



Lower Columbia
Estuary
Partnership

2017 YEAR IN REVIEW

Advancing Science  *Protecting Ecosystems*  *Engaging People*



Advancing Science 2

Protecting Ecosystems 6

Engaging People 12

The Power of Partnership 22

Donors, Board & Staff 23

Estuary Partnership Study Area Map . . Back Cover

A Note from the Director



This has been an interesting year for National Estuary Programs. It started in February with a proposal to eliminate completely the National Estuary Program (NEP). Thanks to the longstanding tradition of bipartisan support for the NEP, Congress fully funded it this year and we are working with Congress funding for next year.

Our nation's estuaries couldn't be more important to our health and economic vitality. They support thousands of species, they mitigate the impact of toxics, they minimize flooding—and they are home to trillions of dollars of economic activity supporting 123 million people. They are centers for tourism, recreation, industry, urbanization, fishing, aquaculture, transportation, and shipping.

Our changing climate is causing a major strain on our estuaries. There is too much at stake not to invest in the health of our nation's waters.

NEPs not only improve the environmental health of our estuaries of significance, they are economic powerhouses themselves. The Estuary Partnership leverages our federal NEP investment to bring millions of dollars to the region, often bringing in funds that can be hard for local entities to access or manage. With that, we create hundreds of local jobs—jobs that stay right here. We develop data and information more cost effectively for the region than individual entities can on their own. We apply our technical expertise to develop smarter, more strategic projects. We fill gaps, including those created in schools when science is cut.

We cross jurisdictional boundaries. The issues our waters face are too big for a single state, single city, or single civic organization to address alone. NEPs bring parties together; building regional collaborations is at the core of who we are and what Congress wanted when they created the NEP.

In the coming year, we look forward to partnering more closely and deliberately with communities of color and other diverse members of our community to make sure we remain a truly community-based organization. It will take all of us.

Your support, engagement, and commitment makes our work possible. Thank you.

A handwritten signature in blue ink that reads "Debrah".

Debrah Marriott
Executive Director

Advancing Science



Adapting to a Changing Climate

The planet's climate is changing at unprecedented rates. In the Columbia River Basin, we see higher water temperatures, reduced snow packs, increased flooding, and more frequent, larger wildfires. These changes impact our economic health. Crops can't endure increased temperature and precipitation changes. Wildfires harm air quality: recently, local public schools and pools had to close because of it. Conversely, adapting to climate change opens new economic opportunities. Wind and solar energy are two of the fastest growing industries in the United States today.

No areas are more vulnerable than our coastlines and estuaries. Over 39% of the United States' population lives in counties directly on the shoreline, at a density six times greater than our inland counties. To ensure these critical areas are climate resilient, all 28 National Estuary Programs across the country are assessing impacts of climate to their region.

As part of this effort, the Estuary Partnership completed a Vulnerability Assessment this past year. The assessment identified risks associated with changing climate patterns (including warmer summers, increasing storminess, sea level rise, and ocean acidification) and assessed their impact on our ability to protect and preserve the Columbia River. Based on this assessment, we adapted our actions and workplans. These include:

- ◆ Collect emerging data on storminess, precipitation, sea levels, temperature, and toxics.
- ◆ Share data with local land use planners so they protect floodplains and retain wetlands.
- ◆ Adapt restoration practices to address emerging data.

OUR JOB IS TO HELP THE REGION BE CLIMATE RESILIENT and help communities along the lower Columbia River adapt and prepare for a changing climate. **OUR JOB IS TO HELP SHIFT OUR APPROACH TO PROTECTING THE EARTH** and address projected impacts before more damage is done.





Innovative Changes in How We Approach Restoration Design

Our Science Team helped Washington Department of Fish & Wildlife (WDFW) evaluate restoration alternatives at Buckmire Slough near Vancouver Lake. Buckmire Slough is part of the Shillapoo Wildlife Area, and provides critical habitat for migrating and wintering waterfowl and sandhill cranes. In designing a restoration plan for Buckmire Slough, WDFW needed to understand what restoration actions will best benefit native vegetation as well as improve habitat for waterfowl, sandhill cranes, salmon, and white-tailed deer. Typically, restoration designs focus on benefitting one species. Here, Estuary Partnership scientists paired hydraulic and ecological models to show how various restoration actions will affect habitat for multiple species. This modeling helped WDFW design a restoration plan that will use levee breaches to re-connect the Columbia River to 800 acres of historic floodplain and wetlands.

“*Our modeling looks at ecologic function as a whole and that helps land managers better understand which restoration actions will have the greatest impact for multiple species. The result is innovative restoration designs that are cost effective and that have a higher likelihood of success.*”

– CATHERINE CORBETT, ESTUARY PARTNERSHIP
CHIEF SCIENTIST

The Estuary Partnership's ecological modeling is changing the way local land managers approach restoration.

Targets to Protect and Restore Critical Habitats

Two key issues for restoration are “how much habitat is enough?” and “where and what types of habitat need protection?” To answer this, we evaluated land cover in the lower Columbia River comparing late 1800’s maps with land cover data we collected in 2009.

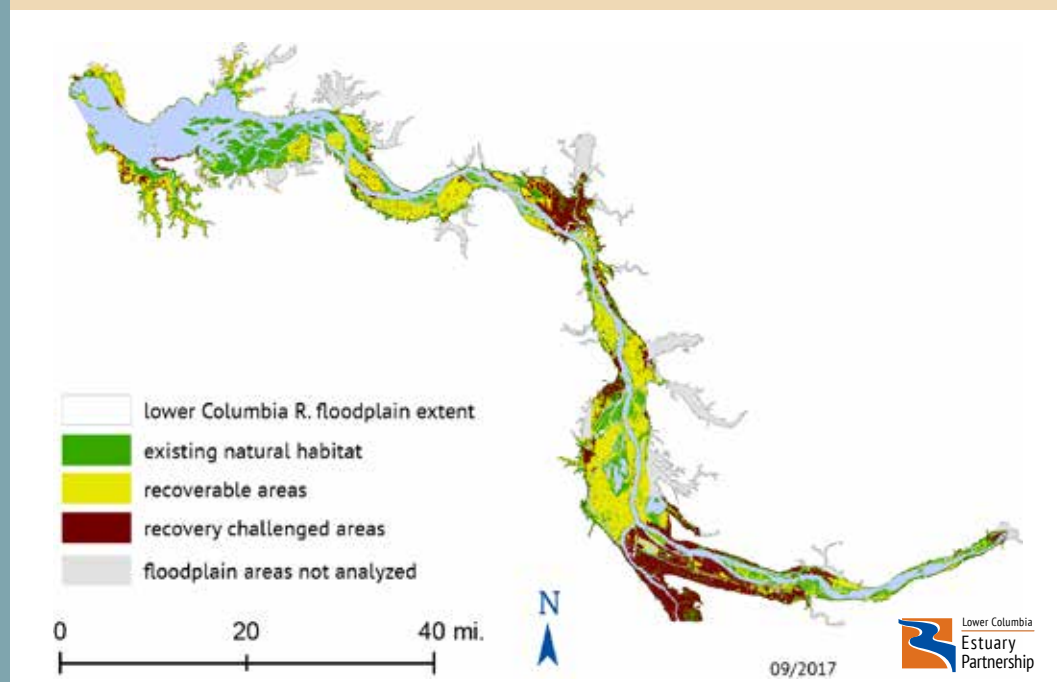
We prioritized habitats that suffered decreases of more than 25% loss in coverage. Our new habitat targets are resource-based and focus on maintaining the remaining native habitats and restoring priority habitats—those habitats that suffered the most loss. Key targets:

- 1) No net loss of native habitats from the 2009 baseline;
- 2) Recover 10,382 acres by 2030; and
- 3) Recover 22,480 acres by 2050.

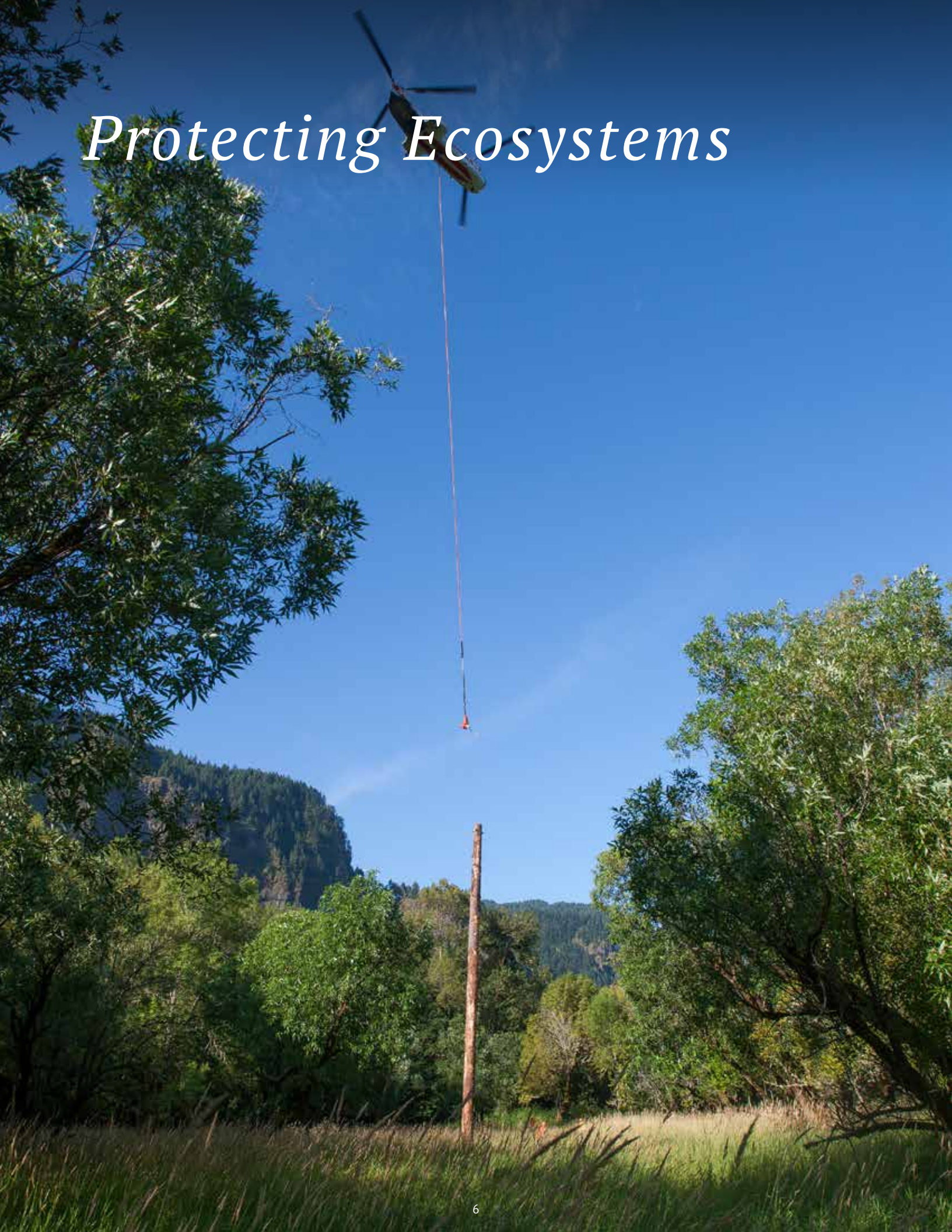
Meeting these targets will bring us to an average of 60% native habitat coverage by 2050. To achieve this, regional partners will need to protect existing habitat and restore 3,300 acres every five years, an increase over the rate of the past decade. We are helping partners in resource management, land use planning, and species recovery to integrate the targets into their programs so that we are all collaboratively working on meeting them.

Now, we are developing a Habitat Performance Index to quantify the success of a restoration project—not only the acres restored but the functions restored, as well. This will help us identify gaps and priorities for future restoration.

Lower Columbia River - Extent of Existing Natural and Recoverable Habitats

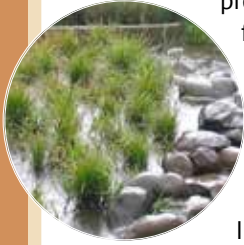


Protecting Ecosystems



Reducing Pollutants

Over 2,000 new chemicals are introduced into the environment each year. Many are in the products we use—pharmaceuticals, personal care products, plastics, fertilizers—and in our farming and manufacturing practices.



Rainwater carries toxics from roofs and pavement into our rivers and streams. These toxics end up in fish, wildlife, water, sediment, and soil, and are harmful to human health. Some cause cancer and neurological, developmental, and reproductive problems, including birth defects and learning disabilities.

In response to the harmful impact of toxics on our health and environment, many people are voluntarily changing their practices. Developers are incorporating pervious pavement and green roofs into their designs. Farmers are reducing the use of pesticides and fertilizers on their crops. Oregon and Washington are leveraging their purchasing power to buy less-toxic office supplies and cleaning products, making them more available and cheaper for everyone. Community members are driving less and avoiding toxics in beauty and personal care products. These actions add up and make a huge difference. We just need to do more.

OUR JOB IS TO REDUCE AND CLEAN UP TOXICS. We bring resources to the region to implement more projects that reduce or remove toxics. We collect and analyze data so we can target clean up reduction actions.



A day in the life of our Senior Research Scientist

Monitoring to Improve the Effectiveness of Restoration Projects



Early on a July day, Senior Research Scientist Matt Schwartz pulled on his waders and looked out over the wetlands of Ruby Lake. Matt and his team were there to survey the site's plant cover and diversity.

Located on the north tip of Sauvie Island, Ruby Lake was restored by our partner, Columbia River Estuary Study Taskforce (CREST), in 2013. They removed reed canarygrass by scraping off two feet of soil and plant matter to lower the marsh elevation—increasing water depths and smothering the invasive grass. Since then, Matt has worked with CREST to gauge how effective the method was at restoring native plant communities and improving conditions for juvenile salmon.

“*I've been going to some of these sites for years now and it is so exciting to see the changes. Ruby Lake started out as solid invasive reed canarygrass. So far, we've seen minimal invasives return,” said Matt. “When a restoration project is successful, nature takes over and native plants return and thrive.”*

In addition to sampling vegetation, Matt and his team monitor macroinvertebrates, water surface elevation, water temperature, and sediment buildup at Ruby Lake and at nearby wetlands. These metrics help us understand a lot about how the site is recovering and the impacts it has on nearby habitat.

The Estuary Partnership works with project partners monitoring throughout the lower Columbia River and estuary to understand the conditions and long-term trends of restoration projects. In addition to tracking the progress of a site before and after restoration, monitoring helps us understand the effectiveness of specific restoration actions.

THIS YEAR, regional partners completed ten projects that added 510 acres of restored or protected habitat.

SINCE 2000, regional partners have restored or protected 23,195 acres across 257 projects restored or protected. The Estuary Partnership led the way on 76 of those, planning, designing, permitting, or constructing projects that restored or protected 4,159 acres.

Restoring Habitat

Every fish, every animal, and every human needs a healthy habitat to thrive—but we have lost 114,050 acres (over half) of the river’s historic habitat to agriculture, industry, hydropower, and urban development since the 1880s. Dams, tide gates, and levees block migration for salmon. Industries, farms, and lots of development have put pollution in the waters and on the land. In the lower river, 13 species of salmonids are listed as threatened or endangered.

A healthy estuary is critical to the environmental health of our ocean and the entire Columbia River Basin. Estuaries contain some of the richest and most diverse habitats for fish and wildlife. Every salmon in the Basin spends months in the estuary, feeding, growing, and adjusting to saltwater before they go out to sea; they stop again in the estuary to rest before their difficult migration up river to spawn.

A healthy estuary is vital to the economic health of our region: fishing, outdoor recreation, shipping, and habitat restoration bring billions of dollars to our communities each year.

OUR JOB IS TO RESTORE AND PROTECT THE LOWER COLUMBIA RIVER'S DIVERSE HABITATS so they can support the wide range of species that depend on them. Connecting the Columbia River to important wetlands improves water quality, reduces flooding of property, and restores the natural food web.


OUR JOB IS TO MONITOR OUR RESTORATION PROJECTS AND GATHER DATA to make sure we are making decisions with the best science for the greatest impact.





Volunteers Help Restore Benson State Park

Multnomah and Wahkeena Creeks were once a dynamic part of the lower Columbia River floodplain, offering important refuge and spawning habitat for coho, chum, and Chinook salmon and steelhead. But like many areas in the Columbia River Gorge, development and even recreation have had negative impacts on the streams' health. In 2014, the Estuary Partnership initiated a major habitat restoration project here. We constructed a stormwater swale to treat run-off from Benson State Park's parking lot, reduced water diversion from the stream to a man-made fishing pond, and added large wood to the streams to create habitat for fish. Over the next three years, 4,026 volunteers and students came from all over to plant trees and shrubs, aiding in the recovery of the two creeks.



“ I volunteer to plant trees because I truly love giving back to the environment. Humans have such a negative impact on our environment, I feel it's our duty to try, no matter how small, to make a positive change.”
– BARBARA BERQUIST, ESTUARY PARTNERSHIP VOLUNTEER AT BENSON (AND MANY OTHER SITES)

“It's a totally different area now thanks to hundreds of amazing volunteers and students. In areas that were over-run with blackberry or were just bare ground, there are now hundreds of native trees and shrubs creating shade, cooling the creeks' waters and providing habitat for salmon. Fish are returning and the plants are flourishing. It's pretty exciting.” – SAMANTHA DUMONT, ESTUARY PARTNERSHIP VOLUNTEER COORDINATOR



Columbia River Basin Restoration Act Signed into Law

In December 2016, under the leadership of U.S. Senator Merkley (OR) and Congressman Blumenauer (OR), the Columbia River Basin Restoration Act (CRBRA) was signed into law. Senators Wyden (OR), Murray (WA), and Cantwell (WA), and Representatives Bonamici (OR) and DeFazio (OR) joined as co-sponsors of this legislation.

The CRBRA authorizes a grant program administered by the U.S. EPA to help local groups voluntarily clean up, monitor, and reduce the use of toxics within the Columbia River Basin.

A large collaboration worked with the Estuary Partnership over eight years to make this happen, including Columbia River Inter-Tribal Fish Commission, NW River Partners, Salmon-Safe, and, most notably, the Pacific Northwest Waterways Association.

Engaging People

DURING THE 2017 SCHOOL YEAR, we provided 24,783 hours of hands-on instruction in environmental sciences to 4,989 students at no cost to students or schools.

SERVICE LEARNING PROJECTS this year took place at Salmon Creek, Steigerwald Lake National Wildlife Refuge, Vancouver Lake, Oxbow Regional Park, La Center Bottoms, Sandy River Delta, Scappoose Bay, Coffenbury Lake, Meldrum Bar Park, and Clatskanie Elementary school grounds.

SINCE 2000, the Estuary Partnership has worked with 3,339 teachers and 72,208 students providing over 356,908 hours of instruction. Students have planted 61,449 native trees and shrubs.

Educating Students

Students need science. It's important to capture their interest in science early in K-5 education. Yet most elementary classrooms lack time for science in the classroom or outdoors.

Students need more time outdoors. It improves their physical health and mental wellbeing, gets them moving, and gives them a connection to their community. There is a marked disparity among student learning for low-income students and students of color. Students who need it the most have the least access and resources.

OUR JOB IS TO BRING OUTDOOR SCIENCE TO MORE STUDENTS.

We bring science lessons to life, often giving K-5 students the only science they will get during the school year. We start in the classroom with lessons about plants, animals, watersheds, or water quality. Then we take them outside to use what they have learned in the field—testing water quality, looking for macroinvertebrates, identifying plants and animal tracks, planting trees, or removing invasive species. This raises their academic success and sparks their interest in learning science and caring for their local watershed.

We help teachers integrate science to teach math and literacy lessons, strengthening Common Core knowledge and helping students meet Next Generation Science Standards. We teach teachers, too, with professional workshops and resource kits for loan.

“*Many of my students have never done community service. A few of them shared how good they felt repairing habitat that animals and humans could enjoy at a later time. It was also done in a local area where they could go back later and see the wonderful work they have done.*” – MIKE BICE, EAST ORIENT ELEMENTARY, GRESHAM, OREGON





A day in the life of an Environmental Educator

Students at Lewis and Clark Elementary Use Science to Connect with Nature



Managing students outside and knowing how to integrate curriculum with outdoor activities can be daunting. That's where our educators step in—we deliver science lessons in the classroom and model how to connect those lessons to the outdoors.

In spring 2017, three 5th grade classes from Lewis and Clark Elementary in Astoria received a series of three classroom lessons from Senior Environmental Educator McKenzie Miller. McKenzie collaborated with the teachers to make sure each lesson met their classroom goals and state standards. Hands-on classroom activities covered topics including ocean acidification and water quality. Our team adapted a Jenga game so students could learn about the local food web in a hands-on—and fun—way. And they saw how small changes can have large impacts.

“*The hands-on activities engage, make real, and model the science vocabulary in a way that all my learners, no matter their home language or learning strengths, can access.*”

– JORDAN MARTIN, LEWIS AND CLARK ELEMENTARY, ASTORIA, OREGON

Following the classroom lessons, McKenzie and other Estuary Partnership educators took the students to nearby Coffenbury Lake to paddle and explore on our two 29-foot “floating classroom” canoes. “There’s always a lot of energy and excitement while we’re out on the canoes, but being on the water allows students to see their community from a new perspective. They point out plants and birds, and we connect those back to food web activities in the classroom by talking about how each organism both relies upon and supports other organisms,” said McKenzie. On land, students calculated carbon sequestration from trees along the lake’s edge and removed thick patches of invasive Scotch broom with the guidance of Lewis and Clark National Historical Park Rangers.

“Every time I see Scotch broom, I just want to take loppers and go cut it!” said student Allyson Fabela after the trip.

Vernon Schoolyard Goes Green

For decades, students at Vernon School in Northeast Portland had a playground that was almost entirely asphalt. Yet greener schoolyards are linked to multiple improvements in behavior, mood, and learning. Last fall, with funding from City of Portland's Bureau of Environmental Services, the Estuary Partnership and Vernon School depaved part of the yard and planted trees to provide a better learning environment for students, more habitat for wildlife, and stormwater infiltration to protect the nearby Columbia Slough.

Students, the nonprofit Depave, community volunteers, teachers, and the Vernon School PTA removed 1,008 square feet of asphalt from the schoolyard. We installed benches to provide a place of relaxation for students and parents and we worked with Portland Public Schools and students to plant six large trees.

“*The new green squares benefit students and wildlife and reduces harmful runoff that ends up in the Slough, so these are triple-win projects.*” – CHRIS HATHAWAY, ESTUARY PARTNERSHIP DEPUTY DIRECTOR AND PROJECT LEAD

Our educators also led a series of classroom lessons to make the connection between land use and healthy watersheds for 5th and 6th grade students. “We are so excited to show our students that stormwater from our school is tied to water quality in the Columbia River and the Slough, and that there are changes to the ways we use the land that can protect waterways and fish,” said Principal Keefer (*Hollywood Star News*, October 12, 2016).





Salmon Creek: A Living Laboratory for Students

Salmon Creek runs through the heart of Clark County from its headwaters in the Cascade Range to Lake River. It travels through agricultural and urban land where it picks up various pollutants. For the last several years, the Estuary Partnership has worked to reforest and improve the creek with the help of students and community volunteers.

One person who knows a lot about the creek's water is Felida Elementary School teacher Meagan Graves. We've worked with Meagan since 2014, and each year we give her students a series of classroom lessons, followed by a service learning project at Salmon Creek. In their lessons, students learned how stormwater and development affect the health of their watershed, and how more trees help improve it. Then students had the chance to plant trees along the creek to improve its habitat and water quality.

“*Each month when we go down to test the water, students make comments about how they can see 'our trees.' This experience has helped them feel like a part of the area and have more pride and interest in the water testing.*” – MEAGAN GRAVES, FELIDA ELEMENTARY SCHOOL, VANCOUVER, WASHINGTON

Between 18 classes and two volunteer events, the Estuary Partnership brought 500 students and 100 volunteers to plant 7,500 trees along Salmon Creek last year. They worked in rain, sunshine, and a lot of mud to help improve habitat, cool stream temperatures, and infiltrate stormwater. The Washington Department of Ecology and the Lower Columbia Fish Recovery Board funded part of this large project.

Giving Everyone Access

Low-income communities and people of color are more likely to live in areas that have poor air quality, contaminated water, and a lack of green spaces. This exposure leaves many people with higher rates of cancer, infertility, learning disabilities, or other toxics-related health impacts. And their voices are frequently absent from discussions of how to solve these problems.

Many people from diverse cultures and socio-economic backgrounds lack opportunities for outdoor learning and access to natural areas. Transportation, park fees, perceived dangers, and historical exclusion have created barriers and unequal access for too many in our communities.

In the summer of 2016, the Estuary Partnership initiated our summer internship program to give college-level students from diverse backgrounds job experience in the environmental education field. Terrence Rawls and Jake Coverdale spent the summer learning alongside our Education Team about how to lead outdoor educational activities. They, in turn, taught us how to better connect with and serve the diverse communities in our region.

The National Estuary Program is community-based to address local problems. Diverse perspectives expand our understanding of each other and our community, and our work caring for the lower Columbia River is enriched by our different cultural backgrounds, needs, and experiences.





IN 2016, 442 volunteers planted 6,081 trees and shrubs along the banks of streams and rivers.

VOLUNTEERS WORKED at Sandy River Delta in Troutdale, Oregon; Horsetail Creek in the Columbia Gorge in Oregon; Steigerwald Lake National Wildlife Refuge in Washougal, Washington; Lewisville Park in Battle Ground, Washington; Brezee Creek in La Center, Washington; and Vancouver Lake and Salmon Creek in Vancouver, Washington.

SINCE 2000, 12,506 students and volunteers have planted 109,695 native trees and shrubs.

SINCE 2000, we have taken 28,835 students and adults on the water in our Big Canoes.

Connecting to the Columbia

Today, we have less physical contact with the natural world than any previous generation. Without a physical connection, we don't always gain the appreciation for it. We value most what we connect to through experience.

Experiencing the Columbia is inspiring and it gives us our sense of place. Being outside improves our physical and overall well-being.

OUR JOB IS TO GET PEOPLE IN OUR COMMUNITIES OUTDOORS TO EXPERIENCE AND CARE FOR THE COLUMBIA RIVER. We use our 14-passenger Big Canoes to give students and community members of all ages the one-of-a-kind experience of being out on the water. Our experienced educators lead the on-water trips, introducing paddling techniques and explaining the sights and sounds of the river. It is a transformative experience.



We bring volunteers to sites throughout the region to remove invasive plants, pick up litter, or plant native trees and shrubs to shade streams and increase habitat for fish and wildlife.

We're connecting people to local natural areas to break down access barriers and show them how they can make a difference in caring for the Columbia.



The Power of Partnership

OUR JOB IS TO IMPLEMENT THE ESTUARY PARTNERSHIP MANAGEMENT PLAN. That takes a lot of partners. Funders and donors are critical. So are the thousands of volunteers, businesses, growers, agencies, organizations, students, teachers, and governments that make it happen.

“*This past year, students, teachers, board members, scientists, and volunteers donated 18,410 hours, hours valued at \$429,359, to help get our work done. It’s pretty inspiring.*”
 – DEBRAH MARRIOTT, ESTUARY PARTNERSHIP EXECUTIVE DIRECTOR

To help, we raise funds for the region. We leverage each dollar as much as we can.

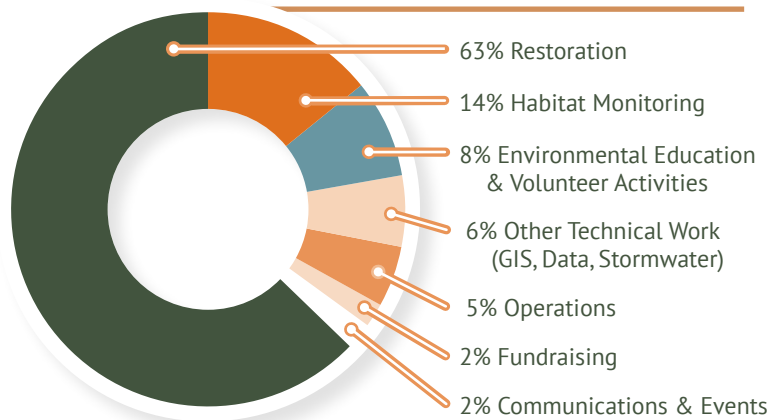
This past year, we brought \$7,600,000 in cash to the region. As part of the National Estuary Program, we receive funds from Congress through U.S. EPA. This year, for every one of those dollars, we raised nine. Those are local dollars spent right here. Most of it goes out to other businesses and organizations in our communities to restore habitat, monitor restoration work, and get students outdoors.

That is a big boost to the economy: it creates about 156 jobs, and significantly more indirect and induced jobs. Since 2000, we have raised over \$66,000,000 and created 1,324 jobs. These are local jobs that cannot be exported.

IN-KIND SERVICE AND VALUE 2017

	HOURS	VALUE
Board Members	334	\$19,500
Scientists & Technical Experts	323	\$86,100
Students Service Learning	12,894	\$193,403
Parent & Teacher Volunteers	2,277	\$52,533
Community Volunteers	2,510	\$52,118
Professional Services	–	\$23,855
Goods	72	\$1,850
TOTAL	18,410	\$429,359

EXPENSES BY ACTIVITY 2017



Thank You

Program Funders

U.S. Environmental Protection Agency
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Project Supporters

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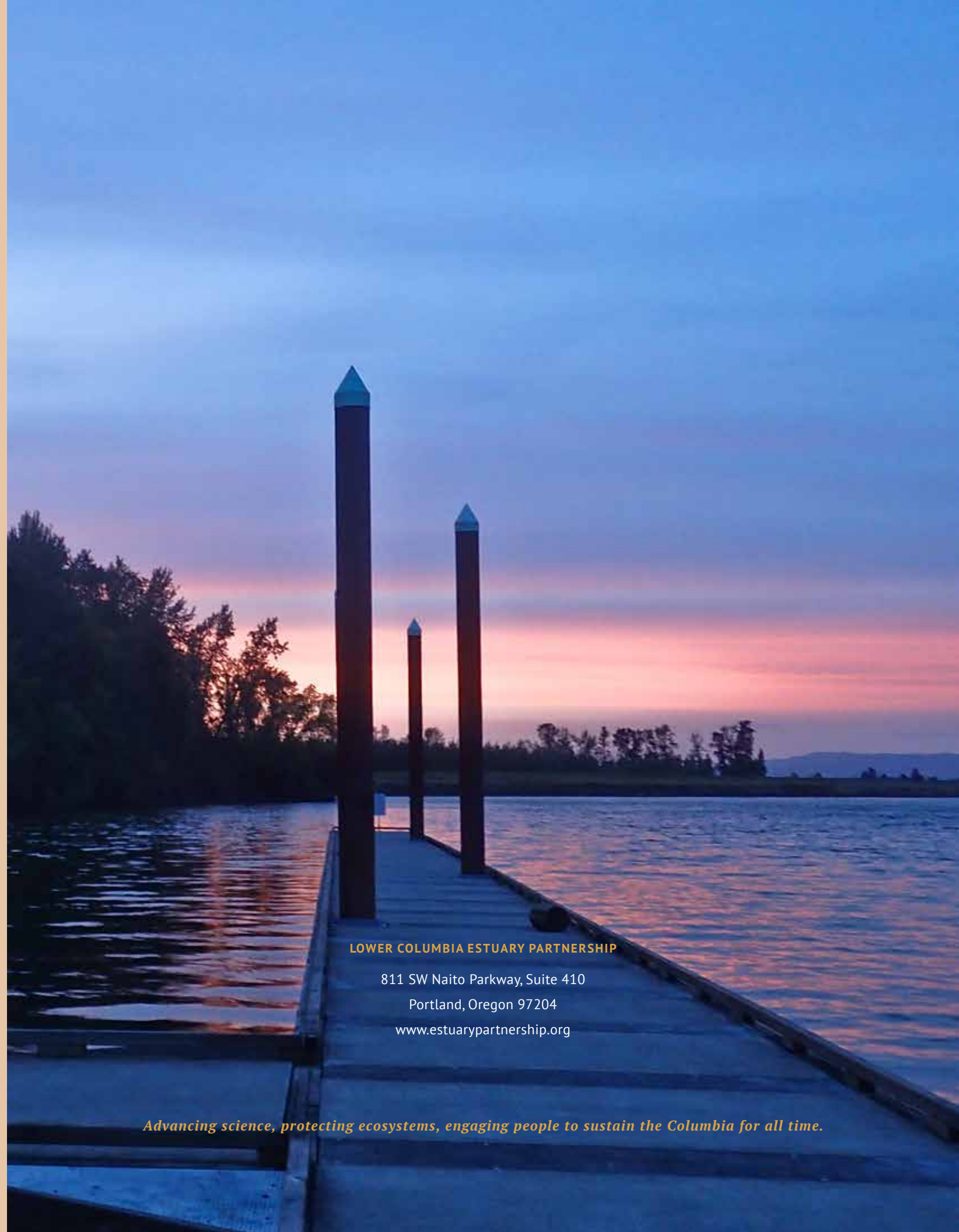
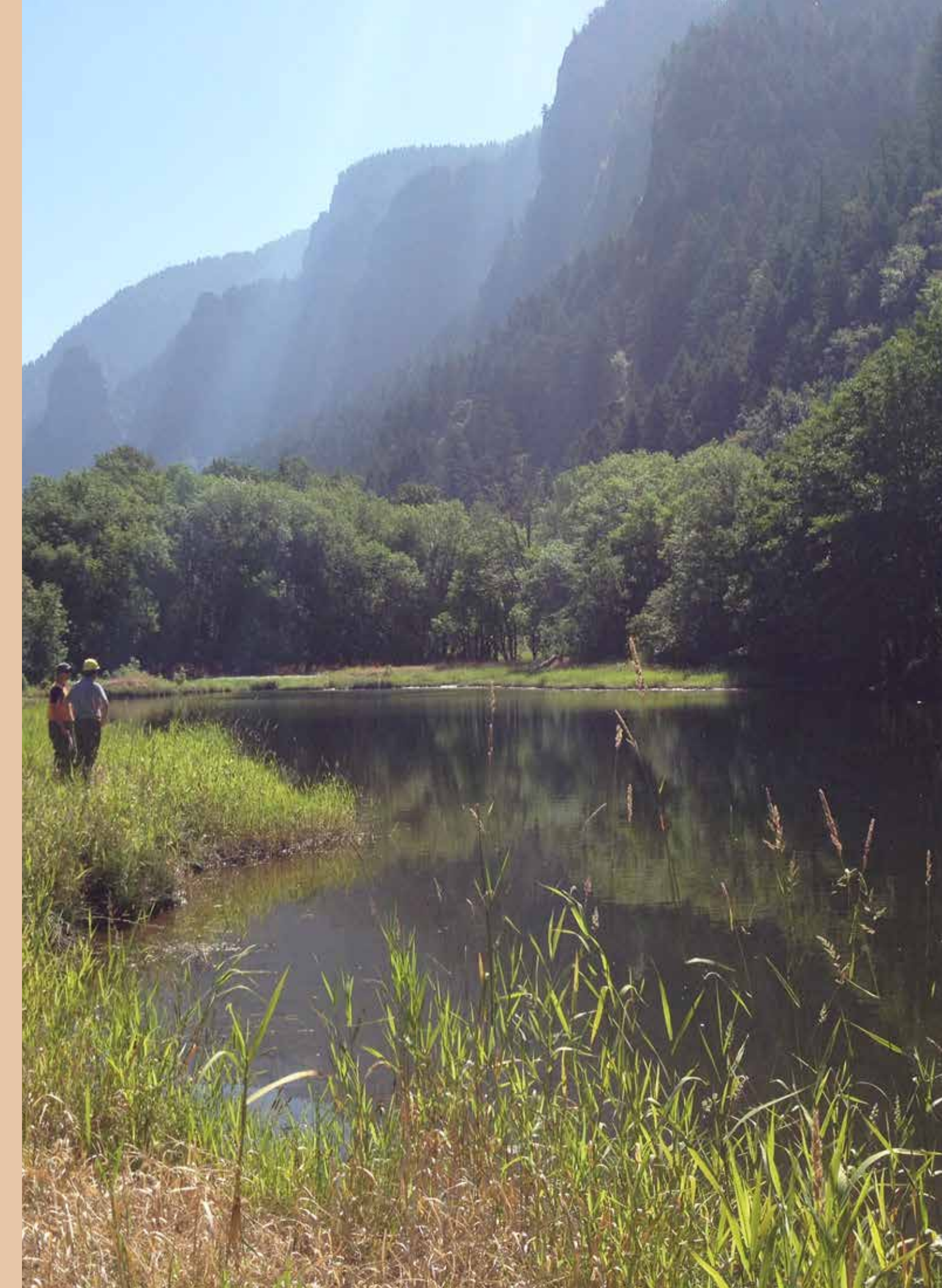
Pacific Ocean



LEGEND

- Cities
- Major Roads
- County Lines
- EP Study Area
- ★ Feature Project
- Education Project
- ▲ Volunteer Project





LOWER COLUMBIA ESTUARY PARTNERSHIP

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Advancing science, protecting ecosystems, engaging people to sustain the Columbia for all time.