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ECOLOGY
State of Washington

Water Quality Financial Assistance 2017–2019 Biennium Outcomes Report

Protecting Washington Waters

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Water Quality Program

Washington State Department of Ecology

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Table of Contents

Page

List of Figures and Tables

Page

Figures

Tables

Acknowledgements

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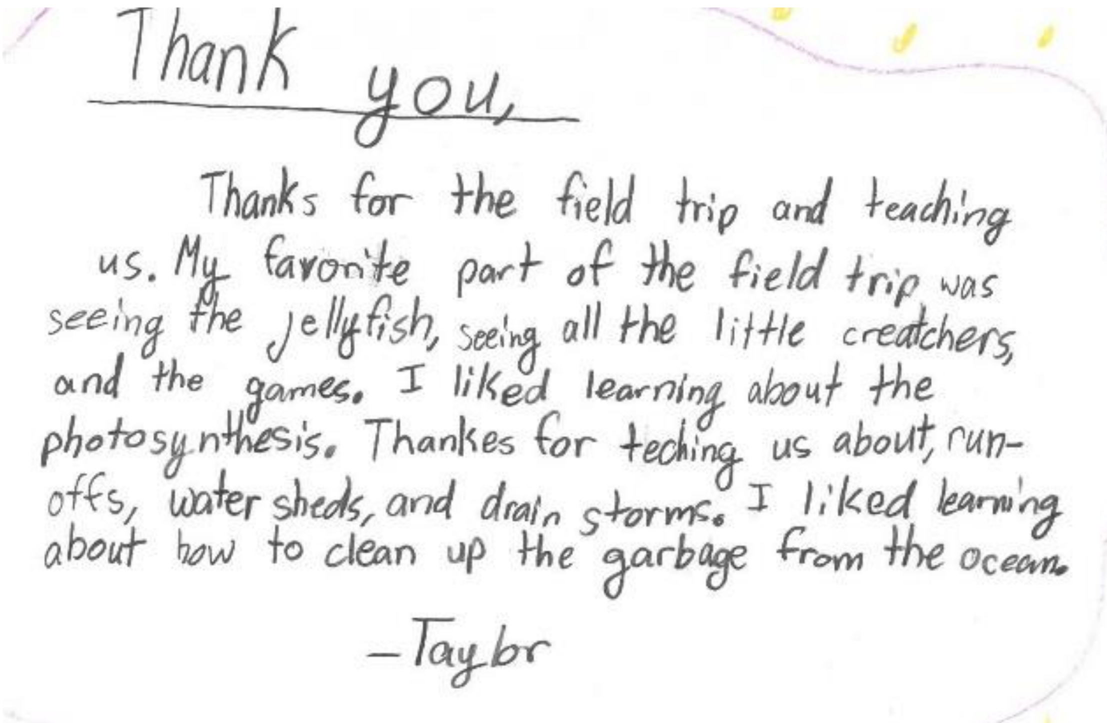
- The Water Quality Financial Assistance recipients and their many project volunteers.



Thank you,

Thanks for the field trip and teaching us. My favorite part of the field trip was seeing the jellyfish, seeing all the little creatchers, and the games. I liked learning about the photosynthesis. Thankes for teching us about run-offs, water sheds, and drain storms. I liked learning about how to clean up the garbage from the ocean.

–Taylor

Figure 1: A thank you letter from a student to the Mountains to Sound Collaborative K-12 Education Pilot Program, a partnership project led by the Stillaguamish Tribe.

Executive Summary

This publication reports on the water quality outcomes achieved by projects completed July 1, 2017 through June 30, 2019. These projects were funded through the State of Washington's Department of Ecology's Water Quality Program. Local jurisdictions, conservation districts, not-for-profits, utility districts, universities, tribes, health jurisdictions, a state agency, and a port carried out these projects.

186 recipients completed 319 projects with over $307 million of funding. 188 projects were awarded funding because they rated and ranked well through the competitive award process. This process is based heavily on the proposed protection and improvement in water quality.

Funded projects included wastewater facilities, stormwater management activities and facilities, nonpoint source activities, onsite septic system repair and replacement, harmful algae control and aquatic invasive plant management.

The Importance of Water Quality

Program Mission

The mission of the Department of Ecology's (Ecology) Water Quality Program is to protect and restore Washington's waters to sustain healthy communities and watersheds. Watersheds are any area of land where runoff collects and drains to a common body of water.

An example of a watershed is the Wenatchee River watershed**.** The Water Resource Inventory Area 45 Riparian Restoration and Community Involvement project worked to improve water quality in the River.

Figure 2: The Wenatchee River. Photo by Heather Simmons.

Washington communities need clean water to drink. Drinking water may come from surface water, like rivers, creeks, or lakes, or underground aquifers, natural water reservoirs buried deep in the ground. Preventing pollution of these water resources, ultimately protects the water that flows through our taps.

An example of a drinking water protection is the Gilligan Creek Watershed Property Protection project. This project shelters a public water supply source for Skagit County and the surrounding watershed.

Figure 3: The drinking water diversion on Gilligan Creek. Photo by Sylvia Graham.

Washington State relies on clean water to support natural resource industries, like fishing and recreation. According to the Pacific Shellfish Institute, Washington's shellfish aquaculture industry has an annual value exceeding $108 million. According to the Recreation and Conservation Office, outdoor recreation expenditures are highest for recreation associated with public waters. Preventing pollution of natural water bodies protects these natural resources industries.

An example of outdoor recreation support is the Strait Water Quality Partnerships project. This project improved water quality at Pillar Point Park, a recreation area on the Strait of Juan de Fuca.

Figure 4: Pillar Point Park. Photo by Clallam County.

Clean water sustains Washington's wildlife. Sensitive species, like salmon, rely on cool, unpolluted water to thrive. Many animals, including the Puget Sound's endangered southern resident orcas, rely on salmon as a main food source. Maintaining good water quality promotes healthy food webs, and in turn, healthy ecosystems.

An example of wildlife habitat enhancement is the East Fork Lewis River Side Channel Restoration project. This project implemented large woody debris and native vegetation to provide habitat for endangered fish, like salmon.

Figure 5: The East Fork Lewis River. Photo by Leanne Whitesell.

Pollution Sources

Sources of water pollution, like human and animal waste, bacteria, viruses, and toxic chemicals, threaten our public health, economy, and environment.

Wastewater, or sewage, is produced from kitchens, bathrooms, commercial and industrial operations, and everyday activities. Wastewater is collected from homes, businesses, and industries, and carried to treatment plants for safe disposal.

An example of potential wastewater pollution is the Town of Carbonado’s 100 year old sewer system. The town completed a project to design a new sewer system to prevent leaks and protect groundwater and public health.

Figure 6: A substandard sewer manhole. Photo by Town of Carbonado.

Another source of water pollution is stormwater runoff. Stormwater is rain and snowmelt that does not soak into the ground. Developed areas have the potential to provide many sources of stormwater pollution, including car leaks, lawn care products, road-side litter, and runoff from rooftops.

An example of stormwater pollutants are chipping thermoplastic pavement markers, a source of phthalates, which can enter a stormwater system through rain runoff. The Phthalates Research for Source Control project identified sources of phthalates, industrial chemicals, which can harm humans and wildlife.

Figure 7: Chipping pavement markers. Photo by Futurewise.

Nonpoint source pollution is found in stormwater, and comes from many diffuse sources and can impact surface and ground water. Stormwater runoff carries this pollution across the landscape. Pollution sources include farmlands, logging activities, yards, construction sites, roads, and on-site sewage systems.

Livestock can be a source of nonpoint pollution. Animal waste can enter a waterbody through storm runoff and the animals can erode a waterbody's banks and channels by using it as a drinking source. The Cowiche Creek Water Quality Enhancement project addressed livestock practices that impact water quality.

Figure 8: Grazing cattle. Photo by Heather Simmons.

Water Quality Financial Assistance

Financial assistance, provided by the Water Quality Program, provides grants and loans directly to high-priority projects. Public bodies and not-for-profit entities can apply for funding for projects that protect water quality or clean up water quality problems. Many projects address issues related to water quality impairments, Total Maximum Daily Loads, the Shoreline Protection Act, and National Pollutant Discharge Elimination System (NPDES) municipal permits. These projects support cleaner water and compliance with regulations.

As water moves across the landscape, natural ecosystems remove pollutants. Ecosystems, like forests, wetlands, and floodplains, capture and filter pollutants. As land is developed for human activities, we lose the water quality benefits of these natural systems. To mitigate this loss, Ecology provides funding for infrastructure to mimic these functions, referred to as treatment. An example of a stormwater treatment facility is the Silverdale Way Regional Stormwater Facility. This facility will slow and clean rain runoff through natural soil and plant processes.

Figure 9: The Silverdale Way Regional Stormwater Facility. Photo by Melissa Snoeberger.

Combined funding program

Public bodies and not-for-profit entities can apply to four funding programs in one competitive application, through a predictable annual funding cycle. The four programs are:

- The Clean Water State Revolving Fund (CWSRF), which provides low-interest loans and possible principle forgiveness to fund all project types.
- The Centennial Clean Water Program (Centennial), which provides grants for nonpoint pollution control and wastewater infrastructure in small communities.
- The Stormwater Financial Assistance Program (SFAP), which provides grants to fund facilities and activities that reduce pollution impacts from existing urban infrastructure.
- The Clean Water Act Section 319 (Section 319), which provides grants to fund activities that provide nonpoint source pollution control.

The annual cycle provides a predictable source of financial assistance for entities that struggle with unstable funding sources. The result is that applicants spend less time searching and applying for financial assistance, and more time planning and implementing high-quality projects.

Infrastructure projects can be very expensive. This can be especially challenging for small, lower income communities. Funds are set aside specifically to meet these needs for hardship-eligible facility projects. In these cases, a funding package may include a combination of forgivable-principal (FP) loans, Centennial grants, reduced interest rates, or reduced match requirements.

An example of a hardship-eligible project is the Sunnyside Sanitary Sewer Improvement project. This project was funded through a low interest, partial principle forgiveness, loan and Centennial grant. This funding addressed the financial hardship created by the cost of needed upgrades to the sewer system.

Figure 10: Placing a sewer pipe in Sunnyside Avenue. Photo by City of Sequim Public Works.

Grant funding typically requires that recipients provide local matching funds to encourage projects with high local priority and commitment. Some funding sources allow in-kind match, such as staff time, supplies, and equipment, to meet the match requirement. An example of a project with in-kind match is the Triple Creek Water Quality Restoration project. This project used student and parent volunteers to help with riparian restoration projects. Their volunteer hours were eligible in-kind match.

Figure 11: Volunteers performing riparian restoration. Photo by the Okanogan Highlands Alliance.

Additional funding sources

- The Stormwater Capacity Grants Program provides non-competitive grants that must be used for activities that help permitted stormwater municipalities achieve and maintain permit compliance.
- The Stormwater Grants of Regional or Statewide Significance Program (GROSS) provides competitive grants to complete projects that benefit multiple municipal stormwater permittees.
- The National Estuary Program Stormwater Strategic Initiative provides competitive grants to implement stormwater projects focused on Puget Sound ecosystem protection and restoration.
- The Aquatic Invasive Plants Management Grants Program provides grants to help control aquatic invasive plants that impact native plants and beneficial uses.
- The Freshwater Algae Control Grants Program provides grants focused on addressing harmful algal blooms in lake ecosystems.

Once funds are awarded, Ecology uses a team approach to support the recipient as they implement their project. The Ecology team includes a regional project manager, technical expert, and financial manager who provide:

- Technical assistance and guidance to achieve project outcomes and water quality improvements.
- Assistance for maintaining a high level of accountability for the use of state and federal funds.
- Easy access to Ecology staff for questions and support.

Figure 12: Ecology Project Manager, Heather Simmons conducts a site visit for the Okanogan Water Quality Best Management Practices project. Photo by Ecology.

What Ecology Provided for Washington

319 water quality projects completed work from July 2017 through June 2019, which is referred to as the 17-19 biennium. These projects included 41 wastewater facilities, 195 stormwater activities and facilities, 61 nonpoint source activities, 5 onsite sewage system projects, and 17 algae and invasive plant management. Ecology funded these projects with over $307 million. Wastewater received the most funding, with about $238 million, $207 million was loan. Stormwater activities and facilities received about $44 million, $39 million was grant. Onsite sewage systems received about $12 million, $10 million was loan. Nonpoint source activities received about $12 million, $11 million was grant. Algae and invasive plant control received about $1 million, all grant.

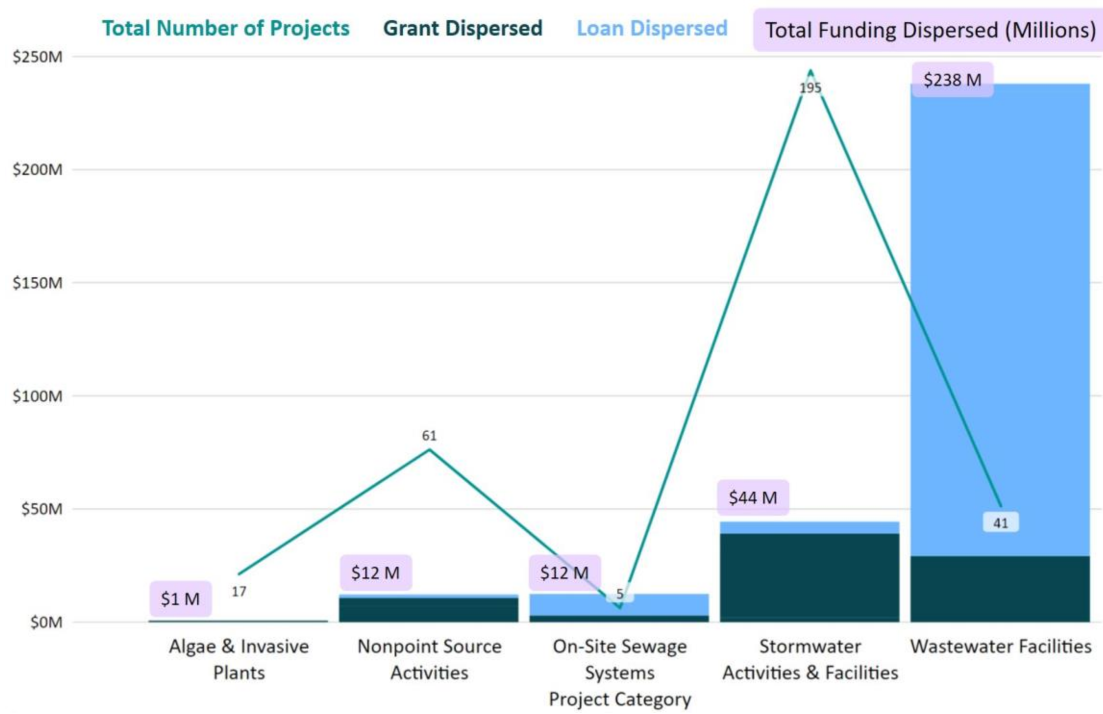


Figure 13: Funding dispersed, rounded to the nearest million, and number of projects per project category in the 17-19 biennium.

Local jurisdictions, like cities, towns and counties, were the most commonly funded recipients.

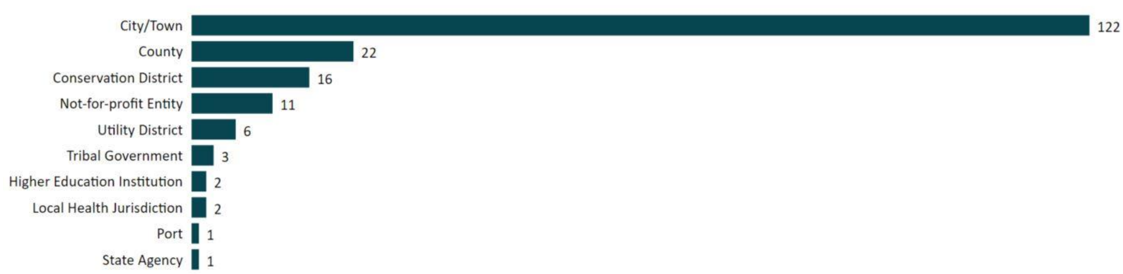


Figure 14: Number of recipients per recipient type in the 17-19 biennium.

Funded projects were implemented in 35 of Washington's 39 counties. The most funds were dispersed in Island, King and Spokane counties, most of which was loan.

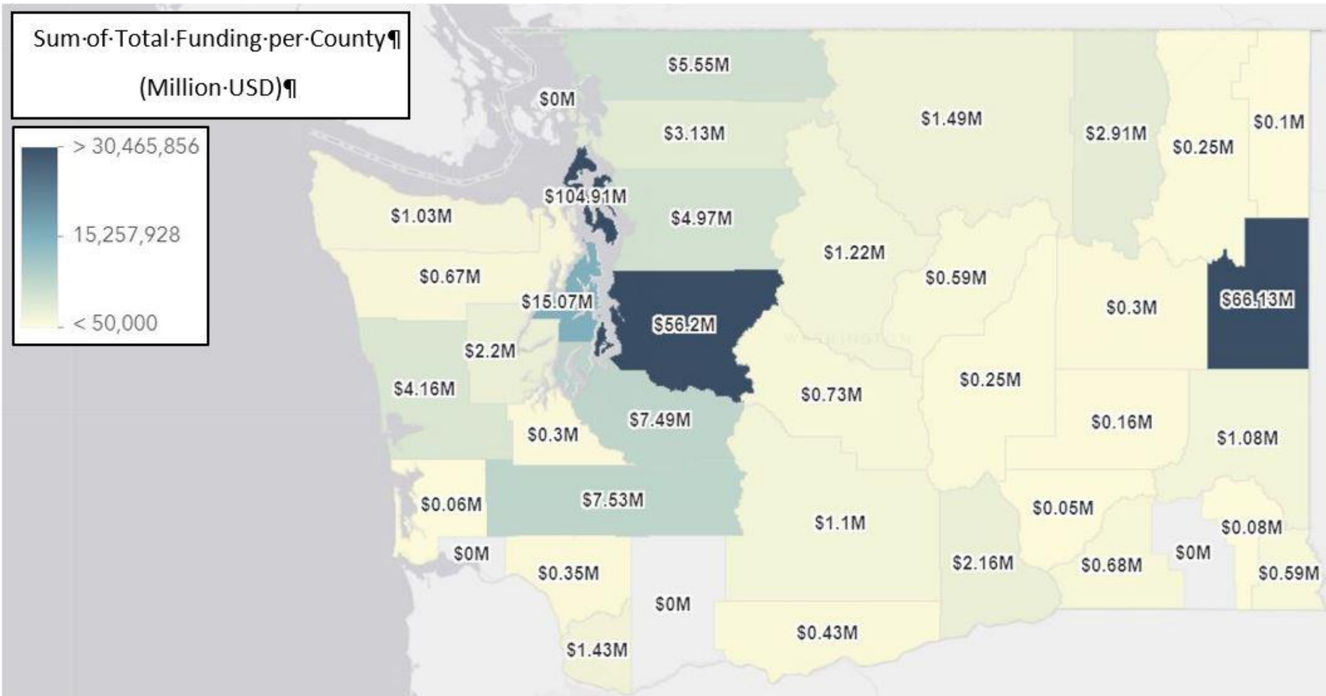


Figure 15: Funding dispersed, per county, in the 17-19 biennium. This map excludes projects that completed statewide work. For further notes on this map, see Table A 1 in Appendix A.

Most of the projects performed multiple types of work to improve water quality. The most common type of work, performed by all types of projects, was education and outreach. Hosting community meetings, work parties, or workshops provided education and outreach. Performing classroom lectures, field trips, and landowner technical assistance also provided it.

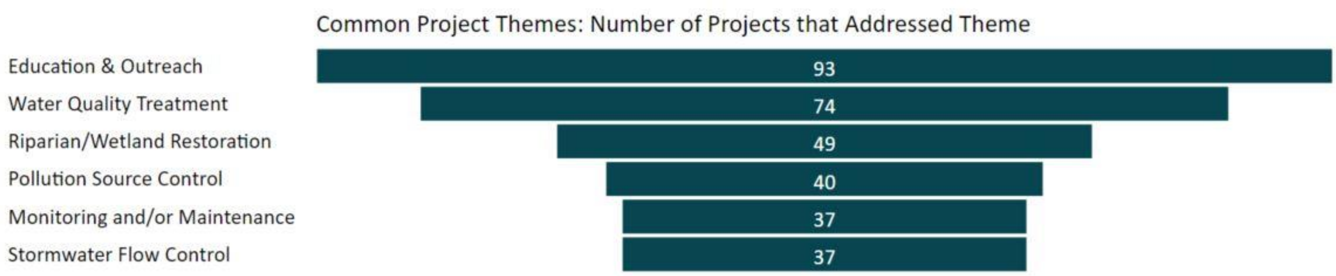


Figure 16: The most common types of work, in the 17-19 biennium, as represented by the number of projects that performed them.

Wastewater Facilities

In the 17-19 biennium, 41 wastewater facility projects were completed using $238 million. Of these projects, 14 were completed by small communities that faced financial hardship, making them eligible for grants and subsidized loans. This combination of assistance is needed to makes expensive infrastructure projects affordable for these communities and their residential rate payers.

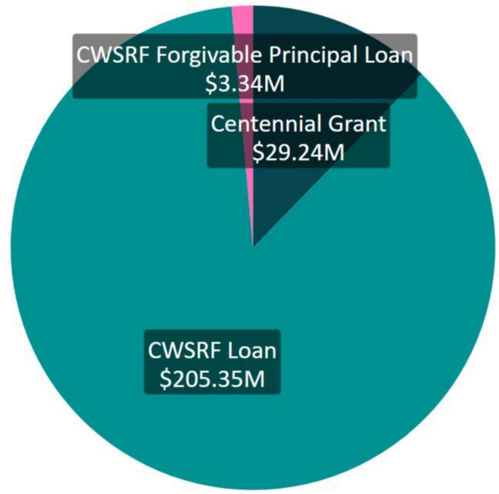


Figure 17: 17-19 biennium wastewater projects funding by funding source.

Many wastewater projects built or rehabilitated critical infrastructure needs. The U.S. Environmental Protection Agency calls these needs capital investments and identifies them as actions required to meet Clean Water Act regulations. The most common need addressed was treatment. Construction was the most common phase of work completed.

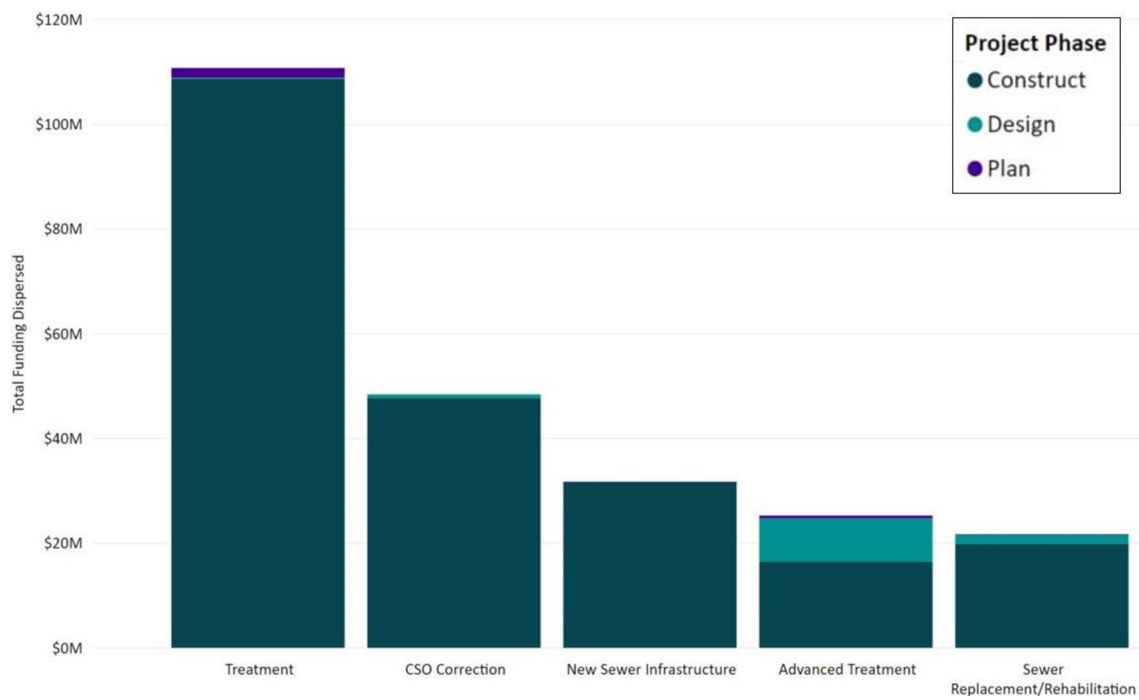


Figure 18: Funding dispersed by wastewater critical infrastructure need and project phase in the 17-19 biennium.

Removed pollutants

Wastewater treatment systems are essential to prevent degradation of surface waters and aquifers. 13 projects planned, designed, or constructed necessary wastewater treatment infrastructure.

The City of Deer Park upgraded their wastewater treatment facility to protect groundwater, their source of drinking water. Their treated wastewater is stored in lagoons, before being sprayed onto a nearby field. They replaced the lagoon liners to prevent groundwater contamination, and added leak detection systems. They installed structures to control the amount of water in the lagoons. The control structures allow the city to store more water without having to enlarge the lagoons.

Figure 19: A wastewater storage lagoon and flow control structure. Photo by City of Deer Park.

Repaired collection systems

11 projects addressed the need for sewer line replacement and sewer infrastructure rehabilitation. These projects performed corrective actions necessary to maintain the structural integrity of sewer collection systems. Two projects replaced almost a mile and a half of damaged sewer pipe.

Kitsap County removed and rehabilitated under-capacity, dilapidated beachfront sewage infrastructure. The construction was completed with minimal disturbance to the fragile shoreline. The Manchester Shoreline Sewer Facility Rehabilitation project protects Yukon Harbor from sewage leaks and spills.

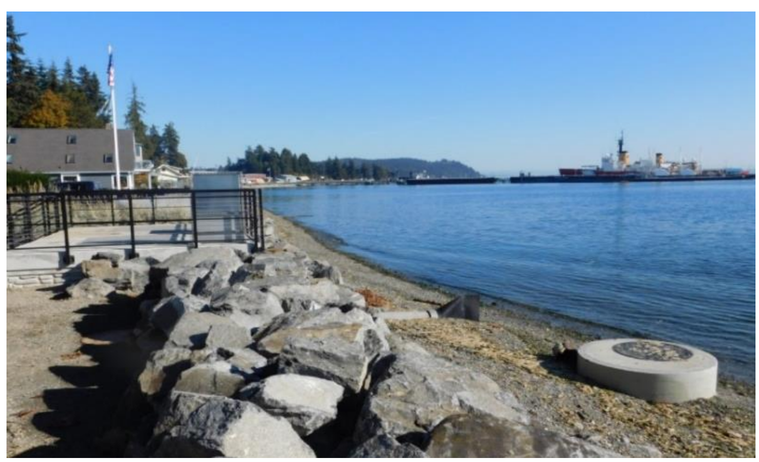


Figure 20: Newly constructed rockery at a shoreline pump station. Photo by Kitsap County Public Works.

Preventing combined sewer overflows

Collection systems that are designed to carry both sewage and stormwater are combined systems. Extreme rain events can overwhelm the capacity of combined systems, causing overflows from manholes or discharge points. The overflow from these combined sewers into local waters results in a public health hazard and water quality degradation. These events are called combined sewer overflows (CSO).

The City of Spokane's CSO Basin 33-1 Control Facility reduces pollutants overflowing into the Spokane River. They had an extensive combined sewer system that overflowed during large and intense storms. The city constructed a 2 million gallon underground tank. Instead of overflowing into the Spokane River, excess sewage is stored and released to the wastewater facility for treatment at a manageable flow rate.

Figure 21: A CSO storage tank under construction. Photo by City of Spokane.

Advanced Treatment

Five projects addressed advanced wastewater treatment needs. These projects planned, designed, or constructed infrastructure that removes pollutants beyond standard secondary treatment.

The City of Oak Harbor constructed a new membrane bioreactor facility to replace their old treatment plant. The new facility protects the water quality of Oak Harbor and the Puget Sound. The new facility implements advanced technology, like membrane filtration and UV disinfection, to treat its wastewater. Furthermore, the technology can adapt to future, potentially more stringent, regulatory limits. The technology produces water that is also suitable for beneficial reuse as reclaimed water.

Figure 22: Membrane technology produces effluent that is visibly clear and contains virtually no pollutants. Photo by City of Oak Harbor.

Extended service

As onsite sewage systems age and begin to fail, many communities expand their wastewater collection systems to serve areas of existing homes and eliminate the pollution issues associated with failing on-site systems. Five projects addressed new sewage collection infrastructure needs. These projects planned or constructed new infrastructure, like pipes and pumps, to collect and carry wastewater to a treatment facility.

The City of Chehalis completed the Coal Creek Sewer Extension project which installed a new sewer collection extension to serve nine properties with failing septic tanks. This work eliminated a pollution source from Coal Creek, a tributary of the Chehalis River, and associated wetlands in the area.

Figure 23: Installation of a force main under Coal Creek Road. Photo by City of Chehalis.

Stormwater Activities and Facilities

Uncontrolled stormwater is one of the most significant causes of water quality degradation. Stormwater flows can cause erosion damage to streams. Stormwater can carry a toxic slurry of pollution to streams, rivers, lakes, estuaries, and aquifers. In cities where storm sewers and wastewater sewers are combined, large storm events can overwhelm sewer treatment plants, causing overflows.

In the 17-19 biennium, 195 projects performed activities and constructed facilities to address stormwater. 61 projects constructed infrastructure to address stormwater with over $35 million of Ecology funding. 124 projects implemented NPDES municipal stormwater permits with about $7.5 million. 10 projects addressed stormwater pollution, in the Puget Sound, with almost $2 million.

Figure 24: The number of projects and amount of funding per type of stormwater project in the 17-19 biennium.

Permit compliance

In the 17-19 biennium, about $7.5 million, in Stormwater Capacity and GROSS grants, was awarded to 118 recipients. These funds are particularly important to small communities, who have limited resources for permit implementation.

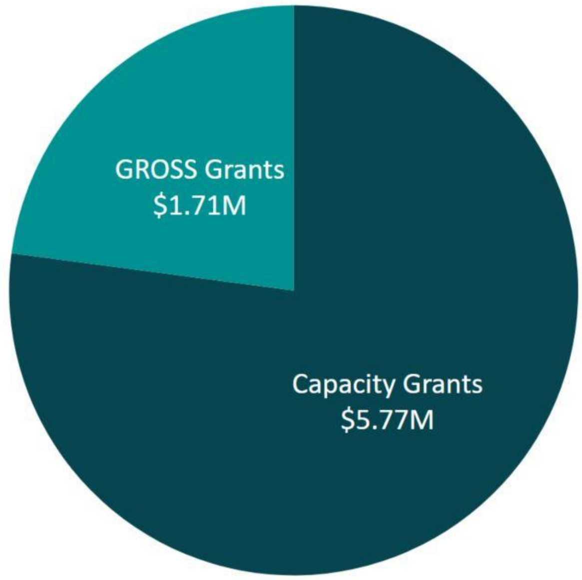


Figure 25: 17-19 biennium stormwater permit compliance projects funding by funding source.

Collectively these projects:

- Improved stormwater system operations by purchasing stormwater system inspection cameras, street sweepers, mowers, and planting at least 1,255 plants.
- Maintained existing infrastructure and reduced pollutants by sweeping at least 2,500 miles of urban streets, cleaning at least 7 miles of stormwater system pipes, removing at least 1,000 tons of debris from stormwater systems, and eliminating at least 104 illicit discharges to the stormwater systems.
- Involved the public through education and outreach, holding at least 281 events for the public or classrooms, and enlisting the help of at least 150 volunteers.

Figure 26: Vactor cleaning a stormwater catch basin. Photo by City of Maple Valley.

Stormwater infrastructure

Stormwater infrastructure projects are often engineered to mimic natural systems, which provide runoff treatment and flow control. In the 17-19 biennium, over $35 million helped fund 61 projects to improve stormwater infrastructure. These projects provided stormwater treatment, flow control, or both. Of these projects, 55 received SFAP grants, three received CWSRF loans, and three received both SFAP and CWSRF funding.

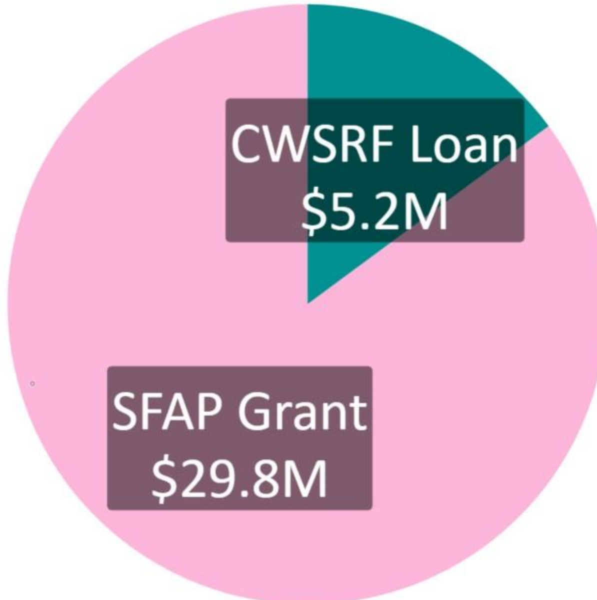


Figure 27: 17-19 biennium stormwater infrastructure projects funding by funding source.

Collectively these projects:

- Constructed infrastructure to treat the storm runoff from 783 acres of developed land, eliminating over 820 tons of sediment and associated pollutants from stormwater systems each year.
- Maintained existing infrastructure and removed pollution sources by sweeping at least 15,000 miles of urban streets, repairing at least half a mile of stormwater system pipes, and eliminating at least 22 illicit discharges to the stormwater system.

Stormwater infrastructure can often provide both stormwater treatment and flow control, like the City of Union Gap's Main Street Stormwater Improvements project. The City installed an underground detention basin, detention pond, and two treatment units. These new facilities increase stormwater detention and infiltration which reduces sediment, oil and high flows to Spring Creek.

Figure 28: A stormwater detention basin. Photo by City of Union Gap.

Infrastructure that uses constructed vegetation and soil to restore natural processes, like infiltration and evaporation, is termed a green retrofit. Whatcom County completed such a retrofit by building a stormwater facility to treat runoff from 76 acres of existing development, adjacent to Lake Whatcom. Annually, the Academy Road Stormwater Improvements project prevents 30.4 pounds of phosphorus from entering the Lake, a drinking water source.

Figure 29: A stormwater facility with sand filters and bioretention. Photo by Kim Levesque.

The City of Walla Walla also completed a green retrofit with their Isaacs Avenue LID Retrofit project. The City installed bioretention basins and swales. These features provide treatment for sediment, oil, and heavy metals. They also increase infiltration and provide detention for stormwater, which reduces stormwater discharges to Mill Creek and Butcher Creek. Additional benefits of this project include eliminating approximately 2,800 square feet of impervious asphalt road surface; and reducing fecal coliform, pesticides and water temperature in Mill Creek.

Figure 30: A large bioswale at an intersection. Photo by Brandy Reynecke.

Puget Sound pollution prevention activities

$1.87 million in National Estuary Program Stormwater Strategic Initiative grant was awarded to 10 projects to address Puget Sound pollution prevention from urban stormwater runoff.

The University of Washington – Tacoma completed the Stormwater Chemical Characterization and Watershed Prioritization project. The project evaluated stormwater quality on a regional scale, by surveying watersheds. This approach helped to identify areas where there is disproportionate water quality degradation. With these areas identified, jurisdictions can prioritize their stormwater management actions.

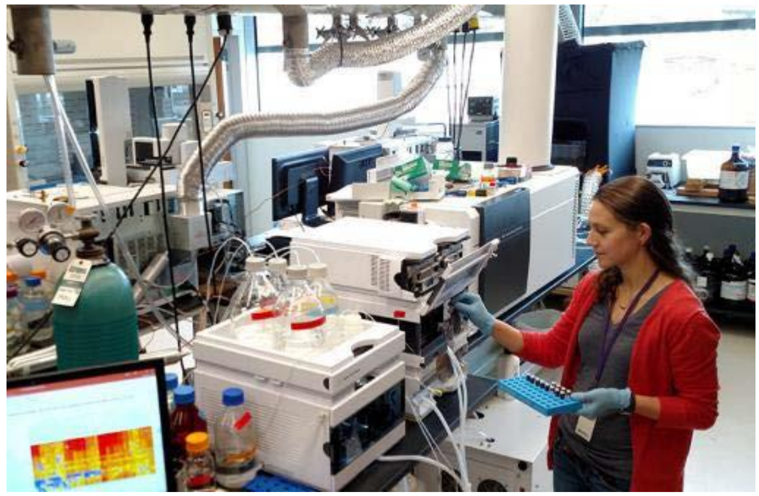


Figure 31: Dr. Katherine Peter loading water samples from Puget Sound creeks for pollutant analysis. Photo by Dr. Edward Kolodziej.

Nonpoint Source Activities

In the 17-19 biennium, 61 nonpoint source activity projects were completed with just under $12.3 million. Funded project recipients worked closely with landowners to implement best management practices (BMPs) to restore native ecosystems, minimize pollution from rural land use activities, and engage communities in watershed protection. Due to the many sources of pollution, nonpoint projects necessitate this holistic approach.

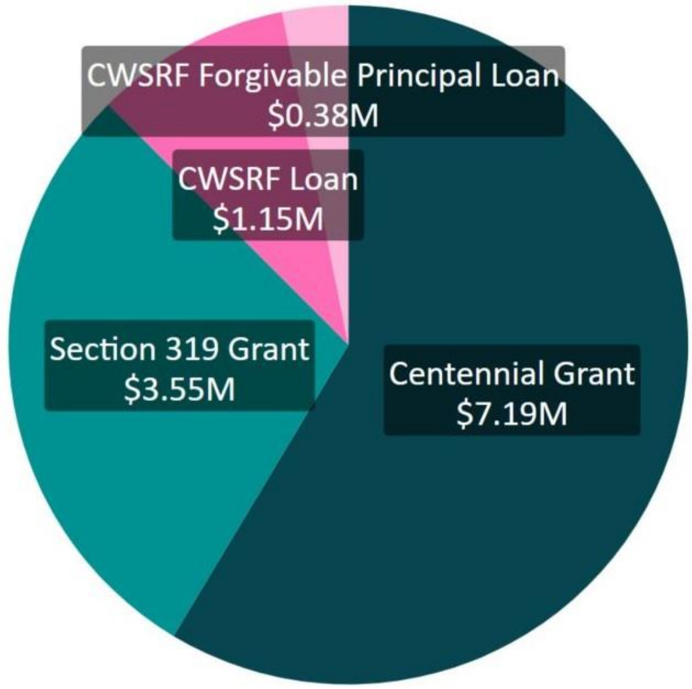


Figure 32: 17-19 biennium nonpoint projects funding by funding source.

Collectively these projects:

- Improved almost 23,000 acres through water quality protective alternative agricultural practices and riparian buffer implementation and restoration.
- Provided over 1,570 landowners with technical assistance.
- Engaged over 2,054 volunteers and received over 3,570 volunteer hours.
- Conducted at least 113 student education events, including classroom visits and field trips.

Figure 33: An educational student field-trip provided by the Riparian Restoration and Stormwater Education in the Hangman Creek Watershed project. Photo by Amanda Richardson.

Water quality monitoring

Water quality monitoring establishes baseline water quality conditions, evaluates changes, and identifies waters needing restoration. Analyzing samples from creeks, rivers, and lakes provides valuable data to assess changes in water quality. This data informs strategic planning, like inter-agency watershed plans, where multiple jurisdictions can prioritize where to efficiently take action.

Data can also be used to inform enforcement actions, like septic repairs, as done by Jefferson County through the Quilcene and Dabob Bays Pollution Identification and Control program. Many residences, in the project area, have outdated septic systems which may not adhere with current septic code. In the 17-19 biennium, this program completed 185 sanitary surveys. These surveys resulted in eliminating 34 sources of septic pollution.

Figure 34: An outhouse, a source of septic pollution. Photo by Michael Dawson.

Planning

Addressing nonpoint pollution is complicated, and involves collaboration between many partners. Engaging stakeholders, including community members, in the planning process can ensure support in future implementation actions.

Chelan County completed a restoration plan through the Mission Creek Water Quality Restoration Phase I project. This plan outlines steps to improve Mission Creek's water quality through community outreach and specific implementation-ready projects, such as Figure 37. The plan was developed with considerable input from private landowners who were once reluctant to participate, and now recognize their involvement is crucial.

Figure 35: Bank erosion following a high flow event. Photo by Chelan County Natural Resource Department.

Riparian restoration

Riparian restoration was the most common type of work throughout the nonpoint projects, restoring almost 40 miles of river, creek, and stream banks. These projects implemented buffers, which prevent erosion, filter pollution, and provide shade and habitat next to streams.

Riparian restoration included planting over 340,675 native or beneficial trees, shrubs, and grasses. The average planting survival rate in Western Washington was 83%. In Eastern Washington it was 70%. Large wildfires in Eastern Washington devastated many of the new plantings.

The Methow Salmon Recovery Foundation completed the Methow Water Quality Restoration and Monitoring Project. The Foundation implemented nearly a mile of riparian restoration to protect the Methow River. The Methow River has high water temperature and the project will provide cooling through vegetative shade.

Figure 36: Riparian restoration on the banks of the Methow River. Photo by Heather Simmons.

Agricultural best management practices

In the 17-19 biennium, almost 13 miles of livestock exclusion fencing was installed. This fencing, along with other agricultural BMPs, like waste management and conservation-based tillage practices can protect nearby water bodies. Farmlands rely on accessible, clean water for livestock and irrigation, however many agricultural activities can pollute waterways.

Direct seed is a conservation-based tillage practice that reduces erosion, protecting streams from overloads of sediment and nutrient pollution. Conserving valuable soil from season to season also benefits farmers. Palouse Rock Lake Conservation District partnered with the Palouse and the Lincoln County conservation districts to offset costs associated with implementation of direct seeding technologies. These offsets incentivized 29 farmers to alter tillage practices on over 8,000 acres of their land.

Figure 37: A no till drill applying direct seed to steep hills. Photo by Palouse Rock Lake Conservation District.

Onsite Sewage Systems

Many residents in Washington have onsite sewage systems (OSS), especially in rural areas. Repairing and replacing OSS is expensive, and can be unaffordable for some property owners. As these systems age, failures are more likely. Pollution from failing OSS is a significant issue for drinking water wells, swimming beaches, and shellfish beds. OSS that are located near surface water are especially critical to be maintained.

In the 17-19 biennium, Ecology provided almost $12.5 million for the repair and replacement of compromised OSS.

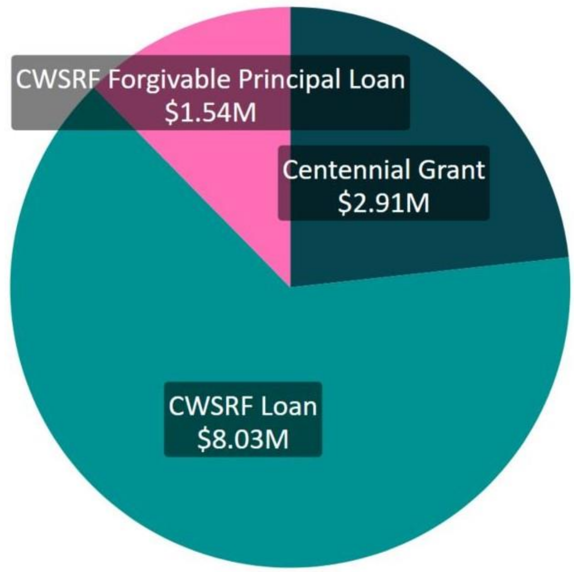


Figure 38: 17-19 biennium onsite sewage systems funding by funding source.

Repairs and replacement

Almost $2 million was awarded to three counties and one conservation district to provide financial assistance to property owners in their jurisdictions. Collectively this funding facilitated the repair or replacement of 161 faulty OSS.

Skagit County provided residents with a Non-point Septic Repair Fund. Commercial shellfish growers and County residents had specific concerns regarding environmental health conditions due to sewage contamination. The contamination carries fecal coliform, a bacteria harmful to recreation and shellfish beds. Growers, residents, and County staff understand that repairing failing OSS will remove fecal coliform pollution resulting in improved quality. The County funded the repair or replacement of 40 failing OSS.

Figure 39: An exposed septic tank. Photo by Skagit County Planning and Development Services.

Accessible funding

Ecology funds a Regional Onsite Sewage Loan Program through a partnership between counties and Craft 3, a non-profit organization. Instead of each county applying for funding and managing individual loan programs, they take turns applying for funds through one application for the whole Program. Ecology contracts with Craft 3 to provide loan administration on behalf of the local government partnership. This Program frees up local health department staff to provide outreach and technical assistance for their communities. The combination of loan and grant funding provides flexible lending options to financially distressed land owners, who made up 40% of the residential loans in the 17-19 biennium.

In the 17-19 biennium, the Program dispersed over $10.5 million to assist property owners with over 550 OSS inspections, repairs, or replacements. Craft 3 held over 35 public events, including workshops, community meetings, and informational booths. In 2018, Cowlitz and Clark counties joined the twelve existing counties in the OSS Regional Loan Program.

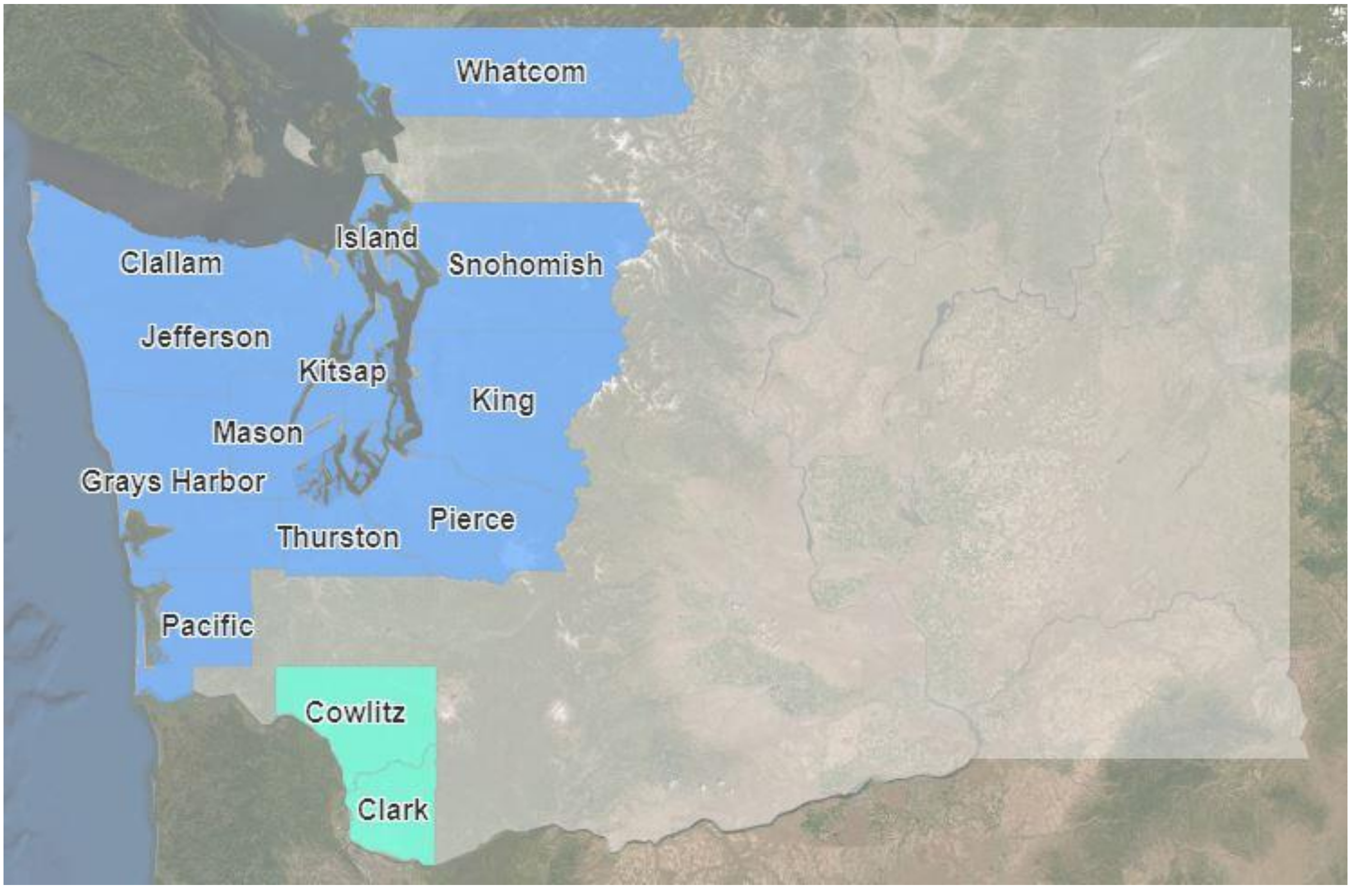


Figure 40: The participating counties in the Regional OSS Loan Program. Green counties joined during the 17-19 biennium.

Algae and Invasive Plant Control

Harmful algae and aquatic invasive plant control involves planning, surveys and mapping, education and outreach, and biomass reduction and removal. Reducing and removing these algae and invasive plants helps restore native plants, salmon passage, and activities like swimming and boating. Most counties in Washington have Noxious Weed Control Boards who lead these efforts.

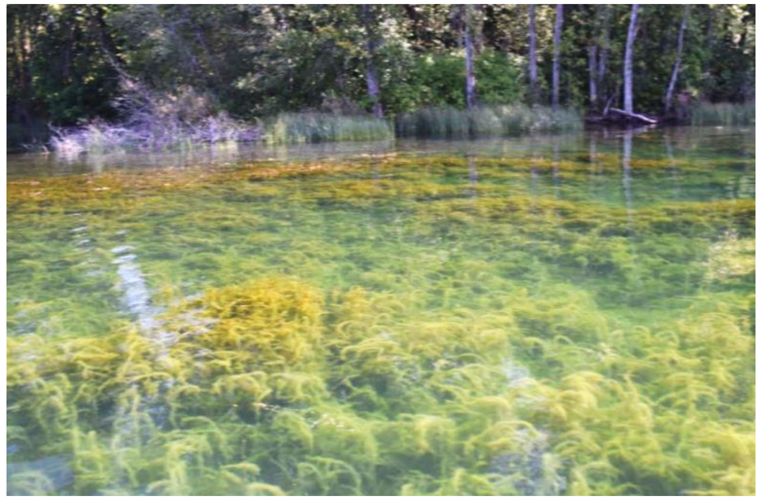


Figure 41: Invasive plants grow in American Lake. Photo by City of Lakewood.

Freshwater algae control

Lake Management Plans and Integrated Aquatic Vegetation Management Plans use research, plant surveys, and analysis to inform appropriate actions to restore lakes and rivers to healthy, native ecosystems. Five algae control projects were completed with about $200,000 from the Freshwater Algae Control Grants Program. These projects conducted at least eight public events and worked with over 30 volunteers.

The Liberty Lake Sewer and Water District completed the Liberty Lake Algae Control Plan. Liberty Lake experiences harmful algal blooms that have the potential to contaminate a drinking water aquifer. The Plan identifies sources of water quality impairment and potential algae mitigation measures.

Figure 42: A cyanobacteria bloom on Liberty Lake. Photo by Liberty Lake Water and Sewer District.

Aquatic invasive plant management

12 aquatic invasive plant (AIP) projects were completed with just over $500,000 from the AIP Management Program. These projects controlled invasive plants on at least 390 acres of lake and over 88 miles of shoreline.

Traditional methods, like herbicide and cutting, were tested against innovative practices to control invasive plants and algae. The Newman Lake Flood Control Zone District completed the Newman Lake Eurasian Milfoil Control Demonstration project. The District conducted demonstration projects to identify alternative weed controls.

The District usually uses herbicide to control milfoil, an aquatic weed, but this method proved difficult in shallow areas. Herbicide application also prevents drinking water extraction from the Lake, for several weeks. The alternative methods, diver suction weeding and benthic mat placement, were successful at controlling milfoil.

Figure 43: A diver removes milfoil in a lake. Photo by Newman Lake Flood Control Zone District.

Regional coordination

Invasive species do not adhere to jurisdictional boundaries. Neighboring jurisdictions work together to prevent, eradicate, and control invasive species. Washington Fish and Wildlife partnered with several counties, the Yakama Indian Nation, and other state agencies to complete the 2015 Yakima River Purple Loosestrife project. The partners surveyed and controlled priority weeds on over 60 miles of the Yakima River and its associated tributaries.

Appendix A.

Agreement #	Total Funding Dispersed ($)	Notes
WQAIP-2018-UWFECL-00009	72639.62	Excluded from map, as project benefits entire state
WQC-2016-MCFEG-00215	163322.6	Divided total funding into 2 and gave each half to each County, Benton and Yakima, that project work took place in. Used 2 coordinates to distribute the funding in analysis.
WQC-2016-PaRoCD-00156	247500	Divided total funding into 2 and gave each half to each County, Lincoln and Whitman, that project work took place in. Used 2 coordinates to distribute the funding in analysis.
WQC-2016-Craft3-00376	10519274	Excluded from map, as project benefits more than 4 counties
WQSWGRS-1719-BellPW-00008	238466	Excluded from map, as project benefits entire state
WQSWGRS-1719-BuriPW-00006	152058.3	Excluded from map, as project benefits entire state
WQSWGRS-1719-ClCoCD-00037	25000	Excluded from map, as project benefits entire state
WQSWGRS-1719-CoPlED-00036	25000	Excluded from map, as project benefits entire state
WQSWGRS-1719-KiCoPW-00011	150341.1	Excluded from map, as project benefits entire state
WQSWGRS-1719-SeaPWD-00014	135120.1	Excluded from map, as project benefits entire state
WQSWGRS-1719-ShelPW-00035	25000	Excluded from map, as project benefits entire state
WQSWGRS-1719-Tumwat-00029	71227.63	Excluded from map, as project benefits entire state
WQSWGRS-1719-WaStUn-00028	484828.7	Excluded from map, as project benefits entire state
WQSWGRS-1719-WaStUn-00034	407726.4	Excluded from map, as project benefits entire state
WQSWCAP-1719-BothPW-00059	25000	Divided total funding into 2 and gave each half to each County, King and Snohomish, that project work took place in. Used 2 coordinates to distribute the funding in analysis.
WQC-2015-PaRoCD-00103	332750	Divided total funding into 4 and gave a quarter to each County, Whitman, Garfield, Adams, and Lincoln, that project work took place in, Used 2 coordinates to distribute the funding in analysis.

Table A 1: Notes on Figure 15