Reservoir	Cushman	47.4291	-123.2201	Mason	6	Western	WDFW, USFS & Tacoma Power
166	Lake Desire	Lake	N/A	47.442292	-122.107457	King	4	Western	WDFW & KCWLR
167	Lake Dolloff	Lake	N/A	47.3238	-122.285	King	4	Western	WDFW & KCWLR
581	Lake Dorothy	Lake	N/A	47.784387	-121.849787	Snohomish	4	Western	WDFW & WDNR
168	Lake Easton	Reservoir	Easton	47.24982	-121.198193	Kittitas	3	Eastern	WDFW & WSPRC
169	Lake Ellen	Lake	N/A	48.498261	-118.259807	Ferry	1	Eastern	WDFW & USFS
170	Lake Entiat/Rocky Reach	Reservoir	Entiat/Rocky Reach	47.7970336	-119.9846785	Chelan	2	Eastern	WDFW & Chelan PUD
171	Lake Erie	Lake	N/A	48.4494	-122.6397	Skagit	4	Western	WDFW & City of Anacortes
172	Lake Fazon	Lake	N/A	48.865879	-122.367774	Whatcom	4	Western	WDFW
173	Lake Fenwick	Lake	N/A	47.3659	-122.2726	King	4	Western	WDFW, Kent Parks & KCWLR
174	Lake Geneva	Lake	N/A	47.291536	-122.281304	King	4	Western	WDFW & KCWLR
175	Lake Gillette	Lake	N/A	48.609207	-117.543755	Stevens	1	Eastern	WDFW & USFS
176	Lake Goodwin	Lake	N/A	48.13596	-122.29041	Snohomish	4	Western	WDFW & Snohomish County Parks
177	Lake Goss	Lake	N/A	48.0391	-122.4782	Island	4	Western	WDFW & Island County
178	Lake Herbert G West	Reservoir	Herbert G West	46.5875	-118.3694	Walla Walla	1	Eastern	WDFW & Reclamation
179	Lake Howard	Lake	N/A	48.157036	-122.326473	Snohomish	4	Western	WDFW
582	Lake Jay	Lake	N/A	48.6159	-123.0205	San Juan	4	Western	WDFW
583	Lake Julia	Lake	N/A	48.065656	-121.874691	Snohomish	4	Western	WDFW
180	Lake Kapowsin	Lake	N/A	46.9844	-122.2188	Pierce	6	Western	WDFW
181	Lake Ketchum	Lake	N/A	48.282212	-122.345132	Snohomish	4	Western	WDFW

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
182	Lake Ki	Lake	N/A	48.151673	-122.265065	Snohomish	4	Western	WDFW
183	Lake Killarney	Lake	N/A	47.286263	-122.290801	King	4	Western	WDFW, City of Federal Way & KCWLR
184	Lake Kokanee	Reservoir	Kokanee	47.402091	-123.207444	Mason	6	Western	WDFW & Tacoma Power
185	Lake Lawrence	Lake	N/A	46.852029	-122.571011	Thurston	6	Western	WDFW
186	Lake Lenore	Lake	N/A	47.487056	-119.517425	Grant	2	Eastern	WDFW & WSPRC
187	Lake Leo	Lake	N/A	48.647901	-117.496481	Pend Oreille	1	Eastern	WDFW & USFS
188	Lake Limerick	Lake	N/A	47.28613	-123.045265	Mason	6	Western	WDFW
189	Lake Loma	Lake	N/A	48.13432	-122.252195	Snohomish	4	Western	WDFW
190	Lake Louise	Lake	N/A	47.161861	-122.567972	Pierce	6	Western	WDFW
191	Lake Maggie	Lake	N/A	47.401477	-123.029778	Mason	6	Western	WDFW
192	Lake Margaret	Lake	N/A	47.769636	-121.900626	King	4	Western	WDFW & KCWLR
193	Lake McMurray	Lake	N/A	48.314316	-122.22616	Skagit	4	Western	WDFW
194	Lake Meridian	Lake	N/A	47.362526	-122.152956	King	4	Western	WDFW, City of Kent & KCWLR
265	Lake Merwin	Reservoir	Merwin	45.979143	-122.419485	Cowlitz	5	Western	WDFW & PacificCorp
195	Lake Morton	Lake	N/A	47.324354	-122.084616	King	4	Western	WDFW & KCWLR
196	Lake Number 12	Lake	N/A	47.325254	-121.975884	King	4	Western	WDFW & KCWLR
197	Lake Padden	Lake	N/A	48.7005	-122.4465	Whatcom	4	Western	WDFW
198	Lake Pateros	Reservoir	Pateros	48.0902253	-119.7861685	Douglas	2	Eastern	WDFW, CTCR & Douglas PUD
199	Lake Pleasant	Lake	N/A	48.064034	-124.328724	Clallam	6	Western	WDFW, Quileute Nation & Clallam County
584	Lake Quinault	Lake	N/A	47.4722	-123.8731	Grays Harbor	6	Western	QIN
200	Lake River	River	N/A	45.7063	-122.7221	Clark	5	Western	WDFW
201	Lake Roesiger	Lake	N/A	47.97285	-121.9235	Snohomish	4	Western	WDFW & Snohomish County Parks
202	Lake Roosevelt	Reservoir	Roosevelt	47.8539486	-118.3415214	Stevens	1	Eastern	WDFW, NPS, CTCR & Spokane Tribe of Indians
203	Lake Sacajawea	Reservoir	Sacajawea	46.3176594	-118.767056	Franklin	3	Eastern	WDFW & USACE
585	Lake Sacajawea	Lake	N/A	46.13117	-122.949935	Cowlitz	5	Western	WDFW & City of Longview
204	Lake Samish	Lake	N/A	48.66654	-122.377	Whatcom	4	Western	WDFW & Whatcom County
205	Lake Sammamish	Lake	N/A	47.564913	-122.057068	King	4	Western	WDFW, Muckleshoot Indian Tribe, Suquamish Indian Tribe, Snoqualmie Indian Tribe, WRIA 8 SRC, WA State Parks, WDNR & KCWLR
206	Lake Sawyer	Lake	N/A	47.340915	-122.038936	King	4	Western	WDFW, City of Black Diamond & KCWLR

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
207	Lake Scanewa	Reservoir	Scanewa	46.474736	-122.090887	Lewis	5	Western	WDFW & Tacoma Power
208	Lake Serene	Lake	N/A	47.869861	-122.285584	Snohomish	4	Western	WDFW
209	Lake Shannon	Reservoir	N/A	48.562399	-121.734075	Skagit	4	Western	WDFW & PSE
586	Lake Sherry	Lake	N/A	48.605045	-117.543446	Stevens	1	Eastern	WDFW & USFS
210	Lake Shoecraft	Lake	N/A	48.1258	-122.307	Snohomish	4	Western	WDFW
211	Lake Stevens	Lake	N/A	48.01307	-122.06682	Snohomish	4	Western	WDFW & Snohomish County Parks
212	Lake Sutherland	Lake	N/A	48.078623	-123.715003	Clallam	6	Western	WDFW, Lower Elwha Klallam Tribe & NPS
587	Lake Swano	Lake	N/A	46.95336	-123.8004	Grays Harbor	6	Western	WDFW & QIN
588	Lake Symington	Reservoir	William Symington	47.5961	-122.8299	Kitsap	6	Western	WDFW, Lake Symington HOA & Ft. Wm. Symington HOA
213	Lake Tapps	Reservoir	Tapps	47.2409	-122.1743	Pierce	6	Western	WDFW, Pierce County, City of Bonney Lake
214	Lake Terrell	Lake	N/A	48.86171	-122.68919	Whatcom	4	Western	WDFW
215	Lake Thomas	Lake	N/A	48.622108	-117.540915	Stevens	1	Eastern	WDFW & USFS
216	Lake Umatilla	Reservoir	Umatilla	46.2441047	-119.2054862	Benton	3	Eastern	WDFW, ODFW & USACE
217	Lake Union	Lake	N/A	47.6445	-122.3346	King	4	Western	WDFW, Muckleshoot Indian Tribe, Suquamish Indian Tribe, WRIA 8 SRC, USACE, WDNR & KCWLR
218	Lake Wallula	Reservoir	Wallula	46.238556	-119.2190711	Benton	3	Eastern	WDFW, ODFW, USFWS & USACE
219	Lake Washington	Lake	N/A	47.647609	-122.276007	King	4	Western	WDFW, Muckleshoot Indian Tribe, Suquamish Indian Tribe, WRIA 8 SRC, USACE, WDNR, USEPA & KCWLR
220	Lake Washington Ship Canal	Canal	N/A	47.6596	-122.3769	King	4	Western	WDFW, Muckleshoot Indian Tribe, Suquamish Indian Tribe, WRIA 8 SRC, USACE, WDNR & KCWLR
221	Lake Wenatchee	Lake	N/A	47.807847	-120.7261069	Chelan	2	Eastern	WDFW, WSPRC & USFS
222	Lake Whatcom	Lake	N/A	48.67356	-122.31585	Whatcom	4	Western	WDFW & City of Bellingham
223	Lake Whitman	Lake	N/A	46.963023	-122.257368	Pierce	6	Western	WDFW
224	Lake Wooten	Lake	N/A	47.467303	-122.981581	Mason	6	Western	WDFW
589	Langendorfer Lake	Lake	N/A	47.75404	-121.852075	King	4	Western	WDFW, WDNR & KCWLR
225	Langlois Lake	Lake	N/A	47.635	-121.8847	King	4	Western	WDFW & KCWLR
590	Larsen Lake	Lake	N/A	47.6059	-122.1401	King	4	Western	WDFW, City of Bellevue & KCWLR
226	Lavender Lake	Lake	N/A	47.2179	-121.1274	Kittitas	3	Eastern	WDFW
770	Lead King Beaver Pond	Pond	N/A	48.93873	-117.35603	Pend Oreille	1	Eastern	WDFW, Riley Creek Timber & USFS

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
592	Leadbetter Lake	Lake	N/A	48.917498	-117.355362	Pend Oreille	1	Eastern	WDFW & USFS
227	Leader Lake	Lake	N/A	48.359905	-119.678267	Okanogan	2	Eastern	WDFW & WDNR
228	Leech Lake	Lake	N/A	46.6447	-121.383	Yakima	3	Eastern	WDFW & USFS
229	Leland Lake	Lake	N/A	47.896676	-122.881788	Jefferson	6	Western	WDFW, Skokomish Indian Tribe & PNP Treaty Council
593	Lemna Lake	Lake	N/A	46.942577	-119.229909	Grant	2	Eastern	WDFW & USFWS
230	Lenice Lake	Lake	N/A	46.84088	-119.834982	Grant	2	Eastern	WDFW
594	Leroy Burns Pond	Pond	N/A	46.2323	-123.3241	Wahkiakum	5	Western	WDFW
231	Lewis River	River	N/A	45.8686	-122.731	Clark	5	Western	WDFW & PacificCorp
232	Liberty Lake	Lake	N/A	47.653852	-117.084098	Spokane	1	Eastern	WDFW & Spokane County
595	Lilly Lake	Reservoir	Lilly	47.294792	-120.308571	Chelan	2	Eastern	WDFW & Stemilt Irrigation District
596	Lincoln Park Pond 1	Pond	N/A	48.115624	-123.476152	Clallam	6	Western	WDFW, Jamestown S'Klallam Tribe & Clallam County
597	Lions Park Pond	Pond	N/A	46.040982	-118.375655	Walla Walla	1	Eastern	WDFW
598	Little Ash Lake	Lake	N/A	45.669287	-121.910478	Skamania	5	Western	WDFW
233	Little Beaver Lake	Reservoir	N/A	48.849776	-118.961988	Okanogan	2	Eastern	WDFW & USFS
234	Little Falls Reservoir	Reservoir	Little Falls	47.8352	-117.9104	Stevens	1	Eastern	WDFW & Avista Utilities
599	Little Goose Lake	Lake	N/A	48.275	-119.5171	Okanogan	2	Eastern	CTCR
235	Little Green Lake	Lake	N/A	48.437093	-119.62953	Okanogan	2	Eastern	WDFW
600	Little Lost Lake	Lake	N/A	48.821436	-117.439076	Pend Oreille	1	Eastern	WDFW & Riley Creek Timber
236	Little Spokane River	River	N/A	47.7901	-117.4003	Spokane	1	Eastern	WDFW & WSPRC
238	Little Twin Lake	Lake	N/A	48.449225	-120.189797	Okanogan	2	Eastern	WDFW
237	Little Twin Lake	Lake	N/A	48.572653	-117.642592	Stevens	1	Eastern	WDFW & USFS
601	Lois Lake	Lake	N/A	46.950488	-119.165685	Grant	2	Eastern	WDFW
239	Lone Lake	Lake	N/A	48.021126	-122.461805	Island	4	Western	WDFW & Island County
761	Long Lake	Lake	N/A	46.6899	-118.2381	Franklin	3	Eastern	Harder Farms & WDNR
241	Long Lake	Lake	N/A	47.4852	-122.5921	Kitsap	6	Western	WDFW & Kitsap County
240	Long Lake	Lake	N/A	47.02177	-122.78063	Thurston	6	Western	WDFW & Lacey Parks
242	Long Lake	Lake	N/A	48.615207	-119.133714	Okanogan	2	Eastern	WDFW
603	Long Lake	Lake	N/A	48.496152	-118.813243	Ferry	1	Eastern	WDFW & USFS
243	Long Lake	Lake	N/A	46.931177	-119.20702	Grant	2	Eastern	WDFW, USFWS & Reclamation
602	Long Lake	Lake	N/A	46.628468	-121.805033	Lewis	5	Western	WDFW & USFS
244	Long Lake/Spokane Lake	Reservoir	Long	47.833872	-117.761059	Stevens	1	Eastern	WDFW, City of Spokane, WDNR & WSPRC

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
604	Long's Pond	Pond	N/A	47.039336	-122.791497	Thurston	6	Western	WDFW
245	Loomis Lake	Lake	N/A	46.437317	-124.043019	Pacific	6	Western	WDFW & WSPRC
246	Loon Lake	Lake	N/A	48.0523721	-117.6439909	Stevens	1	Eastern	WDFW
248	Lost Lake	Lake	N/A	47.334672	-121.404686	Kittitas	3	Eastern	WDFW & USFS
249	Lost Lake	Lake	N/A	46.639255	-121.067065	Yakima	3	Eastern	WDFW & USFS
250	Lost Lake	Lake	N/A	48.849335	-119.052122	Okanogan	2	Eastern	WDFW & USFS
247	Lost Lake	Lake	N/A	47.157153	-123.247505	Mason	6	Western	WDFW
605	Lost Lake/by Lake Chaplain	Lake	N/A	47.947368	-121.855254	Snohomish	4	Western	WDFW
606	Lost Lake/Crappie Lake	Lake	N/A	47.828475	-121.791552	Snohomish	4	Western	WDFW
251	Lost Lake/Devil's Lake	Lake	N/A	47.800493	-122.04206	Snohomish	4	Western	WDFW
252	Lower Goose Lake	Lake	N/A	46.923852	-119.288988	Grant	2	Eastern	WDFW & Reclamation
253	Lower Granite Lake	Reservoir	Lower Granite	46.3869	-117.047	Whitman	1	Eastern	WDFW & USACE
771	Lower Lead King Lake	Lake	N/A	48.9415	-117.3562	Pend Oreille	1	Eastern	WDFW & Riley Creek Timber
607	Ludlow Lake	Lake	N/A	47.914882	-122.775195	Jefferson	6	Western	WDFW, Skokomish Indian Tribe & PNP Treaty Council
608	Lyman Lake	Lake	N/A	48.526916	-119.022454	Okanogan	2	Eastern	WDFW & USFS
609	Marmes Pond	Pond	N/A	46.614683	-118.201583	Franklin	3	Eastern	WDFW & USACE
254	Marshall Lake	Lake	N/A	48.2565	-117.0785	Pend Oreille	1	Eastern	WDFW & USFS
255	Martha Alderwood Manor	Lake	N/A	47.852714	-122.243454	Snohomish	4	Western	WDFW & Snohomish County Parks
256	Martha Lake	Lake	N/A	47.094756	-119.836975	Grant	2	Eastern	WDFW
257	Martha Warm Beach	Lake	N/A	48.16899	-122.341379	Snohomish	4	Western	WDFW
610	Mary Ann Lake	Lake	N/A	48.937025	-119.088566	Okanogan	2	Eastern	WDFW
611	Maryhill Pond	Pond	N/A	45.6807	-120.8317	Klickitat	5	Eastern	WDFW & WSPRC
258	Mason Lake	Lake	N/A	47.356841	-122.923069	Mason	6	Western	WDFW & Mason County
259	Mattoon Lake	Lake	N/A	46.977364	-120.550637	Kittitas	3	Eastern	WDFW
260	Mayfield Lake	Reservoir	Mayfield	46.554081	-122.53686	Lewis	5	Western	WDFW & Tacoma Power
612	Maytown Lake	Lake Manmade	N/A	46.88178	-122.94757	Thurston	6	Western	Private
613	McCabe Pond	Pond	N/A	46.924453	-120.507147	Kittitas	3	Eastern	WDFW & WSPRC
614	McDaniel Lake	Lake	N/A	46.807241	-121.110328	Yakima	3	Eastern	WDFW & USFS
615	McDowell Lake	Lake	N/A	48.465029	-117.676345	Stevens	1	Eastern	WDFW & USFWS
616	McGinnis Lake	Lake	N/A	48.036	-118.8928	Okanogan	2	Eastern	CTCR
261	McIntosh Lake	Lake	N/A	46.866594	-122.76761	Thurston	6	Western	WDFW
262	Medical Lake	Lake	N/A	47.563044	-117.690143	Spokane	1	Eastern	WDFW & City of Medical Lake
617	Melbourne Lake	Lake	N/A	47.500781	-123.127541	Mason	6	Western	WDFW & WDNR

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
618	Menzel Lake	Lake Manmade	N/A	48.04018	-121.92037	Snohomish	4	Western	Private
263	Mercer Slough	Slough	N/A	47.582	-122.1858	King	4	Western	WDFW, Muckleshoot Indian Tribe, Suquamish Indian Tribe, City of Bellevue, WRIA 8 SRC & KCWLR
264	Merrill Lake	Lake	N/A	46.094333	-122.324233	Cowlitz	5	Western	WDFW & WDNR
266	Mesa Lake	Lake	N/A	46.567828	-119.037891	Franklin	3	Eastern	WDFW
766	Methow River	River	N/A	48.04575	-119.91168	Okanogan	2	Eastern	WDFW & USFS
769	Meyers Falls Reservoir	Reservoir	Myers Falls	48.596	-118.0584	Stevens	1	Eastern	WDFW
619	Milk Lake	Lake	N/A	46.984977	-120.996136	Kittitas	3	Eastern	WDFW
620	Milk Pond	Pond	N/A	46.986693	-121.06156	Kittitas	3	Eastern	WDFW & USFS
267	Mineral Lake	Lake	N/A	46.7203	-122.182	Lewis	5	Western	WDFW
621	Mint Lake	Lake Manmade	N/A	45.89392	-122.50722	Clark	5	Western	Private
268	Mission Lake	Lake	N/A	47.532294	-122.825118	Kitsap	6	Western	WDFW
622	Mission Pond	Pond	N/A	48.271142	-120.240592	Okanogan	2	Eastern	WDFW & USFS
623	Mitchell Pond	Pond	N/A	46.06271	-118.951675	Benton	3	Eastern	WDFW & USFWS
269	Molson Lake	Lake	N/A	48.988026	-119.206914	Okanogan	2	Eastern	WDFW
270	Moses Lake	Lake	N/A	47.1055272	-119.326228	Grant	2	Eastern	WDFW & Reclamation
624	Moss Lake	Lake	N/A	47.694115	-121.850073	King	4	Western	WDFW & KCWLR
625	Mound Pond	Pond	N/A	46.028572	-118.965528	Benton	3	Eastern	WDFW & USFWS
271	Mountain Lake	Lake	N/A	48.660119	-122.816263	San Juan	4	Western	WDFW & WSPRC
773	Mountain Meadows Lake	Lake	N/A	48.1946	-117.23082	Pend Oreille	1	Eastern	WDFW
626	Mud Lake	Lake	N/A	46.772144	-120.834993	Yakima	3	Eastern	WDFW
627	Mudgett Lake	Lake	N/A	48.038976	-118.219205	Stevens	1	Eastern	WDFW
272	Munn Lake	Lake	N/A	46.985028	-122.879391	Thurston	6	Western	WDFW
628	Muskegon Lake	Lake	N/A	48.7977	-117.0381	Pend Oreille	1	Eastern	WDFW & USFS
629	Myron Lake	Lake	N/A	46.622131	-120.556064	Yakima	3	Eastern	WDFW
630	Mystic Lake	Lake	N/A	48.327843	-117.143753	Pend Oreille	1	Eastern	WDFW & USFS
631	Naches Park Sportsmen Day Pond	Pond	N/A	46.736092	-120.700418	Yakima	3	Eastern	WDFW & City of Naches
273	Nahwatzel Lake	Lake	N/A	47.242394	-123.333193	Mason	6	Western	WDFW
632	Naneum Pond	Pond	N/A	47.004286	-120.463918	Kittitas	3	Eastern	WDFW
633	Neva Lake	Lake	N/A	48.5765	-123.0861	San Juan	4	Western	WDFW
274	Newman Lake	Lake	N/A	47.772817	-117.085096	Spokane	1	Eastern	WDFW & Spokane County
634	Nicholas Lake	Lake	N/A	48.4621	-118.2452	Ferry	2	Eastern	CTCR

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
275	Nile Lake	Lake	N/A	48.656945	-117.472586	Pend Oreille	1	Eastern	WDFW & USFS
276	Nine Mile Reservoir	Reservoir	Nine Mile	47.7712	-117.5495	Spokane	1	Eastern	WDFW & WSPRC
277	Nooksack River	River	N/A	48.842946	-122.589901	Whatcom	4	Western	WDNR, Whatcom Land Trust & Nooksack Tribe
278	North Lake	Lake	N/A	47.3074	-122.2884	King	4	Western	WDFW & KCWLR
635	North Silver Lake	Lake	N/A	47.578455	-117.652925	Spokane	1	Eastern	WDFW & Private Entities
279	North Skookum Lake	Lake	N/A	48.406117	-117.181029	Pend Oreille	1	Eastern	WDFW, WDNR & USFS
280	North Teal Lake	Lake	N/A	46.919253	-119.201225	Grant	2	Eastern	WDFW & USFWS
636	North Twin Lake	Lake	N/A	48.2892	-118.3637	Ferry	2	Eastern	CTCR
637	North Windmill Lake	Lake	N/A	46.93763	-119.172857	Grant	2	Eastern	WDFW
638	Northup Lake	Lake	N/A	47.886928	-119.041848	Grant	2	Eastern	WDFW & WSPRC
639	Nunnally Lake	Lake	N/A	46.8396	-119.8859	Grant	2	Eastern	WDFW, WDNR & Reclamation
281	Offut Lake	Lake	N/A	46.9195	-122.8304	Thurston	6	Western	WDFW
282	Ohop Lake	Lake	N/A	46.8852	-122.2789	Pierce	6	Western	WDFW
762	Okanogan River	River	N/A	48.1015	-119.7118	Okanogan	2	Eastern	WDFW, WDNR & CTCR
640	Omak Lake	Lake	N/A	48.2713	-119.3956	Okanogan	2	Eastern	CTCR
641	Orchard Pond	Pond	N/A	46.58242	-118.220886	Columbia	1	Eastern	WDFW
283	Osoyoos Lake	Lake	N/A	48.9495409	-119.4301135	Okanogan	2	Eastern	WDFW & WSPRC
284	Ozette Lake	Lake	N/A	48.152616	-124.668131	Clallam	6	Western	NPS & Makah Tribe
285	Pacific Lake	Lake	N/A	47.412296	-118.719279	Lincoln	1	Eastern	WDFW, Private Entities & BLM
642	Padden Creek	Creek	N/A	48.7157	-122.4924	Whatcom	4	Western	WDFW
286	Palmer Lake	Lake	N/A	48.8743	-119.6201	Okanogan	2	Eastern	WDFW, BLM & WDNR
643	Palmer Pond	Pond	N/A	46.004879	-118.996917	Benton	3	Eastern	WDFW & USFWS
767	Palouse River	River	N/A	46.59366	-118.21803	Franklin	1	Eastern	WDFW & USACE
644	Pampa Pond	Pond	N/A	46.781249	-117.94499	Whitman	1	Eastern	WDFW
287	Panther Lake	Lake	N/A	47.522698	-122.851536	Kitsap	6	Western	WDFW
288	Panther Lake	Lake	N/A	47.948629	-122.00585	Snohomish	4	Western	WDFW
289	Park Lake	Lake	N/A	47.590535	-119.395535	Grant	2	Eastern	WDFW & WSPRC
645	Parker Lake	Lake	N/A	48.478488	-117.361102	Pend Oreille	1	Eastern	WDFW & USFS
290	Pass Lake	Lake	N/A	48.420344	-122.636058	Skagit	4	Western	WDFW & WSPRC
291	Patterson Lake	Lake	N/A	48.456386	-120.245597	Okanogan	2	Eastern	WDFW
292	Pattison Lake	Lake	N/A	46.994751	-122.77742	Thurston	6	Western	WDFW
293	Pearrygin Lake	Lake	N/A	48.494331	-120.15982	Okanogan	2	Eastern	WDFW & WSPRC
646	Pepoon Lake	Lake	N/A	48.90044	-117.891735	Stevens	1	Eastern	WDFW & USFS

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
647	Perch Lake	Lake	N/A	47.595962	-119.367348	Grant	2	Eastern	WDFW & WSPRC
648	Peterson Lake	Lake	N/A	47.422507	-122.077049	King	4	Western	WDFW & KCWLR
294	Petit Lake	Lake	N/A	48.638056	-117.086938	Pend Oreille	1	Eastern	WDFW & USFS
649	Phantom Lake	Lake	N/A	47.5951	-122.1214	King	4	Western	WDFW, City of Bellevue & KCWLR
650	Phillips Lake	Lake	N/A	48.953781	-117.767227	Stevens	1	Eastern	WDFW & Private Entity
295	Phillips Lake	Lake	N/A	47.250767	-122.960191	Mason	6	Western	WDFW
651	Phillips Lake Chewelah	Lake	N/A	48.405947	-117.621394	Stevens	1	Eastern	WDFW & USFS
296	Pierre Lake	Lake	N/A	48.900554	-118.138693	Stevens	1	Eastern	WDFW & USFS
652	Pillar Lake	Lake	N/A	46.949145	-119.225852	Grant	2	Eastern	WDFW & USFWS
653	Pine Lake	Lake	N/A	47.587448	-122.044763	King	4	Western	WDFW, City of Sammamish & KCWLR
654	Pit Lake	Lake	N/A	47.376184	-120.14047	Douglas	2	Eastern	WDFW & City of Rock Island
655	Plummer Lake	Lake	N/A	46.715809	-122.973893	Lewis	5	Western	WDFW
656	Poacher Lake	Lake	N/A	46.954294	-119.164421	Grant	2	Eastern	WDFW & USFWS
297	Potholes Reservoir	Reservoir	Potholes	46.9677729	-119.3191678	Grant	2	Eastern	WDFW, Reclamation & WSPRC
298	Potter's Pond	Pond	N/A	48.426279	-117.662405	Stevens	1	Eastern	WDFW & USFWS
657	Powerline Lake	Lake	N/A	46.640017	-119.065921	Franklin	3	Eastern	WDFW
658	Price Lake	Lake	N/A	47.471221	-123.171537	Mason	6	Western	WDFW & WDNR
299	Priest Rapids Lake	Reservoir	Priest Rapids	46.6844245	-119.9324931	Grant	2	Eastern	WDFW & Grant PUD
659	Purdue Lake	Lake	N/A	48.6885	-122.8606	San Juan	4	Western	WDFW
300	Putters Lake	Lake	N/A	47.374841	-120.132886	Douglas	2	Eastern	WDFW & City of Rock Island
660	Puyallup River	River	N/A	47.2055	-122.3139	Pierce	6	Western	WDFW, Pierce County & Puyallup Tribe
661	Quail Lake	Lake	N/A	46.903498	-119.192953	Adams	2	Eastern	USFWS
662	Quarry Pond	Pond	N/A	46.15015	-118.942782	Walla Walla	1	Eastern	WDFW & USFWS
663	Quartz Creek Pond	Pond	N/A	47.020687	-121.139101	Kittitas	3	Eastern	WDFW & USFS
301	Quigg Lake	Lake	N/A	46.948508	-123.643972	Grays Harbor	6	Western	WDFW & QIN
302	Quincy Lake	Lake	N/A	47.1414	-119.927	Grant	2	Eastern	WDFW & Reclamation
664	Rainbow Lake	Lake	N/A	46.313936	-117.660611	Columbia	1	Eastern	WDFW
303	Rainbow Lake/Vic Meyers	Lake	N/A	47.590661	-119.375001	Grant	2	Eastern	WDFW & WSPRC
665	Rainer Lake	Lake Manmade	N/A	46.90273	-122.61448	Thurston	6	Western	Private
304	Rapjohn Lake	Lake	N/A	46.905177	-122.342204	Pierce	6	Western	WDFW
305	Rat Lake	Lake	N/A	48.180743	-119.801692	Okanogan	2	Eastern	WDFW
306	Rattlesnake Lake	Lake	N/A	47.430448	-121.774583	King	4	Western	WDFW, SPU & KCWLR
666	Rebecca Lake	Lake	N/A	48.0552	-118.9345	Okanogan	2	Eastern	CTCR
667	Reflection Pond	Pond	N/A	46.600703	-120.475969	Yakima	3	Eastern	WDFW

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
668	Reflection Pond	Pond	N/A	48.7371	-119.672681	Okanogan	2	Eastern	WDFW
669	Renner Lake	Lake	N/A	48.780467	-118.188779	Ferry	1	Eastern	WDFW & USFS
307	Riffe Lake	Reservoir	Riffe	46.476698	-122.168405	Lewis	5	Western	WDFW & Tacoma Power
670	Rigley Lake	Lake	N/A	48.652989	-117.988698	Stevens	1	Eastern	WDFW & WDNR
308	Riley Lake	Lake	N/A	48.246402	-121.946916	Snohomish	4	Western	WDFW
309	Rimrock Lake	Reservoir	Rimrock	46.6426921	-121.1797988	Yakima	3	Eastern	WDFW & USFS
671	Ringold Hatchery	Spring	N/A	46.5085	-119.2479	Franklin	3	Eastern	WDFW & Reclamation
672	Riparia Pond	Pond	N/A	46.578391	-118.082898	Whitman	1	Eastern	WDFW
310	Robbins Lake	Lake	N/A	47.427065	-123.081515	Mason	6	Western	WDFW & WDNR
673	Roche Harbor Lake	Lake	N/A	48.5884	-123.1228	San Juan	4	Western	WDFW
311	Rock Island Lake	Reservoir	Rock Island	47.3874848	-120.2660881	Chelan	2	Eastern	WDFW & Chelan PUD
312	Rock Lake	Lake	N/A	47.1393	-117.7251	Whitman	1	Eastern	WDFW
674	Rock Lake 1	Lake	N/A	48.456684	-119.791986	Okanogan	2	Eastern	WDFW & WDNR
675	Rock Lake 2	Lake	N/A	48.452771	-119.791109	Okanogan	2	Eastern	WDFW & WDNR
676	Rocky Lake	Lake	N/A	48.49541	-117.873677	Stevens	1	Eastern	WDFW & WDNR
313	Roses Lake	Lake	N/A	47.904241	-120.154174	Chelan	2	Eastern	WDFW
314	Ross Lake	Reservoir	Ross	48.949476	-121.079427	Whatcom	4	Western	WDFW, NPS & SCL
677	Rotary Lake	Lake	N/A	46.628322	-120.509264	Yakima	3	Eastern	WDFW
315	Round Lake	Lake	N/A	48.607181	-119.124577	Okanogan	2	Eastern	WDFW
316	Rowland Lake	Lake	N/A	45.709942	-121.380543	Klickitat	5	Eastern	WDFW
317	Rufus Woods Lake	Reservoir	Rufus Woods	48.0142229	-119.6070386	Okanogan	2	Eastern	WDFW & USACE
318	Sacheen Lake	Lake	N/A	48.1509	-117.3071	Pend Oreille	1	Eastern	WDFW
678	Sage Lake East	Lake	N/A	46.933166	-119.198487	Grant	2	Eastern	WDFW & Reclamation
679	Sage Lake West	Lake	N/A	46.931629	-119.20294	Grant	2	Eastern	WDFW & Reclamation
680	Sago Lake	Lake	N/A	46.941009	-119.223083	Grant	2	Eastern	WDFW & USFWS
319	Saint Clair Lake	Lake	N/A	46.9985	-122.7182	Thurston	6	Western	WDFW
320	Sammamish River	River	N/A	47.7543	-122.2506	King	4	Western	WDFW, Muckleshoot Indian Tribe, Suquamish Indian Tribe, WRIA 8 SRC, USACE & KCWLR
321	Sandy Shore Lake	Lake	N/A	47.890814	-122.767617	Jefferson	6	Western	WDFW, Skokomish Indian Tribe & PNP Treaty Council
681	Schalow Pond	Pond	N/A	48.600548	-119.677246	Okanogan	2	Eastern	WDFW
322	Scooteney Reservoir	Reservoir	Scooteney	46.7046801	-119.0249045	Franklin	3	Eastern	WDFW & Reclamation
764	Scott Lake	Lake	N/A	46.9189	-122.9324	Thurston	6	Western	WDFW

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682	Scriber Lake	Lake	N/A	47.820505	-122.307294	Snohomish	4	Western	WDFW & City of Lynnwood
323	Shadow Lake	Lake	N/A	47.405695	-122.086397	King	4	Western	WDFW & KCWLR
324	Shady Lake	Lake	N/A	47.429321	-122.106794	King	4	Western	WDFW & KCWLR
683	Shaw Lake	Lake	N/A	47.93291	-121.693691	Snohomish	4	Western	WDFW & WSPRC
772	Shelley Lake	Lake	N/A	47.6515	-117.1847	Spokane	1	Eastern	WDFW & Private Entities
684	Shiner Lake	Lake	N/A	46.878383	-119.300263	Adams	2	Eastern	USFWS
685	Shoveler Lake	Lake	N/A	46.942446	-119.228153	Grant	2	Eastern	WDFW & USFWS
325	Sidley Lake	Lake	N/A	48.990656	-119.22308	Okanogan	2	Eastern	WDFW
686	Silcott Pond	Pond	N/A	46.411902	-117.19155	Asotin	1	Eastern	WDFW
687	Silent Lake	Lake	N/A	47.790192	-122.770777	Jefferson	6	Western	WDFW, Skokomish Indian Tribe, PNP Treaty Council & WDNR
329	Silver Lake	Lake	N/A	47.571576	-117.655332	Spokane	1	Eastern	WDFW
327	Silver Lake	Lake	N/A	46.31	-122.776667	Cowlitz	5	Western	WDFW
328	Silver Lake	Lake	N/A	46.884852	-122.365583	Pierce	6	Western	WDFW
688	Silver Lake	Lake	N/A	47.892498	-122.208828	Snohomish	4	Western	WDFW & City of Everett
326	Silver Lake	Lake	N/A	48.978457	-122.069853	Whatcom	4	Western	WDFW & Whatcom County
689	Silver Nail Lake	Lake	N/A	48.993217	-119.464077	Okanogan	2	Eastern	WDFW
690	Silverado Lake	Lake Manmade	N/A	46.63515	-123.05031	Lewis	5	Western	Private
330	Sixteen Lake	Lake	N/A	48.344219	-122.288796	Skagit	4	Western	WDFW
331	Skagit River	River	N/A	48.490016	-122.206718	Skagit	4	Western	USFS & SCL
691	Ski Park Lake	Lake Manmade	N/A	47.10107	-122.14768	Pierce	6	Western	Private
692	Ski View Lake	Lake Manmade	N/A	46.96416	-122.96434	Thurston	6	Western	Private
693	Skookumchuck Reservoir	Reservoir	Skookumchuck	46.785449	-122.699039	Thurston	6	Western	WDFW
332	Skykomish River	River	N/A	47.9988	-122.1781	Snohomish	4	Western	WDFW, Tulalip Tribes, King County & WDNR
694	Smelling Lake	Lake	N/A	48.059194	-121.876985	Snohomish	4	Western	WDFW
695	Smith Lake	Lake	N/A	48.318321	-119.761122	Okanogan	2	Eastern	WDFW & WDNR
333	Snag Lake/Radar Hill Ponds	Lake	N/A	46.419967	-123.813923	Pacific	6	Western	WDFW & WDNR
334	Snake River Arm	Reservoir	Wallula	46.214826	-119.018882	Walla Walla	1	Eastern	WDFW & USACE
696	Snipe Lake	Lake	N/A	46.94682	-119.224593	Grant	2	Eastern	WDFW & USFWS
335	Snohomish River	River	N/A	47.917	-122.1207	Snohomish	4	Western	WDFW & Tulalip Tribes
336	Snoqualmie River	River	N/A	47.8118	-122.0089	Snohomish	4	Western	WDFW, Tulalip Tribes & King County
337	Soda Lake	Lake	N/A	46.963	-119.238451	Grant	2	Eastern	WDFW & Reclamation
697	Soos Creek	Creek	N/A	47.308488	-122.169072	King	4	Western	WDFW & KCWLR

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698	South Bend Mill Pond	Pond	N/A	46.670528	-123.818763	Pacific	6	Western	WDFW
699	South Fork Tolt Reservoir	Reservoir	South Fork Tolt	47.7002	-121.6561	Snohomish	4	Western	City of Seattle
338	South Lewis Park Pond	Pond	N/A	46.432923	-122.843539	Lewis	5	Western	WDFW & Lewis County
339	South Skookum Lake	Lake	N/A	48.392631	-117.181498	Pend Oreille	1	Eastern	WDFW & USFS
340	South Teal Lake	Lake	N/A	46.914057	-119.2028	Grant	2	Eastern	WDFW & USFWS
700	South Twin Lake	Lake	N/A	48.2652	-118.3837	Ferry	2	Eastern	CTCR
341	Spada Lake	Reservoir	Spada	47.9753	-121.6136	Snohomish	4	Western	WDFW & Snohomish PUD
342	Spanaway Lake	Lake	N/A	47.114143	-122.446075	Pierce	6	Western	WDFW & Pierce County
343	Spearfish Lake	Lake	N/A	45.628672	-121.131551	Klickitat	5	Eastern	WDFW
344	Spectacle Lake	Lake	N/A	48.8104382	-119.5324738	Okanogan	2	Eastern	WDFW & WDNR
701	Spencer Lake	Lake	N/A	48.556	-122.804	San Juan	4	Western	WDFW
345	Spencer Lake	Lake	N/A	47.265563	-122.960074	Mason	6	Western	WDFW
702	Spirit Lake	Lake	N/A	46.2651	-122.1479	Skamania	5	Western	WDFW & USFS
346	Spokane River Arm	Reservoir	Spokane River Arm	47.909815	-118.311552	Stevens	1	Eastern	WDFW & Spokane Tribe of Indians
347	Sportsman Lake	Lake	N/A	48.568147	-123.073639	San Juan	4	Western	WDFW
348	Sprague Lake	Lake	N/A	47.2548216	-118.0836862	Adams	2	Eastern	WDFW
703	Spring Lake	Lake	N/A	46.332981	-117.678114	Columbia	1	Eastern	WDFW
349	Spring Lake	Lake	N/A	47.436579	-122.087991	King	4	Western	WDFW & KCWLR
704	Springdale City Pond	Pond	N/A	48.057952	-117.742204	Stevens	1	Eastern	WDFW & City of Springdale
350	Squalicum Lake	Lake	N/A	48.797505	-122.350141	Whatcom	4	Western	WDFW
705	Squaw Lake	Lake	N/A	47.833527	-120.823652	Chelan	2	Eastern	WDFW & USFS
351	Stan Coffin Lake	Lake	N/A	47.1492	-119.9193	Grant	2	Eastern	WDFW & Reclamation
352	Star Lake	Lake	N/A	47.354909	-122.287071	King	4	Western	WDFW & KCWLR
353	Starvation Lake	Lake	N/A	48.491364	-117.711327	Stevens	1	Eastern	WDFW & WDNR
706	Starzman Lake Middle	Lake	N/A	48.23058	-119.776142	Okanogan	2	Eastern	WDFW & BLM
707	Starzman Lake Upper	Lake	N/A	48.234114	-119.77638	Okanogan	2	Eastern	WDFW & BLM
354	Steel Lake	Lake	N/A	47.3261	-122.3001	King	4	Western	WDFW, City of Federal Way & KCWLR
355	Steilacoom Lake	Lake	N/A	47.161412	-122.531473	Pierce	6	Western	WDFW & City of Lakewood
356	Stickney Lake	Lake	N/A	47.875195	-122.256048	Snohomish	4	Western	WDFW
357	Stillaquamish River	River	N/A	48.1985	-122.1897	Snohomish	4	Western	WDFW, Stillaguamish Tribe & USFS
358	Storm Lake	Lake	N/A	47.939438	-121.97294	Snohomish	4	Western	WDFW
359	Sugarloaf Lake	Lake	N/A	48.591245	-119.696686	Okanogan	2	Eastern	WDFW & USFS
360	Sullivan Lake	Lake	N/A	48.8369336	-117.2784062	Pend Oreille	1	Eastern	WDFW & USFS

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
708	Sullivan Pond	Pond	N/A	48.51956	-120.145597	Okanogan	2	Eastern	WDFW
361	Summit Lake	Lake	N/A	47.04933	-123.11684	Thurston	6	Western	WDFW
362	Summit Lake	Lake	N/A	48.958958	-118.127036	Stevens	1	Eastern	WDFW & USFS
709	Summit Lake	Lake	N/A	48.886022	-119.34055	Okanogan	2	Eastern	WDFW & USFS
710	Summit Lake Tribe	Lake	N/A	48.2832	-119.1511	Okanogan	2	Eastern	CTCR
711	Sun Basin Ski Ranch	Lake Manmade	N/A	47.16935	-119.21564	Grant	2	Eastern	Private
712	Sunday Lake	Lake	N/A	48.229399	-122.257839	Snohomish	4	Western	WDFW
713	Sunday Lake	Lake	N/A	47.626681	-121.580534	King	4	Western	WDFW, USFS & KCWLR
363	Swan Lake	Lake	N/A	48.512762	-118.83803	Ferry	1	Eastern	WDFW & USFS
714	Swift Power Canal	Canal	N/A	46.058772	-122.231758	Skamania	5	Western	WDFW
364	Swift Reservoir	Reservoir	Swift	46.050991	-122.044196	Skamania	5	Western	WDFW & PacificCorp
715	Switch Pond	Pond	N/A	46.011968	-118.98798	Benton	3	Eastern	WDFW & USFWS
716	Swofford Pond	Pond	N/A	46.497908	-122.404393	Lewis	5	Western	WDFW
365	Sylvia Lake	Lake	N/A	46.996263	-123.595356	Grays Harbor	6	Western	WDFW, QIN & WSPRC
717	Tahuya Lake	Lake	N/A	47.5663	-122.8374	Kitsap	6	Western	WDFW
366	Takhlakh Lake	Lake	N/A	46.278152	-121.596481	Skamania	5	Western	WDFW & USFS
367	Tanwax Lake	Lake	N/A	46.94429	-122.27385	Pierce	6	Western	WDFW
368	Tarboo Lake	Lake	N/A	47.924272	-122.852881	Jefferson	6	Western	WDFW, Skokomish Indian Tribe & PNP Treaty Council
718	Tate Lake	Lake Manmade	N/A	46.61699	-119.20679	Franklin	3	Eastern	Private
719	Teal Lake	Lake	N/A	47.893474	-122.673613	Jefferson	6	Western	WDFW & PNP Treaty Council
369	Tee Lake	Lake	N/A	47.433407	-123.022955	Mason	6	Western	WDFW
720	Temple Pond 1	Pond	N/A	47.846324	-122.042712	Snohomish	4	Western	WDFW & Snohomish County
721	Thompson Pond	Pond	N/A	48.324371	-119.997264	Okanogan	2	Eastern	WDFW & USFS
722	Thompson Seep North	Seep	N/A	46.688762	-119.260496	Franklin	3	Eastern	WDFW & Reclamation
723	Thompson Seep South	Seep	N/A	46.675362	-119.272949	Franklin	3	Eastern	WDFW & Reclamation
724	Tieton Ranger Pond	Pond	N/A	46.69205	-121.074446	Yakima	3	Eastern	WDFW & USFS
370	Tiger Lake	Lake	N/A	47.516053	-122.832372	Mason	6	Western	WDFW
725	Tims Ponds	Pond	N/A	46.732017	-120.796486	Yakima	3	Eastern	WDFW
371	Toad Lake	Lake	N/A	48.789335	-122.400205	Whatcom	4	Western	WDFW
726	Tradition Lake	Lake	N/A	47.528743	-122.003832	King	4	Western	WDFW, WDNR & KCWLR
372	Trails End Lake	Lake	N/A	47.380191	-122.888271	Mason	6	Western	WDFW
727	Trask Lake	Lake	N/A	47.3338	-122.9893	Mason	6	Western	WDFW
728	Trout Lake	Reservoir	Trout	48.5335	-123.1279	San Juan	4	Western	WDNR

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
374	Trout Lake	Lake	N/A	48.627221	-118.241009	Ferry	1	Eastern	WDFW & USFS
373	Trout Lake	Lake	N/A	47.266125	-122.27959	King	4	Western	WDFW & KCWLR
729	Trout Lake	Lake	N/A	47.617116	-121.313778	King	4	Western	WDFW, USFS & KCWLR
768	Tucannon River	River	N/A	46.54748	-118.17776	Columbia	1	Eastern	WDFW & USFS
730	Tucquala Lake	Marsh	N/A	47.512597	-121.064741	Kittitas	3	Eastern	WDFW & USFS
731	Tug Lake	Lake Manmade	N/A	45.65134	-122.46874	Clark	5	Western	Private
732	Tunnel Lake	Lake	N/A	45.717531	-121.615839	Skamania	5	Western	WDFW
733	Turner Lake	Lake	N/A	48.669994	-119.002708	Okanogan	2	Eastern	WDFW & USFS
375	Twin Lake Big	Lake	N/A	47.483937	-122.95104	Mason	6	Western	WDFW & WDNR
734	Twin Lakes Lower	Lake	N/A	47.525655	-118.516156	Lincoln	1	Eastern	WDFW & BLM
376	Twin Lakes Upper	Lake	N/A	47.532049	-118.499224	Lincoln	1	Eastern	WDFW & BLM
377	Tye Lake	Lake Manmade	N/A	47.866349	-122.010182	Snohomish	4	Western	WDFW & City of Monroe
735	Union River Reservoir	Reservoir	Union River	47.5429	-122.7703	Kitsap	6	Western	WDFW
736	Upper Caliche Lake	Lake	N/A	47.033053	-119.9252	Grant	2	Eastern	WDFW & Reclamation
378	Upper Goose Lake	Lake	N/A	46.941414	-119.278265	Grant	2	Eastern	WDFW & Reclamation
591	Upper Lead King Lake	Lake	N/A	48.946848	-117.357031	Pend Oreille	1	Eastern	WDFW & Riley Creek Timber
379	Upriver Dam Reservoir	Reservoir	Upriver Dam	47.697245	-117.042081	Spokane	1	Eastern	WDFW, City of Spokane & WSPRC
737	Vance Creek Pond 1/Bowers Lake	Pond	N/A	46.997779	-123.411846	Grays Harbor	6	Western	WDFW & Grays Harbor County
380	Vance Creek Pond 2/Inez Lake	Pond	N/A	46.993904	-123.422798	Grays Harbor	6	Western	WDFW, QIN & Grays Harbor County
381	Vancouver Lake	Lake	N/A	45.6736	-122.6993	Clark	5	Western	WDFW
382	Vogler Lake	Lake	N/A	48.570151	-121.773841	Skagit	4	Western	WDFW
383	Wagner Lake	Lake	N/A	47.882735	-121.932554	Snohomish	4	Western	WDFW
384	Waitts Lake	Lake	N/A	48.1774642	-117.7819694	Stevens	1	Eastern	WDFW
385	Walker Lake	Lake	N/A	47.264228	-121.9085	King	4	Western	WDFW & KCWLR
738	Wallace Lake	Lake	N/A	47.904539	-121.676913	Snohomish	4	Western	WDFW & WSPRC
386	Wanapum Lake	Reservoir	Wanapum	47.2151551	-119.9940088	Grant	2	Eastern	WDFW & Grant PUD
387	Wannacut Lake	Lake	N/A	48.869072	-119.517267	Okanogan	2	Eastern	WDFW
388	Wapato Lake	Lake	N/A	47.9128	-120.1545	Chelan	2	Eastern	WDFW & LCRD
739	Wapato Lake	Lake	N/A	47.195726	-122.456792	Pierce	6	Western	WDFW & Tacoma Metro Parks
389	Ward Lake	Lake	N/A	47.008767	-122.875442	Thurston	6	Western	WDFW
740	Ward Lake Lower	Lake	N/A	48.786454	-118.73106	Ferry	1	Eastern	WDFW & USFS
390	Warden Lake	Lake	N/A	46.971015	-119.164773	Grant	2	Eastern	WDFW & WDNR
741	Warman Lake	Lake Manmade	N/A	45.64724	-122.46282	Clark	5	Western	Private

Water Body #	Water Body Common Name	Water Body Category	Reservoir Name	Latitude	Longitude	County	WDFW Region #	Mountain Range	Entities
391	Washburn Island Pond	Pond	N/A	48.095985	-119.671127	Okanogan	2	Eastern	WDFW, Douglas PUD & CTCR
742	Washburn Lake	Lake	N/A	48.84089	-119.596055	Okanogan	2	Eastern	WDFW & BLM
743	Watson Lake	Lake	N/A	46.284969	-117.654836	Columbia	1	Eastern	WDFW
744	Waughop Lake	Lake	N/A	47.170579	-122.564531	Pierce	6	Western	WDFW
745	Webb Slough	Lake Manmade	N/A	47.09667	-117.60636	Whitman	1	Eastern	Private
746	Wentworth Lake	Lake	N/A	48.009717	-124.530547	Clallam	6	Western	WDFW, Quileute Nation & ITT Rayonier
747	West Evans Pond	Pond	N/A	46.419672	-117.116366	Asotin	1	Eastern	WDFW
392	West Medical Lake	Lake	N/A	47.562336	-117.702224	Spokane	1	Eastern	WDFW & WDNR
748	Western Lake/Radar Hill Ponds	Lake	N/A	46.423237	-123.820335	Pacific	6	Western	WDFW & WDNR
749	Wheeler Reservoir Upper	Reservoir	Wheeler Upper	47.2869	-120.3658	Chelan	2	Eastern	WDFW & WHRD
750	Whistle Lake	Lake	N/A	48.459681	-122.60616	Skagit	4	Western	WDFW & City of Anacortes
393	Whitestone Lake	Lake	N/A	48.788793	-119.469055	Okanogan	2	Eastern	WDFW & WDNR
751	Widgeon Lake	Lake	N/A	46.938604	-119.225604	Grant	2	Eastern	WDFW & USFWS
394	Wildcat Lake	Lake	N/A	47.601069	-122.771247	Kitsap	6	Western	WDFW & Kitsap County
395	Wilderness Lake	Lake	N/A	47.374573	-122.035608	King	4	Western	WDFW, City of Maple Valley & KCWLR
396	Willapa River	River	N/A	46.6779	-123.6712	Pacific	6	Western	WDNR
398	Williams Lake	Lake	N/A	47.3350056	-117.6698054	Spokane	1	Eastern	WDFW
397	Williams Lake	Lake	N/A	48.755139	-117.967317	Stevens	1	Eastern	WDFW & WDNR
399	Windmill Lake	Lake	N/A	46.932525	-119.175017	Grant	2	Eastern	WDFW & Reclamation
752	Winlock Waters Lakes	Lake Manmade	N/A	46.4546	-122.8931	Lewis	5	Western	Private
400	Wiser Lake	Lake	N/A	48.9053	-122.4848	Whatcom	4	Western	WDFW
753	Wood Lake	Lake	N/A	47.395081	-123.065307	Mason	6	Western	WDFW & WDNR
754	Woodhouse Pond	Pond	N/A	46.946425	-120.518545	Kittitas	3	Eastern	WDFW
755	Worth Lake	Lake	N/A	46.603865	-119.084616	Franklin	3	Eastern	WDFW
401	Wye Lake	Lake	N/A	47.426506	-122.758571	Kitsap	6	Western	WDFW
402	Wynoochie Lake	Reservoir	Wynoochie	47.3912	-123.60124	Grays Harbor	6	Western	WDFW, QIN & USFS
756	Yahoo Lake	Lake	N/A	47.67676	-124.018382	Jefferson	6	Western	WDFW, QIN & WDNR
403	Yakima River	Reservoir	Yakima	46.631916	-120.521916	Yakima	3	Eastern	WDFW, BLM & Yakama Nation
757	Yakima Sportsmens Pond	Pond	N/A	46.593338	-120.458419	Yakima	3	Eastern	WDFW & WSPRC
404	Yale Reservoir	Reservoir	Yale	46.0264	-122.3133	Cowlitz	5	Western	WDFW & PacificCorp
758	Yellepit Pond	Pond	N/A	46.018868	-118.979441	Benton	3	Eastern	WDFW & USFWS
405	Yokum Lake	Lake	N/A	48.6123	-117.331298	Pend Oreille	1	Eastern	WDFW & USFS
759	Z Lake	Lake	N/A	47.603311	-118.419599	Lincoln	1	Eastern	WDFW
760	Zillah Winery Pond	Pond	N/A	46.405473	-120.282026	Yakima	3	Eastern	WDFW

Notes:

Anderson Island Parks: Anderson Island Parks and Recreation District
Avista Utilities: Avista Corporation
BLM: U.S. Bureau of Land Management
Chehalis Tribe: Confederated Tribes of the Chehalis Reservation
Chelan PUD: Public Utility District No. 1 of Chelan County
CRBFA: Chehalis River Basin Flood Authority
CTCR: Confederated Tribes of the Colville Reservation
Douglas PUD: Public Utility District No. 1 of Douglas County
Everett Public Works: City of Everett, Public Works
Fairchild AFB: Fairchild Air Force Base
Ft. Wm. Symington HOA: Fort William Symington Division 5 Homeowners' Association
Grant PUD: Public Utility District No. 2 of Grant County
KCWLR: King County Water and Land Resources Division
Kent Parks: Kent Parks, Recreation & Community Services
King County Parks: King County Parks and Recreation Division
Lacey Parks: Lacey Parks and Recreation Department
Lake Symington HOA: Lake Symington Community Club Homeowners' Association
LCRD: Lake Chelan Reclamation District
LISECC: Lummi Island Scenic Estates Community Club
NPS: National Park Service
ODFW: Oregon Department of Fish and Wildlife
Pacific County Public Works: Pacific County Department of Public Works
Pend Oreille PUD: Public Utility District No. 1 of Pend Oreille County
PNP Treaty Council: Point No Point Treaty Council
PSE: Puget Sound Energy
Puyallup Tribe: Puyallup Tribe of Indians
QIN: Quinault Indian Nation
Reclamation: U.S. Bureau of Reclamation
SCL: Seattle City Light
Seattle Parks: Seattle Parks and Recreation
Skagit PUD: Public Utility District No. 1 of Skagit County
Skagit Parks: Skagit County Parks and Recreation
Snohomish County Parks: Snohomish County Parks, Recreation & Tourism
Snohomish PUD: Public Utility District No. 1 of Snohomish County
SPU: City of Seattle, Seattle Public Utilities
Tacoma Power: City of Tacoma, Tacoma Public Utilities
Thurston County Parks: Thurston County Parks & Recreation
USACE: U.S. Army Corps of Engineers
USEPA: U.S. Environmental Protection Agency
USFS: U.S. Forest Service
USFWS: U.S. Fish and Wildlife Service
WDES: Washington Department of Enterprise Services
WDFW: Washington Department of Fish and Wildlife
WDNR: Washington Department of Natural Resources
WDSHS: Washington Department of Social and Health Services
WHRD: Wenatchee Heights Reclamation District
WRIA 8 SRC: Water Resource Inventory Area 8 Salmon Recovery Council
WRIA 9 SRC: Water Resource Inventory Area 9 Salmon Recovery Council
WSPRC: Washington State Parks and Recreation Commission
Yakama Nation: Confederated Tribes and Bands of the Yakama Nation

APPENDIX B Public Outreach Signs

Appendix Figure B-1. Example public outreach sign provided by Washington Invasive Species Council. This sign is being phased out and replaced with Figure B-2.

Appendix Figure B-2. Example of a new public outreach sign provided by Washington Invasive Species Council and Washington Department of Fish and Wildlife that will replace the older sign depicted in Figure B-1.

THE PROBLEM

Background

Northern pike are illegally introduced, highly invasive predators in the Columbia River. These voracious fish feed on juvenile salmon and are currently spreading downstream, threatening crucial salmon and steelhead populations.

Why Care?

Washington has invested billions of dollars in the Columbia River region in salmon recovery. If Northern Pike become established further down the Columbia River, the vital salmon runs of the river and its surrounding tributaries, and all the resources invested in their recovery are in jeopardy.


Adam Sepulveda, US Geologic Survey

Salmon fishing is also a big business in Washington. Recreational anglers spend over $1 billion in Washington State on trip-related expenses, such as restaurants, motels, gas, convenience and sporting goods stores, creating more than 14,600 jobs. Further, tribal fisheries, both commercial and ceremonial, would suffer if Northern Pike decreased salmon numbers.

Stocking and introductions of illegal fish species, such as Northern Pike, jeopardize jobs and costs hundreds of thousands of taxpayer dollars to remove.

DO YOUR PART

Catch. Kill. Report.

If found or caught, kill the Northern Pike. **DO NOT** release. There are no catch limits on Northern Pike.

IT'S THE LAW

It is **ILLEGAL** to leave Washington waters with live Northern Pike.
You **CANNOT** transport live fish without a permit.

REPORTING

To report a catch and/or location:

WASHINGTON

☎ 1-360-902-2700
✉ fishpgm@dfw.wa.gov
Create a report at invasivespecies.wa.gov
Use the 'WA Invasives' app on iOS or Android

OREGON

☎ 1-866-INVADER
✉ invasive.species@state.or.us
Create a report at oregoninvasiveshotline.org

Report releasing or transport of pike to the police or your local county sheriff's department.

P.U.D. CHELAN COUNTY · Kalispel natural resources · OISC · OREGON Fish & Wildlife · Spokane Tribe of Indians · Washington Invasive Species Council

STOP THE SPREAD OF INVASIVE NORTHERN PIKE


Alaska Department of Fish and Game

Northern Pike pose a significant threat to Oregon and Washington salmon and steelhead.

IF CAUGHT DO NOT RELEASE.

Photograph and Report to your state Department of Fish and Wildlife.

IMPACTED AREAS

In Washington, Northern Pike were illegally introduced into the Pend Oreille River and have spread from there. They are currently known to be established above the Grand Coulee Dam. They are negatively affecting the upper reaches of the Columbia River watershed and surrounding tributaries in Washington, Idaho, Montana and Canada. They are only two dams away from vital spawning habitat, where they would threaten valuable fisheries, native species, and the ecosystem.

Recreation and Conservation Office

Native American tribes, public utility districts and state agencies are working together to prevent further downstream spread of Northern Pike.

IDENTIFICATION

Everyone can help by learning how to identify Northern Pike and reporting them if found.

Pattern: lateral rows of white to yellow, bean-shaped spots.
Shape: Typically longer and have a snake like look compared to other native fish species.


Shay Wolvert, Confederated Tribes of the Colville

Dorsal (top) fin: extends far back, much closer to the tail than on many other fish species. Fins have black blotches and are usually yellow, orange or red in color.
Turn it on its head: there are up to five pairs of sensory pores on the underside of a pike's jaw, meant for picking up vibrations in the water.

University of Wisconsin SeaGrant, John Lyons

KNOW THE DIFFERENCE

A native fish often confused with Northern Pike due to their similar names is the Northern Pikeminnow. While considered a nuisance fish, Northern Pikeminnow are native to the Pacific Northwest. While the two fish share similar names, they differ greatly in appearance.

Northern Pike

- Olive green color
- Horizontal, bean- shaped spots
- 1-5 sensory pores
- Duck-bill shaped snout
- Sharp teeth
- Average 26 inches and 4 pounds

United States Fish and Wildlife Service, Timothy Knepp

Northern Pikeminnow

- Silver color (darker depending on habitat)
- No spots
- No sensory pores
- Long mouth, ends below its eye
- No teeth
- Average 15 inches and 1 pound

Washington Department of Fish and Wildlife

Appendix Figure B-3. Northern Pike brochure provided by the Washington Invasive Species Council.

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northern pike
Esox lucius Linnaeus, 1758

Record ID 11341478 Download Record (pdf)

Location Information

Location	Stevens, Washington, United States
Coordinates	48.67870,-118.07534

Infestation Information

Infestation Status	Positive

Reporter Information

Reporter	Jesse Schultz , Washington Department of Fish and Wildlife
Observation Date	May 04, 2023
Date Entered	May 04, 2023
Source Type	iPhone
Reported By	Jesse Schultz
Email	jesse.schultz@dfw.wa.gov
Phone Number	360 480-2105

Species Information

Verification and Review

Reviewed	Not Verified

Survey Information

Datum	WGS84
Comments	TEST

Other

Other Geographic Locations

Location	Lake Roosevelt National Recreation Area
Location	US Congressional District WA-5

Appendix Figure B-4. Example of an aquatic invasive species report.

Appendix Figure B-5. Example of public outreach tailgate wrap provided by Washington Department of Fish and Wildlife.

Appendix Figure B-6. Example public outreach sign provided by Washington Invasive Species Council.

Appendix Figure B-7. Example of public outreach sign provided by Washington Department of Fish and Wildlife.

APPENDIX C Environmental DNA (eDNA) Index Sites

The following data represent the best-known data as of the publication of this Response Plan. Changes to these index sites should be communicated to WDFW (ais@dfw.wa.gov) to ensure these data remain current.

Appendix Table C-1. List of locations where eDNA samples are collected at a minimum of an annual basis to monitor for Northern Pike.

Entity	Waterbody	Site Name	Latitude	Longitude
CTCR	Banks Lake	Inlet Osborne Campsite	47.92376	-119.06030
	Banks Lake	West Bank Ankey Boat Launch	47.62818	-119.32777
	Banks Lake	Mid Highway at Dam	47.61981	-119.30811
	Banks Lake	Steamboat Campground Bay	47.85346	-119.12748
	Banks Lake	Coulee City Boat Launch	47.61977	-119.29652
	Columbia River	Rufus Woods, near Nespelem River North	48.13003	-119.04355
	Columbia River	Rufus Woods, near Nespelem River South	48.12393	-119.04322
	Columbia River	Rufus Woods, Bridgeport State Park Boat Launch	48.01430	-119.60708
	Columbia River	Rufus Woods, Willow Flats Fish Dock	47.99374	-119.62310
	Columbia River	Rufus Woods, Seatons Grove Boat Launch	48.03567	-118.97119
	Columbia River	Rufus Woods, Coyote Creek	48.14607	-119.11182
	Columbia River	Rufus Woods, Gravel Boat Launch	48.14164	-119.07202
	Columbia River	Rufus Woods, Timms' Ranch Boat Launch	48.10223	-119.32572
	Columbia River	Wells Pool, Washburn Island 1	48.09312	-119.66639
	Columbia River	Wells Pool, Washburn Island 2	48.09512	-119.66765
	Okanogan River	Mosquito Park West Bank	48.10287	-119.71017
	Okanogan River	Malott Bridge East Bank	48.28014	-119.70447
	Okanogan River	Malott Bridge West Bank	48.28082	-119.70486
	Okanogan River	Monse Bridge East Bank	48.14045	-119.67211
	Okanogan River	Monse Bridge West Bank	48.14047	-119.67441
	Okanogan River	Mosquito Park East Bank	48.10306	-119.70863
Douglas PUD	Columbia River	Lake Pateros, Starr Ramp Upriver from Azwell (9 Right)	47.98077	-119.88876
	Columbia River	Lake Pateros, across from Starr Ramp East (10 Left)	47.98147	-119.87442
	Columbia River	Lake Pateros, Bridgeport Conklin Landing West (7 Left)	48.02389	-119.69213
	Columbia River	Lake Pateros, Bridgeport Conklin Landing East (8 Right)	48.02418	-119.68786
	Columbia River	Lake Pateros, Wells Wildlife Area Side Channel (1 East)	48.07483	-119.68604
	Columbia River	Lake Pateros, Wells Wildlife Area Side Channel (2 West)	48.07532	-119.68695
	Okanogan River	Mosquito West (4 Right)	48.10197	-119.71122
	Okanogan River	Mosquito East (3 Left) Mouth HWY 97 Park	48.10252	-119.70883
	Okanogan River	Wakefield West (5 Right)	48.20743	-119.71259
	Okanogan River	Wakefield East (6 Left)	48.20816	-119.71244
Grant PUD	Columbia River	Priest Rapids Lake, Buckshot Wildlife Area	46.71180	-119.95320
	Columbia River	Priest Rapids Lake, Crab Creek Mouth	46.81510	-119.92270
	Columbia River	Wanapum Lake, Crescent Bar Marina	47.21516	-119.99401
	Columbia River	Wanapum Lake, Sunland Estates Ramp	47.06890	-120.02570
	Columbia River	Wanapum Lake, Wanapum State Park	46.90540	-119.98770
WDFW	Banks Lake	Ankeny Ramp #1	47.62820	-119.32765
	Banks Lake	Ankeny Ramp #2	47.64045	-119.32169
	Banks Lake	Coulee City Marina	47.61714	-119.29415
	Banks Lake	Coulee Playland/Electric City	47.93590	-119.03090
	Banks Lake	Steamboat Rock State Park #1 Main	47.86331	-119.11810
	Banks Lake	Steamboat Rock State Park #2 Northrop	47.87233	-119.09833
	Banks Lake	Steamboat Rock State Park #3 Osborne	47.92350	-119.06030
	Banks Lake	Osborne Bay Ramp	47.91750	-119.05320
	Banks Lake	Sunbanks Resort	47.92630	-119.05780
	Columbia River	Lake Entiat, Lincoln Rock State Park	47.54041	-120.28048
	Columbia River	Lake Entiat, Orondo River Park	47.65681	-120.21651

Entity	Waterbody	Site Name	Latitude	Longitude
	Columbia River	Lake Entiat, Chelan Falls Park	47.79708	-119.98483
	Columbia River	Lake Entiat, Entiat City Park	47.66572	-120.21935
	Columbia River	Lake Entiat, Ramp across from Entiat City Park	47.66530	-120.20780
	Columbia River	Lake Entiat, Beebe Bridge Park	47.80817	-119.97440
	Columbia River	Lake Entiat, Daroga State Park	47.71135	-120.20863
	Columbia River	Lake Pateros, Pateros City Park	48.05510	-119.89560
	Columbia River	Lake Pateros, Brewster Columbia Cove Park	48.09023	-119.78617
	Columbia River	Lake Pateros, Bridgeport Marina Park	48.01480	-119.67810
	Columbia River	Lake Pateros, Conklin Landing Ramp	48.01850	-119.68560
	Columbia River	Lake Pateros, Chicken Creek Ramp	48.09390	-119.66800
	Columbia River	Priest Rapids Lake, Buckshot Wildlife Area	46.71180	-119.95320
	Columbia River	Priest Rapids Lake, Crab Creek Mouth	46.81510	-119.92270
	Columbia River	Priest Rapids Lake, Lake Geneva Middle	46.73770	-119.96580
	Columbia River	Priest Rapids Lake, Desert Air Park	46.68360	-119.93270
	Columbia River	Priest Rapids Lake, Wanapum Tailrace Ramp	46.86440	-119.96790
	Columbia River	Priest Rapids Lake, Priest Rapids Forebay Ramp	46.64330	-119.92540
	Columbia River	Elochoman/Cathlamet Marina Kalama Marina Willow Grove Ramp Beacon Rock State Park Port of Camas/Washougal Marina Marine County Park Hamilton Island Ramp	46.20682	-123.38733
	Columbia River	Kalama Marina	46.00948	-122.84855
	Columbia River	Willow Grove Ramp	46.17313	-123.08403
	Columbia River	Beacon Rock State Park	45.62240	-122.01990
	Columbia River	Port of Camas/Washougal Marina	45.57706	-122.38273
	Columbia River	Marine County Park	45.61200	-122.63350
	Columbia River	Hamilton Island Ramp	45.63370	-121.96520
	Columbia River	Rock Island Lake, Wenatchee Riverfront Park	47.42506	-120.30569
	Columbia River	Rock Island Lake, South Wenatchee/Kirby Billingsley Hydro Park	47.38751	-120.26607
	Columbia River	Rock Island Lake, Wenatchee Confluence State Park	47.46231	-120.32155
	Columbia River	Rufus Woods, Bridgeport State Park	48.01410	-119.60720
	Columbia River	Rufus Woods, Seatons Grove Ramp	48.03580	-118.97150
	Columbia River	Wanapum Lake, Vantage Ramp	46.94125	-119.98392
	Columbia River	Wanapum Lake, Quilomene Yacht Club	47.06890	-120.03160
	Columbia River	Wanapum Lake, Crescent Bar Marina	47.21516	-119.99401
	Columbia River	Wanapum Lake, Sunland Estates Ramp	47.06890	-120.02570
	Columbia River	Wanapum Lake, Wanapum Forebay Ramp	46.88290	-119.95680
	Columbia River	Wanapum Lake, Vantage Docks	46.94190	-119.98398
	Columbia River	Wanapum Lake, Wanapum State Park	46.90540	-119.98770
	Columbia River	Lake Bonneville, Bingen Ramp	45.70852	-121.45740
	Columbia River	Lake Bonneville, Drano Lake Ramp	45.71078	-121.63889
	Columbia River	Lake Bonneville, Sailboard Park	45.69410	-121.87750
	Columbia River	Lake Bonneville, Wind River Ramp	45.71790	-121.78910
	Columbia River	Lake Celilo, Avery Ramp	45.66240	-121.03540
	Columbia River	Lake Celilo, Maryhill State Park East	45.68287	-120.82049
	Columbia River	Lake Celilo, Maryhill State Park West	45.67980	-120.83600
	Columbia River	Lake Roosevelt, China Bend Ramp	48.81041	-117.95099
	Columbia River	Lake Roosevelt, Evans Campground	48.69923	-118.01988
	Columbia River	Lake Roosevelt, Gifford Campground	48.28547	-118.14393
	Columbia River	Lake Roosevelt, Hunters Park	48.12960	-118.22550
	Columbia River	Lake Roosevelt, Keller Ferry Ramp	47.92727	-118.69338

Entity	Waterbody	Site Name	Latitude	Longitude
	Columbia River	Lake Roosevelt, Kettle Falls Marina	48.59914	-118.12364
	Columbia River	Lake Roosevelt, Marcus Island Campground	48.66644	-118.06514
	Columbia River	Lake Roosevelt, North Gorge Campground	48.78696	-118.00135
	Columbia River	Lake Roosevelt, Northport City Ramp	48.92210	-117.77155
	Columbia River	Lake Roosevelt, Jones Bay Campground	47.92080	-118.58215
	Columbia River	Lake Roosevelt, Seven Bays Marina	47.85390	-118.34158
	Columbia River	Lake Roosevelt, Spring Canyon Campground	47.93630	-118.93420
	Columbia River	Lake Roosevelt, Bradbury Ramp	48.51443	-118.14911
	Columbia River	Lake Roosevelt, Crescent Bay Ramp	47.94780	-118.98680
	Columbia River	Lake Roosevelt, Daisy Ramp	48.37546	-118.16785
	Columbia River	Lake Roosevelt, Hansen Harbor Ramp	47.92160	-118.62570
	Columbia River	Lake Roosevelt, French Point Rocks Ramp	48.49455	-118.19749
	Columbia River	Lake Roosevelt, Snag Cove Campground	48.73294	-118.05873
	Columbia River	Lake Roosevelt, Lincoln Mill Ramp	47.82984	-118.40606
	Columbia River	Lake Roosevelt, Hawk Creek Campground	47.81454	-118.32489
	Columbia River	Lake Umatilla, Crows Butte Park	45.85660	-119.85350
	Columbia River	Lake Umatilla, Plymouth Park Ramp	45.92944	-119.35217
	Columbia River	Lake Umatilla, Railroad Island/Upper John Day Dam Ramp	45.72414	-120.69794
	Columbia River	Lake Umatilla, Roosevelt Ramp	45.73110	-120.22513
	Columbia River	Lake Umatilla, Sundale Park	45.71920	-120.31430
	Columbia River	Lake Wallula, Columbia Park East	46.22200	-119.13820
	Columbia River	Lake Wallula, Columbia Park Marina Island View	46.23868	-119.21898
	Columbia River	Lake Wallula, Columbia Point Park Marina	46.26450	-119.25110
	Columbia River	Lake Wallula, Howard Amon Richland South Ramp	46.27961	-119.27062
	Columbia River	Lake Wallula, Snyder Ramp Leslie Groves Park Richland North	46.31428	-119.26024
	Columbia River	Lake Wallula, McNary Ramp	45.94360	-119.29730
	Columbia River	Lake Wallula, Clover Island Marina	46.21675	-119.11588
	Columbia River	Lake Wallula, Walla Walla Yacht Club	46.02661	-118.93624
	Columbia River	Lake Wallula, Chiawana Park	46.24411	-119.20551
	Columbia River	Lake Wallula, Columbia Park West Pasco	46.23380	-119.19060
	Columbia River	Lake Wallula, Wahluke Bend	46.72359	-119.53169
	Columbia River	Lake Wallula, South Slough Ruth	46.65235	-119.42343
	Columbia River	Lake Wallula, White Bluffs Ramp	46.67664	-119.45084
	Columbia River	Lake Wallula, Hanford Reach North Trailhead	46.67976	-119.44669
	Conconully Lake	Conconully Lake State Park Ramp	48.56424	-119.73050
	Conconully Reservoir	Liar's Cove Resort	48.54909	-119.74776
	Cowlitz River	Castlerock Ramp	46.27816	-122.91119
	Cowlitz River	Mayfield Lake, Mayfield Lake Resort	46.50350	-122.57200
	Cowlitz River	Mayfield Lake, Ike Kinswa State Park	46.55408	-122.53686
	Cowlitz River	Mayfield Lake, Washington State Park (old county)	46.53160	-122.55910
	Curlew Lake	Curlew State Park	48.72135	-118.66256
	Curlew Lake	Tiffany's Resort	48.74839	-118.66949
	Diamond Lake	WDFW Ramp	48.12950	-117.18720
	Eloika Lake	WDFW Ramp & Private Dock North	48.01887	-117.36768
	Fan Lake	WDFW Ramp	48.05420	-117.40350
	Horseshoe Lake	WDFW Ramp	48.11149	-117.41657
	Lake Chelan	25 Mile Creek State Park	47.99376	-120.26177
	Lake Chelan	Old Mill Park (Manson)	47.87746	-120.12842
	Lake Chelan	Chelan River Park	47.83510	-120.01420
	Lake Chelan	Lakeshore Marina	47.84138	-120.02515
	Lake Chelan	Lake Chelan State Park	47.87521	-120.19614
	Lake Chelan	Sunset Marina public dock between two private co. that have boat ramps	47.83689	-120.03633

Entity	Waterbody	Site Name	Latitude	Longitude
	Lake Chelan	Lake Chelan Yacht Club	47.92004	-120.20904
	Lake Chelan	Cove Marina	47.90825	-120.21537
	Lake Washington	Factoria 40th St Ramp	47.57494	-122.19039
	Lake Washington	Gene Coulon Park	47.50595	-122.20310
	Lake Washington	Kirkland Ramp	47.67324	-122.20788
	Lake Washington	Atlantic City Park	47.52270	-122.26280
	Lake Washington	Stan Sayres Park	47.57138	-122.27551
	Lake Washington	Magnuson Park	47.67654	-122.24831
	Lake Washington	North Lake Marina	47.75670	-122.25910
	Lake Washington	Leschi South Moorage Craig manager 206 391-6431	47.60070	-122.28430
	Lake Washington	I-90 Bridge Frontage Rd Ramp	47.57790	-122.20190
	Lake Washington	520 Bridge	47.64761	-122.27601
	Lake Whatcom	Bloedal-Donovan Park	48.76147	-122.41699
	Lake Whatcom	WDFW Ramp	48.67398	-122.31422
	Little Spokane River	Pine River Park	47.78962	-117.40020
	Little Spokane River	Public Ramp	47.79010	-117.40030
	Moses Lake	Montlake Park	47.10860	-119.28500
	Moses Lake	Cascade Valley Park	47.13630	-119.31850
	Moses Lake	Lower Peninsula Park	47.09051	-119.31079
	Moses Lake	Blue Heron Park	47.10670	-119.32720
	Moses Lake	Pier 4 Sunrise Resort	47.10137	-119.32538
	Moses Lake	WDFW Ramp North	47.22954	-119.42899
	Moses Lake	Connelly Park	47.18621	-119.34992
	Moses Lake	Cascade Marina	47.13630	-119.31850
	Osoyoos Lake	Veterans Memorial Park	48.94963	-119.43008
	Osoyoos Lake	Deep Bay Park	48.96429	-119.44185
	Palouse River	Lyons Ferry State Park	46.59340	-118.21747
	Pend Oreille River	Boundary Reservoir, Box Canyon Dam Ramp	48.78157	-117.41792
	Pend Oreille River	Boundary Reservoir, Metaline City Park	48.85282	-117.38582
	Pend Oreille River	Boundary Reservoir, Boundary Dam Campground (Pee Wee Falls Campground)	48.98241	-117.35049
	Pend Oreille River	Box Canyon Reservoir, Ione Town Park	48.74040	-117.41386
	Pend Oreille River	Box Canyon Reservoir, Old American Kampground	48.18745	-117.03837
	Pend Oreille River	Box Canyon Reservoir, Usk Ramp	48.31630	-117.27690
	Pend Oreille River	Box Canyon Reservoir, Cusick Ramp	48.33760	-117.29280
	Pend Oreille River	Box Canyon Reservoir, Skookum Creek Ramp	48.29362	-117.24998
	Pend Oreille River	Box Canyon Reservoir, Pioneer Park	48.21010	-117.05480
	Potholes Reservoir	Potholes State Park	46.98136	-119.34732
	Potholes Reservoir	Mar Don Resort	46.96760	-119.32010
	Potholes Reservoir	Glenn Williams Ramp	46.98360	-119.25626
	Potholes Reservoir	Blythe Ramp	46.96961	-119.33255
	Potholes Reservoir	Lind Coulee West Bridge Ramp	46.98895	-119.21038
	Skagit River	Ross Lake, Winnebago Flats	48.98670	-121.07310
	Skagit River	Ross Lake, NPS Old Dock South	48.97530	-121.08300
	Skagit River	Ross Lake, Ross Lake Resort	48.73926	-121.06100
	Snake River	Lake Bryan, Almota/Illia Landing Ramp	46.69690	-117.47060
	Snake River	Lake Bryan, Little Goose Airport Ramp	46.58550	-118.00310
	Snake River	Lake Bryan, Willow Landing Ramp	46.68260	-117.74950
	Snake River	Lake Bryan, Boyer Park and Marina	46.68420	-117.44930
	Snake River	Lake Bryan, Garfield County Port Ramp	46.61641	-117.79681
	Snake River	Lake Herbert G West, Lyons Ferry Marina	46.58710	-118.22250
	Snake River	Lake Herbert G West, Devil's Bench Campground	46.56706	-118.53657
	Snake River	Lake Herbert G West, Ayer Boat Basin Ramp	46.58690	-118.37030
	Snake River	Lake Herbert G West, Texas Rapids Park	46.56380	-118.09970

Entity	Waterbody	Site Name	Latitude	Longitude
	Snake River	Lake Sacajawea, Fishhook Park	46.31772	-118.76666
	Snake River	Lake Sacajawea, North Shore Recreation Area Ramp (Columbia Plateau Trail Park)	46.25280	-118.87640
	Snake River	Lake Sacajawea, Windust Park	46.53330	-118.57700
	Snake River	Lake Sacajawea, Charbonneau Park	46.25680	-118.84690
	Snake River	Lower Granite Lake, Chief Timothy State Park	46.41570	-117.19610
	Snake River	Lower Granite Lake, Offield Landing/Ferry Road Ramp	46.65190	-117.41770
	Snake River	Lower Granite Lake, Swallows Park	46.38660	-117.04660
	Snake River	Lower Granite Lake, Nisqually John Landing Ramp	46.47619	-117.23605
	Snake River	Lower Granite Lake, Blyton Landing Ramp	46.55950	-117.27175
	Snake River	Lower Granite Lake, Greenbelt Ramp	46.42140	-117.03820
	Snake River	Lower Granite Lake, Crum/Wawawai Landing Ramp	46.62900	-117.38090
	Snake River	Lower Granite Lake, HWY 128 Bridge Ramp	46.42230	-117.07200
	Snake River Arm	Sacajawea State Park	46.20173	-119.03745
	Snake River Arm	Hood Park (Burbank Slough)	46.21481	-119.01890
	Spokane River	Long Lake/Spokane Lake, Spokane Lake Campground	47.83360	-117.76130
	Spokane River	Long Lake/Spokane Lake, Riverside State Park	47.79410	-117.56730
	Spokane River	Long Lake/Spokane Lake, Willow Bay RV Resort and Marina	47.88000	-117.65780
	Spokane River	Long Lake/Spokane Lake, Confluence of Little Spokane River	47.78870	-117.53270
	Spokane River	Long Lake/Spokane Lake, Suncrest Park	47.81330	-117.60770
	Spokane River Arm	A Frame Cornelius Campground	47.94218	-118.19360
	Spokane River Arm	Fort Spokane Campground	47.90982	-118.31155
	Spokane River Arm	Two Rivers Marina	47.90544	-118.32320
	Spokane River Arm	Porcupine Bay Campground reopened	47.89740	-118.17470
	Willapa River	Wilson Creek Ramp in Willapa	46.67790	-123.67120
	Yakima River	Roza Park	46.76430	-120.45650
	Yakima River	Harlin Landing	46.63192	-120.52192
	Yakima River	Farrand Park	46.20490	-119.77960
	Yakima River	Union Gap Century Landing	46.53040	-120.47026
	Yakima River	Mabton Bridge Ramp	46.23165	-119.99815

APPENDIX D Rapid Response Data Collection Worksheets

Northern Pike Capture

Agency:	Crew:

DNA tissue samples should be preserved on Whatman paper. Contact Dr. Todd Seamons (todd.seamons@dfw.wa.gov) Ship the sample overnight to the WDFW Genetics Laboratory. Attention: Todd Seamons, WDFW Genetics Laboratory, 1111 Washington St SE, Olympia, WA 98501

Site ID	GPS Point		Capture Method	Date (MM/DD/YYYY)	Total Length (mm)	Weight (g)	Sex (M/F/U)	Photo (Y/N)	Otolith ID	Tissue ID
	Lat (XX.XXXX)	Long (XXX.XXXX)							(DDMMYY-SITEID-001)	(DDMMYY-SITEID-001)

Page ___ of ___	
Site Description:	Agency:
	Crew:
	Data Recorder:

Distance (m) relative to site of detection	Filter #	Volume filtered (ml)	GPS Point		Notes
			Lat (XX.XXXX)	Long (XXX.XXXX)	

Northern Pike: Gill Nets

Page ___ of ___

Site ID:	Initial Detection Location:	Location relative to last positive detection (circle one):
Date (MM/DD/YYYY):		
Time (Military):	Initial Detection Date (MM/DD/YYYY):	Upstream / Downstream

Waterbody:	Start Lat (XX.XXXX):	Start Long (XXX.XXXX):
Agency:	End Lat (XX.XXXX)	End Long (XXX.XXXX):

Water Temp (°C):	Crew:	
Number of Nets:	Data Recorder:	

Comments:

Gill Net Details							
Net #	Set Time (Military)	Pull Time (Military)	Net Type (Mono/Multi)	Net Dimensions LxH (m)	Mesh Size(s) (mm)	Net Depth	
						Min (m)	Max (m)

Catch Details				
Species ID	Fin Clips (Y/N)	Tagged? (PIT, floy, acoustic)	Tag ID	Comments

BBH	Brown Bullhead	COHO	Coho Salmon	LND	Longnose Dace	PMO	Peamouth	TNC	Tench
BC	Black Crappie	COT	Sculpin Spp.	LNS	Longnose Sucker	PS	Pumpkinseed	TT	Tiger Trout
BLC	Bull Trout	CP	Carp	LRS	Largescale Sucker	RBT	Rainbow Trout-all	WAL	Walleye
BRS	Bridgelip Sucker	CT	Cutthroat Trout	LT	Lake Trout	RS	Redside Shiner	WF	Mountain Whitefish
BT	Brown Trout	EB	E Brook Trout	LW	Lake Whitefish	SMB	Smallmouth Bass	WS	White Sturgeon
BUR	Burbot	GS	Green Sunfish	NP	Northern Pike	SOCK	Sockeye	YP	Yellow Perch
CK	Chinook Salmon	K	Kokanee	NPM	Northern Pikeminnow	SPD	Speckled Dace		
CMO	Chiselmouth	LMB	Largemouth Bass	PL	Pacific Lamprey	STH	Steelhead		

Northern Pike: Boat/Backpack Electrofishing (circle one)

Page ___ of ___

Site ID:	Initial Detection Location:	Location relative to last positive detection (circle one): Upstream / Downstream
Date (MM/DD/YYYY):		
Time (Military):	Initial Detection Date (MM/DD/YYYY):	

Waterbody:	Start Lat (XX.XXXX:	Start Long (XXX.XXXX):	Crew:
Agency:	End Lat (XX.XXXX):	End Long (XXX.XXXX):	Data Recorder:
Transect #:	Weather:		Efish Time (sec):

Water Temp (°C):	Pulses:	Volts:
Conductivity:	Duty Cycle:	Amps:

Comments:

Catch Details				
Species ID	Fin Clips (Y/N)	Tagged? (PIT, floy, acoustic)	Tag ID	Comments

BBH	Brown Bullhead	COHO	Coho Salmon	LND	Longnose Dace	PMO	Peamouth	TNC	Tench
BC	Black Crappie	COT	Sculpin Spp.	LNS	Longnose Sucker	PS	Pumpkinseed	TT	Tiger Trout
BLC	Bull Trout	CP	Carp	LRS	Largescale Sucker	RBT	Rainbow Trout-all	WAL	Walleye
BRS	Bridgelip Sucker	CT	Cutthroat Trout	LT	Lake Trout	RS	Redside Shiner	WF	Mountain Whitefish
BT	Brown Trout	EB	E Brook Trout	LW	Lake Whitefish	SMB	Smallmouth Bass	WS	White Sturgeon
BUR	Burbot	GS	Green Sunfish	NP	Northern Pike	SOCK	Sockeye	YP	Yellow Perch
CK	Chinook Salmon	K	Kokanee	NPM	Northern Pikeminnow	SPD	Speckled Dace		
CMO	Chiselmouth	LMB	Largemouth Bass	PL	Pacific Lamprey	STH	Steelhead		

Northern Pike: Snorkel Survey

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Site ID:	Initial Detection Location:	Location relative to last positive detection (circle one):
Date (MM/DD/YYYY):		
Time (Military):	Initial Detection Date (MM/DD/YYYY):	Upstream / Downstream

Waterbody:	Weather:	Snorkelers(s):
Agency:	Water Temp (°C):	Data Recorder:

Visibility (m):	Snorkeling Method:
Section length (m):	

Start Time:	Start Lat (XX.XXXX):	Start Long (XXX.XXXX):
End Time:	End Lat (XX.XXXX):	End Long (XXX.XXXX):

Comments:

Species ID	Count	Habitat Type	Substrate	Vegetation Type	Notes

BBH	Brown Bullhead	COHO	Coho Salmon	LND	Longnose Dace	PMO	Peamouth	TNC	Tench
BC	Black Crappie	COT	Sculpin Spp.	LNS	Longnose Sucker	PS	Pumpkinseed	TT	Tiger Trout
BLC	Bull Trout	CP	Carp	LRS	Largescale Sucker	RBT	Rainbow Trout-all	WAL	Walleye
BRS	Bridgelip Sucker	CT	Cutthroat Trout	LT	Lake Trout	RS	Redside Shiner	WF	Mountain Whitefish
BT	Brown Trout	EB	E Brook Trout	LW	Lake Whitefish	SMB	Smallmouth Bass	WS	White Sturgeon
BUR	Burbot	GS	Green Sunfish	NP	Northern Pike	SOCK	Sockeye	YP	Yellow Perch
CK	Chinook Salmon	K	Kokanee	NPM	Northern Pikeminnow	SPD	Speckled Dace		
CMO	Chiselmouth	LMB	Largemouth Bass	PL	Pacific Lamprey	STH	Steelhead		

Northern Pike: Beach Seining

Page ___ of ___

Site ID:	Initial Detection Location:	Location relative to last positive detection (circle one):
Date (MM/DD/YYYY):	Initial Detection Date (MM/DD/YYYY):	Upstream / Downstream
Time (Military):		

Waterbody:	Start Lat (XX.XXXX):	End Lat (XX.XXXX):
Agency:	Start Long (XXX.XXXX):	End Long (XXX.XXXX):

Water Temp (°C):	Crew:
Max Depth:	Data Recorder:

Number of Tows:	Transect length (m):	Seine height (m):
Water depth (m):	Seine mesh size (mm):	Seine width (m):

Comments:

Catch Details				
Species ID	Fin Clips (Y/N)	Tagged? (PIT, floy, acoustic)	Tag ID	Comments

BBH	Brown Bullhead	COHO	Coho Salmon	LND	Longnose Dace	PMO	Peamouth	TNC	Tench
BC	Black Crappie	COT	Sculpin Spp.	LNS	Longnose Sucker	PS	Pumpkinseed	TT	Tiger Trout
BLC	Bull Trout	CP	Carp	LRS	Largescale Sucker	RBT	Rainbow Trout-all	WAL	Walleye
BRS	Bridgelip Sucker	CT	Cutthroat Trout	LT	Lake Trout	RS	Redside Shiner	WF	Mountain Whitefish
BT	Brown Trout	EB	E Brook Trout	LW	Lake Whitefish	SMB	Smallmouth Bass	WS	White Sturgeon
BUR	Burbot	GS	Green Sunfish	NP	Northern Pike	SOCK	Sockeye	YP	Yellow Perch
CK	Chinook Salmon	K	Kokanee	NPM	Northern Pikeminnow	SPD	Speckled Dace		
CMO	Chiselmouth	LMB	Largemouth Bass	PL	Pacific Lamprey	STH	Steelhead		

Northern Pike: Fyke Nets

Page ___ of ___

Site ID:	Initial Detection Location:	Location relative to last positive detection (circle one):
Date (MM/DD/YYYY):	Initial Detection Date (MM/DD/YYYY):	
Time (Military):		Upstream / Downstream

Waterbody:	Start Lat (XX.XXXX):	End Lat (XX.XXXX)
Agency:	Start Long (XXX.XXXX):	End Long (XXX.XXXX):

Water Temp (°C):	Crew:
Number of Traps:	Data Recorder:

Comments:

Fyke Net Details					
Trap #	Deployment Time (Military)	Retrieval Time (Military)	Net Dimensions LxWxH (m)	Mesh Size(s) (mm)	Set Depth (m)

Catch Details				
Species ID	Fin Clips (Y/N)	Tagged? (PIT, floy, acoustic)	Tag ID	Comments

BBH	Brown Bullhead	COHO	Coho Salmon	LND	Longnose Dace	PMO	Peamouth	TNC	Tench
BC	Black Crappie	COT	Sculpin Spp.	LNS	Longnose Sucker	PS	Pumpkinseed	TT	Tiger Trout
BLC	Bull Trout	CP	Carp	LRS	Largescale Sucker	RBT	Rainbow Trout-all	WAL	Walleye
BRS	Bridgelip Sucker	CT	Cutthroat Trout	LT	Lake Trout	RS	Redside Shiner	WF	Mountain Whitefish
BT	Brown Trout	EB	E Brook Trout	LW	Lake Whitefish	SMB	Smallmouth Bass	WS	White Sturgeon
BUR	Burbot	GS	Green Sunfish	NP	Northern Pike	SOCK	Sockeye	YP	Yellow Perch
CK	Chinook Salmon	K	Kokanee	NPM	Northern Pikeminnow	SPD	Speckled Dace		
CMO	Chiselmouth	LMB	Largemouth Bass	PL	Pacific Lamprey	STH	Steelhead		

Northern Pike: Baited Set lines

Page ___ of ___

Site ID:	Initial Detection Location:	Location relative to last positive detection (circle one):
Date (MM/DD/YYYY):	Initial Detection Date (MM/DD/YYYY):	Upstream / Downstream
Time (Military):		

Waterbody:	Start Lat (XX.XXXX):	End Lat (XX.XXXX):	Crew:
Agency:	Start Long (XXX.XXXX):	End Long (XXX.XXXX):	Data Recorder:

Water Temp (°C):	Deployment Time (Military):	Bait Type:
Weather:	Retrieval Time (Military):	

Line Weight:	Number of Hooks:	Hook Suspension Location:
Line Material:	Hook Type:	
Ganoin Length:	Hook Size(s):	

Comments:

Catch Details				
Species ID	Fin Clips (Y/N)	Tagged? (PIT, floy, acoustic)	Tag ID	Comments

BBH	Brown Bullhead	COHO	Coho Salmon	LND	Longnose Dace	PMO	Peamouth	TNC	Tench
BC	Black Crappie	COT	Sculpin Spp.	LNS	Longnose Sucker	PS	Pumpkinseed	TT	Tiger Trout
BLC	Bull Trout	CP	Carp	LRS	Largescale Sucker	RBT	Rainbow Trout-all	WAL	Walleye
BRS	Bridgelip Sucker	CT	Cutthroat Trout	LT	Lake Trout	RS	Redside Shiner	WF	Mountain Whitefish
BT	Brown Trout	EB	E Brook Trout	LW	Lake Whitefish	SMB	Smallmouth Bass	WS	White Sturgeon
BUR	Burbot	GS	Green Sunfish	NP	Northern Pike	SOCK	Sockeye	YP	Yellow Perch
CK	Chinook Salmon	K	Kokanee	NPM	Northern Pikeminnow	SPD	Speckled Dace		
CMO	Chiselmouth	LMB	Largemouth Bass	PL	Pacific Lamprey	STH	Steelhead		

Catch Details				
Species ID	Fin Clips (Y/N)	Tagged? (PIT, Floy, Acoustic)	Tag ID	Comments

BBH	Brown Bullhead	COHO	Coho Salmon	LND	Longnose Dace	PMO	Peamouth	TNC	Tench
BC	Black Crappie	COT	Sculpin Spp.	LNS	Longnose Sucker	PS	Pumpkinseed	TT	Tiger Trout
BLC	Bull Trout	CP	Carp	LRS	Largescale Sucker	RBT	Rainbow Trout-all	WAL	Walleye
BRS	Bridgelip Sucker	CT	Cutthroat Trout	LT	Lake Trout	RS	Redside Shiner	WF	Mountain Whitefish
BT	Brown Trout	EB	E Brook Trout	LW	Lake Whitefish	SMB	Smallmouth Bass	WS	White Sturgeon
BUR	Burbot	GS	Green Sunfish	NP	Northern Pike	SOCK	Sockeye	YP	Yellow Perch
CK	Chinook Salmon	K	Kokanee	NPM	Northern Pikeminnow	SPD	Speckled Dace		
CMO	Chiselmouth	LMB	Largemouth Bass	PL	Pacific Lamprey	STH	Steelhead		

APPENDIX E Northern Pike Taxonomic Keying Characteristics

Northern Pike Taxonomic Keying Characteristics

Northern Pike *Esox lucius* can be readily identified by examining anatomical features (morphological and meristic characteristics) and coloration patterns. For the Northern Pike Rapid Response Plan, an abbreviated list of distinguishing characteristics has been assembled to differentiate Northern Pike from 1) common Columbia River species that are frequently misidentified as Northern Pike and 2) other members of the pike family (Esocidae) that are less common but closely resemble Northern Pike in appearance. The use of a regional dichotomous key is recommended for definitive identification and information from Scholz and McLellan (2009) has been relied upon here.

Identification Process

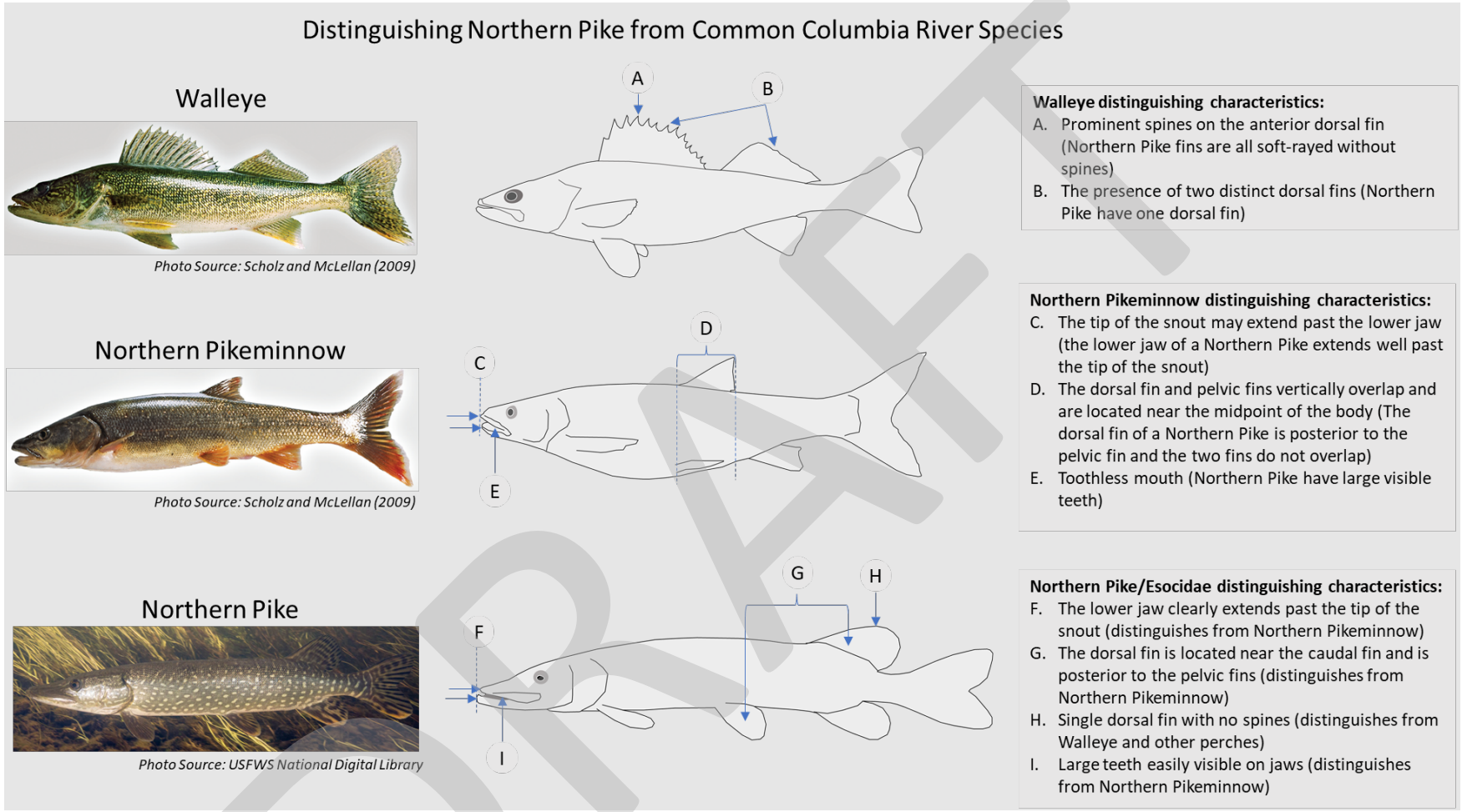
The identification process and information presented here assume that the individual making the identification has a general understanding of fish anatomy and can preliminarily rule out species that differ greatly in appearance and anatomy from Northern Pike. The identification process focuses first on anatomical characteristics that quickly distinguish Northern Pike from other common Columbia River species and then focuses on anatomical characteristics that distinguish Northern Pike from other members of the pike family (Esocidae).

Step 1. Distinguishing Northern Pike from Common Columbia River Species

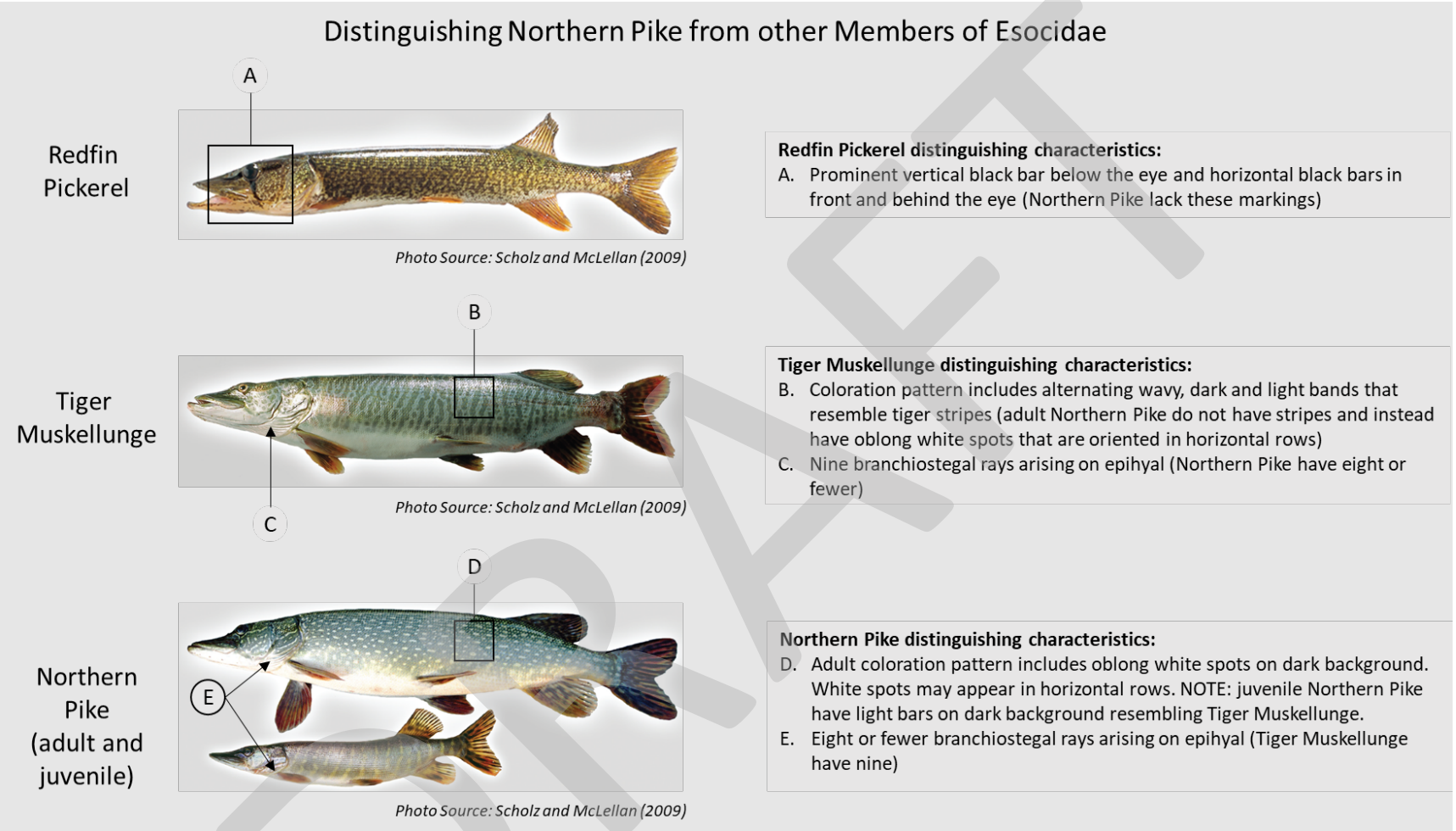
Northern Pike are superficially similar in appearance to several fish species that are commonly found in the Columbia River. These other species include Northern Pikeminnow (*Ptychocheilus oregonensis*) and Walleye (*Sander vitreus*) and are frequently misidentified as Northern Pike. Northern Pikeminnow and Walleye can be easily distinguished from Northern Pike (and all members of Esocidae) based on dorsal fin number and morphology, relative location of dorsal and pelvic fins, dentition, and snout length relative to lower jaw length (Appendix Figure E-1).

Step 2. Distinguishing Northern Pike from other Members of Esocidae

Redfin Pickerel and Tiger Muskellunge are found in habitats that are adjacent to or potentially drain into the Rapid Response Plan Area and should therefore be considered when identifying a putative Northern Pike. Moreover, these species closely resemble Northern Pike in body form and general appearance. Adults of each species may be differentiated from one another based on external coloration patterns (Appendix Figure E-2.). However, juvenile Northern Pike closely resemble the coloration patterns of Tiger Muskellunge and should be definitively identified using meristic branchiostegal counts (Scholz and McLellan 2009).



Appendix Figure E-1. Distinguishing anatomical characteristics used to differentiate between Northern Pike and other common Columbia River species that are frequently misidentified as Northern Pike. Distinguishing characteristics are adapted from Scholz and McLellan (2009).



Appendix Figure E-2. Distinguishing anatomical characteristics used to differentiate between Northern Pike and other members of the Esocidae family that may occur in the Rapid Response Plan area. Distinguishing characteristics are adapted from Scholz and McLellan (2009).

APPENDIX F Notification Templates

Date

RE: **Notification of Suspected Northern Pike Waterbody**

Dear Stakeholder,

This letter is to notify you that there has been a verified detection of a Northern Pike *Esox lucius* in WATERBODY NAME in COUNTY NAME (GPS COORDINATE). No Northern Pike specimen has been collected thus WATERBODY NAME is now classified as "Suspect." The first detection occurred on Date, detected via DETECTION METHOD by Entity. The detection was verified by Select Sampling Method on Date by Entity. As a result, monthly sampling (SPECIFY METHODS) will occur in WATERBODY NAME conducted by Entity (PhoneNumber, EmailAddress) for a minimum of 3 years of negative testing and no Northern Pike capture. If a Northern Pike is captured or verified detections occur in proximate waterbodies, a follow-on notification will be sent. If you have any questions, please direct them to ais@dfw.wa.gov.

Sincerely,

YourName
Title

Date

RE: **Notification of Positive Northern Pike Waterbody**

Dear Stakeholder,

This letter is to notify you that there has been a verified capture of a Northern Pike *Esox lucius* in WATERBODY NAME in COUNTY NAME (GPS COORDINATE). Pictures are attached. WATERBODY NAME is now classified as "Positive" for Northern Pike. The first detection occurred on Date, detected via DETECTION METHOD. The date of capture occurred on Date and was verified by FISHERIES EXPERT 1 (name and organization) and FISHERIES EXPERT 2 (name and organization). As a result, a Rapid Response effort is being initiated by Entity and Incident Command System (ICS) has been requested. Once ICS has been approved, you will receive a Notification of Rapid Response with more information.

Sincerely,

YourName
Title

Date

RE: **Notification of Northern Pike Rapid Response**

Dear Stakeholder,

This letter is to notify you that a Rapid Response effort has been initiated in response to the verified capture of a Northern Pike *Esox lucius* in WATERBODY NAME in COUNTY NAME (GPS COORDINATE) on Date. As a reminder, the first detection in WATERBODY NAME occurred on Date, detected via DETECTION METHOD. The date of capture occurred on Date and was verified by FISHERIES EXPERT 1 (name and organization) and FISHERIES EXPERT 2 (name and organization). Incident Command System (ICS) has now been approved. RR_FirstName RR_LastName has been designated as the Incident Commander (PhoneNumber, EmailAddress) [add all Commanders' information if a Unified Command]. Incident Command is in the process of convening a Multi-Agency Coordinating Group and designating General and Command Staff. Once in place, Responding Entity Leads will be designated to oversee sampling in WATERBODY NAME. Initial scoping efforts are planned to begin Date and the initial Rapid Response efforts will be completed no later than 6 weeks from today, Date. Rapid Response efforts will culminate in a meeting to establish a plan for any required extended response activities, to include potential eradication, containment, or suppression efforts. Situation reports and public notices will be provided at regular intervals until ICS has been terminated. If you have any questions, please contact RR_FirstName RR_LastName at PhoneNumber or EmailAddress.

Sincerely,

YourName
Title

APPENDIX G MAC Group Meeting Data Summary Form

Northern Pike Rapid Response MAC Group Meeting Data Summary Form

Initial detection date: _____

Initial detection location (lat/long and description): _____

Rapid Response Lead name: _____

Table 1. Field Lead name(s)

Name	Waterbody

Table 2. Verification efforts

Sampling date	Gear	Effort	Lat	Long	Present?
					Yes
					Yes
					Yes
					Yes

Table 3. Initial scoping efforts

Sampling date	Gear	Effort	Lat	Long	Present?
	eDNA				Yes
	eDNA				Yes
	eDNA				Yes
	eDNA				Yes
	eDNA				Yes

	Fish count video review				Yes
					Yes
					Yes
					Yes
					Yes

Table 4. Range delimitation efforts

Sampling date	Gear	Effort	Lat	Long	Present?
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes
					Yes

APPENDIX H Invasive Northern Pike Situation Assessment Form

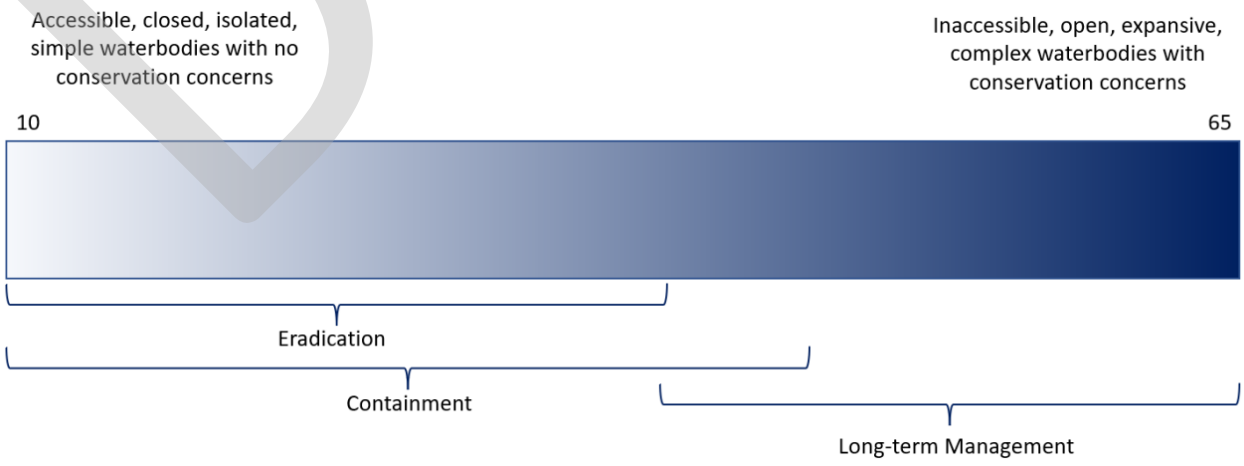
Invasive Northern Pike Situation Assessment

Baseline Information

Date	04/26/2023
Waterbody Name	
Have Northern Pike ever been eradicated here?	Yes or No
Is a bathymetric map available?	Yes or No
Acres	
Max Depth	
Means to access waterbody?	

Scoring

Question	**Score**	
How difficult is the waterbody to access (Scale 1-5)?	Select One	
Transportation costs to site?	Select One	
Is the waterbody open or closed? *(Regular status, not during flood stage)*	Select One	
If open, on a scale of 1-5 how expansive is the connectivity?	Select One	
On a scale of 1-5, how complex is the habitat?	Select One	
Are Northern Pike isolated or dispersed?	Select One	
Can temporary barriers be used to contain the Northern Pike population?	Select One	
Are there conservation concerns in the waterbody?	Yes or No	
Are native fish present?	Yes or No	
Cost to eradicate?	Select One	
Post-eradication, is fishery restoration needed?	Yes or No	
	Calculate Score	0



Chair Blain Reeves
Washington Invasive Species Council
c/o Justin Bush, Executive Coordinator
State of Washington
Recreation and Conservation Office
P.O. Box 40917
Olympia, Washington 98504-0917

I would like to express my interest in a seat on the Washington State Invasive Species Council to continue and expand Trout Unlimited's involvement with the Council. Trout Unlimited is national nonprofit with over 300,000 members dedicated to the conservation and protection of North America's native cold-water fish and their habitat.

Invasives species represent a significant and under addressed threat both directly to Washington's native fish, but also a broader threat to the ecosystems that fish populations rely on. I believe our goals of educating the public and decision makers about the risks posed by invasives, increasing coordination and expanding efforts by government and non-government organizations to address existing invasive species, and better preparing the state to prevent the introduction and spread of invasives are closely aligned with the goals of the Council. Trout Unlimited has a large grassroots membership base, works on state policy issues related to native fish, and has project staff doing habitat restoration work across Washington State.

I believe my experience working with other conservation nonprofits, local and regional fish recovery organizations, state government, and service on state policy advisory committees will make me a beneficial addition to the Council.

I appreciate your consideration,

Alexei Calambokidis
Washington Conservation Manager
Trout Unlimited
alexei.calambokidis@tu.org

Invasive European green crab

Washington Department of FISH & WILDLIFE

Contact information:

Meagan West
Federal Policy Coordinator
meagan.west@dfw.wa.gov

European green crabs threaten West Coast economies, environments, and tribal, cultural, and commercial resources

Federal funding and reinstatement of NOAA's Office of Aquatic Invasive Species are requested to combat European green crabs.

The European green crab is considered one of the world's worst invasive species. These shore crabs feed on clams, mussels, and other native shellfish. They can compete with Dungeness crabs and impact resources that are part of the cultural identity of tribes and native peoples as well as affect small businesses and low-income rural communities.

While digging for their next meal, European green crabs can also destroy habitats that salmon rely on such as estuaries and eelgrass beds. This could hinder salmon and Southern Resident killer whale recovery efforts, reduce shorebird food supplies, and ultimately affect the overall health and resiliency of the Salish Sea and outer coast waters.

An invasive species emergency in Washington state

European green crabs were detected in California in 1989 and have since spread up the West Coast as far as Alaska. They were discovered on the Washington coast in 1998 and in inland waters near Puget Sound in 2016. Beginning around 2018, significant increases in the invasive crabs were detected, potentially linked to warmer waters.

Washington state has since taken national leadership on managing the European green crab's impacts, which are still at early stages of invasion in our state. As part of this leadership, Washington Governor Jay Inslee and several tribes issued emergency proclamations in 2022 recognizing the threats posted by European green crabs and directing state agencies and partners to coordinate emergency measures to control them, led by the Washington Department of Fish and Wildlife (WDFW).

With funding from the state legislature, more than **285,000 European green crabs were removed from Washington waters in 2022** by WDFW, Native American tribes, shellfish growers, and other agencies and partners.

Yet federal funding levels are insufficient to address the scope of this emergency as evidenced by the state providing state funding to support federally recognized tribes, Washington Sea Grant, and federal agencies to conduct green crab research and protect national wildlife refuges.

We request that Congress and the National Oceanic and Atmospheric Administration (NOAA) recognize the emergency nature and destructive potential of European green crab on the West Coast by providing funding as detailed on the following page.

May 2023

European green crab federal funding request

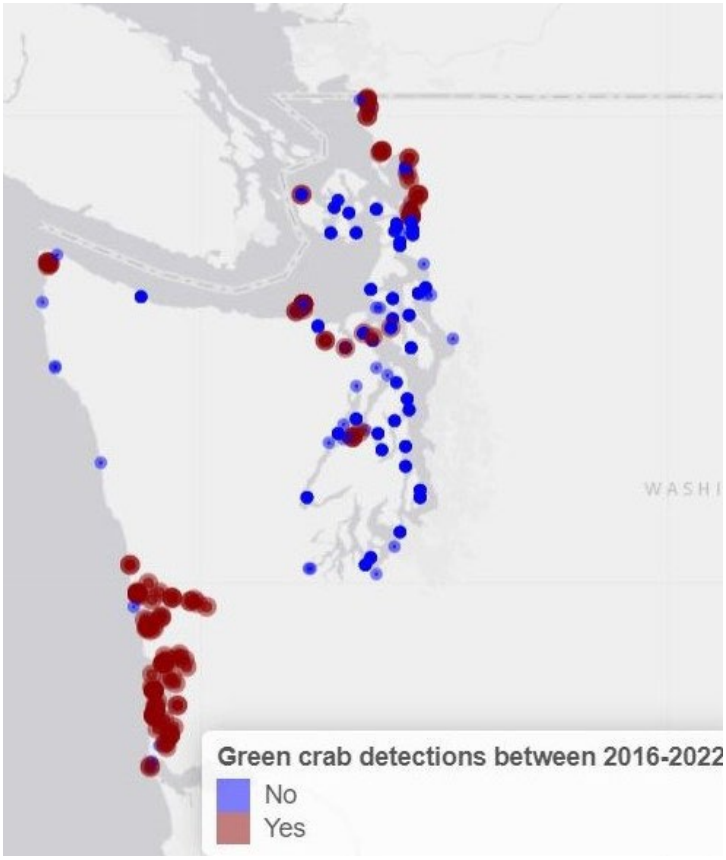
Washington Department of FISH & WILDLIFE

Request for federal funding and support for West Coast green crab response

We respectfully request that Congress recognize the emergency nature and destructive potential of European green crab, support Washington and other states' initiatives to combat this species, and act to minimize this destruction by implementing the following requests:

- Fund the reestablishment of the Office of Aquatic Invasive Species at NOAA headquarters to support state, tribal, and federal European green crab management programs.
- Appropriate $5 million in fiscal year 2024 and future years to the Coastal Aquatic Invasive Species Mitigation Grant Program as authorized under the Frank LoBiondo Vessel Incidental Discharge Act of 2018.
- Provide funding for European green crab prevention, management, and data stewardship to:
    - $300,000 to U.S. Fish and Wildlife Service's Willapa National Wildlife Refuge and Dungeness National Wildlife Refuge
    - $750,000 to U.S. Geological Survey's Biological Threats and Invasive Species Research Program for its Western Fisheries Research Center and Alaska Science Center
    - $8 million to Bureau of Indian Affairs' Invasive Species Program for its Northwest Region
    - Funding to U.S. Department of Agriculture's Animal and Plant Health Inspection Service for Washington's coastal shellfish growers who have been impacted by European green crabs.

European green crab detections in Washington state 2016 – 2022



More information is available online at wdfw.wa.gov/greencrab

May 2023

State of Washington
DEPARTMENT OF FISH AND WILDLIFE
Mailing Address: Post Office Box 43200 Olympia, WA 98504-3200 • (360) 902-2200 • TDD (360) 902-2207
Main Office Location: Natural Resources Building, 1111 Washington Street SE, Olympia, WA

June 1, 2023

The Honorable Christine Rolfes
Chair, Senate Ways and Means
303 John A. Cherberg Building
Post Office Box 40466
Olympia, WA 98504-0466

The Honorable Timm Ormsby
Chair, House Appropriations
315 John L. O'Brien Building
Post Office Box 40600
Olympia, WA 98504-0600

The Honorable Kevin Van De Wege
Chair, Senate Agriculture, Water
Natural Resources, and Parks
212 John A. Cherberg Building
Post Office Box 40424
Olympia, WA 98504

The Honorable Mike Chapman
Chair, House Rural Development,
Natural Resources, and Parks
132B Legislative Building
Post Office Box 40600
Olympia, WA 98504

RE: European Green Crab Quarterly Progress Report – Spring 2023 (January 1 to March 31, 2023)

Dear Chairs Rolfes, Ormsby, Van De Wege, and Chapman,

In 2021, the Washington Department of Fish and Wildlife (WDFW), tribal co-managers, and partners identified an exponential increase of invasive European green crabs (EGC), *Carcinus maenas,* in the Lummi Nation's Sea Pond within the Salish Sea, and in outer coastal areas including Makah Bay, Grays Harbor, and Willapa Bay.

On Dec. 14, 2021, the WDFW Director submitted an emergency measures request under RCW 77.135.090 for EGC response to Governor Jay Inslee. On Jan. 19, 2022, Governor Inslee issued an emergency proclamation (#22-02) to address the exponential increase in EGC populations across Washington's marine shorelines. The proclamation directed WDFW to eradicate, reduce, or contain EGC in Washington, and to increase coordination with partner agencies and Native American tribes.

The Washington State Legislature approved $8,568,000 in emergency funding during the 2022 Supplemental Budget to facilitate increased EGC management efforts. In response to the legislative budget proviso directive, this report is the third in a series of ongoing quarterly progress reports (Q3). The Q3 report will outline the successes and challenges of ongoing EGC emergency response efforts in Washington state from January 1 to March 31, 2023.

Trapping activities in Q3 remained relatively low due to cold weather and the expected reduction in EGC activity. Many entities had yet to begin their trapping seasons, though trapping continued in several areas resulting in the removal of EGC throughout Q3. Coordination efforts among co-managers, tribes, and partners were a focus of this relative trapping downtime. WDFW and

Washington Sea Grant hosted meetings to discuss lessons learned from 2022, priorities for 2023 and to plan the future of EGC management.

During the Q3 period, the collective effort of all organizations involved in EGC management removed 37,158 additional EGC from Washington state marine waters, with 35,274 from the Coastal Branch and 1,689 from the Salish Sea Branch. Since January 1, 2022, approximately 322,438 EGC have been removed from all Washington state marine waters, with 239,743 removed from the Coast Branch, and 82,695 removed from the Salish Sea Branch. In addition to active removal trapping, Q3 trap deployment occurred in areas where EGC had not previously been detected for early-detection monitoring. EGC has not been detected in the Salish Sea Branch south of the northern Hood Canal. Data on EGC abundance, body size, sex ratios, and reproductive status were collected for future analysis, along with DNA and RNA samples to assess connectivity between EGC populations. While challenges remain, the continued efforts of all parties and the clear organizational structure set in Q3 will allow for continued success in Q4. Additional information on European green crab in Washington and regular updates are available at: wdfw.wa.gov/species-habitats/invasive/carcinus-maenas.

Per RCW 77.135.090, the WDFW Director continues to evaluate the effects of the European Green Crab emergency measures, finds that the emergency continues to persist and advises that all emergency measures should be continued.

If you have any questions about this report or the Department's efforts in this area, please feel free to contact Tom McBride, WDFW's Legislative Director, at (360) 480-1472.

Sincerely,

Allen Pleus
WDFW European Green Crab Incident Commander

cc:
Kelly Susewind, Director, Washington Department of Fish and Wildlife
Kelly Cunningham, WDFW Fish Program Director
Ruth Musgrave, Senior Policy Advisor to Governor Jay Inslee

European Green Crab Quarterly Progress Report – Spring 2023 (January 1 to March 31, 2023)

Washington Department of Fish and Wildlife (WDFW)

Washington Department of FISH and WILDLIFE

June 1, 2023

Table of Contents

Executive Summary

In response to the Engrossed Substitute Senate Bill (ESSB) 5693 (2022 c 297) legislative budget proviso directive, this report has been authored as the third in a series of ongoing quarterly progress reports (Q3). This report will serve to outline the successes and challenges of ongoing European green crab (EGC) emergency response efforts in Washington state from January 1 to March 31, 2023. In addition, this report will put the work during Q3 in the context of the work completed in 2022 (Q1 and Q2).

The previous quarterly progress reports are available at: https://wdfw.wa.gov/publications and on WDFW's European green crab webpage.

In 2021, the Washington Department of Fish and Wildlife (WDFW), co-managers, tribes, and partners identified an exponential increase of invasive European green crab (EGC), C*arcinus maenas*, in the Lummi Nation's Sea Pond within the Salish Sea, and in outer coastal areas including Grays Harbor, Makah Bay, and Willapa Bay. On Dec. 14, 2021, WDFW Director Susewind submitted an emergency measures request under Revised Code of Washington (RCW) 77.135.090 for EGC response to Governor Jay Inslee. On Jan. 19, 2022, Governor Inslee issued an emergency proclamation (#22-02) to address the exponential increase in EGC populations across Washington's marine shorelines. The proclamation directed WDFW to eradicate, reduce, or contain EGC in Washington. The Washington State Legislature approved $8,568,000 in emergency funding during the 2022 Supplemental Budget to facilitate increased EGC management efforts. In response to the legislative budget proviso directive, this report is the third in a series of ongoing quarterly progress reports (Q3). The Q3 report will outline the successes and challenges of ongoing EGC emergency response efforts in Washington state from January 1 to March 31, 2023.

An Incident Command System (ICS) was established to deal with the complexities of the EGC management effort. Support for and coordination with co-managers, tribes and partners is essential, as the scale of the EGC emergency is such that no one entity could ever hope to implement successful statewide management strategies alone. Washington Sea Grant (WSG), the Lummi Nation, the Makah Tribe, the Shoalwater Bay Tribe, shellfish growers and various other entities have continued their ongoing efforts managing EGC populations, closely coordinating with WDFW. The ICS also resulted in the creation and distribution of various updates including reports to the governor every 10 days and Situation Reports (SitReps) based on operational periods (monthly January and February, then bi-weekly until November) to provide information on and ensure transparency regarding management actions taken, grant funding allocations, EGC catch numbers, trapping efforts, media outreach, and other relevant information. These Situation Reports were synthesized for the public, media, and other external audiences in EGC Public Updates published bi-monthly in January/February and March/April distributed through WDFW's EGC Management Updates email list as well as Department webpages, communications, and social media channels.

Representatives from most entities participating in EGC management have joined the ICS Multi-Agency Coordination (MAC) group. The MAC group provides a forum for these representatives to share information, establish a common operating picture, develop long-term priorities for the EGC emergency, and commit and allocate funding and other resources to enhance emergency measures responses. In Q3, the EGC MAC group continued to meet and review/recommend the new

Washington State Recreation and Conservation Office (RCO) EGC Emergency Measures Fund request for proposals. In addition, the EGC MAC group continued the implementation of the Fiscal Year 2023 EGC Emergency Measures Strategic Action Plan.

Trapping activities in Q3 remained relatively low due to cold weather and the expected reduction in EGC activity. Many entities had yet to begin their trapping seasons, though trapping continued in several areas resulting in the removal of EGC throughout Q3. Coordination efforts among co-managers, tribes, and partners were a focus of this relative trapping downtime. WSG and WDFW hosted meetings to discuss lessons learned from 2022, priorities for 2023 and to plan the future of EGC management.

During the Q3 period, the collective effort of all organizations involved in EGC management removed 37,158 additional EGC from Washington state marine waters, with 35,274 from the Coastal Branch and 1,689 from the Salish Sea Branch. Since January 1, 2022, approximately 322,438 EGC have been removed from Washington state marine waters, with 239,743 removed from the Coast Branch, and 82,695 removed from the Salish Sea Branch. In addition to active removal trapping, Q3 trap deployment occurred in areas where EGC had not previously been detected for early-detection monitoring. EGC has not been detected in the Salish Sea Branch south of the northern Hood Canal. Data on EGC abundance, body size, sex ratios, and reproductive status were collected for future analysis, along with DNA and RNA samples to assess connectivity between EGC populations.

WDFW, WSG, co-managers, tribes, and partners achieved significant progress in EGC management efforts. With the creation of the EGC Research Tasks Force, steps are underway to coordinate with EGC researchers across the Pacific coast of North America to determine research priorities to support EGC management efforts in Washington state and throughout the region. Additional progress was also made on public outreach and community engagement to support EGC awareness, with WDFW representatives engaging more than 2,000 individuals during over a dozen event days and producing a range of new outreach materials. While challenges remain (e.g., completion of a standardized electronic trapping data submission, hiring staff, and creation of the Fiscal Year 2024 Strategic Action Plan), the continued efforts of all parties and the clear organizational structure set in 2022 will allow for continued success during the 2023 emergency response field season.

Background

European green crab

The European green crab (EGC), *Carcinus maenas,* is a globally damaging invasive species that poses a threat to the ecological, economic, and cultural resources of Washington state. Native to Western Europe and Northwestern Africa, this hardy and voracious predator has since expanded its range throughout the globe (Carlton and Cohen 2003). Green crabs exploit a variety of different habitat types within intertidal and subtidal zones. Along the Pacific Coast of North America, EGC inhabit protected shorelines in unstructured sandy and muddy bottoms, estuaries, saltmarshes and seagrass beds, as well as utilizing woody debris and rocky substrates (Kern et al. 2002). The European green crab has wide tolerances for salinity (1.4-54 ppt) and temperature (0-35 °C) and can even survive air exposure for several days (Leignel et al. 2014).

In areas where EGC have been able to establish large populations for extended periods of time, they have the potential to negatively impact other species, particularly smaller crabs and bivalves (Jamieson et al. 1998, McDonald et al. 2001). It is estimated that damages to commercial shellfisheries from EGC predation average $22.6 million per year on the East Coast of the United States (Lovell et al. 2007). Similar loses from EGC predation are possible for Salish Sea shellfish fisheries (Mach and Chan 2013) and Pacific Coast fisheries are also at risk. Predation on oysters by EGC could negatively impact oyster fisheries, as adult EGC can prey upon young oysters (Dare et al. 1983, Poirier et al. 2017) and have been observed cracking and consuming adult oysters in laboratory settings (Forster, personal communication). Lab work has shown that juvenile EGC outcompeted similar-sized Dungeness crabs for food and shelter and juvenile Dungeness may serve as prey for larger EGC, resulting in potential impacts to wild Dungeness populations. Predation by EGC has led to declines in native bivalve and crab populations in invaded habitats (Grosholz et al. 2000). In addition, burrowing by EGC can have significant negative impacts on eelgrass, estuary, and marsh habitats (Malyshev and Quijón 2011, Matheson et al. 2016, Howard et al. 2019).

Given their history as a prolific invasive species, EGC is classified as a Prohibited Level 1 Invasive Species in Washington (Washington Administrative Code [WAC] 220-640-030; Appendix A), meaning they may not be possessed, introduced on or into a water body or property, or trafficked (transported, bought, or sold), without department authorization, a permit, or as otherwise provided by rule (RCW 77.135.040; Appendix A). We are currently not asking the public to kill suspected EGC, which may sound counterintuitive but is intended to protect native crabs from cases of mistaken identity (native crabs continue to be commonly misreported as EGC by the public; Flannery, personal communication). EGC is most accurately identified by the 5 large spines or marginal teeth on either side of their forward carapace, a unique pattern for crabs on the Pacific Coast of North America (Figure 1). Despite their name, coloration of green crabs varies

Figure 1. Image of a European green crab (EGC), *Carcinus maenas*, with distinguishing features highlighted. The main distinguishing feature of EGC are the five spines, or marginal teeth, on each side of the carapace behind the eyes. Additional identifying features are the three lobes, or rostral bumps, between the eyes, and somewhat flattened rear legs.

from bright green to dark orange, thus color is not a reliable feature to use when distinguishing EGC from native crab species.

History of the European green crab in Washington state

The first detection of EGC in the waters of Washington was in 1998 in Willapa Bay and Grays Harbor (Carlton and Cohen 2003); Table 1; Figure 2). Initial emergency management responses took place but ended after a few years due to a lack of evidence of self-recruitment and fewer EGCs being captured. A population of EGC was discovered in 2012 in Sooke Basin, British Columbia, Canada (Gillespie et al. 2015). In response over concerns of new EGC introductions within the Washington portion of the Salish Sea, WDFW designated Washington Sea Grant (WSG) to lead an early detection monthly monitoring community science network, also known as the Crab Team. This also marked the beginning of increased communication and collaboration with the Department of Fisheries and Oceans Canada (DFO) to explore transboundary EGC management in the Salish Sea. The first detections of EGC in the Washington region of the Salish Sea occurred in 2016 at Westcott Bay on San Juan Island by the WSG Crab Team and in Padilla Bay by staff at the Padilla Bay National Estuary Research Reserve (Grason et al. 2018). There were additional detections of EGC in 2017 in Makah Bay by the Makah Tribe and in Dungeness Spit within the Dungeness National Wildlife Refuge, which is managed by the U.S. Fish and Wildlife Service (USFWS). Since 2018, there have been increasing numbers of EGC detections in the Salish Sea and Pacific coastal regions of Washington. In response to continued EGC presence in the Salish Sea, the Salish Sea Transboundary Action Plan for Invasive European Green Crab was created and signed by representatives of WDFW, WSG, the Puget Sound Partnership, and the DFO in 2019 (Drinkwin et al. 2018).

Table 1 Yearly European green crab captures in Washington from 1998-2022. Data is divided by EGC captured in the Washington state portion of the Salish Sea and EGC captured along the Pacific Coast of Washington. Please note that this data only represents crabs captured, not the effort employed. Catch effort (number of traps deployed, number of locations trapped, frequency of trap recovery) varies greatly across years.

Year	Salish Sea	Pacific Coast	Total
1998	0	364	364
1999	0	507	507
2000	0	235	235
2001	0	142	142
2002	0	167	167
2003	0	24	24
2004	0	4	4
2005	0	115	115
2006 - 2014	0	68	68
2015	0	8	8
2016	5	19	24
2017	101	64	165
2018	77	1,115	1,192

Year	Salish Sea	Pacific Coast	Total
2019	177	1,766	1,943
2020	2,858	3,971	6,829
2021	86,340	16,825	103,165
2022	81,006	204,274	285,280

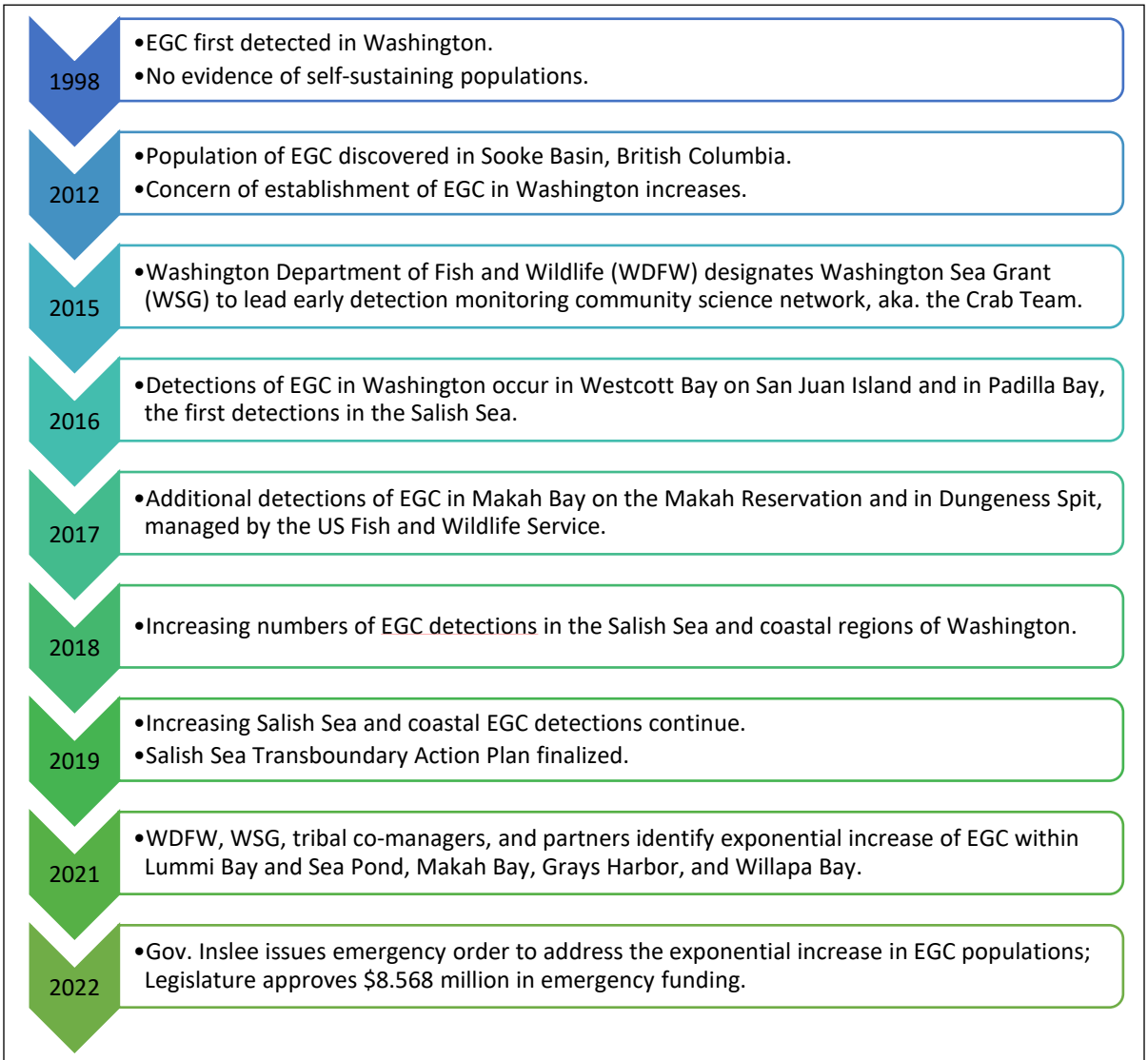


Figure 2 Timeline of European green crab (EGC) invasion In Washington State.

Emergency Proclamation and Supplemental Funding

In 2021, WDFW, co-managers, tribes, and partners identified an exponential increase of invasive EGC in the Lummi Nation's Sea Pond within the Salish Sea, and in coastal areas including Makah Bay, Grays Harbor, and Willapa Bay. It was concluded that this continuing increase in EGC

distribution and abundance posed an imminent threat to Washington's economic, environmental, and cultural resources. While $2.3 million was appropriated by the State Legislature for EGC management in the 2021-23 biennium, it was determined to be insufficient to control these exploding populations.

On Dec. 14, 2021, Director Susewind submitted an emergency measures request under RCW 77.135.090 (Appendix A) for EGC response to Governor Jay Inslee. While emergency funding was not immediately available, on January 19, 2022, Gov. Inslee issued an emergency proclamation (#22-02) to address the exponential increase in the EGC population within the Lummi Nation's Sea Pond and Pacific coastal areas. The proclamation directs WDFW to implement emergency measures as necessary to affect the eradication of or to prevent the permanent establishment and expansion of EGC in Washington. In addition, the Governor urged the Legislature to provide additional emergency funding as requested by the WDFW as soon as possible.

Working with the Office of the Governor, the Office of Financial Management, tribal co-managers including the Lummi Nation, Makah Tribe, and others, along with WSG, WDFW requested $8,568,000 from the State Legislature during the 2022 supplemental session to control increasing EGC populations. The Legislature fully-funded this request in the 2022 Supplemental Budget, which was signed by Governor Inslee on March 31, 2022.

Governor Proclamation 22-02 Directives

The following text, taken from "Emergency Proclamation by the Governor 22-02 Green Crab Infestation", outlines the primary directives to WDFW and other state agencies by Governor Jay Inslee regarding EGC management:

"NOW THEREFORE, I, Jay Inslee, Governor of the state of Washington, by virtue of the authority vested in me under RCW 43.06.010(14), as a result of the above-noted situation, and in accordance with RCW 77.135.090, do hereby order the Department of Fish and Wildlife to begin implementation of emergency measures as necessary to effect the eradication of or to prevent the permanent establishment and expansion of European green crab.

FURTHERMORE, I direct the Department of Ecology, and I ask the Department of Natural Resources and the State Parks and Recreation Commission to identify European green crab management as a high priority on their respective state-owned aquatic lands and to facilitate implementing the emergency measures described herein."

Legislative Proviso

The following text, taken from "ESSB 5693 - Making 2021-2023 fiscal biennium supplemental operating appropriations", Section 308 (Page 552, Line 16) - outlines the primary directives to WDFW by the Washington State Legislature regarding EGC management:

"Implement eradication and control measures on European green crabs through coordination and grants with partner organizations. Provide quarterly progress reports on the success and challenges of the measures to the appropriate committees of the legislature."

Successes of European green crab management measures

The following is an overview of the major successes related to European green crab (EGC) management actions for the third quarter of the emergency, from January 1 to March 31, 2023 (Q3). The success of Q1 and Q2 (March 1 – December 31, 2022) will also be discussed and included for context. A complete list of EGC management actions of Q3 can be found in Appendix A of this report.

Incident Command System implementation

The Washington State Emergency Management Division assigned mission #22-1085 on April 18, 2022, for the EGC emergency response. After meeting with other state and federal agencies, the Washington Department of Fish and Wildlife (WDFW) Director Kelly Susewind formally implemented an Incident Command System (ICS) on May 5 in delegating authority to Allen Pleus, WDFW's Aquatic Invasive Species (AIS) Policy Coordinator, to serve as Incident Commander (Figure 3). This approach provides a clear command structure, as well as standardizing communications and management action implementation across the state.

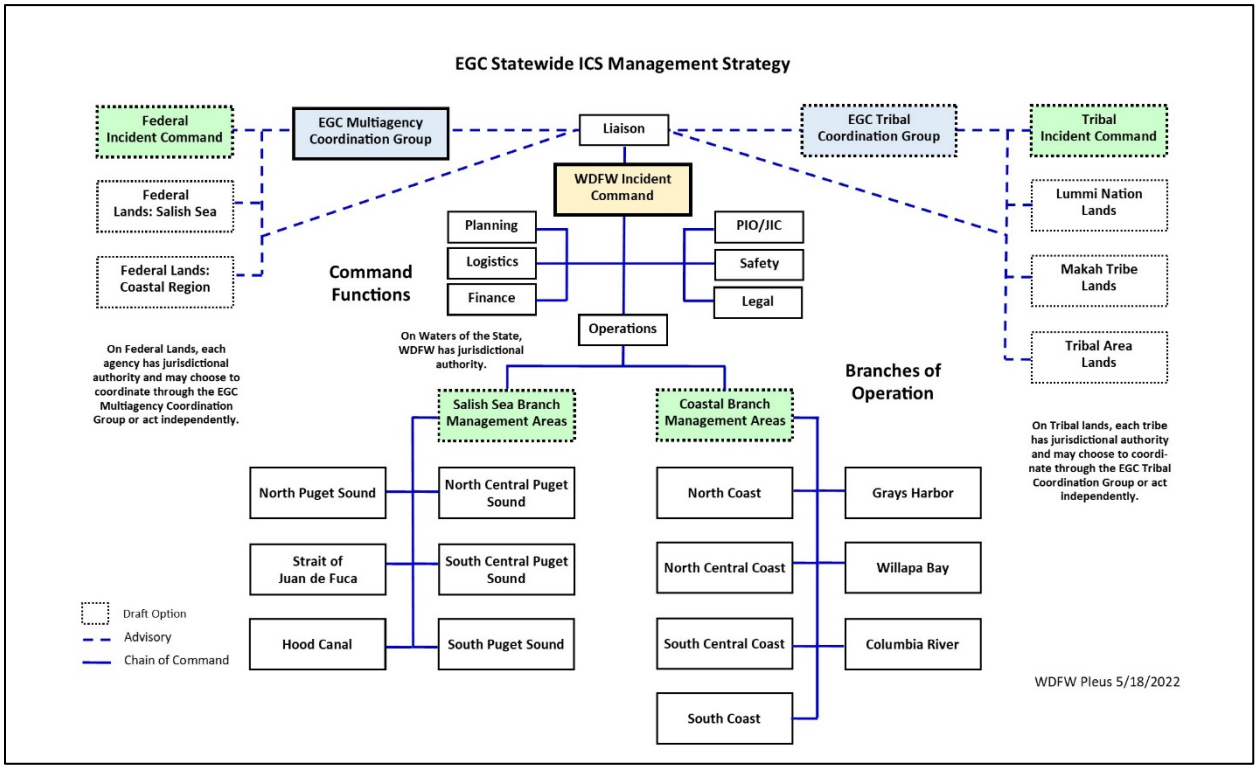


Figure 3 Incident Command System structure for the European green crab emergency response in Washington.

In addition, ICS provides support to federal and tribal participants across the state while they retain their autonomy in EGC management decisions and actions. During Q3, successes of the EGC ICS have included:

- Ensuring that ongoing management actions are guided by the five Incident Objectives developed in Q1:
    A. Facilitate WDFW implementing Governor's Emergency Proclamation for statewide emergency measures with respect for tribal sovereignty and federal jurisdictions.
    B. Health and safety of all participants.
    C. Reduce or contain EGC populations below levels that result in environmental, economic, and cultural resource harm.
    D. Collaborative and transparent emergency management.
    E. Post-emergency transition to long-term EGC management by local tribal co-managers and partners with WDFW oversight.
- Meetings with tribal entities to discuss ICS structure and solicit recommendations on how tribes would like to engage on policy and technical levels.
- Regular reports to the governor every 10 days per RCW 77.135.090 on the effects of emergency measures and advising the governor if all or some emergency measures should be discontinued.
- Creation of ICS Situation Reports (SitReps) based on a two-week operational period summarizing the status of Washington state EGC emergency measures including actions taken, funding allocations, EGC catch numbers, trapping efforts, and other relevant information for dissemination among EGC emergency measure co-managers, tribes, and partners.
    - During months of reduced trapping activity resulting from winter conditions (November - February), SitReps are created on a monthly operational period.
- Creation of monthly and then bi-monthly EGC Public Updates updating on Washington state EGC Emergency measures, highlighting the efforts of agencies, tribes, and partners, and sharing stories from the field for dissemination to the public and media.
- Continued WDFW internal policy coordination meetings.

An important aspect of the EGC ICS structure is the Multi-Agency Coordination (MAC) group. The MAC group consists of representatives from various co-managers, tribes, and partners including state and federal agencies, and shellfish growers (Table 2). The MAC group provides a forum for these representatives to share information, establish a common operating picture, and recommend common long-term priorities for the EGC emergency. In addition, the group is tasked with making recommendations to WDFW for emergency funding and may commit and allocate additional or in-kind funding and other resources to enhance emergency measures response. Since its formation on June 8, 2022, the MAC group has convened eighteen times (five times in Q3). During Q3, the EGC MAC group successes have included:

- Aided in the development of The Washington State Recreation and Conservation Office (RCO) EGC Emergency Measures Fund request for proposals.
- Reviewed and recommended RCO EGC Emergency Measures Fund requests of:
    - $30,000 Grays Harbor Conservation District funding to procure a boat to assist with conservation district-led trapping efforts.

- $90,000 Pacific Conservation District funding to assist Willapa-Grays Harbor Oyster Growers Association trapping efforts.
- These recommendations are in addition to previous proposals, which includes:
  - $91,316 U.S. National Oceanographic and Atmospheric Administration
  - $402,220 State of Washington Department of Natural Resources
  - $100,000 Lummi Indian Business Council
  - $99,312 Pacific County Vegetation Management
  - $75,154 State of Washington Department of Ecology
  - $32,897 U.S. Fish & Wildlife Service (FWS) Dungeness National Wildlife Refuge (NWR)
  - $110,240 US FWS Willapa National Wildlife Refuge
  - $70,517 Washington State University (WSU)/Washington Sea Grant (WSG)
  - See the Q1 and Q2 EGC Legislative Reports for more details

- Completion of the Fiscal Year (FY) 2023 EGC Emergency Measures Strategic Action Plan, including establishing priority tasks to be addressed.
- Began work on development of FY 2024 EGC Emergency Measures Strategic Action Plan (scheduled for completion by June 30, 2023).

Table 2 List of European green crab (EGC) Multi-Agency Coordination (MAC) group member organizations. Representatives of these organizations share information, establish a common operating picture, and develop common long-term priorities for the EGC emergency

Multi-Agency Coordination group member organizations	
Pacific Coast Shellfish Growers Association	Washington Department of Ecology
Lummi Nation Business Council	Washington Department of Fish and Wildlife
Puget Sound Partnership	Washington Department of Natural Resources
Shoalwater Bay Tribe	Washington Emergency Management Division
U.S. Bureau of Indian Affairs	Washington Recreation and Conservation Office
U.S. Environmental Protection Agency	Washington Sea Grant
U.S. Fish and Wildlife Service	Washington State Department of Agriculture
U.S. Geological Survey	Washington State Parks and Recreation Commission
U.S. National Oceanographic and Atmospheric Administration	Willapa Grays Harbor Oyster Growers' Association

Coordination with co-managers, tribes and partner organizations

Perhaps the greatest success of EGC management in Washington are the efforts, both independent and collaborative, of the many co-managers, tribes, and partners within the state (Table 3). The scope of the EGC emergency is such that no one organization can hope to curtail it alone. For years, co-managers, tribes and partners such as WSG, local, state, federal agencies, shellfish growers have worked with WDFW to implement short- and long-term management actions to support statewide efforts in EGC management. The contributions of all entities involved in EGC control cannot be overvalued. While this report does not go into specifics of the contributions of each group, MAC group member organizations were invited to submit addendums to outline their specific actions and successes in their own words. Addendums submitted to WDFW before publication are included in this document in Appendix B.

Since EGC extend beyond jurisdictional boundaries, management responses require action, collaboration, and coordination between various groups. It is important to note that EGC management is very complex with multiple jurisdictions, varying management priorities, different management types, complex operations, and different resource capacities. Additionally, each organization can have differing goals for sensitive habitats, species protections and aquaculture operation protections. SitReps were disseminated every two weeks based on ICS operational periods to support meeting the collaboration and transparent emergency management objective. During months of reduced trapping activity resulting from winter conditions (November - February), SitReps dissemination was shifted to a monthly operational period. These SitReps included information on management actions taken, grant funding allocations, EGC catch numbers, trapping efforts, media outreach and other relevant information. The first SitRep was disseminated on June 16, 2022, for a total of thirteen for 2022.

During Q3, several large meetings between co-manages, tribes, and partners occurred to discuss past and future EGC management efforts. WSG hosted the EGC Trapper's Summit in January at Suquamish Clearwater Casino. The summit focused on entities that actively trapped EGC in 2022. The meeting provided the opportunity for participants to share observations and learn what other trappers saw in 2022 and are planning for 2023, collaboratively explore the data that we've been individually pulling together, build on each other's technical knowledge of trapping, and identify questions and priorities that might help inform future trapping efforts. WDFW hosted the annual Washington EGC Co-Managers and Partners Meeting in Lacey in February. Participants, including co-managers, other tribal staff, shellfish growers, and staff from other agencies and partners, could join the meeting in person or online via Teams. Presenters from entities participating in the EGC Emergency Response provided updates, including:

- Allen Pleus (WDFW), EGC Incident Commander, provided an update on EGC management in Washington state;
- Chris Waldbillig (WDFW) and Justin Bush (RCO) updated attendees on the availability of grant funding for EGC emergency response efforts;
- Dr. Brian Turner (WDFW) presented on current science around EGC and the newly launched EGC Research Task Force;
- Nicole Burnet (Padilla Bay National Estuarine Research Reserve) presented findings from their EGC larval studies and their plans to develop an identification guide;
- Diana Dishman (National Oceanic and Atmospheric Administration) gave participants guidance on complying with Endangered Species Act permitting;
- and Jessica Ostfeld (WDFW Outreach Specialist) provided an update on EGC outreach and communications, and ways partners and tribes can coordinate to increase community awareness and public reporting of EGC.

Table 3 List of co-managers, tribes, and partner organizations working with WDFW on control and management efforts of the European green crab in Washington. Participants implement short- and long-term management actions to support statewide efforts in EGC control, including independent and WDFW collaborative trapping, outreach and education, field support, and monitoring. These actions are an essential component of the EGC management in Washington.

European green crab management tribal co-managers and partner organizations	
Bay Center Farms	Quinault Indian Nation
Brady's Oysters	Samish Indian Nation
Chuckanut Shellfish	Shoalwater Bay Tribe
Drayton Harbor Oyster Co.	Stillaguamish Tribe of Indians
Elkhorn Oyster Co.	Stillwaters Environmental Center
Goose Point Oysters	Suquamish Tribe
Grays Harbor National Wildlife Refuge	Swinomish Indian Tribal Community
Jamestown S'Klallam Tribe	Taylor Shellfish Farms
Lower Elwha Klallam Tribe	Twin Harbors Waterkeeper Alliance
Lummi Nation	United States Fish and Wildlife Service
Makah Tribe	United States Navy
Northwest Straits Commission	Veterans Corps
Pacific County Vegetation Management	Washington Sea Grant
Pacific Seafoods	Washington State Department of Natural Resources
Padilla Bay National Estuarine Research Reserve	Washington State DNR Puget Sound Corps
Pacific States Marine Fisheries Commission	Washington Conservation Corps
Penn Cove Shellfish	Willapa Bay National Wildlife Refuge
Port Gamble S'Klallam Tribe	Willapa-Grays Harbor Oyster Growers' Association
Quileute Tribe	

Budget allocation

The $1,082,364 in funds provided for this report period allowed for the continuation of our management efforts.

- Staff (Salaries + Benefits): $207,110
    - Funds spent on staff. WDFW field staff remained at Q2 levels, though hiring efforts are underway to increase staffing for the 2023 trapping season.
- Equipment: $3,722
    - Funds spent on high value equipment.
- Goods & Services: $24,691
    - Funds spent on general field supplies and gear such as bait and traps.
- Travel: $10,925
    - Funds spent on motor pool vehicles, per diem and lodging. Aside from trapping efforts, travel funds allowed staff to present at and attend conferences and perform outreach for various stakeholder groups.
- Contractual Services: $705,084

    - Funds spent on pass through contracts for our various partners including WSG, Lummi Nation, Makah Tribe, and funding awarded through the WDFW Coastal EGC Local Management Grant and the RCO EGC Emergency Measures Grant programs.
- Pass Through: $878
    - Fund spent on pass through funding for client services with the Pacific Shellfish Institute.
- Agency Indirect: $129,953
    - Funds spent on agency-wide, general administration costs.

European green crab monitoring and removal

The state is divided into Coastal and Salish Sea Management Branches to facilitate effective EGC ICS communications and management (Figure 4). These branches are then further divided into 13 Management Areas based on WDFW recreational fishing marine areas. Trapping efforts across the state were undertaken by WDFW, WSG, co-managers, tribes, and partner organizations. The catch numbers presented for Q3 represent the collective effort of all organizations, and those efforts must be recognized.

During Q3, traps deployment across Washington's Management Areas was heavily reduced due to unsafe field conditions and expected reduction in EGC activity resulting from cold winter weather. Trapping efforts occurred only in North Puget Sound, Hood Canal, and the Strait of Juan de Fuca in the Salish Sea Branch, as well as North Harbor, Grays Harbor, and Willapa Bay in the Coastal Branch. Trapping efforts will resume at all Management Areas in Q4 (April 1 – June 30, 2023).

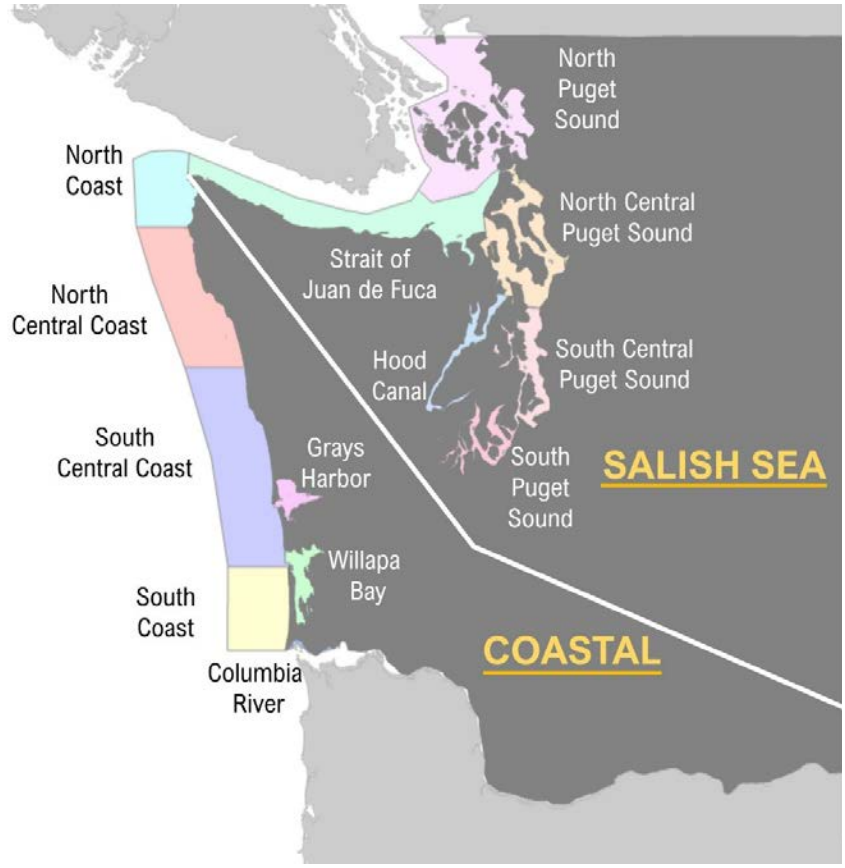


Figure 4 Map of Washington state European green crab management locations. The state has been split into two Management Branches (Coastal and Salish Sea) and thirteen Management Areas (North Puget Sound, Strait of Juan de Fuca, Hood Canal, North Central Puget Sound, South Central Puget Sound, South Puget Sound, North Coast, North Central Coast, South Central Coast, South Coast, Grays Harbor, Willapa Bay, Columbia River).

In total, 37,158 EGC were removed in Q3 from Washington state waters, with 35,469

removed from the Coastal Branch and 1,689 removed from the Salish Sea Branch (Table 4). In the Coastal Branch, the majority of EGC were removed from Grays Harbor (21,479), followed by the Willapa Bay (13,413) and North Coast (577) Management Areas. In the Salish Sea Branch, most EGC were removed from the North Puget Sound (1,687), with a few collected in the Strait of Juan de Fuca (2). While trapping occurred in Hood Canal, no EGC were captured. To date, EGC have not been detected in the Salish Sea Branch south of northern Hood Canal, though early-detection monitoring continues across the southerly Management Areas. Data on EGC abundance, body size, sex ratios, and reproductive status were collected for future analysis, along with DNA and RNA samples to assess connectivity between EGC populations. Removed EGC were euthanized following humane best practices and disposed of within local landfills or, in the case of EGC collected by the Shoalwater Bay Tribe, utilized as fertilizer in their tribal community garden (Pfleeger-Ritzman, personal communication).

Table 4 European green crab capture totals for Q3 (January 1 – March 31, 2023), 2022 (January 1 – December 31, 2022), and All (the duration of the EGC management effort) based on SitRep reported catch and trapping effort. These numbers are presented for each Branch (Coastal and Salish Sea) and Management Area. These totals include not only removal efforts by Washington Department of Fish and Wildlife, but co-managers, tribes, and partners such as the Washington Sea Grant Crab Team, the Lummi Nation, the Makah Tribe, the Shoalwater Bay Tribe, and participating shellfish growers. * = Pre-Season Status; no trapping occurred in these Management Areas.

Branch	Management Area	Q3 Total EGC Captured	2022 Total EGC Captured	All EGC Captured
Salish Sea	North Puget Sound	1,687	80,900	82,587
Salish Sea	Strait of Juan de Fuca	2	90	92
Salish Sea	Hood Canal	0	16	16
Salish Sea	North Central Puget Sound	*	0	0
Salish Sea	South Central Puget Sound	*	0	0
Salish Sea	South Puget Sound	*	0	0
Salish Sea	**All**	**1,689**	**81,006**	**82,695**
Coastal	North Coast	577	25,109	25,686
Coastal	North Central Coast	*	0	0
Coastal	South Central Coast	*	34	34
Coastal	South Coast	*	0	0
Coastal	Grays Harbor	21,479	24,264	45,743
Coastal	Willapa Bay	13,413	154,862	168,275
Coastal	Columbia River	*	5	5
Coastal	**All**	**35,469**	**204,274**	**239,743**
All	***All***	***37,152***	***285,280***	***322,438***

Direct comparisons of Q3 capture totals for the same time in 2022 are not possible, as the emergency response and its associated data collection efforts did not begin until March 1, 2022. However, one striking observation can be made despite this limitation: the Q3 catch for Grays Harbor (3 months) nearly matches their total catch in 2022. Partners in Grays Harbor greatly increased their trapping efforts in Q2 (October 1 - December 31, 2022) and remained active during Q3, which likely explains Greys Harbor's similar catch numbers for Q3 and 2022 (See the Q2 report for more details).

Research activity

Effective invasive species management requires a robust understanding of the invader and its impacts. As a prolific global invader, a wealth of research exists regarding EGC. However, many fundamental questions about EGC, particularly regarding their detection, abundance, impacts, and movements in Washington state, have yet to be answered.

On February 13-14, 2023, a two-day EGC Transboundary Research Discussion occurred between WSG, WDFW, WSU, and Department of Fisheries and Oceans Canada (DFO) at WSG in Seattle to discuss research priorities in support of European green crab management. As transboundary colleagues, DFO, WDFW, and WSG have worked together for several years to reconcile our mutual understanding of local green crab status and ecology. With the increasing scale of management action in Washington, the demand for reliable information to guide management practices is also growing, yet data and research gaps remain. This group identified and strategized on topic areas needing additional scientific investigation and started prioritizing these research areas to address management-related questions. Areas of discussion for future research included: population control techniques through an Integrated Pest Management lens, population genetics and genetics tools, predicting dispersal and spread, and understanding habitat use and migration. The work started here will be carried forward by the newly formed EGC Research Task Force (RTF) and enables researchers to leverage each other's capacity, reduce duplicative investigations, and focus on the most-needed information to manage green crabs.

The RTF is an organization of researchers, managers, and experts on EGC from across the Pacific Coast of North America. Membership in the RTF is by invitation. Participants must have active/previous involvement in EGC or similar research and be associated with EGC management efforts along the Pacific Coast of North America. The RTF provides a forum to discuss the current state of EGC research and promote synergy in research efforts. Additionally, the RTF aims to develop a ranked list of needed EGC research with a primary focus on improving the prevention, detection, and management of EGC. One of the primary tasks for the RTF includes developing technical thresholds for EGC impact, including a threshold at which EGC populations no longer harm environmental, economic, or cultural resources. This process includes identifying data requirements for assessing EGC populations and assisting in evaluating EGC population trends and impacts.

On February 15, 2023, Incident Command System (ICS) staff and a consortium of invasive species researchers and managers met with 19th Legislative District's Representative Joel McEntire to discuss innovative long-term solutions to EGC management including exploring the feasibility of genetically modifying traits in the invasive species to manage their populations, creating new

detection tools, and more. The research consortium and ICS staff included participants from the Washington Recreation and Conservation Office (RCO), administrative host of the Washington Invasive Species Council, WDFW, University of Washington, WSG, WSU Extension, and Woods Hole Oceanographic Institution in Massachusetts. Together the consortium discussed the current state of scientific knowledge and abilities including initial steps toward a long-term goal of integrating new tools into the toolbox. Recognizing EGC as a global invasive species, the consortium is also exploring the feasibility of a research summit bringing together the best minds globally to tackle this shared issue.

WDFW received a progress report on an ongoing EGC telemetry study funded by RCO EGC emergency funding. The project, led by the National Oceanographic and Atmospheric Administration (NOAA), Northwest Fisheries Science Center, in partnership with the WDFW Willapa Bay Field Station, and Willapa Grays Harbor Oyster Growers Association, involved tagging four groups of 10 EGC (40 total), and two groups of 8 Dungeness crabs (16 total) with transmitters to test the effectiveness of intertidal acoustic telemetry on crabs (particularly EGC) and compare their inter- and subtidal habitat use. Understanding EGC habitat use across space and time, particularly over seasonal time frames, could be vital to designing effective mitigation strategies. As of March 2023, all receivers were collected, and all 56 crabs were detected. Preliminary results show that most Dungeness crab departed the main detection area within about a week. In contrast, many EGC remained in the study area throughout the monitoring period, with some movement between intertidal sites. The detection data has been sent for analysis, with results expected in Q4 (April1- June 30, 2023). The full update can be found in Appendix C.

Public communications and outreach efforts

Communications, public education, involvement, and support are essential for effective invasive species management. No matter the effort of government agencies and managers, they will be limited in their ability to monitor and report on the species spread. Public awareness and reporting can complement professional monitoring and allow for earlier detection of species spread. Media relations, other mass communications, and public awareness also supports effective policymaking and collaboration with local communities, stakeholders, and partners. Q3 saw a dramatic increase in WDFW EGC outreach efforts. Highlights for Q3 have included:

Focused/Local communication

- Representatives of WDFW presented a public European green crab webinar on February 21, 2023. This event was hosted by the Washington Invasive Species Council as part of Washington Invasive Species Awareness Week (February 20-26, 2023). The “European Green Crab Public Update Webinar” was approximately 1 hour and 15 minutes with 40 attendees and can be viewed here.
- WDFW staff presented at the Western Aquatic Invasive Species Short Course in Missoula, MT and at the Coastal Invasive Species and Exotic Pets Workshop in Astoria, OR.
- Outreach representatives from WDFW were present at numerous events throughout Washington, including the Seattle Boat Show, Penn Cove Musselfest, and Storming the Sound. At the Long Beach Razor Clam Festival, WDFW and WSU Extension partnered to operate an EGC outreach booth. Similarly, WDFW and Grays Harbor Conservation District

representatives worked together during the Ocean Shores Razor Clam Festival. More than 2,000 people were reached during these combined outreach efforts.

- WDFW deployed updated outreach materials for 2023, including an EGC identification graphic, identification outreach sign, plain language talking points, and partner recognition sign (Figure 5). Signs, outreach materials, and other resources were shared with county conservation districts, parks, tribes, marinas, boat launches and water access areas, shellfish growers, and other partner groups. More than 1,000 stickers and 200 reporting signs were distributed. Materials are hosted online here. All additional communication and outreach efforts are listed in Appendix A.

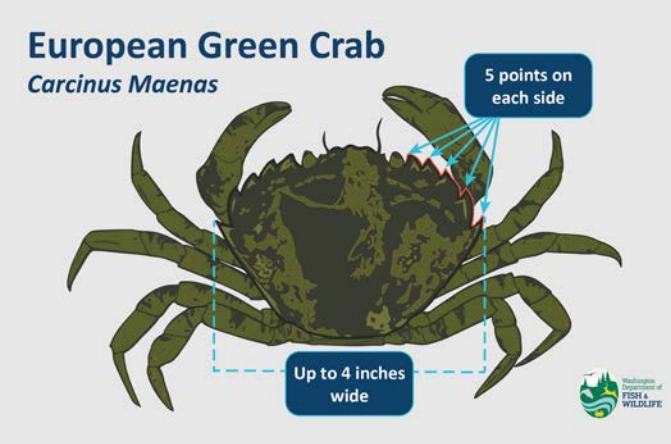


Figure 5 The newly created European green crab identification graphic.

General public communication

- General information on EGC such as identification and public reporting is posted at: https://wdfw.wa.gov/greencrab
- Continued bi-monthly Public Updates regarding Washington State EGC Emergency measures, including updates distributed to relevant media outlets: https://wdfw.wa.gov/species-habitats/invasive/carcinus-maenas#conservation
- Detailed information on EGC ecology and identification, webinar recordings of stakeholder meetings, and an archive of ICS Public Updates are posted on this webpage for EGC practitioners and the general public: https://wdfw.wa.gov/species-habitats/invasive/carcinus-maenas
- WDFW mailing list for EGC Management updates to provide regular updates and other news regarding coordinated efforts to monitor and control invasive EGC in Washington waters. There are currently ~500 subscribers and average mail traffic is 1-2 emails per month: https://wdfw.wa.gov/about/lists
- WSU, in collaboration with WA Sea Grant, initiated the development of an EGC early detection program to engage citizen scientists in EGC control efforts. The program is called EGC Molt Search and will train volunteers in the 12 Puget Sound Counties to survey beaches and report molt findings on a specially designed reporting tool on the MyCoast App. The trainings will occur in May and June 2023.
- Current EGC management efforts have been reported in numerous local and national media outlets (Appendix A).

Program challenges

WDFW, co-managers, tribes, and partners have achieved significant progress toward the five Incident Objectives in a short timeframe. However, as we progress through the initial stages of the EGC emergency, there are several challenges we must address. These challenges include:

- Hiring, onboarding, and training of new and returning seasonal field staff. The WDFW EGC field crew will be significantly larger than in previous years. New staff will require training in field procedures, data collection, and safety practices. Returning staff will receive a refresher course and training with our new electronic data trapping data submission system (see below).
- Finalization of the WDFW 2023 field season plan. WDFW must use its increased capacity for action in the state must be utilized effectively. Meetings with partners and co-managers, particularly in the Coastal Branch, will help to identify priorities and how WDFW can support their efforts. Internal discussions on prioritizing removal, monitoring, and detection in various locations are ongoing.
- Completion and implementation of a standardized electronic trapping data submission system for use across all participating entities. Working with Esri, a geographic information system (GIS) company, WDFW is developing software to allow direct uploading of catch data in real-time to significantly enhance our data collection capability while also eliminating errors resulting from data transfers from physical to digital formats.
- Completing the creation of the "European green crab hub", a website that will serve as a go-to resource for all things EGC in Washington. The site is being developed in collaboration with Esri. The public can use the site to learn more about EGC and ongoing management activities, while co-managers, tribes, and partners can use it to submit data for SitReps.
- Completing the FY 2024 Strategic Action Plan (SAP) to meet Incident Objectives and identifying the statewide and Management Area leadership required to implement plan tasks and the necessary resources to support them. The planned completion date is June 30, 2023
- Finalization of an EGC disposal contract between WDFW and Pacific Gro. Pacific Gro is a liquid fertilizer company based in WA and has generously agreed to accept our fish waste (i.e., EGC and used bait) free of charge. This partnership will allow organic material that would otherwise be dumped in landfills to be put to productive use as outlined in HB 1799 (2022). Please note the contract was completed, and crab deliveries have begun at the time of writing but was not accomplished in Q3.
- Establishing research priorities for EGC management in Washington. While the RTF is in the process of creating a rigorous ranked list of EGC research priorities for Washington, there is an immediate need to highlight needed before the field season begins in earnest. To that end, the preparation of an unranked list of priority research is underway to serve as a temporary guide. This unranked list is based on the required research to complete tasks in the FY 2023 SAP and will likely significantly overlap with the final ranked list.

Next steps

The EGC emergency management priority actions for next quarter (April 1 – June 30, 2023) include:

- Host meetings with co-managers, tribes, and partners in Willapa Bay and Grays Harbor to discuss the state of EGC management efforts, priorities for 2023 and beyond, and how WDFW can best support local efforts.
- Hiring and onboarding for new and returning WDFW 2023 EGC staff.
- Implementing the Fiscal Year 2023 EGC Emergency Measures Strategic Action Plan to fulfill the five Incident Objectives.
- Development of Fiscal Year 2024 EGC Emergency Measures Strategic Action Plan.
- Ongoing MAC group meetings every two weeks until November.
- Continued monthly EGC Research Task Force meetings to develop a priority research list for EGC in Washington and discuss EGC research-related issues.
- Development and distribution of bi-monthly Situation Reports (SitReps).
- Ongoing advocacy for increasing federal partner support and funding.
- Finalization of the Esri EGC data collection tools for use in the field.
- Identifying additional proposals for FY24 emergency measure grants.
- Ongoing outreach to tribal co-managers on policy and technical coordination.

Glossary

AIS – Aquatic Invasive Species

DFO – Department of Fisheries and Oceans Canada

DNR – Department of Natural Resources

Ecology – Department of Ecology

EDRR – Early Detection Rapid Response

EGC – European green crab (Carcinus maenas)

FY – Fiscal Year

ICS – Incident Command System

MAC Group – Multi-Agency Coordination Group

NGO – Non-governmental organizations

NOAA – National Oceanographic and Atmospheric Administration

NWR – National Wildlife Refuge

Q1 – First quarterly phase of EGC emergency response (March 1 – September 30, 2022)

Q2 – Second quarterly phase of EGC emergency response (October 1 – December 31, 2022)

Q3 – Third quarterly phase of EGC emergency response (January 1 – March 31, 2023)

RCO – Recreation and Conversation Office

RCW – Revised Code of Washington

RTF – Research Task Force

SitReps – ICS Situation Reports

USFWS – United States Fish and Wildlife Service

USGS – United States Geological Survey

WAC – Washington Administrative Code

WDFW – Washington Department of Fish and Wildlife

WSG – Washington Sea Grant

WSU – Washington State University

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Appendix A

WAC 220-640-030 - Prohibited level 1 species.

The following species are classified as prohibited level 1 species:

(1) Molluscs: Family Dreissenidae: Zebra and quagga mussels: *Dreissena polymorpha and Dreissena rostriformis bugensis*.
(2) Crustaceans:
(a) Family Grapsidae: Mitten crabs: All members of the genus *Erochier*.
(b) Family Portunidae: European green crab, *Carcinus maenas*.
(3) Fish:
(a) Family Channidae: China fish, snakeheads: All members of the genus *Channa*.
(b) Family Clarriidae: All members of the walking catfish family.
(c) Family Cyprinidae:
(i) Carp, Bighead, *Hypopthalmichthys nobilis*.
(ii) Carp, Black, *Mylopharyngodon piceus*.
(iii) Carp, Silver, *Hypopthalmichthys molitrix*.
(iv) Carp, Largescale Silver, *Hypopthalmichthys harmandi*.
(d) Family Esocidae: Northern pike, *Esox lucius*.

RCW 77.135.040 - Prohibited and regulated species - Required authorization

(1) Prohibited level 1, level 2, and level 3 species may not be possessed, introduced on or into a water body or property, or trafficked, without department authorization, a permit, or as otherwise provided by rule.

(2) Regulated type A, type B, and type C species may not be introduced on or into a water body or property without department authorization, a permit, or as otherwise provided by rule.

(3) Regulated type B species, when being actively used for commercial purposes, must be readily and clearly identified in writing by taxonomic species name or subspecies name to distinguish the subspecies from another prohibited species or a regulated type A species. Nothing in this section precludes using additional descriptive language or trade names to describe regulated type B species as long as the labeling requirements of this section are met.

RCW 77.135.090 - Emergency measures

(1) If the director finds that there exists an imminent danger of a prohibited level 1 or level 2 species detection that seriously endangers or threatens the environment, economy, human health, or well-being of the state of Washington, the director must ask the governor to order, under RCW 43.06.010(14), emergency measures to prevent or abate the prohibited species. The director's findings must contain an evaluation of the effect of the emergency measures on environmental factors such as fish listed under the endangered species act, economic factors such as public and private access, human health factors such as water quality, or well-being factors such as cultural resources.

(2) If an emergency is declared pursuant to RCW **43.06.010**(14), the director may consult with the invasive species council to advise the governor on emergency measures necessary under RCW **43.06.010**(14) and this section, and make subsequent recommendations to the governor. The invasive species council must involve owners of the affected water body or property, state and local governments, federal agencies, tribes, public health interests, technical service providers, and environmental organizations, as appropriate.

(3) Upon the governor's approval of emergency measures, the director may implement these measures to prevent, contain, control, or eradicate invasive species that are the subject of the emergency order, notwithstanding the provisions of chapter **15.58** or **17.21** RCW or any other statute. These measures, after evaluation of all other alternatives, may include the surface and aerial application of pesticides.

(4) The director must continually evaluate the effects of the emergency measures and report these to the governor at intervals of not less than ten days. The director must immediately advise the governor if the director finds that the emergency no longer exists or if certain emergency measures should be discontinued.

ESSB 5693 (2022 c 297)- Making 2021-2023 fiscal biennium supplemental operating appropriations

Section 308. (Page 552, Line 16)

(67) $2,472,000 of the general fund—state appropriation in fiscal year 2022 and $6,096,000 of the general fund—state appropriation in fiscal year 2023 are provided solely for the department to implement eradication and control measures on European green crabs through coordination and grants with partner organizations. The department must provide quarterly progress reports on the success and challenges of the measures to the appropriate committees of the legislature by December 1, 2022.23

Q1 (March 1 – September 30, 2022) EGC Report

The Q1 report is available at https://wdfw.wa.gov/publications/02372 or via this link: European Green Crab Quarterly Progress Report – Fall 2022

Q1 Catch data clarification

Please note that European green crab (EGC) catch numbers in the Q1 report included EGC caught from January 31 – February 28, 2022. These months fall outside the official duration of Q1 (March 1 – September 30, 2022) but were included to 1) accurately represent EGC removals for 2022 and 2) the submission process for SitRep 1 included co-managers, tribes, and partners submitting catch data from January 1- June 11, 2022, as a single number.

Q2 (October 1 – December 31, 2022) EGC Report

The Q2 report is available at https://wdfw.wa.gov/publications/02414 or via this link: European Green Crab Quarterly Progress Report – Winter 2022

List of Washington European green crab management actions in chronological order for Q3 (January 1 – March 31, 2023) as provided in Situation Reports

Date	EGC Management Action
1/1-31/2023	WDFW continues ongoing development of online data reporting application and "microsite" with Esri contractor. The product will have both internal and external functions for partners and the public, including data submission, operations support, and maps and public awareness resources.
1/9/2023	WDFW contacts 14 conservation districts and provides EGC outreach resources. Outreach staff also connected with other coastal partners, marinas and marine resources committees offering EGC identification and outreach materials.
1/18/2023	MAC Group meeting: MAC Group representation was discussed, and gaps were identified, notably participation from the shellfish industry, and the Department of Fisheries and Oceans Canada was added as a MAC Group member. Budget was discussed, and presentations were given by Justin Bush on the status of the Recreation and Conservation office grants, and by Chris Waldbillig on the coastal management grants. The FY23 State Action Plan was reviewed by the group and finalized.
1/19/2023	WDFW provides an EGC emergency management update at the annual Shellfish Co-Manager Policy meeting.
1/19/2023	WDFW EGC outreach staff attend Storming the Sound in La Connor and distributes materials to attendees including environmental education organizations.
1/20/2023	EGC State Caucus meeting: WDFW meeting with MAC Group state agency representatives to discuss 2023 planning and resource needs.
1/20/2023	EGC Federal Caucus meeting: WDFW meeting with MAC Group federal agency representatives to discuss 2023 planning and resource needs.
1/24/2023	WA Sea Grant hosts the EGC Trapper's Summit at Suquamish Clearwater Casino. The summit focused on co-managers and partners that actively trapped EGC in 2022 and was provided to share observations and learn what other trappers saw in 2022 and are planning for 2023, collaboratively explore the data that we've been individually pulling together, to build on each other's technical knowledge of trapping, and identify questions and priorities that might help inform future trapping efforts.
1/27/2023	WDFW EGC outreach staff attend "Illuminight" in Mount Vernon, an event focused on celebrating the Skagit River and community, and has 100+ EGC conversations.

Date	EGC Management Action
1/30/2023	WDFW meeting with Northwest Straits Commission to discuss 2023 planning and resource needs for North Puget Sound Management Area.
1/31/2023	WDFW deploys updated outreach materials, including a EGC identification graphic, EGC identification outreach sign, plain language talking points, and partner recognition sign.
1/31/2023	WDFW completes January distribution of 70+ EGC reporting signs and 700+ EGC stickers to partner organizations and individuals.
2/1/2023	EGC Co-Manager & Partner Meeting: The Washington Department of Fish and Wildlife (WDFW) hosted the annual Washington EGC Co-Managers and Partners Meeting in Lacey. This was a hybrid event, and participants including tribal staff, shellfish growers, and staff from other agencies and partners were able to join the meeting in person or online via Teams. Presenters from entities participating in the EGC Emergency Response provided updates including: Allen Pleus (WDFW), EGC Incident Commander, provided an update on EGC management in Washington state; Chris Waldbillig (WDFW) and Justin Bush (RCO) updated attendees on the availability of grant funding for EGC emergency response efforts; Dr. Brian Turner (WDFW) presented on current science around EGC and the newly launched EGC Research Task Force; Nicole Burnet (Padilla Bay National Estuarine Research Reserve) presented findings from their EGC larval studies and their plans to develop an identification guide; Diana Dishman (National Oceanic and Atmospheric Administration) gave participants guidance on complying with Endangered Species Act permitting; and Jessica Ostfeld (WDFW) provided an update on EGC outreach and communications, and ways partners and tribes can coordinate to increase community awareness and public reporting of EGC.
2/2/2023	EGC MAC Group meeting: The European Green Crab Multi-Agency Coordination (MAC) Group met virtually on February 2, 2023. A research update was provided by Dr. Brian Turner. A safety update was provided by WDFW Safety Officer Scott Loerts and safety officer contacts for all organizations participating in field work were solicited with the intent of attendance at quarterly safety meetings to achieve emergency measures priority objectives. Two proposals were reviewed by the MAC Group. Proposal 9, "GHCD Green Crab Removal Trapping – Boat Purchase" was submitted by the Grays Harbor Conservation District for $30,000 and recommended for approval by the MAC Group with no dissenting votes. Proposal 10, "Funding to Willapa Grays Harbor Oyster Growers Association" was submitted by the Pacific Conservation District for $90,000 and recommended for approval by the MAC Group with no dissenting votes. Pending WDFW approval of these agreements, of the $1.1 million available through Recreation and Conservation Office (RCO) EGC interagency agreements available in FY 2023, approximately $0 remains unobligated.
2/2-11/2023	Seattle Boat Show: EGC staff provided education and outreach at WDFW's booth, speaking with more than 900 people about EGC, passing out signs, fliers, and other outreach materials. EGC reporting signs were also distributed to industry and attendees.
2/8/20223	Meeting with Senator Jeff Wilson (19th District): Tom McBride (WDFW Legislative Liaison) and Allen Pleus (WDFW EGC IC) met with Senator Jeff Wilson about allocation of EGC funds, specifically to the middle coast of Washington. As follow up to that meeting, DFW provided the overall funding distribution numbers to Senator Wilson.

Date	EGC Management Action
2/9/2023	WDFW Region 4 Co-Manager meeting: Allen Pleus (WDFW EGC IC) provided an update on EGC emergency measures to the Lummi Nation and Nooksack Indian Tribe at their monthly regional meeting with WDFW Region 4 Director Brokes.
2/10/2023	EGC definitions work group meetings: Continuation of meetings between WDFW and WSG to draft consistent definitions for common EGC management terms used in SitReps, reports, data management, and Incident Action Plans. The intent is to have a review draft for dissemination available by March 16.
2/13-14/2023	EGC transboundary meeting: Hosted 2-day Transboundary Research Discussion at WSG joined by WDFW and DFO colleagues. Several partners from WSG, WDFW, WSU and DFO (Science) convened at WSG in Seattle on Feb 13 and 14 to discuss research priorities in support of European green crab management. As transboundary colleagues, DFO, WDFW, and WSG have been working together for several years to reconcile our mutual understanding of local green crab status and ecology. With the increasing scale of management action in Washington, the demand for reliable information to guide management practices is also growing, yet data and research gaps remain. This group identified and strategized on topic areas in need of additional scientific investigation and started the process of prioritizing these research areas to address management-related questions. Areas of discussion for future research included: population control techniques through an IPM lens, population genetics and genetics tools, predicting dispersal and spread, and understanding habitat use and migration. The work started here will be carried forward by the research task force and enables researchers to leverage each other's capacity, reduce duplicative investigations, and focus on the most-needed information to manage green crabs.
2/13-14/2023	Training: WDFW and WSG provided field training for DNR in Grays Harbor.
2/14/2023	EGC State caucus meeting: Review of proposed MAC Group membership requirements by RCO, WDFW, DNR, AGR, ECY, Parks, and EMD. Recommendations were incorporated into a WDFW EGC MAC Group “Composition, Structure & Duties” review draft document for discussion at the next MAC Group meeting.
2/14/2023	EGC Emergency Measures Update: At the request of Senator Wilson at the meeting on February 8th, WDFW provided the “2021-23 Biennium EGC Emergency Measures Budget and Effort Distribution” document.
2/15/2023	Meeting with Representative Joel McEntire (19th District): Incident command staff and a consortium of invasive species researchers and managers met with 19th Legislative District’s Representative Joel McEntire to discuss innovative long-term solutions to European green crab (EGC) management including exploring the feasibility of genetically modifying traits in the invasive species to manage their populations, creating new detection tools, and more. The research consortium and incident command staff included participants from the Washington Recreation and Conservation Office, administrative host of the Washington Invasive Species Council, Washington Department of Fish and Wildlife, University of Washington, Washington Sea Grant, Washington State University Extension, and Woods Hole Oceanographic Institution in Massachusetts. Together the consortium discussed the current knowns and scientific abilities including initial steps toward a long-term goal of integrating new tools into the toolbox. As next steps, the consortium will be developing a scope of work, timeline and budget for initial actions including EGC gene mapping followed by EGC gene annotation. Recognizing EGC is a global invasive species, the consortium is also exploring the

Date	EGC Management Action
	feasibility of a gene□cs summit bringing together the best minds globally to tackle this shared issue.
2/15/2023	EGC MAC Group meeting: The European Green Crab Multi-Agency Coordination (MAC) Group met virtually on February 15, 2023. The purpose and expectations of MAC Group membership were discussed due to an increased interest in membership and identification of gaps in representation. A science management overview was provided by Drs. Brian Turner, Sean McDonald, and Emily Grason. This presentation was a shortened reprisal of the in-depth presentation given at the EGC Co-Managers & Partners hybrid meeting held in Lacey on February 1.
2/16/2023	Willapa-Grays Harbor Estuary Collaborative meeting: The Willapa-Grays Harbor Estuary Collaborative (WGHEC) held a special session dedicated to European green crab on the WA coast during their quarterly winter meeting. Presentations from the Washington Department of Fish and Wildlife (WDFW), the Department of Natural Resources (DNR), the Shoalwater Bay Indian Tribe, Pacific Seafoods, Pacific County Vegetation Management (PCVM), and Washington Sea Grant focused on topics ranging from 2022 trapping and monitoring results, 2023 trapping plans, and management progress to-date. A panel followed, where all presenters were asked questions related to research and management priorities and green crab trends. The goal of the session was to update the core members of the Collaborative on the status of the coastal green crab invasion, to hear from researchers and managers about their work for upcoming year, and to make sure that local perspectives were heard and considered in future planning conversations.
2/17/2023	SitReps: WDFW issues SitRep #14 (January 1 to 31, 2023).
2/21/2023	ICS consultation with state Emergency Management Division: Allen Pleus (EGC Incident Commander), Kirt Hughes (WDF), Justin Bush and Jessica La Belle (RCO) met with Kevin Wickersham of the state Emergency Management Division (EMD) for feedback on implementation of EMD Mission # 22-1085 (EGC emergency measures) Incident Command System (ICS). Mr. Wickersham noted that this is a long-term, complex, and large spatial incident like Highly Pathogenic Avian Influenza (HPAI) emergency situation and that WDFW continues to implement the ICS process in a comprehensive and strategic manner.
2/21/2023	EGC Public Update Webinar: Representatives from the Washington Department of Fish and Wildlife presented a public European green crab webinar on February 21, 2023. This event was hosted by the Washington Invasive Species Council as part of Invasive Species Awareness Week. Allen Pleus, the Incident Commander for the green crab emergency, provided a welcome and overview of the funding and incident command structure. Public Information Officer Chase Gunnell then expounded on this with an in-depth discussion of Washington's European green crab emergency response and communications to date. Future goals and management strategies were also highlighted. Brian Turner then described the current distribution and impacts of the European green crab. The importance of coordination between the state and multiple co-managers and partners was emphasized. EGC Outreach Specialist Jessica Ostfeld covered European green crab identification and ways for the public to get involved. Finally, there was a question-and-answer session with all the speakers. The "European Green Crab Webinar" was approximately 1 hour and 15 minutes with 40 attendees and can be viewed at: https://youtube.com/playlist?list=PLo22nBM4mjeQwuqRUGKE-9P-8q-l3dLZc.

Date	EGC Management Action
2/21/2023	EGC Science Task Force: 1st meeting held.
2/24-3/2/2023	Willapa Bay and Grays Harbor Incident Action Plan (IAP) Workshop Planning: Based on feedback from multiple forums, WDFW meet with RCO and WSG to begin planning two one-day workshops to support local Willapa Bay and Grays Harbor Management Area (MA) co-managers and partners in developing a 2023 EGC Incident Action Plan. The Willapa Bay MA workshop will occur sometime the last two weeks of April and the Grays Harbor MA workshop sometime the first two weeks of May.
2/27/2023	WDFW EGC Seasonal Tech recruitment: WDFW issues recruitment notice for 2023 EGC seasonal technician trapping and logistics support: European Green Crab Technician - Scientific Technician 2 - 8 Positions - Career Seasonal - *02979-23.
2/28-3/2/2023	Transboundary: Chelsey Buffington (WDFW) provided an EGC update to the Invasive Species Council of British Columbia then spent two days trapping EGC with Canada's Coastal Restoration Society.
2/28/2023	Jan/Feb European Green Crab Public Update issued. This edition covered management actions in January and early February, as well as highlights on work by the Jamestown S'Klallam Tribe and WDFW in Sequim and Discovery Bays, and innovative monitoring tactics by WDFW staff near Seabeck in Hood Canal. Consistent with other EGC Public Updates, highlights were published to WDFW's blog and social media, and an email was sent to the EGC Management Updates listserv. The sign-up for the email is available here.
2/28/2023	WDFW deployed updated outreach materials for 2023, including an EGC identification graphic, identification outreach sign, plain language talking points, and partner recognition sign. Signs, outreach materials, and other resources were shared with county conservation districts, tribes, marinas, boat launches and water access areas, shellfish growers, and other partner groups. More than 1,000 stickers and 150 reporting signs were distributed.
2/28/2023	A letter signed by WDFW Director Kelly Susewind on EGC and Prohibited invasive species to shellfish shippers, dealers was distributed and is available online. This letter is part of follow-up to the December incident involving EGC confiscated from a Seattle market.
3/1/2023	EGC MAC Group meeting: The European Green Crab Multi-Agency Coordination (MAC) Group met virtually on March 1, 2023. A document providing the specifics of the MAC Group composition, structure, and duties was finalized and will be distributed to parties interested in MAC Group membership and used as guidance for qualifying participants. In-person workshops to coordinate EGC management activities in the Willapa Bay and Grays Harbor areas were discussed and an agenda overview with workshop goals was provided. Additionally, Incident Commander Allen Pleus provided an overview of the emergency measures budget and effort distribution with comparisons of coastal, Salish Sea, and statewide funding and efforts.
3/1/2023	Second Quarterly (Q2) EGC progress report: In response to the legislative budget proviso directive in ESSB 5693 (2022 c 297), the second in a series of ongoing quarterly progress reports (Q2) was issued. The report summarizes the successes and challenges of ongoing European green crab (EGC) emergency response efforts in Washington state from October 1 to December 31, 2022. In addition, the report puts the work during Q2 in the context of the work completed in Q1 (March 1 to September 30, 2022). It is available at: https://wdfw.wa.gov/publications/02414.

Date	EGC Management Action
3/1/2023	WDFW Staffing: Olympia-based EGC biologist hired and onboarded.
3/9/2023	EGC Definitions Workgroup meeting (WDFW & Washington Sea Grant).
3/9/2023	Updated EGC outreach materials including wallet-sized ID card, rack card, EGC in WA 101 presentation, 2022 detection maps, and more uploaded online at: https://wdfw.wa.gov/species-habitats/invasive/carcinus-maenas#resources
3/10/2023	EGC SitRep #15 issued.
3/10/2023	WDFW trap outfitting emphasis work session. Working toward completing the outfitting (tags, rebar weights, entrance restrictions) for remaining shrimp and Fukui traps that will be available for loan.
3/15/2023	European Green Crab Multi-Agency Coordination (MAC) Group meeting: MAC Group composition was discussed, and there is currently one seat available for a tribal nation, two seats available for support entities, one seat open for Salish Sea aquaculture, and one seat open for coastal aquaculture. The upcoming workshops for the Willapa Bay and Grays Harbor Coordination Areas were discussed, including the prep work for participants to complete. The development of the Fiscal Year 2024 (FY24) European Green Crab Strategic Action Plan was also discussed, and a request was made for Fiscal Year 2023 (FY23) task leads to provide task status updates on a worksheet that will be managed by Jessica La Belle. Theresa Thom of the US Fish & Wildlife Service provided an overview of the planning process for the updates to the national European green crab management plan. Developing a contract for the Washington long-term management plan was an additional topic of discussion.
3/15/2023	Federal letters: As part of WDFW's commitment to seek enhanced federal European green crab (EGC) support, WDFW Director Susewind submitted letters to the Washington State congressional representatives and to NOAA Administrator Richard Spinrad. Both these letters were co-signed by state Senator Kevin Van De Wege, Representative Mike Chapman, four additional state agencies, and seven tribes. Copies of the letters are available at https://wdfw.wa.gov/species-habitats/invasive/carcinus-maenas#conservation.
3/16/2023	Final Definitions Workgroup meeting.
3/17/2023	WDFW meeting with USGS to explore whether there are any synergies between the work of the USGS Early Detection Rapid Response team and the needs of those working in Washington to tackle the growing presence of European Green Crab.
3/17-19/2023	Grays Harbor Conservation District (GHCD) and WDFW tabled at the Ocean Shores Razor Clam Festival to raise awareness about European green crab infestations on the coast. More than 500 people were reached, and outreach materials were distributed to attendees and local partners.

Date	EGC Management Action
3/21/2023	Second meeting of the European green crab Research Task Force (RTF).
3/21-4/2/2023	Ongoing WDFW data hub/app development with Esri.
3/21-4/2/2023	Design, ordering, and acquisition of EGC retractable, standing banner for use in outreach.
3/22/2023	WDFW EGC policy group meeting/status update.
3/27-31/2023	WDFW support to Jamestown S'Klallam Tribe in preparation of Senator Murray and Representative Kilmer visit on April 5.
3/30/2023	EGC MAC Group meeting: Incident Commander (IC) Pleus provided a review of SitRep #16 with localized updates from Shawn Evenson (Lummi), David Beugli (WGHOGA), Dawson Litle (Makah), Alexa Brown (WDNR) and Larissa Pfleeger (Shoalwater Bay). IC Pleus reviewed the new EGC management definitions with a note on the new term "emphasis response" being added to management types for planned large-scale responses. Meagan West (WDFW) provided an update on agency efforts to seek federal funding for EGC response including the letter sent to the Washington Congressional Delegation and the letter sent to NOAA. Roger Fuller (Padilla Bay NERR), Leah Robison and Allie Simpson (NW Straits Commission) provided and update on work being done in North Puget Sound Management Area. IC Pleus and Jessica LaBelle (RCO) provided an update on the 2023 EGC management planning workshops set for Willapa Bay on April 18 and Grays Harbor on May 4.
3/31/2023	National Aquatic Nuisance Species Task Force European green crab management plan meeting.

List of media reporting in chronological order related to Washington European green crab management for Q3 (January 1 – March 31, 2023) as provided in Situation Reports

Date	Outlet	Headline	URL
1/5/2023	The CW11 KSTW	Department of Fish & Wildlife recently confiscated live European Green Crabs sold illegally	https://www.cbsnews.com/seattle/video/department-of-fish-wildlife-recently-confiscated-live-european-green-crabs-sold-illegally/
1/6/2023	The Cordova Times	Prohibited live European green crabs confiscated in Washington	https://www.thecordovatimes.com/2023/01/06/prohibited-live-european-green-crabs-confiscated-in-washington/
1/11/2023	Sequim Gazette	Invasive green crab presence remains on Olympic Peninsula	https://www.sequimgazette.com/news/invasive-green-crab-presence-remains-on-olympic-peninsula/
1/17/2023	Northwest Treaty Tribes	Fight in "brushfire mode" against invasive crab	https://nwtreatytribes.org/fight-in-brushfire-mode-against-invasive-crab/
1/21/2023	The Astorian	Guest Column: All hands on deck to slow spread of European green crab	https://www.dailyastorian.com/opinion/columns/guest-column-all-hands-on-deck-to-slow-spread-of-european-green-crab/article_c0489a3a-978c-11ed-9985-ef025d60fcca.html
1/24/2023	SMEA UW Currents	RAVING MAD CRAB	https://smea.uw.edu/currents/raving-mad-crab/
1/27/2023	The Daily World	Fish and houseguests: Shoalwater Bay Tribe pushes back against green crab	https://www.thedailyworld.com/news/fish-and-houseguests-shoalwater-bay-tribe-pushes-back-against-green-crab/
2/11/2023	The Narwhal	The worst house guests: European green crabs are invading B.C. waters	https://thenarwhal.ca/invasive-european-green-crabs/
2/13/2023	Washington Stormwater	E&O Effort Aims to Mobilize Volunteers Against Invasive Species	https://www.wastormwatercenter.org/eo-effort-aims-to-mobilize-volunteers-against-invasive-species/
2/13/2023	Recreation and Conservation Office	Governor Proclaims the Week of February 20 as Invasive Species Awareness Week	https://rco.wa.gov/invasive-species-awareness-week/?utm_source=rss&utm_medium=rss&utm_campaign=invasive-species-awareness-week

Date	Outlet	Headline	URL
2/14/2023	Fox 11 41	Invasive species awareness week	https://www.fox41yakima.com/invasive-species-awareness-week/
2/21/2023	Undercurrent News	Battle against European green crab infestation underway off Canadian coast	https://www.undercurrentnews.com/2023/02/21/battle-against-european-green-crab-infestion-underway-off-canadian-coast/
2/22/2023	MyNorthwest	WA preparing to protect marine life against invasive green crab	https://mynorthwest.com/3837843/state-prepares-protect-local-marine-life-invasive-green-crab/
2/23/2023	Q13 Fox News	Invasive species pose serious threat to Washington state	https://www.q13fox.com/news/invasive-species-pose-serious-threat-to-washington-state
2/24/2023	Kitsap Daily News	Volunteers sought for invasive green crab monitoring	https://kitsapdailynews.com/news/volunteers-sought-for-invasive-green-crab-monitoring/
2/25/2023	Bollyinside	Washington State is seriously threatened by invasive species	https://www.bollyinside.com/news/latest-science-news/washington-state-is-seriously-threatened-by-invasive-species/
2/28/2023	The Everett Post	The Invasive Species of Washington and What the Community Can do to Help	https://www.everettpost.com/local-news/the-invasive-species-of-washington-and-what-the-community-can-do-to-help
3/6/2023	WSG Blog	WSG receives $1.59 million to boost Puget Sound habitat	https://wsg.washington.edu/wsg-receives-1-59-million-to-boost-puget-sound-habitat/
3/6/2023	Chinook Observer	Green menace: Scientists hopeful tracking study will reveal green crab secrets	https://www.chinookobserver.com/news/green-menace-scientists-hopeful-tracking-study-will-reveal-green-crab-secrets/article_ff658eb6-bc63-11ed-862e-835b5d78920b.html
3/13/2023	WSG Blog	A Code to Crab By	https://wsg.washington.edu/crabbers_code_launch/
3/14/2023	Inergency	Invasive Green Crabs Pose Threat to Washington's Shellfish Industry and Tribal Culture	https://inergency.com/amp/invasive-green-crabs-pose-threat-to-washingtons-shellfish-industry-and-tribal-culture-2/

Date	Outlet	Headline	URL
3/16/2023	Seattle's Child	Exciting adventures on the Guillemot Cove Trail	https://www.seattleschild.com/guillemot-cove-trail/
3/27/2023	Chinook Observer	Willapa Bay crabbers deliver record haul	https://www.chinookobserver.com/news/willapa-bay-crabbers-deliver-record-haul/article_208b4ae2-cccf-11ed-b016-f7116b25e41e.html
3/29/2023	United States Senate Committee on Appropriations	At Hearing with Secretary of the Interior, Senator Murray Highlights How Conservation Keeps Our Economy Strong, Families Safe, and Nation Globally Competitive	https://www.appropriations.senate.gov/news/majority/at-hearing-with-secretary-of-the-interior-senator-murray-highlights-how-conservation-keeps-our-economy-strong-families-safe-and-nation-globally-competitive
3/29/23	The Bulletin	Willapa Bay crabbers deliver record haul	https://www.bendbulletin.com/willapa-bay-crabbers-deliver-record-haul/article_a7ad57f8-8f55-5f98-b794-fc907ee560aa.html

Appendix B – Co-manager and partner addendums

Shoalwater Bay Tribe Natural Resources Department

Shoalwater Bay Indian Tribe Legislative Report

January 1, 2023, through March 31, 2023

Introduction

The Shoalwater Bay Tribe Natural Resources Department (SBDNR) has been trapping European green crab (EGC) steadily since 2020. The Tribe's Natural Resource Department was contacted by Washington Sea Grant in 2020 to pursue a sentinel site for monitoring. EGC were observed in Willapa Bay in the late 1990's, Shoalwater did not hear of rediscovery in 2015 by Washington Department of Fish and Wildlife. SBDNR started trapping during fall of 2020 with little results from sentinel site methods. It wasn't until varied site assessment trapping with shrimp pots and other trap types was explored, that more than 534 EGC were removed during trapping in September of 2020, clearly indicating a larger population. In 2021 5,965 EGC were removed and as a result in January of 2022, Shoalwater Bay Tribal Council declared a State of Emergency centered on the threat to Tribal cultural and natural resources. SBDNR did not have EGC program funding in FY2020-2021, SBDNR and Pacific County Vegetation Management trapped and collaborated on efforts in Willapa Bay. SBDNR had yearend and a full proposal funded through the BIA in FY2022. In 2022 SBDNR removed 42,708 EGC from Tribal aquatic lands and the Reservation. SBDNR and the Tribe did request direct funding through the supplemental legislative request in FY22, and that request was denied. SBDNR currently funds the entirety of EGC work with Bureau of Indian Affairs Invasive Species Program funding.

Current work/ supplies/ staff/ research

Currently SBDNR does not have full-time staff dedicated to only EGC removal and research. SBDNR staff from varying fields (biologists, foresters, equipment operators, agricultural techs) spend a few hours each week setting and retrieving shrimp pots. SBDNR's approach is pragmatic and targeted. SBDNR has deployed camera traps to review trap and bait efficacy, analyze crab interactions, assess site populations. SBDNR also added water quality monitoring to trapping sites. We have implemented mark/ recapture efforts in two trapping sites. SBDNR has also tested traps and methodologies exhaustively to pursue the most efficient setup. SBDNR has used modified oyster bags, collected from beach then added entry tunnels, weight, line and buoy, these can work as well

as some more expensive traps. SBDNR has also used Frabill, minnow, crawdad, fukui, ladiner, folding metal fukui, collapsible crab and shrimp pots, and top entry traps. In Willapa Bay smaller traps needed to be staked as usually they rolled with tides, Fukui traps broke because of weight of crabs, and small entry pots do not seem to work well for SBDNR even to capture young of the year crab. The most effective trap has been a 1" and/or ½" 24x24x10 shrimp pot, as CPUE ratio was exceptional, all size classes were attracted, bait lasts longer, and the traps for the most part can handle Willapa Bay tide cycles.

All SBDNR trapping is currently by land access only. Traps are set and retrieved within 2 hours of low tides. All traps are checked within 24 hours, and no traps are left out permanently. Traps are moved constantly following the population of EGC. Currently SBDNR's program does not support trapping during high tides, Willapa Bay tide cycles are volatile and unsafe for most sites during a high tide. SBDNR's program will acquire an airboat with funding from BIA and has two staff who have completed MOCC, making trapping windows and tides not an issue soon. SBDNR has trapped year-round since 2022. Tribal tidelands have a very high population of EGC that does not seem to be affected by current trapping efforts.

1st quarter FY23 Efforts

From January 1, 2023, through March 31, 2023, SBDNR removed 5,355 EGC. Numbers removed are averaging higher than 2022 for the same period, SBDNR has set 442 more traps for the same period this year than last and removed 2,147 more EGC than 2022 for same period. The numbers of gravid females captured are also 45% greater than 2022. SBDNR is not seeing a reduction in population or presence during the winter, when most other entities stop trapping or have little crab present. SBDNR areas remain inundated with EGC year-round. All SBDNR captured and removed crab have been composted in the Tribe's community garden since 2021.

Challenges/ concerns

Throughout the reporting period SBDNR continues to address challenges and mitigate EGC problems head on. Data sovereignty and Tribal sovereignty is an ongoing and concerning subject. SBDNR has found shrimp pot openings too small for large crab (90mm+), we are having new traps constructed that are modified to mitigate the problem. Pot security and seasonal tides are always an ongoing issue in the area SBDNR traps. Staff time and funding with BIA, currently SBDNR is looking at other opportunities for long term, perpetual funding. SBDNR and the Tribe are looking for answers regarding the impacts to Dungeness crab in the Willapa (season take was exceptionally high, the age class of Dungeness from commercial harvest, connection to EGC population dynamics, larval spread, gravid concentration) and on Willapa ecosystem, eel grass beds, clams, oysters, and other resources important to the Tribe. SBDNR also recognizes that while our efforts are sustained and consistent for our region, the entire bay and other areas need to maintain consistent trapping pressure and be utilizing the best available trapping practices consistently.

Washington Department of Natural Resources

Washington Department of Natural Resources (DNR) – Addendum for the Operational Period of January 1st – March 31st, 2023, under IAA #22-1970 for European Green Crab Emergency Measures.

1) DNR hired an EGC coordinator for the Salish Sea (Puget Sound) Region on March 1st to join our Coastal Region EGC Coordinator hired in October 2022. The DNR EGC Coordinators have been equipped and trained to WDFW EGC management protocols and integrated into the Aquatic Resources Division's Invasive Species and Aquatic Reserves Programs.

2) DNR EGC Coordinators developed a work plan for its managed lands in March. This detailed work plan was shared and reviewed in collaboration with RCO, WDFW, WA Sea Grant and other affected programs and stakeholders. The DNR work plan was then presented for review and comment by the partners involved in the EGC Incidental Command framework through our continued participation within the Multi Agency Coordination (MAC) Group. DNR management actions include development of new monitoring sites in or near Aquatic Reserves, assessment trapping at sensitive habitats such as DNR managed Natural Areas and control trapping throughout the Coastal Region as presented in the work plan. DNR implemented its trapping and assessment efforts detailed in its work plan.
DNR worked with our Coastal Region partners including Pacific County Vegetation Management, the Shoalwater Bay Tribe, and Pacific Seafood on trapping efforts. DNR completed trapping of all our priority sites in the Coastal Region for the first time as of April. Additionally, DNR staff efforts have resulted in 133 EGC captured this operational period within DNR Natural Areas in Grays Harbor and Willapa Bay.

3) DNR is sharing an existing agency boat and an airboat to support EGC management activities for the DNR EGC Coordinators efforts while dedicated resources are secured with IAA funding. DNR has purchased a 24' landing craft to be used primarily in the Puget Sound to monitor EGC on our Natural Area Preserves and Aquatic Reserves. The boat is being outfitted with safety gear and bottom paint and will be ready for use in June. DNR ordered an airboat for EGC assessment and control measures on the coast and is awaiting delivery before outfitting and placing it in operation.

Washington Sea Grant Crab Team

WSG Crab Team - Addendum for the Operational Period of January 1st – March 31st, 2023, under WDFW contract 20-15421

Hiring

WSG Crab Team completed hiring and onboarding of a full-time Program Coordinator - a position vacant on the team since July 2022. The position is embedded in WSG as a Community Science Specialist and Lisa Watkins brings substantial experience to the team in this area. The Program Coordinator for the Crab Team monitoring network will undertake training, recruitment/retention, and coordination of the 68-site monitoring network (including both coastal and inland sites).

Trappers Summit

WSG Crab Team convened ~50 staff from federal and state agencies, and Washington tribes at the second Trapper's Summit in Suquamish on January 24, 2023. WSG hosts this annual meeting of technical staff involved in green crab control trapping from across Washington with the following goals:

- Debrief on data and observations from 2022 trapping season, collecting site-level information of green crab trapping effort and captures to build a shared understanding of the ongoing status and trends of the European green crab invasion in Washington.
- Create pathways, workflows, and relationships that facilitate ongoing data and information sharing and rapid dissemination of best practices across an expanding and distributed landscape of trapping professionals.
- Identify gaps in knowledge, and technical information needs to inform research efforts and resource sharing.
- Provide continuing education on green crab history, biology and research, to advance professional development and scientific expertise among technical staff conducting control trapping. This builds the overall statewide capacity to interpret the invasion and implement efficient management strategies.

This year was the second meeting of this group, building on two virtual meetings held after the 2021 trapping season (1 inland, 1 coastal). The in-person meeting was vital to information sharing and relationship building. Groups in attendance presented their 2022 findings in summary form. In addition, WSG shared a presentation on green crab biology and how to interpret demographic data of crabs (specifically size/age) from captures. Lastly, breakout sessions enabled attendees to share semi-structured discussion space on several topics including:

- Data management best practices
- Synthesizing observations into regional status and trends
- Trapping and population suppression approaches

- Green crab habitat use and migration patterns

Notes from this discussion were shared out with summit attendees to provide a resource for reference.

Monitoring Season Launch
January through March, WSG conducts the annual launch of the monitoring network, to mobilize monitors across all 68 sites statewide in initiating monthly green crab monitoring starting in April. This starts with assessing site monitor needs, recruitment, permitting, planning and executing training events for both new and returning participants. This year, WSG Staff worked to:

- Hold **4** virtual and **6** in person sessions for **72** new monitors. These workshops introduce individual volunteers, and staff from partner groups to background on the green crab invasion, protocols, and species ID.
- Hold **6** continuing education workshops for **69** returning monitors. These sessions include some review of protocols, but largely engage experienced monitors in enriched content. This year, topics included handling ESA-listed species and advanced sculpin identification.
- Deliver a total of **42.5** training hours to new and experienced monitors combined.

Regional and National Management Support
Members of WSG participate in several regional and national efforts related to green crab management planning. During this period, WSG continued to support statewide and coastwide national management efforts through participation of several staff in the Aquatic Nuisance Species Taskforce re-writing of the National European Green Crab Management Plan. Green crab biologists from Crab Team participated in the new WDFW research task force, and WSG hosted colleagues from WDFW, DFO and WSU for a two day research working meeting to start to identify gaps and opportunities for green crab research in support of management efforts. WSG participated in planning meetings for training workshops in Alaska, aimed at increasing scope and efficiency of early detection efforts which is an urgent priority in the region given the first detections in AK in summer 2022.

Trapping consultations and trainings offered
Washington Sea Grant continued to pilot a new "Trapping Program Framework" in conjunction with WDFW, whereby new trappers who are interested in larger trapping efforts (e.g. assessment or removal) work with both parties on a full suite of trainings, designed to help them initiate, plan, and execute their own field efforts. The Trapping Program Framework begins with a consultation phase, where groups meet together with WSG and WDFW to discuss trapping goals and resources. From there, WSG and WDFW work together to deliver the necessary trainings to help them achieve their goals. In this quarter, WSG either led or participated in these types of sessions with several groups across inland and coastal geographies, including:

- Two initial consultations: one each with Hama Hama Oysters and Jorstad Oyster
- Three Site scouting visits: two with DNR (one each in Willapa Bay and Grays Harbor) and one with the Grays Harbor Conservation District
- Delivered a virtual training on how to plan a large scale field effort to 5 DNR staff
- In collaboration with WDFW, delivered a field training to WDFW and DNR technicians at Ocean Shores (5 new technicians, and 4 returning staff)

- Provided field support (1 FTE) to DNR staff for an assessment at the Grays Harbor National Wildlife Refuge

Communications and Outreach Support
With WSG's history of experience and scientific expertise on green crab, program staff support statewide efforts through presentations that interpret and synthesize status and trends of green crab populations and invasion management as the data permit. This information is extremely important to enable managers to track and understand the status of the invasion on a regional scale and understand notable trends or changes. This year, Crab Team provided such presentations at the following events:

- WDFW Annual Statewide Update meeting (2/1/23)
- MAC Group presentation (2/15/23)
- Washington Coastal Estuary Collaborative (2/16/23)

Outreach is an ongoing role WSG plays in engaging and educating members of the public in green crab efforts. During this period, WSG provided outreach presentations in the following venues:

- Coastal Interpretive Center Glimpses Lecture Series (1/19/23)
- Stories in Marine Biology (UW Lecture series) (2/7/23)
- Salish Sea Stewards Training (2/23/23)
- Friday Harbor Labs Seminar Series (3/30/23

Washington State Department of Ecology

Addendum for the Operational Period of January 1st – March 31st, 2023, under IAA contract 22-2007 for European Green Crab Emergency Measures.

The Department of Ecology has two programs that address the European green crab emergency, Padilla Bay National Estuarine Research Reserve (PBNERR) and the Northwest Straits Commission (NWSC). PBNERR manages 11,966 acres including one of the largest eelgrass meadows in the United States. Eelgrass is a habitat favored by European green crabs (EGC) and because of this, PBNERR has prioritized EGC management since 2001 when we began an annual program of early detection monitoring. Planning efforts during the recent quarter (January through March 2023) have focused on testing boat-based trapping, hiring staff and interns for the new trapping season, training, and acquiring critical equipment such as a larger bait freezer. Trapping activities included boat-based trapping with shrimp traps, and in March we began the new season's land-based prospecting using a mix of minnow, Fukui, and shrimp traps. No EGC were captured during the first

quarter of the year. During this quarter, four PBNERR staff and one AmeriCorps member from Washington Service Corps participated in trapping.

EGC captures in Padilla Bay last year increased sharply late in the season and as a result this past winter we began testing boat-based trapping to enable us to trap year-round, improve access to remote sites, trap deeper channels near EGC hot spots, and prospect for EGC in our eelgrass meadow. Our pilot testing of boat-based trapping proves that it can be a valuable new tool in Padilla Bay as EGC numbers increase. However, significant scheduling bottlenecks included a lack of trained boat drivers, competing programmatic needs for our shallow-draft research boat, and too few staff funded to work on EGC control during the winter. As a result we enrolled several staff in a Motorboat Operator Training Course offered by Shannon Point Marine Center, and we developed plans to refurbish an older moth-balled shallow-draft boat and return it to service as an EGC trapping boat in FY24. We have also been adjusting our EGC workplan, as well as staff and budget projections to address the sharp increase in EGC. The strong support from the Legislature for emergency EGC control has been greatly appreciated and critical to preventing EGC from establishing new, local breeding populations. Continued eradication of EGC from Padilla Bay will require ongoing support from funders.

During the recent quarter, both PBNERR and NWSC provided EGC presentations during the Washington Trappers' Summit on Jan 24th, to Skagit County's Salish Sea Stewards on Feb 28th, and to the EGC MAC Group on March 30th.

The NWSC provides training, funding, and support to seven county based Marine Resources Committees and manages regional conservation projects such as local coordination for EGC monitoring and control efforts. Since 2020, NWSC has coordinated local EGC trapping efforts in Drayton Harbor (Whatcom County) and expanded its geographic scope in 2022, to include trapping and local coordination across both Whatcom and Skagit Counties. From January through March 2023, NWSC developed training materials, coordinated with local partners and landowners, and updated the Quality Assurance Project Plan (QAPP) in preparation for trapping beginning in April and ongoing outreach activities. During this quarter, NWSC did not conduct any trapping activities. NWSC's outreach and coordination efforts in 2023 have been led by two staff who will be leading trapping efforts with the support of Washington Conservation Corps members, WDFW technicians, a Veterans Conservation Corps intern (currently hiring), volunteers, Salish Sea Conservation Corps members, and other partner staff. Additionally, NWSC has continued collaborating with local and regional partners including PBNERR, WA Sea Grant, WA Department of Fish and Wildlife, Taylor Shellfish, Drayton Harbor Oyster Co., Northwest Straits Foundation, Marine Resources Committees, and many private landowners.

Appendix C – Additional updates

Addendum for the Operational Period of January 1st – March 31st, 2023, under IAA contract 22-1995 for European Green Crab Emergency Measures.

Habitat utilization by European green crab in Willapa Bay as measured with acoustic telemetry: a pilot study.

Study update Oct – March 2023

G Curtis Roegner, National Oceanic and Atmospheric Administration
Zach Forster, Washington Department of Fish and Wildlife
David Beugli, Willapa-Grays Harbor Oyster Growers Association

This pilot study was designed to test effectiveness of intertidal acoustic telemetry and compare the inter- and subtidal habitat use of European green crab (EGC) at Nahcotta in Willapa Bay. We deployed arrays of acoustic receivers (Vemco VR2AR) at intertidal and subtidal locations to establish an acoustically connected network, potentially allowing for fine-scale movements of EGC across the tidal gradient. One site was a bivalve aquaculture venture, the other an eelgrass-oyster-burrowing shrimp complex we recently mapped with imagery from uncrewed aerial vehicles. In addition to our receivers, an existing green sturgeon receiver network spread throughout Willapa Bay could also detect crab t transmitters.

We tagged four groups of 10 EGC with V9-2x-BLU-1 transmitters on 13 October 2022. There was an equal sex ratio; no females had extruded eggs. Treatments were released at high tide at inter- and subtidal locations. We also tagged two groups of 8 Dungeness crab and released them at the subtidal locations.

All receivers were successfully recovered and the data downloaded on 1 March 2023. Preliminary analysis indicates good connectivity between inter- and subtidal receivers, necessary for the position calculations. We detected all 56 tagged crabs and noted differential habitat use between species. Most Dungeness crab departed the main detection area within about a week, and several were located on the Willapa Bay green sturgeon array (mostly down estuary). In contrast, many EGC remained in the study area throughout the monitoring period, with some movement between intertidal sites. The detection data has been sent for analysis, with results expected in ~ 9 weeks.

[Report End]

Washington State Spotted Lanternfly Action Plan

Webinar Agenda

June 5, 2023

1-4:00 p.m. Pacific Daylight Time

1:00 – 1:10:	**Welcome & Introductions**
	Blain Reeves, Chair, Washington Invasive Species Council and *Greg Haubrich, Washington State Department of Agriculture*
1:10 – 1:35:	**Nationwide Approach to Spotted Lanternfly**
	Matthew Travis*, United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection Quarantine*
1:35 – 1:55:	**North Carolina and Spotted Lanternfly: Best Practices and Lessons Learned**
	Joy Goforth, Paul Adams, Amy Michael, *North Carolina Department of Agriculture and Consumer Services*
1:55 – 2:10:	**Q&A for North Carolina Presentation**
2:10 – 2:15:	*Break*
2:15 – 2:45:	**Washington State Action Plan and Request for Feedback**
	Jessica La Belle, *Washington Invasive Species Council*
2:45 – 3:00:	**Tree-of-heaven mapping in Washington**
	Greg Haubrich, *Washington State Department of Agriculture*
3:00 – 3:15:	**California's State Action Plan**
	Kyle Beucke, *California Department of Food and Agriculture*
3:15 – 3:30:	**British Columbia's Approach to Spotted Lanternfly Preparedness**
	Dr. Chandra Moffat, *Agriculture and Agri-Food Canada*
3:30 – 4:00:	**Panel Q&A with Regional Representatives (Washington, California, British Columbia)**

DRAFT # 2

Open for Comment

Spotted Lanternfly
Washington State Action Plan

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Leading Agency Acknowledgements

WASHINGTON STATE
RECREATION AND CONSERVATION OFFICE
Washington Invasive Species Council

WSDA

USDA APHIS

Design by Samara Group LLC

Table of Contents

Purpose Statement

Written by Jessica La Belle, WISC
To be added before the final draft.

Abbreviations and Acronyms

Abbreviation	Definition
CAPS	Cooperative Agriculture Pest Survey Program
CEMP	Comprehensive Emergency Management Plan
ESF	Emergency Support Function
FSH	Forest Service Handbook
ICS	Incident Command System
IPM	Integrated Pest Management
MAC-G	Multiagency Coordination Group
PPA	Plant Protection Act
RCW	Revised Code of Washington
SEOC	State Emergency Operations Center
SLF	Spotted Lanternfly
SCC	Washington State Conservation Commission
SDS	Safety Data Sheet
TOH	Tree-of-Heaven
UCG	Unified Coordination Group
USFS	United States Department of Agriculture Forest Service
USDA APHIS PPQ	U.S. Department of Agriculture Animal and Plant Health Inspection Service Plant Protection and Quarantine
WACD	Washington Association of Conservation Districts

Introduction and Background

Biology and Life Cycle of Spotted Lanternfly

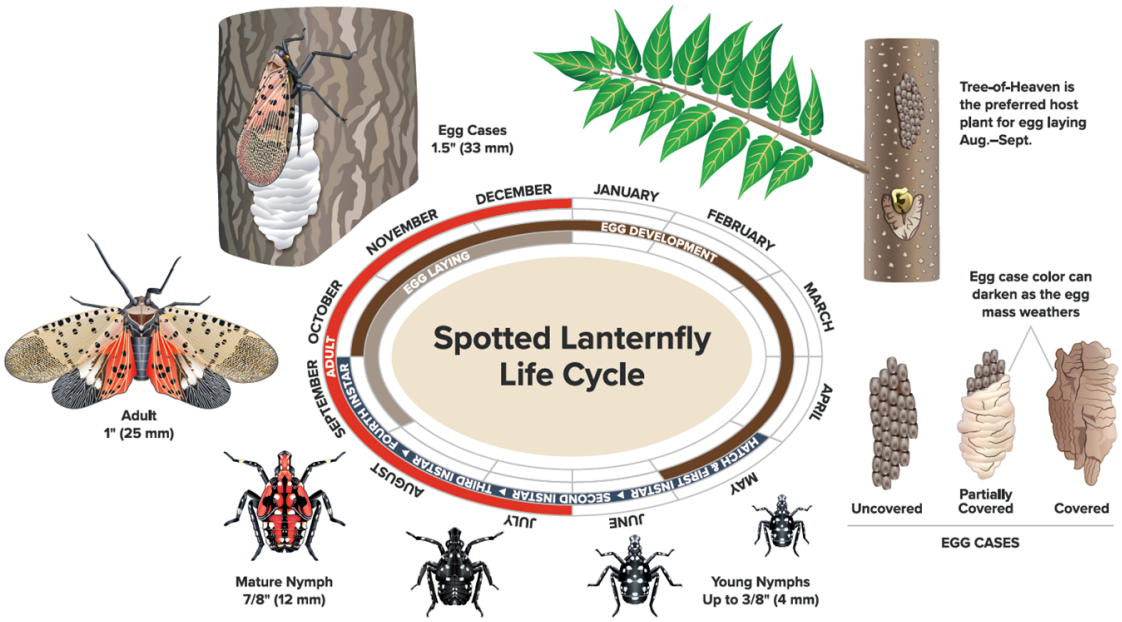
Written by Jessica La Belle, WISC & Fiona Smeaton, Samara Group

Spotted lanternfly, *Lycorma delicatula* (White 1845), is an insect native to the subtropical regions of southeast Asia (China, India, Bangladesh, and Vietnam). This species has been introduced to and is considered highly invasive in South Korea, Japan, and the United States. Spotted lanternfly (SLF) are planthoppers (family Fulgoridae) with piercing/sucking mouthparts that feed on the nutrient rich, sugary sap in the phloem of plants. This is highly detrimental as plants rely on phloem to transport nutrients obtained in the leaves from photosynthesis to other parts of the plant. Both nymph and adult populations will feed on a variety of plants, with over 170 known species of host plants, and that number continues to climb as SLF spreads into new areas and is exposed to different plant species (Wakie, et al 2020). The nymphs will often feed

on softer plant material including new growth, leaves, and herbaceous stems, while the adults feed on the phloem, depriving the plant of nutrients and leaving it susceptible to other stressors. A unique aspect of SLF feeding behavior, and part of why it is a pest of concern, is that the adult SLF excrete honeydew almost continually as they feed. These sugary excretions promote the growth of sooty mold (*Ascomycota* spp), weakening the host plant and often resulting in its demise (PennState Extension 2021). SLF have proven to be generalists and will easily adapt to varying conditions (Francese et al. 2020). SLF feeds on plants of agricultural, environmental, economic, and ethnobotanical significance to great devastation in states where infestations have been detected. It is for these reasons that the detection of SLF in Washington state would be considered a plant health emergency.

SLF has expanded to over 25% of the United States since its initial discovery in Pennsylvania in 2014. In addition to spreading through flight or walking, SLF will often hitchhike onto moving objects and travel greater distances than anticipated. All life stages may be found to travel across the continent through various pathways, and deceased SLF have already been found in Pacific coastal states. Their egg masses in particular can be found on organic or inorganic substances and have high survivability to traveling far distances through many different temperatures.

Figure # Illustration credit: Washington State University Extension & Washington State Department of Agriculture

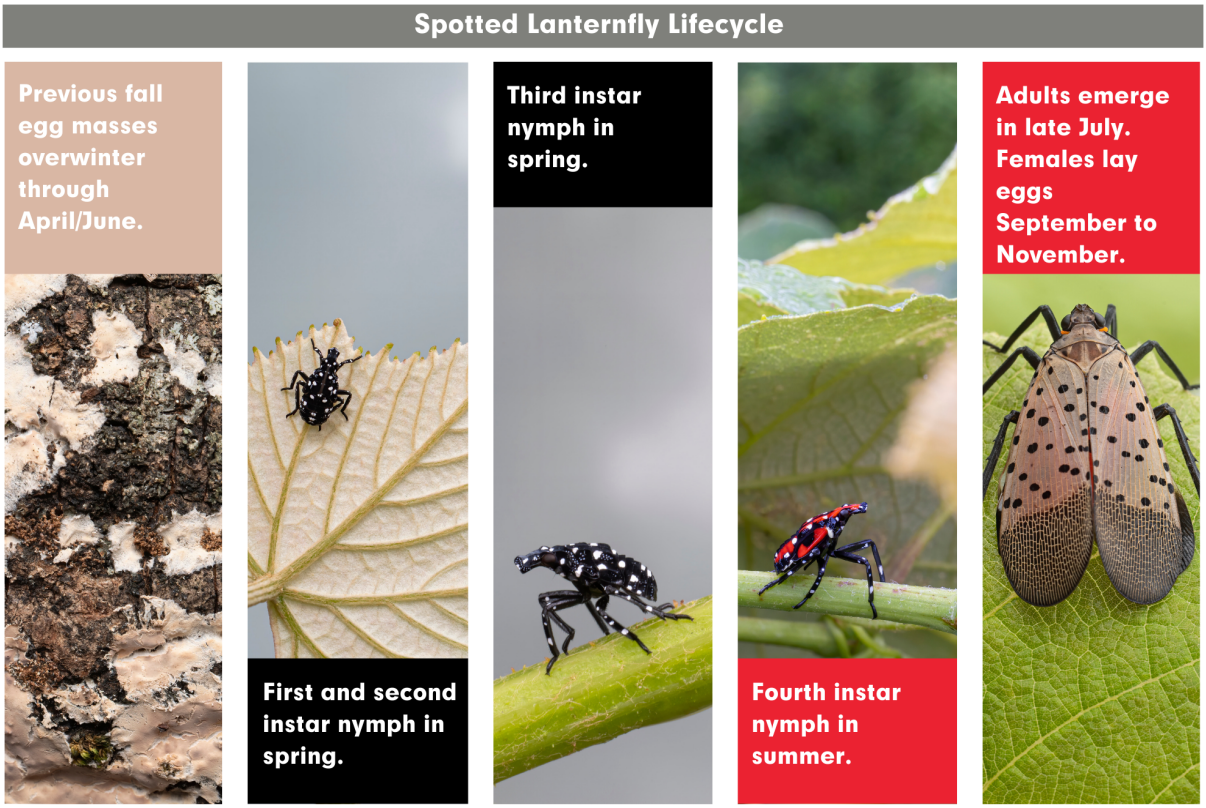


In the eastern United States where SLF has established populations, adult females will typically start to lay eggs from September to November, though they may lay eggs as late as December (Essler et al. 2021). They will search out areas to lay their egg masses on tree bark, with their

preferred host plant being Tree-of-Heaven *Ailanthus altissima* (Mill.) Swingle. However they will often deposit eggs on the smooth or rusty surfaces of man-made objects, such as lawnmowers, bikes, grills, vehicles, and more. Their egg masses resemble a smear of mud as the females will cover individual egg masses with wax that dries and cracks to look like mud. Each covered egg mass is about an inch long and will contain 30 to 50 eggs, though there can be multiple egg masses per surface (USDA APHIS SLF) (PennState Extension 2021).

The SLF first instar nymph will emerge from their egg cases in late spring and will climb up the host trees towards the canopy. If the nymphs are dislodged by wind or other obstacles, they will seek out a new tree and continue to climb up (Francese et al. 2020). Newly hatched nymphs are white for the first few hours after their emergence before their color darkens. The first instar nymphs are about one fifth of an inch (5 mm) long and all black with white spots. The second and third instar nymphs will keep this coloration and grow to about one quarter to one third of an inch long. Nymphs will molt into the fourth instar from July through September, and emerge with a brilliant red coloration on the upper body with white spots, and black on the lower body. The final molt will occur in late summer to early fall when the adult SLF emerges.

Figure # Year-long life cycle of the SLF as seen in the Eastern U.S.



Adult SLF are approximately 25mm (just under one inch) in length. The head and legs are dark brown to black in color, and the antennae are very short and rounded with orange tips. The proboscis, or piercing-sucking mouthpart, is held folded along the underside of the body when not in use and is 7mm in length. The forewings are light gray to light brown with black spots,

while the distinctive hindwings are banded in black, white, and red at the posterior. The tips of the wings have distinct veins (Mermer et al. 2021). When at rest with the wings folded back along the body, the forewings may appear slightly pinkish in hue as the red hindwing coloration can be seen through it. The brightly colored hindwings are the most recognizable feature of the SLF, but may only be visible when the insect is alarmed or about to take flight. The abdomen is a pale yellow with short black bands. Their leg length is approximately two thirds of an inch (Mermer et al. 2021). Males and females are identical in coloration throughout all life stages; the only visible differences are that adult females have a set of small red valvifers at the end of the abdomen, and when gravid the abdomen may become grossly swollen.

Figure # Photo is by Julie Urban, with the piercing-sucking proboscis outlined.

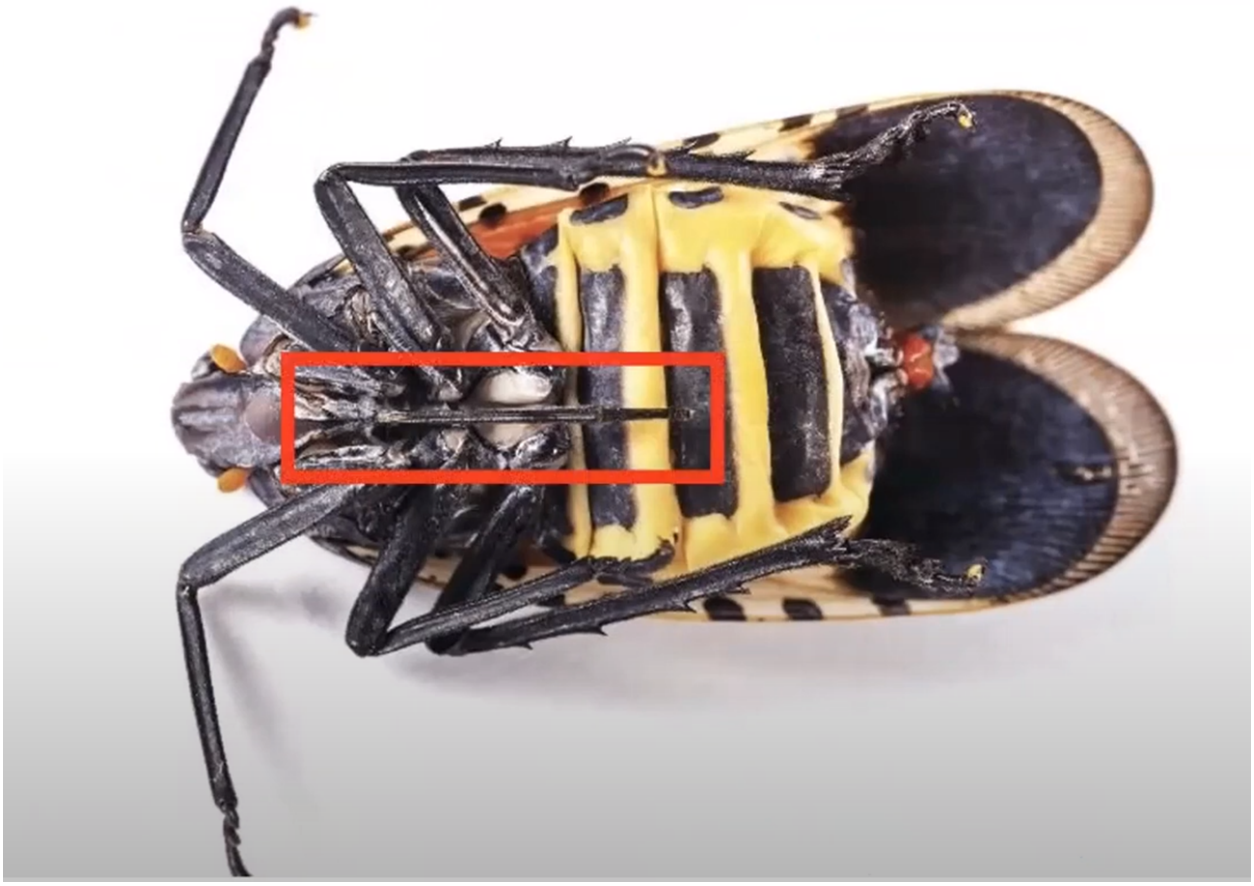


Figure # Adult Spotted Lanternflies are most commonly seen resting, with their wings folded

Host Plants

Written by Stacy Horton, NPCC- WA

Adult Spotted Lanternfly preferred host is the Tree-of-Heaven

The rapid spread of the SLF is facilitated by the prevalence of its preferred host, Tree-of-Heaven (TOH) *Ailanthus altissima* (Mill.) Swingle, as well as its use of many other host plants (Barringer and Ciafré 2020). An SLF host plant is any plant species where the insect is found during any stage of its lifecycle. SLF will subside, feed and lay eggs on host plants. Adult SLF prefers to feed and lay eggs on TOH (USDA). Scientists had speculated that the SLF could not develop or reproduce without access to TOH, and while this assumption was found to be incorrect, fitness of the SLF was reduced, and the number of egg masses laid was dramatically lower for other host plants (Uyi et al. 2021). Environments like highways, railroad corridors, and logging roads usually have abundant TOH and wild grapes, providing for dispersal of the SLF (Barringer and Ciafré 2020). Scientists and others are keeping an eye on the TOH as it is a likely setting for SLF to be detected in Washington state.

Figure #

Tree-of-Heaven in Washington State is an invasive species

In Washington state, the TOH is an invasive fast-growing tree that primarily grows in open areas (WSDA), and can commonly be found along forest edges, woodlands, fence rows, roadsides, railroad embankments, old fields, and urban parks (NWCB). It is considered a class C noxious weed in Washington State (King County). While TOH is more abundant in eastern Washington, it is found throughout the state (WSDA). The Washington State Noxious Control Board is actively working to map the location of the TOH to guide removal efforts (WSDA).

Additional Host Plants

SLF is an invasive pest that feeds on a large variety of plant species, including those in the agricultural, timber, ornamental industries, and backyard plants. (PennState Extension). The potential to impact a wide assortment of ecosystems throughout its potential range and its North American distribution may not be limited by the presence of TOH (Barringer and Ciafré 2020). Through field observations, ongoing research, and recent publications, SLF is reported to feed on at least 56 taxa in North America, increasing the known worldwide feeding plant taxa to 103 (Barringer and Ciafré 2020), and when including plants that SLF will lay egg masses on, this number rises to 172 (CAFE 2022). If allowed to spread in the United States, SLF could damage the country's grape, orchard, and logging industries (USDA).

Hosts reported for this insect include, but are not limited to: American beech (*Fagus grandifolia*), American linden (*Tilia americana*), American sycamore (*Platanus occidentalis*), big-toothed aspen (*Populus grandidentata*), black birch (*Betula lenta*), black cherry (*Prunus serotina*), black gum (*Nyssa sylvatica*), black walnut (*Juglans nigra*), dogwood (*Cornus* spp.), Japanese snowbell (*Styrax japonicus*), maple (*Acer* spp.), oak (*Quercus* spp.), paper birch (*Betula papyrifera*), pignut hickory (*Carya glabra*), sassafras (*Sassafras albidum*), serviceberry (*Amelanchier canadensis*), slippery elm (*Ulmus rubra*), tulip poplar (*Liriodendron tulipifera*), white ash (*Fraxinus americana*), and willow (*Salix* spp.) (CAFE 2022).

Late season adults tend to move away from TOH to grape vines, silver maple, willow, and other hosts and are reported to feed on almost anything as they move from one area to another in search of a preferred food source (Cornell CALS). As an example, populations have been found feeding in corn and soybean fields for short periods of time, and nymphs have been found feeding on basil, cucumber, rose, statice flowers, and even grass though none are a preferred food source (Cornell CALS).

Apples, cherries, grapes, and hops are just a few of the important species in Washington state that SLF are known to attack (King County). As SLF continues to encounter new feeding hosts as it spreads across North America, the full range of host plants used by this species remains unknown (Barringer and Ciafré 2020).

Damage –Feeding Injury to Plants

SLF feeds on plant sap to acquire nutrients (PennState Extension). Adult and immature SLF damage host plants by feeding on sap from stems, leaves, and the trunks of trees (CAFE 2022). Causes of serious damage include oozing sap, wilting, leaf curling, defoliation, and dieback in trees, vines, crops and many other types of plants (PDA 2023). Damage can also occur when large quantities of a plant's sugary sap is consumed to extract nitrogen and amino acids and large quantities of excess sugar-water is expelled, called honeydew (Cornell CALS). On sunny days, honeydew can be seen falling from trees, resembling a light rain (PennState Extension). As the honeydew accumulates, it is often colonized by sooty mold (fungi) (PennState Extension). This sooty mold can further damage the plant by blocking photosynthesis in the leaves of plants coated with the excrement (CT.gov 2021). With dense groupings of SLF, understory plants may die because of the sooty mold buildup on their leaves (PennState Extension). Though no life stage of the SLF feeds directly on fruit, sooty mold growth on the skins of grapes and tree fruit can make crops unmarketable (Cornell CALS). Impacts may also include a loss of yield or reduction in quality, reduction of cold hardiness, and in some cases, plant death (Cornell CALS). Consequences of direct feeding damage by nymphs and adults to the host trees vary greatly by host species, numbers of SLF feeding, and environmental conditions (PennState Extension). SLF likely prefers hosts with higher feeding quality such as hosts with greater available sap (Barringer and Ciafré 2020). Feeding is considered a plant stressor and may contribute to the long-term weakening of established plants and trees. High levels of adult SLF feeding can reduce the photosynthetic activity of some trees. It is possible that after heavy feeding, multiple years of sustained damage, or feeding in particularly dry years, SLF may cause significant damage to ornamental and shade trees (PennState

Extension). Consequences of direct feeding damage by nymphs and adults to the host trees vary greatly by host species, numbers of SLF feeding, season, and environmental conditions (PennState Extension).

Honeydew from the SLF can also attract other insect pests (Cornell CALS). Insects such as wasps, hornets, bees, and ants may be attracted to the sugary waste created by the lanternflies, or sap weeping from open wounds in the host plant. Host plants have been described as giving off a fermented odor when SLF is present (CAFE 2022).

Damage – Crops at risk

Many Washington state crops are at risk from the SLF, including major crops like grapes, hops, apples, stone fruit, and others (WSDA). Nymphs and adults damage plants by sucking sap from stems, trunks, and leaves (NWCB). SLF is a plant stressor that, in combination with other stressors like other insects, diseases, and weather, can cause significant damage to its host (PennState Extension). SLF alone may not kill the plant or tree, and death has only been noted in tree saplings, TOH, and grapevines. Some plants are at more risk than others (e.g., grapevines, maple, black walnut) (PennState Extension). Although the insect hasn't been found in Washington State yet, the SLF is a potentially devastating insect pest known to attack apples, cherries, grapes, hops and many other plants (King County).

Grapes – a crop at particular risk

While the list of SLF host plants is long, one of the greatest agricultural concerns falls on grapes (Cornell CALS). SLF has proven to be a serious pest of grapes (both cultivated and wild). They are swarm feeders and up to 400 adults per vine have been reported. Feeding by a population this high has been shown to weaken the vine, leading to loss of winter hardiness, reduced or no return bloom or crop, and even vine death (Cornell CALS). Feeding damage can deplete reserves and stored starches in affected plants which can be serious for sensitive plants, such as grapes (Cornell CALS). Grape vines that had significant feeding by SLF either produce mainly non-fruiting shoots or die the following year (CAFE 2022). High infestations in Pennsylvania resulted in the death of well-established grape vines (King County).

Different hosts for different life stages of SLF

While the SLF is primarily known to feed on TOH, it has many other host plants, including grape, hop, apple, stone fruit, maple, poplar, walnut, and willow (USDA 2019). The insect changes hosts as it goes through its developmental stages (USDA 2019).

SLF nymphs feed on a wide range of plant species, while adults prefer to feed and lay eggs on TOH (USDA 2019). Nymphs have an especially large host range that includes annual and perennial flowers, herbaceous plants and any new and tender plant growth, whereas adults seem to depend more on certain hosts, primarily woody stems of trees and vines (PennState Extension). First through third instar nymphs feed on young shoots of perennial and annual plants while the hardier fourth instar nymphs and adults feed directly on older tissue (Cornell CALS). A strong preference for TOH develops sometime during the fourth instar through early- to mid-staged adults and is the preferred host (Cornell CALS). Many more eggs are laid, and the egg laying begins sooner, if SLF can feed on TOH (Cornell CALS).

Feeding location varies by developmental stage. Nymphs are often found at the top of trees where new growth of trees and shrubs occur, whereas adults feed more on the trunks and branches in the Fall, and feed all through the trees earlier in their lifecycle (PennState Extension).

Adult SLF tend to stay in a preferred tree to gather and feed, while nymphs may remain on the same plant species for only a day or two (PennState Extension). A tree favored by the adult in previous years has a good chance of attracting the adults in future years, making these specific trees good candidates for removal or as targets for systemic insecticides (PennState Extension). Adults may choose a favored tree even when similar cultivars are found nearby (PennState Extension).

Where To Spot the Spotted Lanternfly

When SLF occurs in a new area, the adults are most likely to be found on TOH (Cornell CALS). Adults and nymphs frequently gather in large numbers on host plants. They are easiest to spot at dusk or at night as they migrate up and down the trunk of the plant. During the day, they tend to cluster near the base of the plant if there is adequate cover or in the canopy, making them more difficult to see. Egg masses can be found on smooth surfaces on the trunks of host plants and on other smooth surfaces, including brick, stone, and dead plants (USDA). The USDA

states that dusk is a great time to inspect your trees or other host plants for signs of this pest, as the insects tend to gather in large groups on the trunks and stems of plants at that time of day (CAFE). SLF may key in on particular host plants and may present seasonal patterns of use. The patterns in host use may change with varying weather conditions, by region, and from other factors as yet undetermined (PennState Extension). Regular monitoring of high-value plants throughout the season is recommended (PennState Extension).

Spotted Lanternfly Pest History and Pathways

Spotted Lanternfly Pest History in United States

Written by Josh Milnes, WSDA & Sven-Erik Spichiger, WSDA

SLF was first detected in the USA on September 22, 2014, when an employee of the Pennsylvania Game Commission reported an unusual insect infesting TOH (Spichiger 2014) in a rural portion of Berks County Pennsylvania. Preliminary surveys conducted by the Pennsylvania Department of Agriculture suggested that the point of introduction was a landscape stone company at the end of the road that imported stone from China. Trees covered with hundreds of SLF adults were encountered at the original detection site, as well as at the landscaping company. Empty egg masses were also found, indicating that the infestation was more than one year old. Because populations were highest at the landscaping company, a delimiting grid centered on the company and extending for five miles was surveyed for presence or absence of SLF in the fall of 2014. Results indicated spread and establishment with spot detections in the outermost grids.

The initial response was to regulate movement and attempt eradication using tree removal and insecticide-treated trap trees. Though effective, these tactics could not be performed on the massive scale needed to contain and eliminate the population. Treated properties showed more than significant reductions in population, but were later re-infested by untreated adjacent properties. Due to the massive reproductive potential, and widespread availability of key host species in the environment, the SLF population in Pennsylvania expanded past a containable event by the beginning of 2016.

Although all life stages can be unknowingly spread by humans, the egg masses pose the greatest risk for long distance spread. SLF lays egg masses on many surfaces like trees, nursery stock, vehicles, train cars, tractor trailers, lawn furniture and many other items that are often transported long distances. These egg masses resemble a splash of mud, and are easy to overlook. In addition, SLF will deposit eggs in protected areas like under loose bark, on Christmas trees, or inside of rusted barrels. Because a key host species, TOH, surrounds rail lines, intermodal facilities, highway rest areas, and airfields, SLF has an easy time depositing egg masses on conveyances that travel long distances.

Adults also pose a serious risk for long distance movement of SLF but make localized containment a real challenge. In areas of heavy infestation, adults will congregate in such high

numbers that it is impossible to not accidentally have an SLF land on items that are outside. Adults will accidentally end up in the beds of pick-up trucks, crates for harvesting apples, plant pots, horse trailers, and any other outdoor items. Even individuals who practiced personal biosecurity in Pennsylvania, unwittingly ended up having adults enter their work vehicles. The reality is that untrained and unaware residents who were not actively practicing biosecurity contributed to localized spread of SLF past areas that were being targeted for treatment.

By 2023, SLF had made use of multiple human assisted pathways to spread beyond the point of introduction to 13 neighboring and remote states. To see a current depiction of SLF distribution in the United States, visit the NYSIPM Interactive Spotted Lanternfly Map (link details in references)

In the time since its first detection, SLF has demonstrated an ability to spread to the West Coast states, with dead adults being found in air cargo in California and nursery equipment in Oregon. A viable egg mass was also detected on military equipment at a California border inspection station. Western states, including Washington, will continue to be at risk for introduction of SLF from multiple pathways.

Spotted Lanternfly is Linked to Tree-of-Heaven

Written by Josh Milnes, WSDA & Sven-Erik Spichiger, WSDA

Tree-of-Heaven is an invasive deciduous tree native to central China and Taiwan that was introduced in North America as an ornamental shade tree, and is also a preferred host of the SLF (Murman *et al.,* 2020). Due to its rapid growth and adaptability, TOH has been able to spread to over 30 states, connecting the East Coast to the West Coast (USDA National Invasive Species Information Center, 2023). Established TOH continually spreads by sending up root suckers that may emerge as far as 50 feet from the parent tree. This noxious weed has been considered a source for SLF dispersal across North America in regions where the insect has been detected. TOH populations create a “biological land bridge” across North America, allowing for potential spread of SLF across the country and into the Pacific Northwest. Furthermore, TOH is known to grow in disturbed areas, including roadsides, fence rows, parking lot edges, and most importantly along railway corridors. Adult SLF have been known to hitchhike on railcars across state lines. Furthermore, railcars that remain stagnant near TOH populations are often targeted by SLF that will lay their egg masses on the railcars, allowing them to be transported and hatch in new locations. Since SLF can be spread by TOH established near rail lines, it is intuitive that TOH near rail lines or other ports of introduction would significantly increase the chances of establishment in the Pacific Northwest.

Hitchhiking Adults

Written by Josh Milnes, WSDA & Sven-Erik Spichiger, WSDA

SLF are plant hoppers and are therefore highly efficient at hitchhiking, they will jump onto objects or other species and remain unnoticed as they are transported beyond their physical distribution range. Hitchhiking is considered the most effective mode of transporting SLF across

vast distances and can explain the rapid expansion of SLF on the East coast. This is why it is imperative to safeguard Washington state from SLF hitchhiking based on existing pathways from infested areas in the Eastern United States into Washington state, such as rail lines, ports, and highways.

Spotted lanternflies have been reported to travel an average of 3 to 4 miles by walking, jumping, and flying (CU New York State Integrated Pest Management 2023). Although they are poor flyers, they more than make it up with their powerful hind legs. All nymphal and adult stages of the SLF are capable of jumping at impressive distances. Due to their mobility, SLF is capable of spreading around on their own if unhindered through transportation (e.g. containers, vehicles, and rail). A concern to Washington is the negative impact SLF could have on the industry through hitchhiking as seen with niche modeling conducted by Wakie *et al.,* 2020, suggesting that SLF would be able to establish in large regions across Washington state.

Figure #

Traveling Egg Masses

Written by Josh Milnes, WSDA & Sven-Erik Spichiger, WSDA

All SLF life stages are capable of hitchhiking, but it is the egg stage that can be spread long distances by people who move infested material or items. It has been recorded that female SLF can deposit their egg masses on a variety of substrates including man-made objects such as rail

cars, vehicles, and trailers, as well as outdoor equipment (patio furniture, RVs). There are cases where egg masses have been reported on mud flaps of semi-trucks transporting goods across state lines on the East coast, or rail cars moving the insect across North America. The spread of SLF across Pennsylvania and into Ohio shows populations establishing along rail depots. This is most likely a direct result of the presence of TOH adjacent to rails at all of these sites.

Impacts of a Spotted Lanternfly Invasion

Economic Risk

Written by Todd Murray, WSU

SLF is a phloem feeding insect and can therefore cause direct injury to plants. Phloem-feeding insects remove nutritious plant liquids by piercing and sucking contents from the vascular tissue using modified and specialized mouthparts (Triplehorn et al. 2005). In addition to depleting nutrients from growing plants, injury from feeding can cause deformation of new vegetative and fruit growth. This injury can reduce yields and increase plant mortality resulting in the need to implement pest management activities for commercial growers and land managers to remain economically viable (Pedigo & Rice 2006).

SLF, like other piercing-sucking insects, can produce significant amounts of honeydew. Honeydew is an insect excretion composed of sugars. In aggregation, large amounts of honeydew can cover the plant stems and foliage. This excretion is a growing substrate for sooty molds (multiple fungal species). Sooty mold mats of mycelium can cover and block plant abilities to photosynthesize, affect plant metabolism, and can reduce overall yields (Alkolaly et al. 2022).

The host range of SLF is still being realized. Barringer & Ciafré, 2020, describe 103 plant species that may be injured by SLF in North America. Grapes, apples, cherries and small fruits are known hosts for SLF and economically important crops that could impact Washington state agriculture. Economic impacts to crops could also be variable pending on the surrounding vegetative structures and compositions. SLF can seek and feed on multiple hosts throughout an individual's development. Variable host combinations can increase survivorship, resulting in larger population loads and ultimately increasing crop injury (Urban & Leach 2023).

Regulated pests can cause significant economic disruption and financial losses for commercial agricultural producers and all product shipment. Losses are due to restrictive quarantines that halt movement of goods and products. When a regulated pest infests a new area, regulators require commercial producers and product distributors to follow quarantine compliance. The presence or discovery of SLF in a new location will cause increased regulations and increased costs to comply with quarantine restrictions and regulations. Added costs can include increased treatments, inspections, and certifications to move products out to markets in a manner to stop the unintentional spread of SLF individuals and populations.

The discovery and presence of SLF in Washington state would cause quarantine restrictions and enforcement of regulations. Additionally, the mobility of SLF adults and nymphs create a high risk through unintentional transportation of individuals. The cryptic nature of egg masses also increases the need for strict inspection criteria and practices in infested regions. In other areas of the country where SLF has been found, disruption of ornamental plants and Christmas trees has been significant. Washington state is the 4th largest producer of Christmas trees in the country with major export markets to Hawaii, California, Mexico, Asia, and key military units worldwide.

Economic Impact to Washington State Wine and Grape Industry

Written by Melissa Hansen, WSWC and Todd Murray, WSU

Figure #

The economic impact of SLF in its native range is mostly documented on yield impacts in Korean grapes and associated with photosynthetic loss due to sooty mold buildup (Leach et al. 2019). Upon its introduction in Pennsylvania, extreme examples of yield loss due to direct feeding were reported up to 90% by individual growers. Economic losses continue into the following season as new buds are revealing lower yield capacity and increased cold damage. Added costs associated with pest management programs have increased by three times (Urban 2020), further reducing the margin of profit for the grower.

Nearly all wine grapes are produced in eastern Washington, but the wineries that purchase the grapes are located throughout the state, from Seattle and Woodinville to Walla Walla. About 90 percent of the wineries are small producers, bottling less than 5,000 cases of wine annually. During harvest, winemakers utilize all modes of transport to bring fruit to their winery, from one bin in a pickup truck to rental trucks or to larger trailers. Quarantine restrictions could put a stranglehold on timely transport, scheduling, and crush operations, which are necessary for wineries to process fruit in a small window of time.

Washington state is #2 in the national production of wine grapes. In 2019, the farm gate value of grapes was $300 million. There are almost 60,000 acres of wine grapes and 400 wine grape growers in Washington state. Washington wines sold $2.5 billion in 2021 and have a direct, indirect, and induced total economic impact of $8.8 billion annually. Washington state is also a leader in Concord grape juice production with an estimated 157,000 tons produced in 2022 and a value of $407 per ton (Ball, T. 2022 personal communication). While the specific economic impact of SLF on Washington wine grapes is dependent on other variables, it is clear that the impact would be significant due to the size of Washington's wine and juicegrape industries.

Economic Impact to Washington Tree Fruit Industry

Written by Melissa Hansen, WSWC and Todd Murray, WSU

Washington state is a world leader in tree fruit production and export. In 2021, the tree fruit industry covered over 232,000 acres in Washington state, much of which are in apple production with some cherry and pear production. Washington state produces 93% of the United State's organic apples and leads the nation in sweet cherry production. About 75% of the nation's cherry production and nation's cherry exports come from the Pacific Northwest. The tree fruit industry is valued over $10 billion. Apples are valued at $3.18 billion after packing, and account for $7.5 billion in total economic impact. The apple industry in Washington State generates $848 million in state and local taxes and is a major employer for the state. Washington State exports over 24% of its fresh apple crop internationally and distributes fruit across the United States. Washington State is also a major producer of stone crops including apricots, peaches, nectarines, prunes and plums. SLF infestations in tree fruit producing regions would have a significant impact on the cost and ability to export fruit. Sustaining this is a significant feature of the state's economy.

Economic Impact to Washington Hops Industry

Written by Melissa Hansen, WSWC and Todd Murray, WSU

Washington state is a major producer of hops, the green, cone-shaped flowers that give bitterness, flavor, and aromas to craft beers. Washington state accounts for almost 30% of the total world hop production. Nearly 43,000 acres of hops were harvested in Washington in 2022 with a farm gate value of $435 million. The Pacific Northwest is the largest growing region of hops in the world; Washington represents about 70 percent of the PNW production.

Environmental Risk

Written by Fiona Smeaton, Samara Group

The impacts of an SLF invasion in Washington state could have significant implications on the environment as well as the economy. Due to its many host species there is the potential for SLF to cause serious damage to native and ornamental trees. Many street trees in cities across Washington will be subject to SLF damage. While it is rare for the insect to actually kill infested trees there is still significant damage done through its feeding behavior and excretion of honeydew. Additionally rural and open natural areas will likely see pockets of infestations that may be harder to track and yet potentially dangerous to native habitats. Continual feeding can greatly weaken host trees especially when combined with other stress factors such as drought or other pests. The falling honeydew can be detrimental to understory plants as it will create sooty mold and limit the plant species ability to photosynthesize.

The greatest environmental danger from SLF will be in its ability to quickly spread and reproduce in new areas, especially agricultural settings. Once SLF arrive in an area they are very difficult to control and will spread through their own means and through human assisted activities. If there is TOH present the success and spread of the SLF will be even greater. As plant-hoppers, SLF are highly effective at moving between patches of host trees. The long term impacts of SLF are still unknown and will vary with different habitats, however, the short term effects on host trees, especially once dense infestations are established, make it clear that there will be significant damage done if efforts are not taken to control the spread of the insect into new environments.

Forest Impacts and Pathways

Written by Ya-Wen Ott, US Forest Service & Karen Ripley, US Forest Service

Although wild plant hosts of SLF in the U.S. are still relatively unknown, several native deciduous trees are found to be frequent hosts including maples (*Acer* spp.), walnuts (*Juglans* spp.), birches (*Betula* spp.), willows (*Salix* spp.), oaks (*Quercus* spp.), and ash trees (*Fraxinus* spp.) (Barringer and Ciafré 2020; Lavely et al. 2022). To our knowledge, SLF nymphs have only been found on one conifer in the U.S., northern white cedar (*Thuja occidentalis* L.), but it is uncertain if the tree is a feeding host (Barringer and Ciafré 2020). SLF nymphs were reported feeding on blueberries (*Ericaceae* spp.) (Barringer and Ciafré 2020) which might affect native shrubs such as Cascade blueberry, oval-leaved blueberry, evergreen huckleberry, small cranberry, and red huckleberry in Washington state. These berries are important food plants for birds and wildlife and cultural foods for Indigenous communities. Direct damage from SLF feeding and mold growth on excreted honeydew can diminish both the availability and quality of these berries.

Deciduous forest trees have rarely been killed by SLF, but occasional young saplings might die in response to long-term heavy feeding (Lavely et al. 2022). Even though SLF might not directly damage forest trees, SLF effects can be cumulative when trees are also stressed by other biotic

or abiotic factors, such as drought and heat stress (Barringer and Ciafré 2020; Lavely et al. 2022; Urban and Leach 2023). Overall, impacts of SLF on forest health should continue to be assessed as conditions change.

Figure #

Forests may also be a source of infestations when near high-risk locations such as vineyards, orchards, and tree nurseries (Urban and Leach 2023). Due to the sheer numbers of individual SLF present, some infestations can be a nuisance and disrupt forest recreation (Urban 2020; D. Mausel, personal communication). Furthermore, SLF egg masses, nymphs and adults can move easily along transportation pathways (Urban 2020), making quarantine, eradication, and slow-the-spread strategies difficult to execute in forests and across dispersed recreation sites.

Urban and Community Impacts

Written by Todd Murray, WSU

Urban and community impacts from SLF will depend directly on the response by regulatory agencies. Eradication programs can be initially costly when host plant material is removed from a delimited range of the infestation. Urban and community impacts would be high given the large host range of this pest due to the amount of host plant material that would need to be removed within the area that needed to be eradicated. The loss of canopy cover from removed street trees will have many detrimental effects on already overburdened communities. Street

trees have many benefits to communities including creating shade, mitigating air and noise pollution, providing habitat and creating visual appeal. Areas with already limited populations of street trees will be even more vulnerable to losing green spaces altogether.

Long-term urban and community impacts will be associated with the management of established populations of SLF. Costs and impacts would include tree and shrub replacement with resistant varieties or non-host species, chemical control of established populations to conserve plant health and avoid large inconvenience caused by honeydew deposition or aesthetic stress by large aggregations of feeding insects.

Cultural Resources

Written by Jessica La Belle, WISC
To be added before the final draft.

Human Health & Safety

Written by Fiona Smeaton, Samara Group

The SLF does not bite or sting humans and so does not cause direct impacts to human health and safety; however, there are indirect economic and environmental impacts. The insects themselves can cause a nuisance to communities as large infestations will swarm and interrupt outdoor activities (Murman et al. 2020). Infested trees will collect excreted honeydew which becomes sooty mold as the SLF adults pierce the woody plant tissue in order to reach the nutrient-rich phloem (PennState Extension, 2021). On warm or sunny days, large amounts of honeydew can fall like rain on outdoor and recreational equipment, as well as people that are in the area, which can significantly limit individuals' ability to access and enjoy outdoor or natural areas.

There are safety concerns from insecticides used to combat SLF and herbicides used to control its preferred invasive plant host, TOH. Pesticides are an important tool required for the control of invasive species; however, overuse or incorrect use can be unsafe for humans. Only pesticides registered by the Environmental Protection Agency (EPA), as well as for use in Washington state should be used to control SLF and TOH. Homemade pesticides can be dangerous to the environment and people alike (PennState Extension 2021). It is important to read all instructions and follow the application rate and protocols listed on the pesticide label. When treating SLF with insecticides it is essential to wear proper protective gear and limit exposure as much as possible. The danger to human health from insecticides depends on two factors, the toxicity of the insecticide and the amount in which the individual is exposed to (PennState Extension 2021). Using the least toxic insecticide that is still effective is the best way to reduce the risk to human health and safety. All insecticides are labeled with their toxicity level on the bottle.

Pesticide drift and runoff can cause chemicals to enter waterways and non-targets which may in turn lead to safety risks to humans. The style of application for pesticides will impact this. Trunk injections are more targeted and have a smaller chance of runoff into the surrounding

environment; however, they are only effective when adults are present and shouldn't be done in drought conditions. On the other hand, mist blowers (not likely to be used in this case), spray treatments or soil drenches are more likely to have pesticide drift, causing impacts to non-targets and humans applying the treatments. Application of pesticides using these strategies near waterways should be limited wherever possible (PennState Extension 2021). There are strict guidelines in place for pesticide applications near surface water and these will need to be evaluated on a case by case basis.

While removal of the SLF preferred host tree, TOH is commonly identified as the best strategy for controlling the insects, care should be taken during this removal process. Full coverage clothing can help to prevent burning or rashes on the skin from coming in contact with the leaves and sap. Those who are allergic to the TOH sap or pollen should take extra care when dealing with this tree. If TOH sap comes in contact with broken skin even more serious reactions can occur including fever, chest pain, shortness of breath and more depending on the individual's exposure and sensitivity to the plant (ISAC 2006).

The Department of Health (DOH) will be a valuable resource going forward for pesticides which may be used against SLF. An SLF page with fact sheets and contacts will be available on the DOH website.

Readiness (Pre-Incident Actions)

Preventative Measures

Written by Molly Darr, WSU & Josh Milnes, WSDA & Todd Murray, WSU

In a recent model, it was predicted that SLF would establish in California by 2033 without preventative management (Jones et al. 2022). While SLF cannot be prevented from coming onto your property, there are steps that can be taken to protect against infestation and damage. When choosing the best defense against SLF damage, recommendations are circumstantial, and specific to the landscape and host species landowners have targeted for protection. While the efficacy of preventative measures are still being investigated, current strategies largely consist of cultural control strategies like egg scraping, tree banding, trapping, protective barriers, and host tree removal (Liu 2019). Additional research on potential behavioral control methods like attractants, repellents, or mating disruption is needed (Urban and Leach 2023).

SLF lay their eggs in rows, which are then covered in a cement-like putty. Eggs can be laid on nearly any flat surface. Mechanical removal of egg masses is possible, and should be attempted in winter or early spring, after adults have died but before eggs hatch. Egg masses can be smashed with a stick, hand, or scraped with a credit card or knife blade. Unfortunately, mechanical removal of egg masses is often impractical as most egg masses are deposited in hidden places, or are out of reach in tree canopies (Liu 2019, Urban and Leach 2023) (Fig. # below). It is also important to look for egg masses on vehicles, camping equipment, trailers, and other flat surfaces that are stored outside before taking them across state lines. The movement

of infested materials is one of the most common ways SLF can be spread to new territories, and many states have ordered quarantine to prevent human assisted spread of SLF (Leach 2021a).

Glue traps, funnel traps, and sticky bands are sometimes employed for local management of SLF. While they may not be effective on a large scale, this may be a useful non-chemical control approach for small parcels of land like backyards. More research is needed to determine effects on population reduction (Leach 2021b). Exclusion netting can be used in agricultural settings to protect fruit trees and grape vines. Studies have shown this method results in up to 99.8% reduction of SLF populations on grape vines (Urban and Leach 2023).

Host tree removal may be effective on small properties or in residential areas. This can prevent the accumulation of honeydew and associated sooty mold, thereby preventing personal property damage (Leach 2021b). TOH is a preferred host plant of SLF, and is also an invasive plant species in the United States (Parra et al. 2017). Removal is recommended to prevent SLF infestations from spreading, though removal of preferred host plants has not yet been evaluated for SLF populations reduction (Leach 2021b). This approach may inadvertently increase pressure on other non-target host plants in the area (Urban and Leach 2023).

Figure #. SLF eggs are often deposited in cryptic locations and can be hard to see. A collection of egg masses are pictured here on the interior of a fence post. Photo: Lawrence Barringer, Pennsylvania Department of Agriculture.

Survey and Detection Protocols

Written by Yolanda Inguanzo, USDA

Approved survey methods for SLF have been developed by the Cooperative Agriculture Pest Survey Program (CAPS). The National CAPS program conducts exotic plant pest surveys through a national network of cooperators and stakeholders. The CAPS program also provides funding to states and local agencies to conduct surveys. There is additional funding through the Plant Protection Act (PPA) programs. There are 2 surveys funded through PPA in Washington state that include SLF as a target, they are *Grape Commodity Survey*, and *Pathway Survey for Pests of Multiple Agricultural Systems.* These surveys have a list of bundled target pests included in them in addition to SLF. Bundled surveys are encouraged in the CAPS and PPA programs to survey for multiple pests that can be found in the same place with the same hosts, as this is a cost-effective way to get more surveys done with limited funding. A requirement for the use of CAPS and PPA funding is that the approved survey method must be used, and one important function of the CAPS program is the development of science-based survey methods. The approved method for SLF is visual survey, there is no approved trap and lure at this time.

Visual survey for feeding damage

SLF is large and its appearance is unlike any other insect. Surveyors should become familiar with all life stages including egg masses. Having real specimens and pictures might be helpful for surveyors to become familiar with what they look like. Signs and symptoms of feeding damage may identify where closer visual surveys should be done, although signs of feeding damage alone are not a positive detection. Signs of feeding damage include: wilting plants, weeping wounds of sap on trunks, honeydew on leaves, sooty mold, understory mold growth under affected foliage, and increased activity of wasps, hornets, bees, and ants feeding on honeydew.

Nymphs (Fig. #) and adults (Fig. #) are typically found in aggregations on the branches and trunk of a host plant. Early instar nymphs are not host specific and can be found on woody and non-woody plants (Dara et al., 2015). As the nymphs mature to fourth instars and adults, the host range narrows significantly and the majority of individuals migrate to the TOH (Dara et al., 2015). The fourth instar nymphs (red nymph) and adults are the most distinct and easily detected life stages. Identifying symptoms of feeding damage may be useful in areas of low density.

Survey for egg masses

Searching for egg masses is an important part of a visual survey. Egg masses are apparent before they hatch and after hatching older egg masses may be found. They can be deposited on any surface such as buildings, vehicles, sheds, and trees. Egg masses have also been found under outdoor items and under loose bark. In Pennsylvania, SLF overwinters in the egg stage, the first egg masses have been found in late September to October. Phenology in the Pacific Northwest may be slightly different but surveys for egg masses can be done through the year. Surveyors should become familiar with the appearance of egg masses at all stages by looking at pictures of newly deposited, and older hatched egg masses. Surveyors should examine all surfaces, examine tree trunks and bark carefully and up close, and lift and look under objects.

Figure # New (right) and hatched (left) egg mass of Lycorma delicatula (Miram Cooperband, USDA APHIS).

Survey for immature life stages

Early instars (1-3) are black with white spots and occur in spring to early summer. Fourth instars are bright red and distinctive. Surveyors should examine all parts of the plant carefully, including stems and undersides of leaves. For large trees, binoculars may be helpful to examine the upper canopy. Negative data may be reported if fourth instar nymphs or adults are not found and no feeding damage symptoms are observed when host material is inspected between July and November.

Figure # Miriam Cooperband, USDA APHIS

Survey for adults

Adults have gray forewings with black spots and reticulated tips. The hindwings have contrasting blocks of red and black with a white stripe partially dividing them.

Figure #



Survey site selection

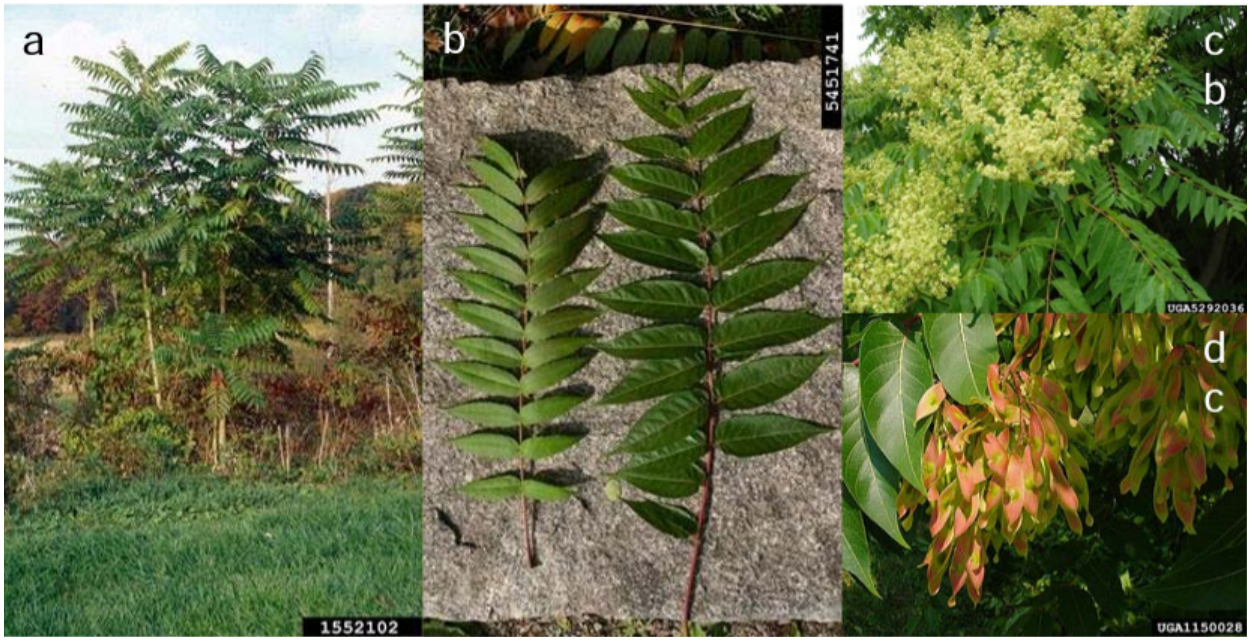
Surveys should be conducted in grape vineyards; tree fruit orchards; and high-risk areas, including wholesale and retail distributors of natural and artificial outdoor products, utility and transportation right-of-ways, construction companies and contractors, landscapers, and loggers and firewood dealers. TOH is a sentinel plant for visual survey and inspection for SLF. Particular attention should be made on TOH found in pathway areas at risk of SLF introduction.

Tree-of-heaven identification

TOH is an exotic plant, invasive in eastern Washington, and while it is less common west of the Cascade range there are many isolated or small clumps of trees throughout western Washington. It is preferentially found in disturbed areas, including roadsides, forest edges, fencerows, and fields. TOH has alternate, compound leaves, and each leaflet has one or more glandular teeth along the lower margin. (see photo) Crushed leaves and flowers have an unmistakable scent of rancid peanut butter. Flowers occur in large terminal clusters and are small and pale yellow to greenish. Flat, twisted, winged fruits each containing a single central seed are produced on female trees in late summer to early fall and may remain on the trees for long periods of time.

Figure #

(a) Tree of heaven thicket (b) leaves (c) flowers (d) seeds(All photos from Bugwood.org (a)Catherine Herms, The Ohio State University (b) Leslie J. Mehrhoff, University of Connecticut
(c) Jane Samanek, Phytosanitary Administration (d) Chuck Bargeron, University of Georgia



Preparedness Funding

Written by Justin Bush, WISC & Greg Haubrich, WSDA

The State of Washington believes that prevention and preparedness is the best approach to invasive species management, requiring far less resources than initial response, long-term management, and restoration. As such, Washington is taking a unified approach to funding activities to prevent SLF and prepare for response. This unified approach has sought and received funding from a variety of organizations including:

- Columbia Gorge Cooperative Weed Management Area
- Washington State Legislature
- Washington State Department of Agriculture
- Washington Department of Natural Resources
- U.S. Department of Agriculture Forest Service (USFS)
- U.S. Department of Agriculture Animal and Plant Health Inspection Service Plant Protection and Quarantine (USDA APHIS PPQ)

Starting in 2018, the Washington State Department of Agriculture began visual surveys for SLF at vineyards statewide using a combination of state and federal funds from USDA APHIS PPQ and USFS. Such surveys continue as a strategy of early detection and rapid response. Cumulatively, more than $550,000 has been directed, in part, to SLF surveys since 2018.

Rapid response preparedness activities to date include a bi-state Oregon and Washington functional exercise and full-scale exercise in 2019, followed up with a 2022 Washington State SLF tabletop exercise focusing on state roles and authorities, facilitated by the Washington Invasive Species Council with funding from the USDA APHIS PPQ. These preparedness activities laid the groundwork for this SLF action plan, funded by USDA APHIS PPQ. Full accounting of costs is undetermined; however, Washington's exercise is estimated to have cost approximately $15,000.

The preparedness strategy of identifying TOH began in 2020, building momentum toward a Washington Invasive Species Council-led statewide TOH census in 2021 that mobilized first detectors and citizen scientists statewide to inventory and report TOH in addition to visually surveying trees for SLF. The census resulted in 375 reports statewide in addition to determining presence in 8 counties where populations were previously undocumented. Additional surveys have been funded by the Washington State Department of Agriculture, passing more than $80,000 in funding to counties and other local cooperators since 2021.

Preparedness funding also includes pilot control projects to assist landowners led by the Forest Youth Success program in Skamania County, funded by the Columbia Gorge Cooperative Weed Management Area including an adjacent pilot control project led by the Underwood Conservation District in White Salmon and Bingen, Washington funded by the Washington Department of Natural Resources and Columbia Gorge Cooperative Weed Management Area. Both pilot projects have a cumulative cost of $38,375.

Additional preparedness needs fall into the following categories:

1. Survey and Inventory
2. Tree-of-Heaven Mapping and Removal
3. Public Education and Outreach

The Washington State Department of Agriculture is actively seeking funding from the State Legislature in addition to seeking funding from the U.S. Department of Agriculture through a Specialty Crop Block Grant, however, full preparedness funding needs have not been identified. Through development of the action plan, Washington state agencies and partners will document resource needs and intend to collaborate and seek funding for full implementation.

Response

Planning and Response Strategy

Figure #

Planning Assumptions

Written by Erin Coyle, WSDA & Sven-Erik Spichiger, WSDA

Washington state recognizes SLF as a plant and forest health threat with potential to severely endanger the agricultural or horticultural industries of the state. A detection of this pest may result in a plant health emergency compromising economic well-being, viability of natural resources, and environmental and public health. Numerous local, state, federal, educational institutions, and industry organizations may play a role in responding to and eradicating SLF as a declared state emergency. A plant or forest health emergency may significantly restrict the intrastate, interstate, and international movement of nursery stock and other plant products. It is assumed multi-agency legal authorities and funding will be required to provide a sufficient level of resources to conduct an effective plant pest mitigation response.

Agencies, organizations, and individuals identified in this planning effort are familiar with the content including response strategies, regulatory authorities, policies, and resource limitations. Entities identified in this plan will coordinate on execution of response actions, including the timely reporting of plant health emergencies.

Response Strategy

Written by Erin Coyle, WSDA & Sven-Erik Spichiger, WSDA

Response to invasive plant pests fall under the jurisdiction of Washington State Department of Agriculture Plant Pest Program. Plant health incidents may overwhelm local or single organization/agency resources and be of such scale that existing agreements may not provide an adequate response. All responses are guided by an Integrated Pest Management (IPM) approach.

Response and control efforts could involve the destruction of affected plants, products, and other materials that cannot be thoroughly cleaned and disinfected. Widespread biosecurity control measures may be implemented. Suspected infected locations and transport vehicles may need to be cleaned and disinfected. Quarantine may be required of areas where there are confirmed or suspect cases. Special operational procedures within these zones may be required. Law enforcement may be required for quarantine enforcement.

Response Authorities and Regulatory Policies

Written by Erin Coyle, WSDA & Sven-Erik Spichiger, WSDA

Washington State Legislature Title 38 Revised Code of Washington (RCW) (RCW 38.52) mandates the use of the standardized Incident Command System (ICS) in all multi-agency (federal, state, and local) or multijurisdictional incidents and emergencies. In participation with local, state, and federal agencies, the use of the standardized ICS system for an expanding SLF response and IPM implementation may be applied with scalability and flexibility.

Washington State Department of Agriculture has several authorities and responsibilities under RCW Title 17 that would apply if SLF is detected in Washington state. Specific and relevant rules are mentioned in this section RCW 17.24:

RCW 17.24.003
Purpose.
The purpose of this chapter is to provide a strong system for the exclusion of plant and bee pests and diseases through regulation of movement and quarantines of infested areas to protect the forest, agricultural, horticultural, floricultural, and apiary industries of the state; plants and shrubs within the state; and the environment of the state from the impact of insect pests, plant pathogens, noxious weeds, and bee pests as well as the public and private costs that result when these infestations become established.

RCW 17.24.041

Power to adopt quarantine measures—Rules.
If determined to be necessary to protect the forest, agricultural, horticultural, floricultural, beekeeping, or environmental interests of this state, the director may declare a quarantine against an area, place, nursery, orchard, vineyard, apiary, or other agricultural establishment, county or counties within the state, or against other states, territories, or foreign countries, or a portion of these areas, in reference to plant pests, or bee pests, or noxious weeds, or genetically engineered plant or plant pest organisms. The director may prohibit the movement of all regulated articles from such quarantined places or areas that are likely to contain such plant pests or noxious weeds or genetically engineered plant, plant pest, or bee pest organisms. The quarantine may be made absolute or rules may be adopted prescribing the conditions under which the regulated articles may be moved into, or sold, or otherwise disposed of in the state.

RCW 17.24.101
Statewide survey and control activity.
If there is reason to believe that a plant or bee pest may adversely impact the forestry, agricultural, horticultural, floricultural, or related industries of the state; or may cause harm to the environment of the state; or such information is needed to facilitate or allow the movement of forestry, agricultural, horticultural, or related products to out-of-state, foreign and domestic markets, the director may conduct, or cause to be conducted, surveys to determine the presence, absence, or distribution of a pest. The director may take such measures as may be required to control or eradicate such pests where such measures are determined to be in the public interest, are technically feasible, and for which funds are appropriated or provided through cooperative agreements.

RCW 17.24.111
Director's cooperation with other agencies.
The director may enter into cooperative arrangements with a person, municipality, county, Washington State University or any of its experiment stations, or other agencies of this state, and with boards, officers, and authorities of other states and the United States, including the United States department of agriculture, for the inspection of bees, plants and plant parts and products and the control or eradication of plant pests, bee pests, or noxious weeds and to carry out other provisions of this chapter.

RCW 17.24.171 - Determination of imminent danger of infestation of plant pests or plant diseases—Emergency measures—Conditions—Procedures.
(1) If the director determines that there exists an imminent danger of an infestation of plant pests or plant diseases that seriously endangers the agricultural or horticultural industries of the state, or that seriously threatens life, health, economic well-being, or the environment, the director shall request the governor to order emergency measures to control the pests or plant diseases under RCW 43.06.010(13). The director's findings shall contain an evaluation of the effect of the emergency measures on public health.
(2) If an emergency is declared pursuant to RCW 43.06.010(13), the director may appoint a committee to advise the governor through the director and to review

emergency measures necessary under the authority of RCW 43.06.010(13) and this section and make subsequent recommendations to the governor. The committee shall include representatives of the agricultural industries, state and local government, public health interests, technical service providers, and environmental organizations.
(3) Upon the order of the governor of the use of emergency measures, the director is authorized to implement the emergency measures to prevent, control, or eradicate plant pests or plant diseases that are the subject of the emergency order. Such measures, after thorough evaluation of all other alternatives, may include the aerial application of pesticides.
(4) Upon the order of the governor of the use of emergency measures, the director is authorized to enter into agreements with individuals, companies, or agencies, to accomplish the prevention, control, or eradication of plant pests or plant diseases, notwithstanding the provisions of chapter 15.58 or 17.21 RCW, or any other statute.
(5) The director shall continually evaluate the emergency measures taken and report to the governor at intervals of not less than ten days. The director shall immediately advise the governor if he or she finds that the emergency no longer exists or if certain emergency measures should be discontinued.

RCW 17.15.020

Implementation of integrated pest management practices.
Each of the following state agencies or institutions or county agencies shall implement integrated pest management practices when carrying out the agency's or institution's duties related to pest control:
(1) The department of agriculture;
(2) The state noxious weed control board;
(3) The department of ecology;
(4) The department of fish and wildlife;
(5) The department of transportation;
(6) The parks and recreation commission;
(7) The department of natural resources;
(8) The department of corrections;
(9) The department of enterprise services;
(10) Each state institution of higher education, for the institution's own building and grounds maintenance;
(11) Each county noxious weed control board; and
(12) Each weed district.

Response if Detection Occurs on Federal Forest Land

Written by Ya-Wen Ott, US Forest Service & Karen Ripley, US Forest Service

The U.S. Forest Service (USFS) will respond with a risk assessment if the detection of SLF occurs on federal forest land. The risk of SLF damaging native tree species is considered relatively low and its impact to forest health in the eastern U.S. has been minor (Lavely et al. 2022; D. Mausel, personal communication). Currently, SLF is recognized as a human nuisance

pest in the USFS Eastern Region (Region 9). Therefore, USFS priorities do not allow SLF survey, eradication, suppression, or new monitoring projects under Forest Service Handbook (FSH) 6509.11g 22:

> **FSH 6509.11g 22.12 Prevention, Suppression, Eradication, and Restoration**
> Use SPFH and SPS4 funds to prevent and reduce unacceptable tree and forest resource losses by suppressing forest insects and diseases eradicating isolated infestations of gypsy moth. Management of the European gypsy moth and invasive plants in tropical forests, and restoration of National Forest System lands damaged by forest insects and diseases, must be in accordance with the USDA Forest Service and APHIS Memorandum of Understanding.
>
> **FSH 6509.11g 22.14 Other Uses**
> State and Private Forestry programs help facilitate:
> Pest Quarantine Enforcement. Use SPFH and SPS4 funds to work with and support the Animal and Plant Health Inspection Service quarantine enforcement activities. Such activities involve forest insects and diseases on National Forest System lands, affecting trees and forests, wood projects, stored wood, and wood-in-use.
>
> **FSH 6509.11g 22.3 Prohibited Uses of Forest Health Management Funds**
> Nuisance Insects. Do not use funds to finance the suppression of insects that are primarily a nuisance to people and do not damage trees, forests, wood products, stored wood, or wood-in-use. Nuisance insects include pests such as: flies, mosquitoes, gnats, yellow jackets, and black flies.

The USFS involvement will mostly focus on TOH and SLF impacts on forest overstory and understory plants.The USFS will continually review the SLF risk to forests, its role in the SLF response, and the need for monitoring, pest alerts, and management guidelines. If the SLF risk to forests changes in the future, and it is no longer recognized merely as a human nuisance pest in forests, then USFS funds could be used on SLF directly.

Response Structure

Written by Erin Coyle, WSDA & Sven-Erik Spichiger, WSDA

Concept of Operations

WSDA is the primary state agency with statutory authority pertaining to plant industry issues and routinely conducts detection surveys for exotic plant pests as well as investigations of reported and/or suspected new detections. When a plant pest is discovered, WSDA coordinates the communication of new plant pest information with the United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection Quarantine (USDA APHIS PPQ), all Primary and Supporting Agencies, as well as other appropriate state and federal agencies, state academic institutions, and industries.

WSDA, acting within its statutory mandate, will respond to such incidents in coordination with federal, state and local agencies, and may coordinate with the State Emergency Operations Center (SEOC) for activation of Emergency Support Function (ESF) #11 as needed. WSDA as the Coordinating Agency will notify all Primary and Support Agencies of their needed support when ESF #11 is activated. Under the activation level set by the SEOC, response and recovery activities will be consistent with the Washington State Comprehensive Emergency Management Plan (CEMP) and Washington Restoration Framework and these activities will be governed by WSDA procedures.

State Emergency Response Organization

As the lead organization assigned to plant health and pest emergencies in Washington state under the Comprehensive Emergency Management Plan (CEMP), WSDA coordinates plant health services and provides direction and control of allied associations and agencies assisting in emergencies and disasters. A comprehensive overview of the organizational structure for state responses to emergencies, coordinated with or supported through the State Emergency Operations Center, is detailed in the Washington State Comprehensive Emergency Management Plan found at: https://mil.wa.gov/plans.

Unified Coordination Group

With a positive detection of SLF in the state of Washington, WSDA and WISC Executive Coordinator may establish a Unified Coordination Group (UCG) among cooperating agencies to coordinate decision making and resource allocation. The UCG may establish incident priorities with input from other local, state, and federal agencies with legal responsibility for the protection of natural resources, agriculture, and plant and forest health. This group will coordinate with the Incident Management Team(s), if any are used, and may include representatives from industry and stakeholder groups as appointed by the core coordinating authorities of this plan.

Membership of this group may consist of representatives of the following agencies:

- Washington State Conservation Commission
- United States Department of Agriculture
- Washington Invasive Species Council
- WA State Noxious Weeds Coordinators Association
- Washington State University
- Washington Noxious Weed Control Board
- United States Forest Service
- Washington State Department of Agriculture
- Other organizations as identified

Incident Management Team

The unified command, consisting of state and federal agencies, may choose to activate an Incident Management Team (IMT). Priorities for this team will be set forth by the Multiagency Coordination Group (MAC-G). This team will consist initially of WISC, WSDA, USFS, USDA,

and SCC. As the incident expands, additional personnel may be added along with additional positions to help manage the incident. Incident Command, during or in advance of an incident, may utilize an Incident Complexity Analysis Tool to assess the complexity, severity, and scope of the response to determine if the incident can be managed effectively with current interagency staff or if staffing resources need to be expanded and a regional IMT or USDA IMT should be requested for support.

Quarantine/Regulation – Enforcement and Compliance

Written by Sven-Erik Spichiger, WSDA & Erin Coyle, WSDA

WSDA is the lead agency for implementation of the regulatory plant pest control response and for maintaining appropriate state quarantines. Response activities are led by WSDA and may be done so in unified command with USDA APHIS PPQ. WSDA reviews and coordinates control activities to ensure compliance with local, state, and federal laws and initiates timely response and recovery measures. If determined to be necessary to protect the forest, agricultural, horticultural, floricultural, beekeeping, or environmental interests of this state, RCW 17.24.041 outlines the authority of WSDA to adopt quarantine measures. If SLF is detected in Washington, the director of WSDA may declare a quarantine against any of the following in reference to this plant pest:

- Area
- Place
- Nursery
- Orchard
- Vineyard
- Apiary
- Other agricultural establishment
- County or counties within the state, or against other states
- Territories
- Foreign countries
- Or a portion of these areas

The director may also prohibit the movement of all regulated articles from such quarantined places or areas that are likely to contain SLF. The quarantine may be made absolute or rules may be adopted prescribing the conditions under which the regulated articles may be moved into, sold, or otherwise disposed of in the state.

Emergency Funding and Long-Term Management of Spotted Lanternfly

Written by Justin Bush, WISC & Greg Haubrich, WSDA

In the State of Washington, new invasive species are considered an emergency and are responded to as such. The economic, environmental, and cultural impacts of SLF are known to be vast and devastating. The general state approach is that of emergency funding, meaning

resources required for initial attack to the confirmed detection of SLF for the purpose of immediate containment, with a goal of eradication. Secondly, if SLF becomes established, the general approach is containment through regulatory processes and enforcement paired with long-term control costs to suppress populations to the lowest level possible.

Upon initial confirmation that SLF is present in Washington, State Department of Agriculture Pest Program staff will brief the department director and make a recommendation on the imminent danger of an infestation of plant pests or plant diseases that seriously endangers the agricultural or horticultural industries of the state, or that seriously threatens life, health, economic well-being, or the environment per Revised Code of Washington (RCW) 17.24.171. The director will review presented information, the staff recommendation, and determine if emergency measures are required through development of findings. Upon determination of imminent danger, the director shall request the governor to order emergency measures to control the pest.

If an emergency is declared, the director will be requested to appoint SLF Preparedness Advisory Group members as a committee to advise the governor through the director and to review emergency measures necessary and make subsequent recommendations to the governor. The committee shall include representatives of the agricultural industries, state and local government, public health interests, technical service providers, and environmental organizations.

Upon the order of the governor of the use of emergency measures, the director is authorized to implement the emergency measures to prevent, control, or eradicate plant pests or plant diseases that are the subject of the emergency order. Such measures, after thorough evaluation of all other alternatives, may include the aerial application of pesticides. The emergency order shall direct the Department of Agriculture to begin implementation of emergency measures, as necessary, to affect the eradication of or to prevent the permanent establishment and expansion of the SLF. The order should also direct the Department of Natural Resources, Washington State Department of Transportation, and the State Parks and Recreation Commission, to identify SLF management as a high priority on their respective state-owned lands and to facilitate implementing emergency measures. Finally, the order should urge the State Legislature to provide additional emergency funding as requested by the WSDA as soon as possible.

Concurrently, the Washington State Department of Agriculture will develop emergency funding requests to the U.S. Department of Agriculture, including the Forest Service, and Animal and Plant Health Inspection Service Plant Protection and Quarantine. The Washington Invasive Species Council will convene a special meeting for the purpose of briefing all member organizations on the situation and collaboratively identify additional funding sources to assist response.

Per state law, the WSDA director shall continually evaluate the emergency measures taken and report to the governor at intervals of not less than ten days. The director shall immediately

advise the governor if he or she finds that the emergency no longer exists or if certain emergency measures should be discontinued.

At such time that the WSDA determines that emergency measures and efforts to eradicate initial populations have failed and should be discontinued, the strategy will transition to containment through regulatory processes and enforcement paired with long-term control costs to suppress populations to the lowest level possible. At that time, WSDA, with assistance from the emergency measures committee and Washington Invasive Species Council, shall develop a 5-Year management plan and budget for submission to the State Legislature for funding. Upon completion of the plan, the WSDA, with assistance from the emergency measures committee and Washington Invasive Species Council, shall hold a statewide forum to review accomplishments, current research, and collect industry and public feedback to inform objectives for an updated 5-Year management plan and budget.

Management

Spotted Lanternfly Treatments

Written by Rian Wojahn, WSDA

Integrated Pest Management (IPM) and best available science will help guide the SLF treatment process. Factors such as SLF life stage, host plant(s), location (i.e. forest, agricultural, industrial, residential, etc.) and environment will need to be considered before SLF treatments transpire. It is highly important to be thoughtful throughout the process.

Treatment options against SLF continue to grow. However, selected treatment(s) must match the proper SLF life stage. Figure # below provides information on treatment and timing once SLF is detected in Washington state. Treatments include egg mass scraping, crushing, high-pressure water spraying, Golden Pest Spray Oil or similar, the contact insecticide Bifenthrin or similar, and systemic insecticide Dinotefuran or similar. An “outside the box” option is vacuuming, which has been used successfully in the northern giant hornet eradication program. It’s important to remember that many decisions must be made and treatments likely won’t start right away. They also may not necessarily take place throughout each window of time. All insecticides must be registered by the Environmental Protection Agency (EPA) and listed for use in Washington state. Applications must be made according to the label and by a certified applicator. Certain products may also be certified for use by the Organic Materials Review Institute https://www.omri.org

Figure #: Treatment timing

Management/Treatment Options	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Scrape, smash or use high-pressure water to remove egg masses												
Treat egg masses with Golden Pest Spray Oil* or similar												
Contact insecticide application(s) (**nymphs and adults**)												
Systemic insectide application(s) (**adults**) tree and soil injections												
Vaccuming (**hatch until adult**)												

*soy bean oil (food grade)

Leach H, Walsh B, Swackhamer E, Korman A. 2021. Spotted lanternfly management guide. Penn State Extension, May 19.

Products and equipment will be staged at a central location. Before leaving for the SLF detection site ensure all required personal protective equipment (PPE) has been loaded. If insecticide treatments will occur, a safety plan, spill kits, and insecticide application recording forms need to be on-site. Furthermore, check with individuals already on-site to confirm additional resources are not needed. All treatments will be done in cooperation with another entity or entities. Areas such as railroad rights-of-way may involve a contractor.

Tree-of-Heaven Control

Written by Jennifer Mendoza, WA NWCA & Anne Schuster, WA NWCB

Tree-of-Heaven Identification

TOH, is a fast-growing, medium-sized tree in the family Simaroubaceae. The trees can grow over 30 meters in height, and can grow one meter a year, in the right conditions (Kowarik and Säumel 2007). The trees spread by root suckers, sprouts from cut trunks, and by seed. Due to their root sprouts, TOH frequently form thickets (Washington State Noxious Weed Control Board 2011). Individuals can live for 30-50 years, and occasionally over 100 years, though thickets can live indefinitely (Burch and Zedaker 2003).

Trees grow in a wide variety of habitats, though are frequently found in forest edges and disturbed sites, such as fence rows, roadsides, along railroads, in abandoned lots, and in urban plantings. TOH is very drought tolerant, and can be shade tolerant, though they prefer open, sunny areas. They can grow in mature second-growth forests, riparian areas, grasslands, and between cracks in concrete (Kowarik and Säumel 2007).

TOH has a deep taproot, along with many lateral roots, which can spread over 30 meters long (United States Forest Service 2014).

The stems are yellow to chestnut brown, with a pith center. Young stems are pubescent, covered in very small, light hairs, though the bark ages to be smooth. The branches have heart-shaped leaf scars, with a round bud shape at the sinus. The trunk and older stems have smooth, gray bark, with shallow diamond-shaped fissures (Washington State Noxious Weed Control Board 2011).

The leaves are made up of 11-27 leaflets. The leaflets grow opposite along the midrib of the leaf, with a single leaflet at the tip. Each leaflet is ovate-lanceolate in shape, with a rounded base, but otherwise has smooth margins. Each leaflet can grow 4-15cm long. The base of each leaflet has 1-3 rounded lobes, the underside of which each has a conspicuous gland. The entire leaf, which can be up to 1 meter in length, grows alternately up the stems (Hitchcock and Cronquist 1973). The foliage smells like peanut-butter, rotten peanut-butter, popcorn, or vomit when lightly crushed (Washington State Noxious Weed Control Board 2011).

Trees are mainly dioecious, with male and female flowers on separate plants. The male and female flowers look similar, though the inflorescences of male flowers are generally larger and have more flowers, while the female flowers can have sterile stamens. The flowers grow in large panicles, 10-30cm wide, at the ends of stems. They typically bloom late May through the end of July. The individual flowers are white to light-green, 6-8mm wide, have 5 petals, and have 5

sepals. Males have 10 stamens, while females may have 5 or 10 sterile stamens. Trees usually begin flowering at 3-5 years old (Kowarik and Säumel 2007).

The flowers develop into oblong samaras, which are 3-5 cm long and 1.15cm. These loosely twisted samaras have 1 centrally placed seed (Kowarik and Säumel 2007). The samaras start green and age to pale tan, yellow, or red-brown, becoming the most obvious around September. Like a maple samara, these seed pods can easily spread on the wind (Washington State Noxious Weed Control Board 2011). The seeds are short-lived in the seed bank, as they can only survive and be viable for around 1 year (Kota et al. 2007). Trees produce the most seed when 12-20 years old (Kowarik and Säumel 2007).

There are a few trees that can be confused with TOH. Smooth sumac (*Rhus glabra*), staghorn sumac (*Rhus typhina*), and black walnut (*Juglans nigra*) all have similarly-shaped leaves with many leaflets. However, all 3 of these species' leaflets have serrated edges, solid stems, and no peanut-butter smell. The sumacs' inflorescences are made of much smaller flowers than TOH. They will form dense cone-shaped bundles of seed, which are usually red to red-brown and have a velvet-like appearance. The sap from sumacs can be very milky in appearance. Walnut trees' bark is very rough, with vaguely rectangular fissures. The catkin inflorescences will form large green walnuts (Burke Herbarium, 2022).

Manual and Mechanical Tree-of-Heaven Control

Small plants can be hand pulled, but all root fragments must be removed. Digging may be required, as small plants can grow large root systems quickly, which are difficult to remove, and will resprout if left in the soil (Kowarik and Säumel 2007).

Cutting or mowing alone will not kill seedlings, root sprouts, saplings, and trees, due to how readily roots and stumps sprout. Cutting and mowing can stimulate more growth. An herbicide treatment is required for successful control of TOH when using any cutting or girdling method (Constán-Nava et al. 2010).

Any stems left in contact with moist soil can resprout roots and shoots from nodes (Washington State Noxious Weed Control Board, 2011), so all plant parts should be disposed of properly. This can include burning, wood chipping, and putting stems and branches in landfill garbage. Small amounts of plant matter can be put in thick trash bags that do not let light through, before putting in the garbage. It should be noted that many municipalities' composting facilities do not get hot enough to kill all plants or seeds.

Biological Tree-of-Heaven Control

Grazing can be used to kill TOH stems and weaken the roots, but is not a long-term solution as it does not kill the roots and the tree can continually resprout (Burch and Zedaker 2003). Grazing can cause illness in livestock if TOH makes up too great a percentage of forage (S. Bird, personal communication December 6, 2022).

Research is being conducted on potential insect and fungal pathogens, though currently there are no approved biological controls for TOH (Washington State Noxious Weed Control Board 2011).

Cultural Tree-of-Heaven Control

It may be possible to shade out and discourage establishment of TOH seedlings by establishing a thick canopy of trees or by growing a dense grass sod (Washington State Noxious Weed Control Board 2011). A thick weed tarp may also be effective.

Fire, either prescribed burns or wildfire, can increase TOH seed establishment due to opening areas to infestation (Guthrie et al. 2016). Following fire, restoration with competitive and desired plants would be needed in areas prone to TOH invasion.

Chemical Tree-of-Heaven Control

Foliar treatment is the method of choice for controlling TOH. Combining glyphosate (3 quarts per acre) with triclopyr 3 lb./gal. (2 quarts per acre) or triclopyr 4 lb./gal. (1.5 quarts per acre) will give the best control results. This is a non-selective treatment that will harm any plant that might be below the TOH, or that the herbicide might spray or drip onto. This treatment is best done in July, until the TOH leaves start to change color in the fall (Pennsylvania State Extension 2020).

Basal bark treatment is effective when done from July until the TOH's leaves start to change color in fall. Triclopyr ester should be used, either ready to use or at 20%, 1:4 in basal oil. The herbicide should be applied directly to the bark of the tree, in a continuous band 30cm-45cm wide, around the entire circumference of the tree, near the base of the tree. This is only effective on stems that are 15 cm and under in diameter. Larger stems and trees should be treated with the hack and squirt method (Pennsylvania State Extension 2020).

The hack and squirt method is also best done from July until the TOH leaves start to change color in the fall. Use glyphosate or triclopyr diluted 1 to 1 with water. Do not completely girdle the tree, as this will not allow the herbicide to reach the roots. Make periodic hacks around the tree. A good guideline is having one hack per inch of diameter. Immediately squirt herbicide into each hack, filling the cut. This method is not very effective on stems less than 1 inch in diameter (Pennsylvania State Extension 2020).

If a tree must be removed, a cut stump treatment can be effective, though is not nearly as successful as the above methods. It is better to use a foliar, basal bark, or hack and squirt treatment and wait for the herbicide to begin to take effect before cutting down a tree (Pennsylvania State Extension). It is better to treat a stump when cutting a TOH down, rather than leave it completely untreated, as root suckers can sprout up more than 30 meters away after a tree is cut down. Triclopyr ester or imazapyr with bark or crop oil (33:67 to 50:50 mixture ratio) should be applied to the surface of the stump within 5 minutes of cutting the tree. Due to the lower efficacy rate of this method, follow up monitoring and maintenance will be needed to control any sprouts up to 30 meters away from the originally treated tree (United States Forest Service 2014).

With any herbicide use, regulations that apply to the specific area and herbicide label directions should be rigorously followed. Only the herbicide(s) appropriate for the habitat, time of day, season, and method of application should be used. Appropriate personal protective equipment should be utilized and herbicide storage and disposal methods followed per the label and/or the safety data sheet (SDS).

Biological Control of Spotted Lanternfly

Written by Molly Darr, WSU

Biological control will likely be an important component of an integrated pest management approach for SLF. Mammals, fish, birds, and insects have all been observed feeding on SLF in the U.S., though population impact has not been determined. It is thought that SLF may sequester toxins from the plant hosts it feeds on, which may limit its palatability to potential predators (Dara et al. 2015). However, several potential biological control agents have been identified, including entomopathogenic fungi and two subspecies of native parasitoids. Conservation or augmentative biological control approaches could be a viable long-term management strategy, but further research is needed to study SLF in its native range to better understand SLF behavior and identify additional natural enemies (Lee et al. 2019).

Parasitoids

Ooencyrtus kuvanae Howard (Hymenoptera: Encyrtidae) has been found to parasitize SLF eggs, though it is not endemic to the U.S. *Ooencyrtus kuvanae* is primarily an egg parasitoid of spongy moth, and more research is needed to determine nontarget effects and potential impact on SLF populations if introduced (Liu and Mottern 2017). *Anastatus orientalis* Yang & Choi (Hymenoptera: Eupelmidae) (Fig. #) and *Dryinus sinicus* Olmi (Hymenoptera: Dryinidae) are both endemic to the native range of SLF and are currently under evaluation in quarantine. *Anastatus orientalis* is an egg parasitoid thought to significantly impact SLF populations in South Korea, and has been successfully reared in a controlled environment. Investigation of the nymphal parasitoid *D. sinicus* is still in the early stage, as rearing efforts have been less successful in quarantine (Urban and Leach 2023).

Entomopathogenic fungi

Baktoa major, Beauveria bassiana, Metarhizium pemphigi and *Ophiocordyceps delicatula* are all native entomopathogenic fungi that have been documented attacking SLF in the U.S (Clifton et al. 2021). *Beauveria bassiana* is already marketed as a commercialized biopesticide and would be a relatively simple addition to an SLF control program (Clifton et al. 2020). Both *B. bassiana* and *B. major* are known to have caused a reduction in SLF populations in targeted areas of SLF's invasive range, but further research is needed to determine area-wide efficacy. *Metarhizium pemphigi* and *O. delicatula* were both discovered in southeastern Pennsylvania, where *B. bassiana* and *B. major* were present, and localized population collapses of SLF were observed. Sampling is ongoing across similar locations to determine prevalence of these four entomopathogens, and if occurrences of SLF population disruption are associated (Clifton et al. 2021).

Figure #: Lateral image of male (A) and female (B) *Anastatus orientalis*. Photo credit: Joshua Milnes, WA State Dept Agriculture - Plant Protection Division.

Restoration and Recovery

Written by Fiona Smeaton, Samara Group

Once SLF has entered a region, complete eradication is unlikely. With great effort, infestations in the eastern United States have been successful only in limiting the spread and population size of SLF. Even with all precautions in place, it is likely that SLF will spread to Washington's urban and rural environments, though exactly when this will happen is unclear. Long-term management of SLF is dependent on a combination of strategies, the most effective of which are to reduce the preferred host plant TOH, continuously monitor the presence of SLF in order

to contain its spread, and apply the appropriate treatments as soon as possible (PennState Extension 2021).

The effects SLF may have on the environment will vary as it reaches new habitats due to the extensive list of known host plants; however, ecosystems with a diversity of native Pacific Northwest plants will be more resistant to SLF invasion than ecosystems already degraded by invasive plants. Restoration and recovery efforts should focus on maintaining and recuperating diverse native vegetation and protecting areas of high native biodiversity from ecosystem stressors.

Continuing management efforts to directly treat SLF, remove TOH, and deploy biocontrol measures will support recovery efforts and help to slow the spread of the invasion to other areas, but must be conducted carefully to protect other ecological resources. Following the specific timing and application strategy during SLF treatments is important for efforts to be successful–for example, the use of insecticides, especially neonicotinoids, can have damaging impacts to pollinators and other beneficial insects and should be used with extreme caution (Elmquist et al 2023). Environmental risks are also present with efforts to reduce TOH using manual and chemical removal. TOH herbicide treatments can have adverse impacts on wildlife if it enters non-target plants or waterways and TOH removal may result in temporary loss of habitat, especially along waterways, as loss of canopy cover can degrade water quality and have impacts on water temperature and flow (USDA APHIS 2021). Native plant species should be planted to replace TOH as soon as treatment of the area is finished and timelines allow in order to restore native biodiversity and ecosystem resilience. Additionally, replanting after TOH removal will make the mitigation process more appealing to private property owners and communities.

Education and Outreach

Outreach Plan

Written by Cassie Cichorz, WSDA & Allison Halpern, WSCC & Maria Marlin, WISC & Karla Salp, WSDA

Communication and Outreach Goals

Through public outreach and education, the Washington Invasive Species Council (WISC), Washington State Department of Agriculture (WSDA), and other entities will communicate the severe threat that SLF poses to Washington's agriculture and natural resources. The need for the public to be aware and report any suspected sightings will be reinforced. If the invasive insect is detected in the state, the participating entities will continue to provide updates on management and eradication efforts.

Communication efforts will focus on:

- Providing information about the threat that SLF poses to multiple agricultural industries throughout the state.
- Educating industry members and encouraging investment in employee training of SLF identification and reporting.
- Alerting high-risk points along the introduction pathway (ports, railroads) and promoting frequent and thorough inspection of shipping containers and goods.
- Ensuring the public is aware of SLF and its preferred host, TOH, as well as how to identify and report it.
- Explaining why early detection and rapid response is necessary.
- Developing educational resources and outreach materials for widespread distribution and use.
- Promoting cooperation and open communication between leading state agencies and stakeholders.
- Harmonizing our messaging across all partners and organizations.
- Finding and collaborating with project supporters, such as state and federal agencies, tribal leadership, city councils, county commissioners, environmental groups, and recreational organizations.
- Responding to misleading or inaccurate information.

- If SLF is detected, agencies will continue to use outreach and education to detect the extent of SLF, prevent the spread, monitor for new populations, and participate in the work needed to remove SLF from Washington state.

- Efforts will focus on encouraging support for eradication as a multi-pronged, multi-year eradication if detected. These efforts are detailed above in the eradication section, but may include

    - Support for SLF trapping or removal

    - Support for SLF treatment

    - Support for Quarantine

Audiences

- Tribes
- Ports/marinas
- Railroads
- Department of Transportation rest stops and ferry terminals
- Moving companies
- Industry: hops, grapes, Christmas trees, fruit trees, hemp
- Farmers
- Nurseries
- Master gardeners
- Private and public landowners
- Landscapers, outdoor workers

- Environmental groups/natural resource organizations
- State and local elected officials
- City/County/State parks and recreation
- County noxious weed boards
- Schools/Summer camps
- Conservation districts
- Hikers/outdoor enthusiasts
- Travelers within the pathway

Primary messages before the spotted lanternfly is detected in Washington

SLF poses a serious threat to Washington's natural resources and agriculture.

Public reporting of this invasive pest is critical to rapid response. The window to eradicate this pest will be extremely small; early detection is therefore crucial. If you see this insect, take a picture. A high-quality photo is necessary for verification. Then immediately report the sighting, with the photo attached, via one of the following options:

- Email **PestProgram@agr.wa.gov**
- On your phone or tablet using the **WA Invasives app**
- **Online** at **https://invasivespecies.wa.gov/**
- Call **800-443-6684** to reach the Washington State Department of Agriculture's Pest Hotline

If you can, save and preserve the specimen. WSDA may ask for it to verify the identification. To preserve a specimen, you may bag and freeze it. Alternatively, place in vial with ethanol (preferred) or isopropyl alcohol. Be sure to also note the date, collector name, and GPS coordinates if possible.

The public can also take an active role in helping to reduce the insect's preferred host, TOH. To better inform management decisions as well as prioritize removal, we need data on the distribution of TOH in Washington. The public can help this effort by surveying their communities for TOH and reporting the findings through the WA Invasives app.

If a TOH is growing on your property, it should be promptly removed. Everyone needs to do their part to reduce suitable habitat and food sources for the SLF. Contact your local noxious weed control board for more information on the best ways to remove this invasive weed.

Primary messages after SLF detected in Washington

The highly invasive spotted lanternfly has been detected in Washington. Take a photo and report suspected sightings immediately to the Washington State Department of Agriculture.

After reporting, kill the insect but preserve using the instructions above in case it is needed by state entomologists.

Secondary messages after SLF detected in Washington

If you are removing TOH, contact the local county noxious weed board for resources.

Eradication efforts are underway to protect our environment and farms from SLF. Here is what you can expect and how to learn more. (Description of physical and chemical methods will be described. Safety discussions will complement any mention of chemical applications.)

Strategy

- Conduct extensive public education and engagement to identify and report SLF sightings.
- Hold continual learning opportunities, both in person and virtual, to extend our reach throughout the state.
- Create graphic-heavy materials that are easy to understand, especially for non-English speakers. The term 'spotted lanternfly' will be translated into Spanish, but the English common name will also be used.
- Raise awareness through targeted social media posts and campaigns.
- Attend industry-wide conferences and conventions to interact with different growers, providing both educational opportunities and material they can use to teach others.
- Ensure local and state parks are updated and equipped with educational material to share with visitors.
- Dispense frequent and transparent communication about the SLF Washington State Action Plan.
- If SLF is detected in Washington, keep key stakeholders updated on the response and control efforts.
- Coordinate messaging internally and externally among staff and stakeholders.
- Inform cooperators/collaborators on how to help deliver information.
- Produce non-electronic forms of communication for cooperators/collaborators to help deliver public information.
- Promptly and professionally reply to concerns from the public or stakeholders.
- Work closely with USDA Animal and Plant Health Inspection Service (APHIS) on timing and messaging.

Communication Methods

- Workshops
- Conferences
- Webinars
- Website pages
- Blog entries
- Internet advertising
- Social media posts and reels

- News releases
- Handouts
- Identification tools and outreach handouts
- Billboards
- Radio Ads
- Public Service Announcements
- Videos
- E-mail distribution list
- E-mail listserv
- Public presentations

Spokespeople for Spotted Lanternfly and Tree-of-Heaven

To-Be-Determined (SLF & TOH), Executive Coordinator, Washington Invasive Species Council
Jessica La Belle (SLF & TOH), Invasive Species Program Specialist and Spotted Lanternfly Preparedness Advisory Group Coordinator, Washington Invasive Species Council
Maria Marlin (SLF & TOH), Community Outreach and Environmental Education Specialist, Washington Invasive Species Council
Sven-Erik Spichiger (SLF), Managing Entomologist, Washington State Department of Agriculture
Joshua Milnes (SLF), Entomologist, Washington State Department of Agriculture
Karla Salp (SLF), Public Engagement Specialist, Washington State Department of Agriculture
Cassie Cichorz (SLF), Public Education and Outreach Specialist, Washington State Department of Agriculture
Alison Halpern (SLF), Scientific Policy Advisor, Washington State Conservation Commission
Wendy Descamp (TOH), Pest Program Specialist, Washington State Department of Agriculture
Anne Schuster (TOH), Education Specialist, Washington State Noxious Weed Control Board

Key Stakeholders

- Washington Invasive Species Council
- Washington State Department of Agriculture
- Washington State Noxious Weed Board
- County weed boards
- State Conservation Commission
- Legislature
- USDA APHIS
- Washington Department of Transportation
- Tribes
- Railroads
- Ports

Industry Events (Outreach Opportunities)

- Washington Hop Growers Annual Meeting (January)
- Spokane Ag Expo (February)
- Wine VIT (February)
- Northwest Garden and Flower Show (February)
- National Grape Cooperative VIT (March)
- Master Gardeners Annual Trainings (October)
- Washington State Grape Society Annual Meeting (October)
- Washington State Tree Fruit Association (early December)
- North West Horticultural Exposition (December)
- Pacific Northwest Vegetable Association Conference and Trade Show (Mid-November)
- Washington Vegetation Management Association Weed Conference (November)
- Washington Small Fruit Conference (usually in November)
- Washington Farm Bureau Annual Meeting (November)
- Washington Association of Counties Annual Meeting (November)

Possible Challenges

- Areas may be urban with multicultural populations and require multiple translations and additional culturally specific context.
- Areas may be more rural and dotted with small towns; its landscape is covered with agriculture. The need for communication will need to be appropriate for neighborhoods and distant neighbors.
- The area may have a high population of monolingual non-English speakers.
- The area may have limited access to internet services or mobile devices.
- The area may have a high population of retirees and seniors who may need different methods of outreach and reporting.
- Growers may be harder to reach and prepare for success if they are out in the field farming.
- Finding appropriate cooperators/collaborators to help share the information.
- Presenting high level information or legal language in a less complex format.

Additional Activities

ACTIVITY	TIMING	ACTIONS/MESSAGING
Tree Check Month	August	This coincides with the adult stage of the SLF life cycle. Check trees for invasive insects such as the SLF.
Reassessment of key messages, talking points, and outreach material	January	Annual review of communication messaging based on SLF distribution and presence/absence in Washington.

Invasive Species Awareness Week	February	Public awareness is key to early detection and rapid response. An update on the SLF, including current national distribution, will be presented.
Spring Home & Garden Shows	January - April	Informational Booths and Presentations
Spring Plant Sales	March - May	Informational Booths and Handouts
State and County Fairs	August - September	Informational Booths and Presentations
RV & Camping Shows	Varies based on location	Informational Booth and Handouts
Sportsman Shows	Varies based on location	Informational Booth and Handouts

Outreach and Education: Conservation Districts, WSU County Extension Offices, Private Landowners and Producers

Written by Alison Halpern, WSCC & Todd Murray, WSU

Summary

The Washington State Conservation Commission (SCC) and Washington State University will help the Washington State Invasive Species Council and the Washington State Department of Agriculture to communicate key messages regarding the spotted lanternfly, an invasive species, to its audiences using a combination of print and digital media.

Target Audiences

- Conservation Districts (45 across WA)
- County and Tribal Offices (40 statewide)
- Washington Association of Conservation Districts (WACD)
- Private landowners / agricultural producers / community members
- General public and stakeholders
- WSU Extension Tribal Invasive Species Outreach Programs
- WSU Master Gardeners

- WSU Master Naturalists
- WSU Small Forest Landowners
- WSU Tree Fruit Extension
- WSU Viticulture and Enology Department
- WSU Pesticide Education and License Recertification

Strategy

SCC will help to develop and disburse educational content on the spotted lanternfly, including educational copy and graphics. Additionally, SCC will distribute this content in editable formats to conservation district employees, who will be encouraged to share this information with their digital audiences. SCC will also share digital materials directly to stakeholders through SCC social media and distribute printed materials when tabling events.

WSU Extension will package educational materials developed and translate resources to relevant extension communities. WSU Extension is ideal for educational outreach and distribution, and has a statewide network of over 7,000 volunteers, highly engaged natural resource professionals, and access to all pest management professionals.

Tactics

- Digital Media – Blog posts, social media posts, and newsletters.
- Print Media – Flyers and handouts for outreach events, and informational brochures for private landowners, agricultural producers, and community members.
- Collaborations – SCC will work with the Communications, Partnership, and Outreach (CPO) group, Better Ground, and the Education and Outreach Work Group to disseminate information on the spotted lanternfly to a broader audience.
- Integration of SLF into curricula used in educating WSU Extension volunteer networks, grower groups, and pest management professionals.

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