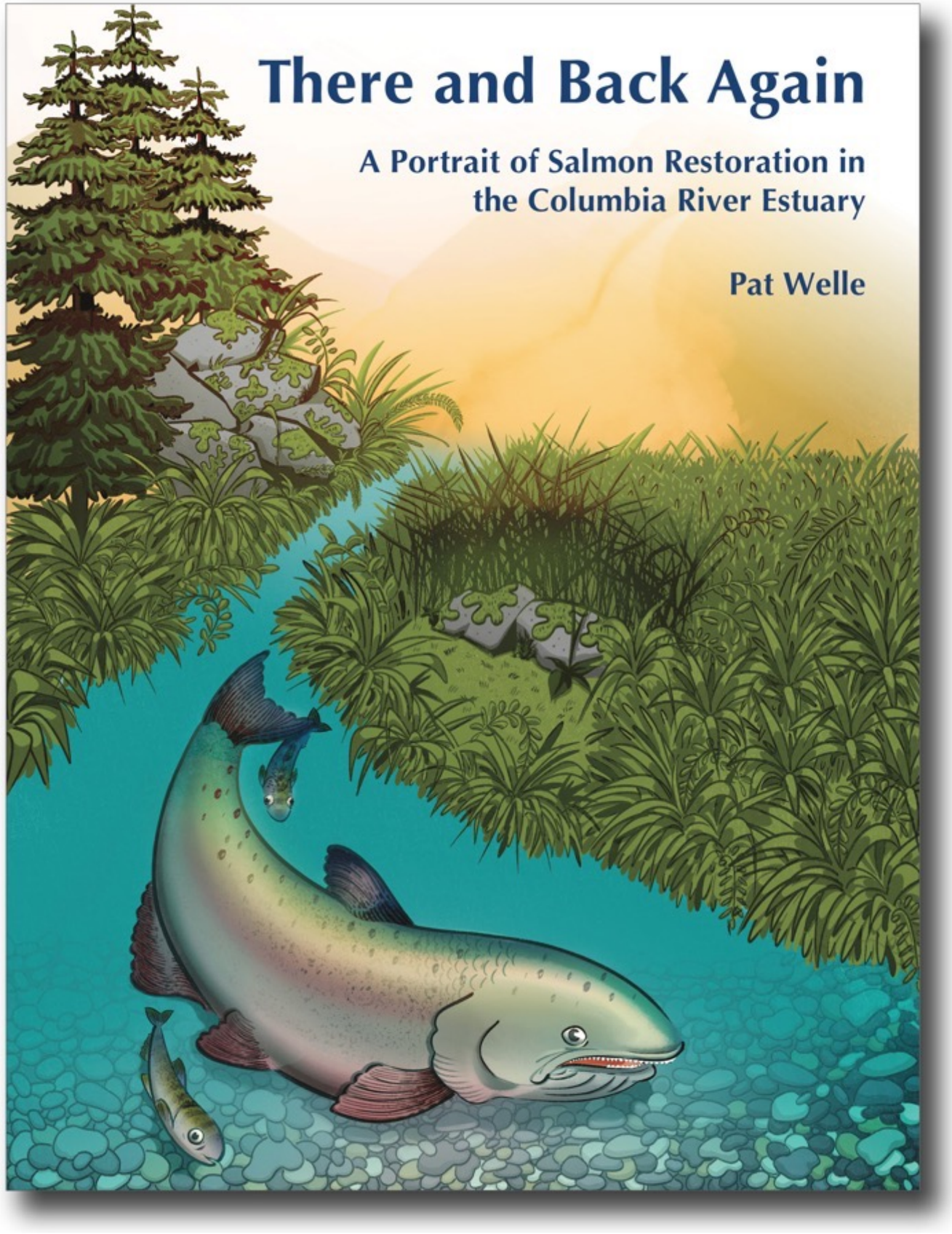
There and Back Again

A Portrait of Salmon Restoration in the Columbia River Estuary

Pat Welle

LCRWC, November 9, 2021



I do a lot of photography…

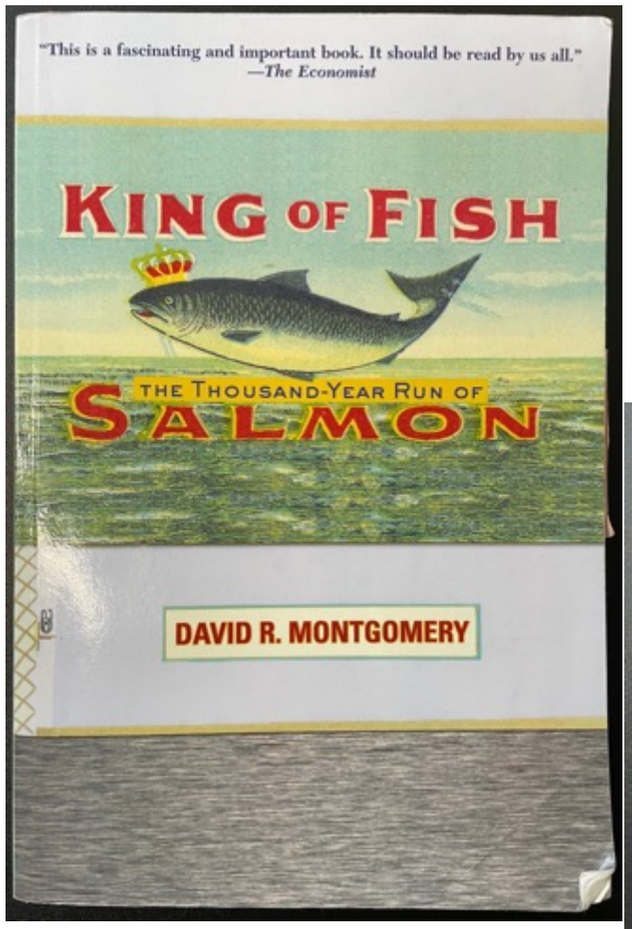
When I retired I wanted to create a photo collection of the estuary, but couldn't quite leave the wonderful work I had been doing…

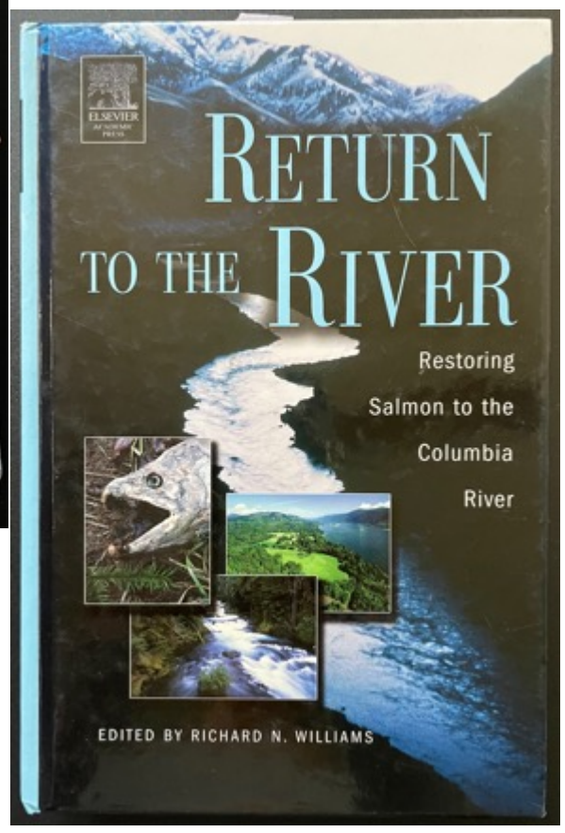
… and realized the stories of what we do have not been told.

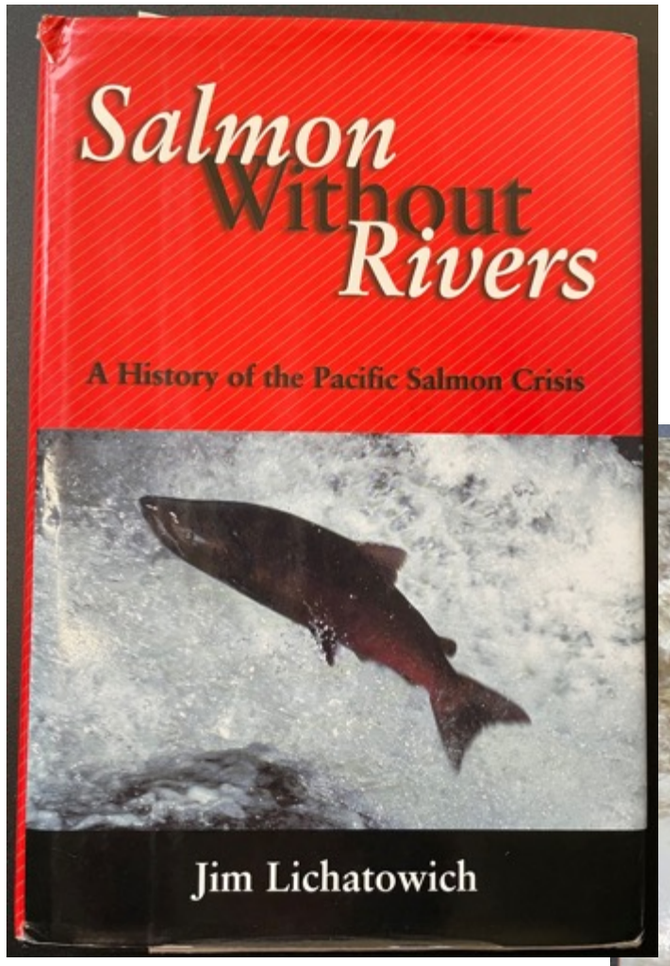
The book is an insider's look at the restoration science, management, and actions the Columbia River estuary… using photographs, maps, and writing.

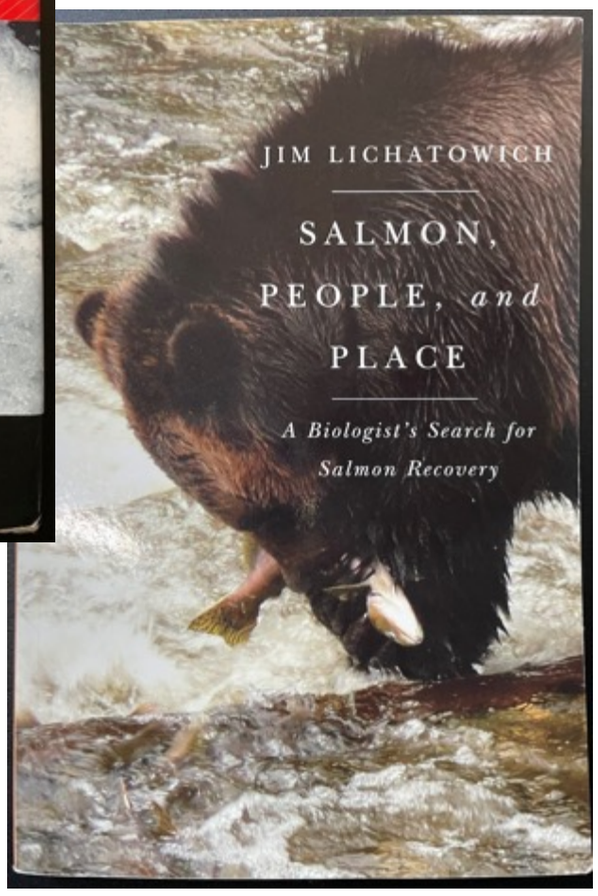
Quotes from the book shown in blue-gray

Books that inspired this work…









Goal and Concepts

Present to a general audience why and how salmon restoration is being done in the estuary…

…and the stories of those dedicated to this work.

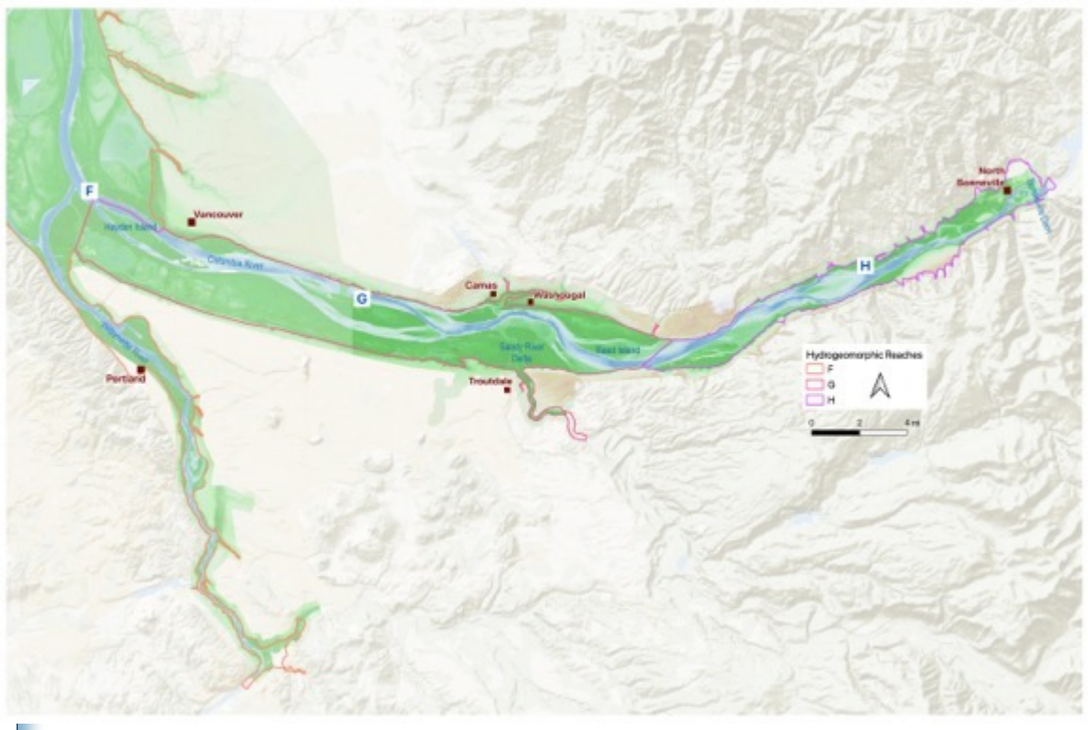
- Photos — draw in visual readers, support key concepts
- Sidebars — add short, in-depth stories
- Graphics and maps — context, another presentation form
- Detailed writing — more depth

Key Concepts

- Recent* research has led to a greater understanding of the estuary's biological importance to Pacific salmon; I show how this is playing out "on the ground"
- Number/variety of entities; effectiveness of the many smaller ones
- People involved — different backgrounds, skills, and ideas brought to work
- Scope of projects; from individual, small efforts, to the larger, multi-year ones, and some of the "messes" they create

**Since late 1980s*

Contents



Columbia River Estuary

Ilwaco
Grays River
Columbia River
Astoria
Pacific Ocean
Cathlamet
Puget Island
Cowlitz River
Longview
Lewis River
St. Helens
Columbia River Estuary Foodplain
0
5
10 mi
Sauvie Island
Bonneville Dam
Columbia River
North Bonneville
Vancouver
Willamette River
Portland
Sandy River

Introductory map; used as base for many, additional maps.

Data for maps provided by Keith Marco, Lower Columbia Estuary Partnership

1- Early History

- Brief description of changes from mid-1800s to late 1900s.
- Picked an important (singular) topic — the rise and fall of the canning industry — to highlight history complexity.
- Extended time in the Oregon Historical Society archives; used a few of their photos to enhance the writing.

2- Salmon Life Diversity

"Columbia River salmon evolved over a vast expanse of time in a dynamic system of mountain streams, saltwater estuaries, and the ocean.

"Salmon life-histories vary considerably. They are strongly connected to the individual natal streams where they return to spawn.

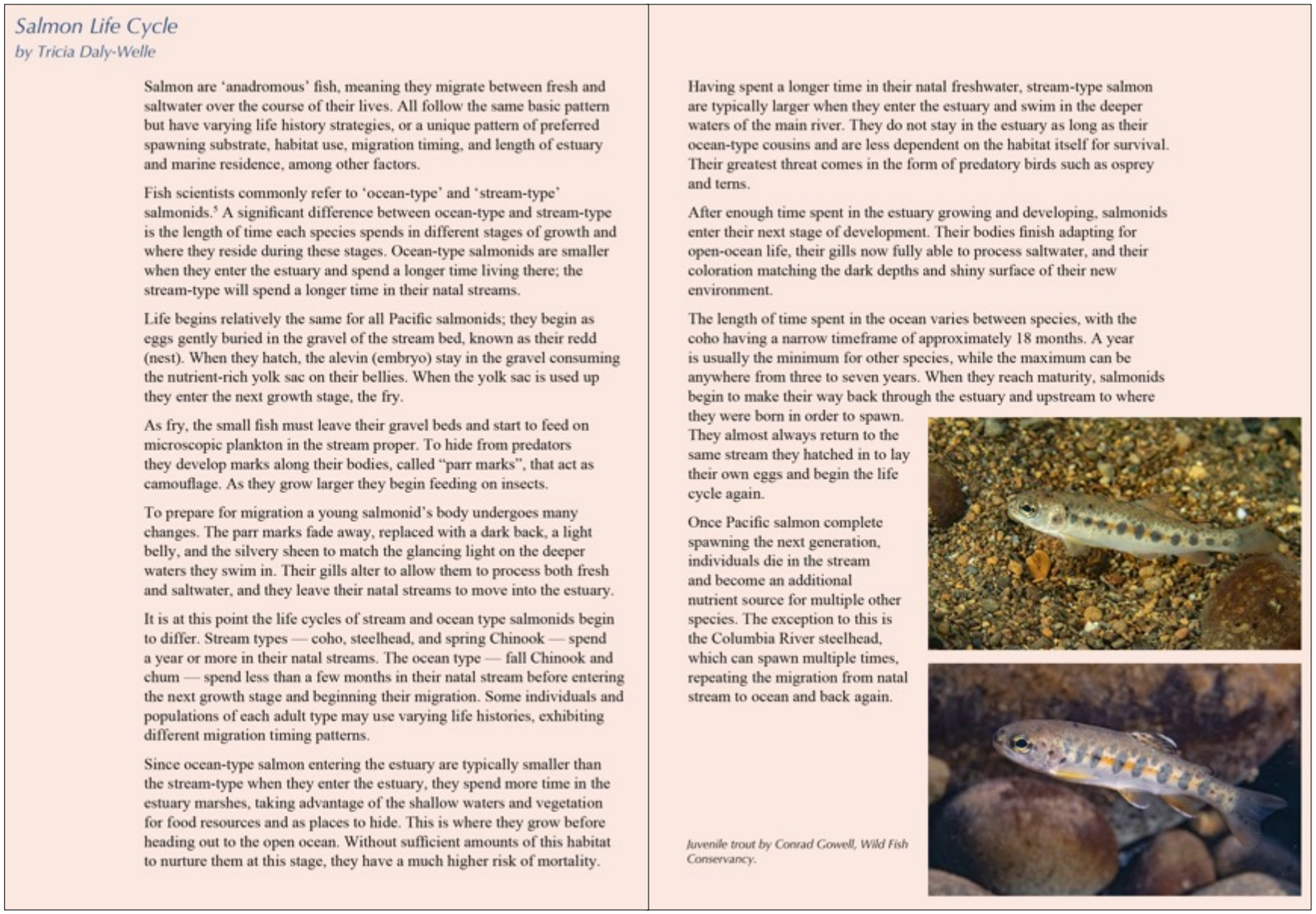
"The estuary is both a corridor for migrating salmon and a place where juvenile salmon rear for extended periods."

- Changes over time and space
- Salmon Life Cycle
- Wild vs Hatchery fish
- Hydrogeomorphic Reaches
- Habitat

Balance of technical terms and photos

Multiple maps and sidebars

Photographs: my favorite writer's tool!



Salmon Life Cycle
by Tricia Daly-Welle

Salmon are 'anadromous' fish, meaning they migrate between fresh and saltwater over the course of their lives. All follow the same basic pattern but have varying life history strategies, or a unique pattern of preferred spawning substrate, habitat use, migration timing, and length of estuary and marine residence, among other factors.

Fish scientists commonly refer to 'ocean-type' and 'stream-type' salmonids.[5] A significant difference between ocean-type and stream-type is the length of time each species spends in different stages of growth and where they reside during these stages. Ocean-type salmonids are smaller when they enter the estuary and spend a longer time living there; the stream-type will spend a longer time in their natal streams.

Life begins relatively the same for all Pacific salmonids; they begin as eggs gently buried in the gravel of the stream bed, known as their redd (nest). When they hatch, the alevin (embryo) stay in the gravel consuming the nutrient-rich yolk sac on their bellies. When the yolk sac is used up they enter the next growth stage, the fry.

As fry, the small fish must leave their gravel beds and start to feed on microscopic plankton in the stream proper. To hide from predators they develop marks along their bodies, called "parr marks", that act as camouflage. As they grow larger they begin feeding on insects.

To prepare for migration a young salmonid's body undergoes many changes. The parr marks fade away, replaced with a dark back, a light belly, and the silvery sheen to match the glancing light on the deeper waters they swim in. Their gills alter to allow them to process both fresh and saltwater, and they leave their natal streams to move into the estuary.

It is at this point the life cycles of stream and ocean type salmonids begin to differ. Stream types — coho, steelhead, and spring Chinook — spend a year or more in their natal streams. The ocean type — fall Chinook and chum — spend less than a few months in their natal stream before entering the next growth stage and beginning their migration. Some individuals and populations of each adult type may use varying life histories, exhibiting different migration timing patterns.

Since ocean-type salmon entering the estuary are typically smaller than the stream-type when they enter the estuary, they spend more time in the estuary marshes, taking advantage of the shallow waters and vegetation for food resources and as places to hide. This is where they grow before heading out to the open ocean. Without sufficient amounts of this habitat to nurture them at this stage, they have a much higher risk of mortality.

Having spent a longer time in their natal freshwater, stream-type salmon are typically larger when they enter the estuary and swim in the deeper waters of the main river. They do not stay in the estuary as long as their ocean-type cousins and are less dependent on the habitat itself for survival. Their greatest threat comes in the form of predatory birds such as osprey and terns.

After enough time spent in the estuary growing and developing, salmonids enter their next stage of development. Their bodies finish adapting for open-ocean life, their gills now fully able to process saltwater, and their coloration matching the dark depths and shiny surface of their new environment.

The length of time spent in the ocean varies between species, with the coho having a narrow timeframe of approximately 18 months. A year is usually the minimum for other species, while the maximum can be anywhere from three to seven years. When they reach maturity, salmonids begin to make their way back through the estuary and upstream to where they were born in order to spawn. They almost always return to the same stream they hatched in to lay their own eggs and begin the life cycle again.

Once Pacific salmon complete spawning the next generation, individuals die in the stream and become an additional nutrient source for multiple other species. The exception to this is the Columbia River steelhead, which can spawn multiple times, repeating the migration from natal stream to ocean and back again.

Juvenile trout by Conrad Gowell, Wild Fish Conservancy.

Wild and Hatchery

Wild and Hatchery Salmon

Jamie Glasgow, Wild Fish Conservancy

The Value of Wildness

Wild salmon have been swimming Pacific Northwest waters for millions of years. Because they return to spawn in the very rivers where they were born, wild salmon and steelhead are shaped by, and reflect, the environments where they live. The species of salmon present, the timing of their migrations to and from saltwater, and even body size and shape, co-evolve with the specific conditions within their natal watersheds. Streams with larger spawning gravels create larger-bodied salmon because those are the type of fish that can spawn successfully there. Warmer streams produce salmon that are more heat-tolerant than do cooler streams. Every generation, these differences are encoded in each wild salmon population's genetics. Consequently, within the lower Columbia wild chinook salmon from the Kalama watershed are genetically distinguishable from wild chinook salmon from Germany Creek, even though they are the same species.

"Salmon adapt to the environments in which they live. These two images contrast a river which wild fish can no longer access due to a dam, and the hatchery that was built to mitigate for that blocked habitat."

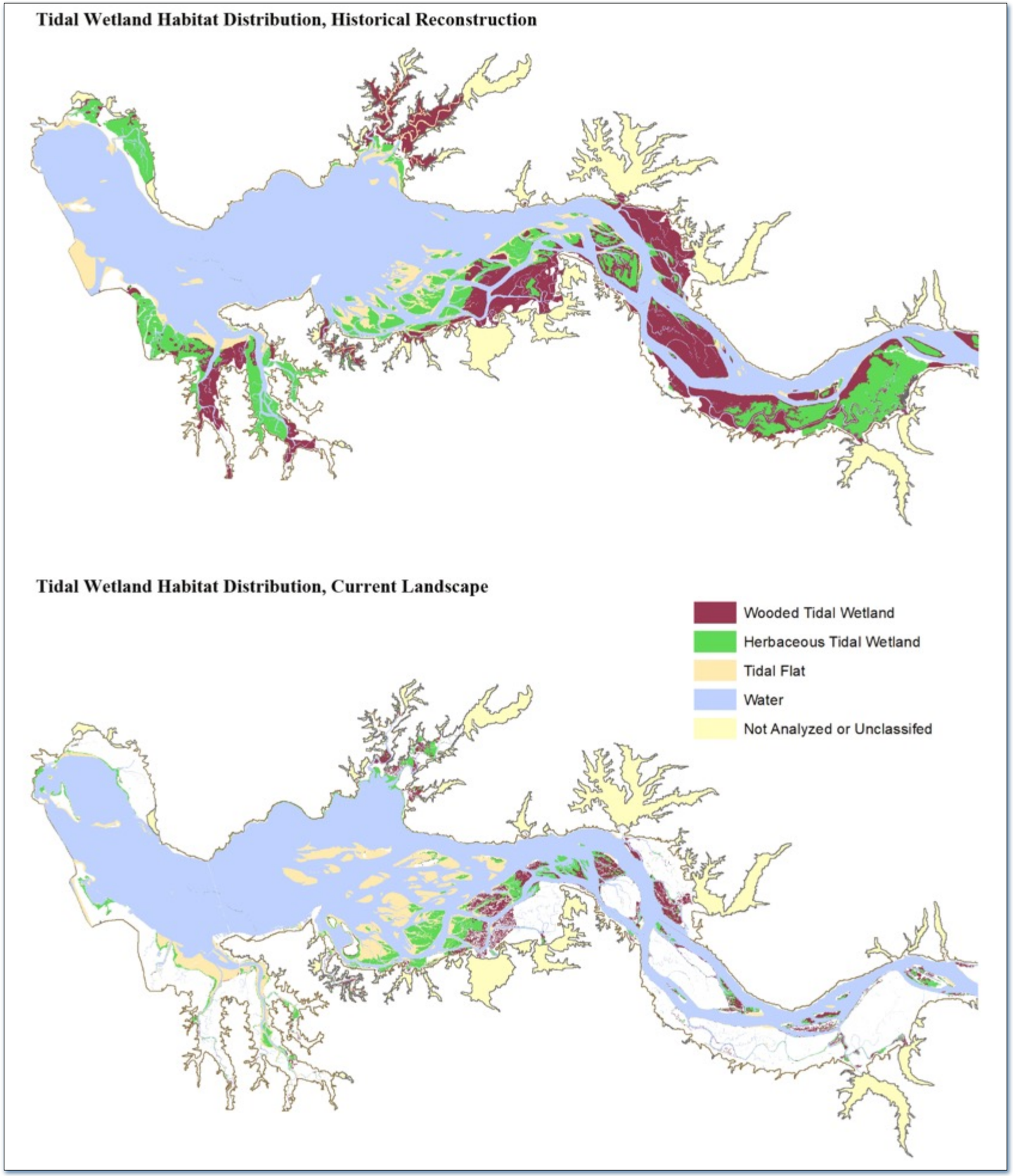
Photos by Conrad Gowell, Wild Fish Conservancy.

Wetland habitat distribution
through time

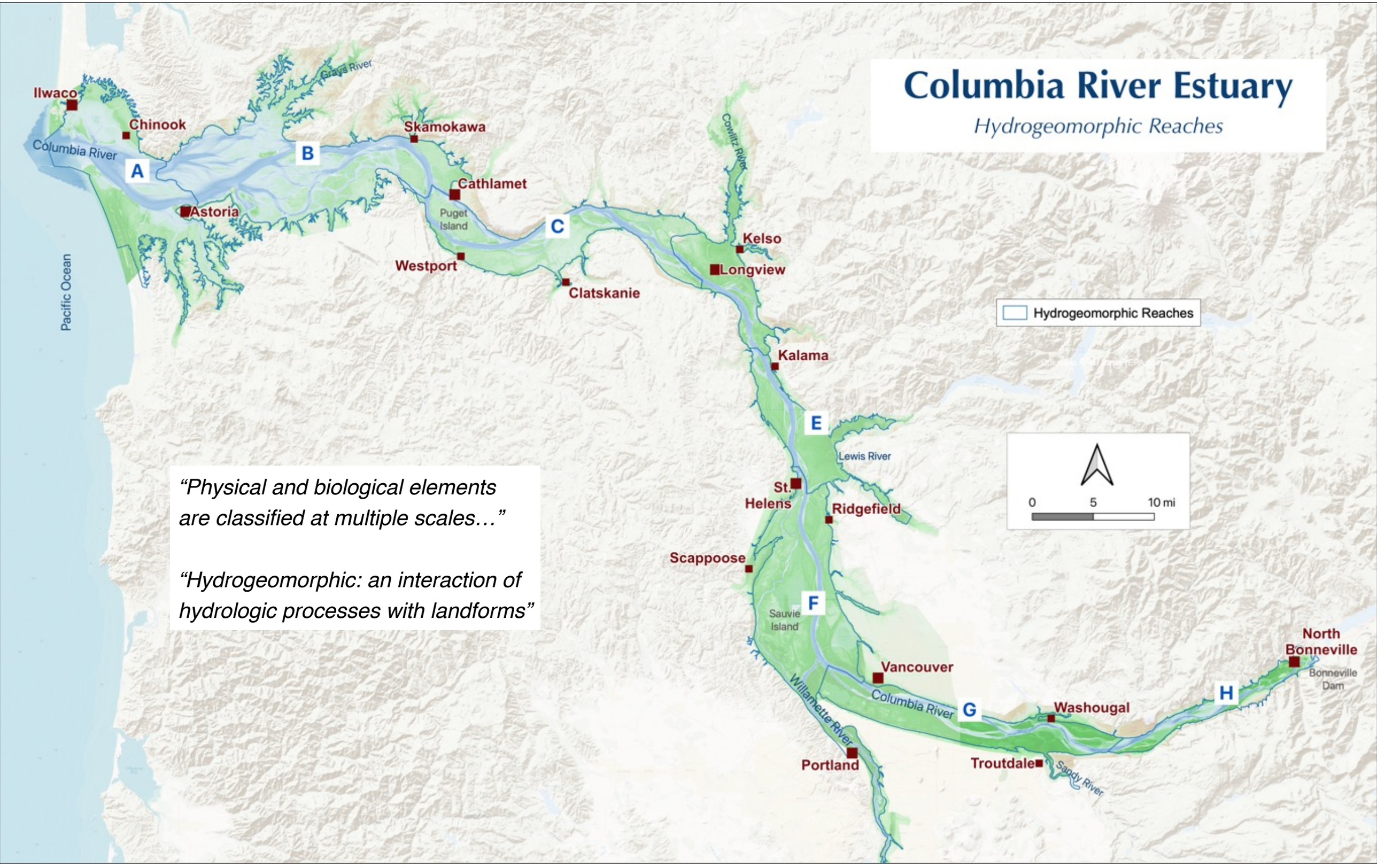
"…since the late 1800s, over 70% of original wetlands have been lost in the estuary."

From LCEP:

Historical data from 1870-1890
And Current data



Hydrogeomorphic Reaches



"Physical and biological elements are classified at multiple scales…"

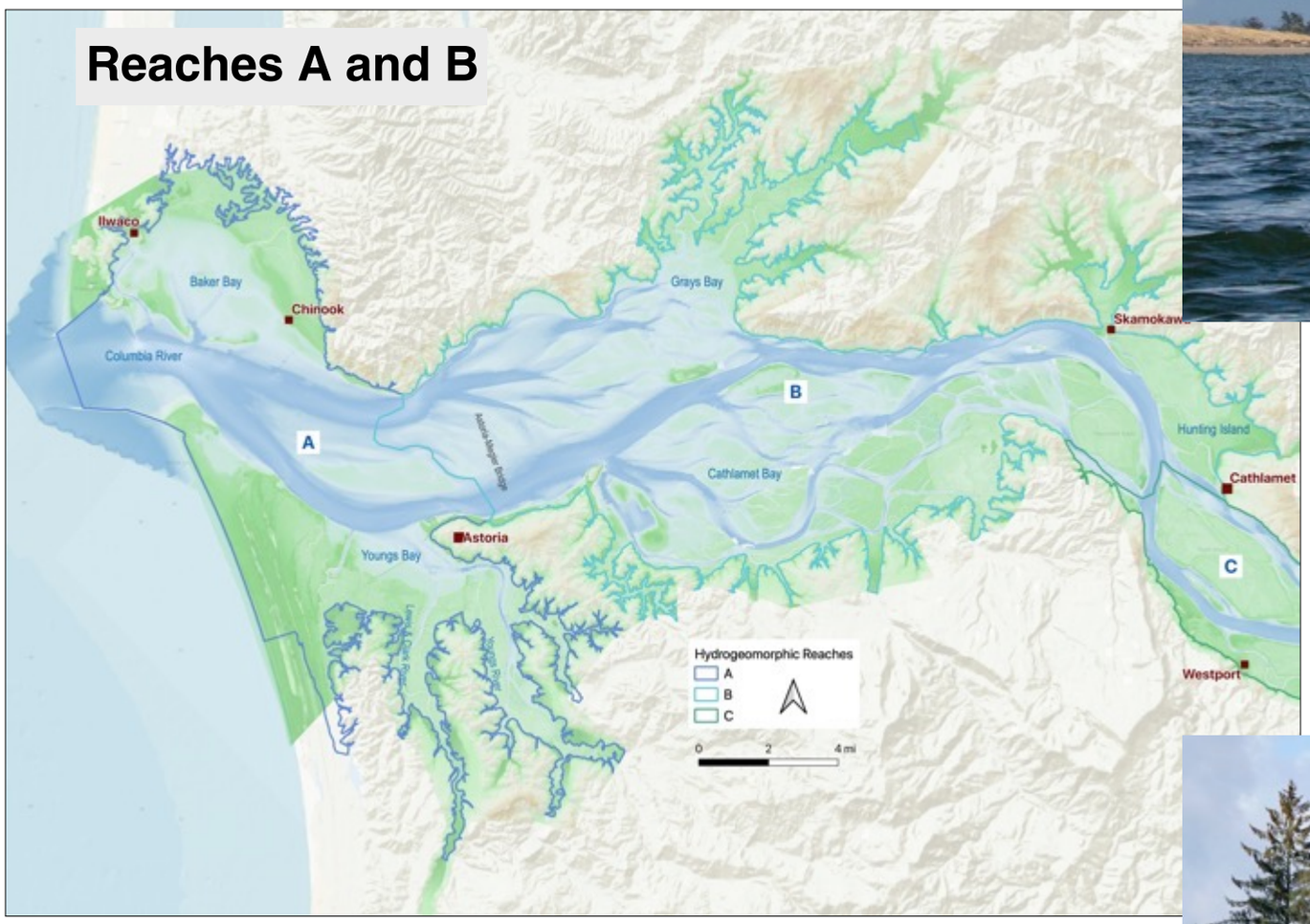
"Hydrogeomorphic: an interaction of hydrologic processes with landforms"

From Columbia River Estuary Ecosystem Classification, Charles Simenstad, USGS

Reaches C, D, E

"… contains large, swampy mid-channel islands, distributary channels, sloughs, and floodplains. This reach includes a confined valley along the mainstem of the river and broad bottomlands at the confluences of the Cowlitz and Kalama Rivers."

Hydrogeomorphic Reaches

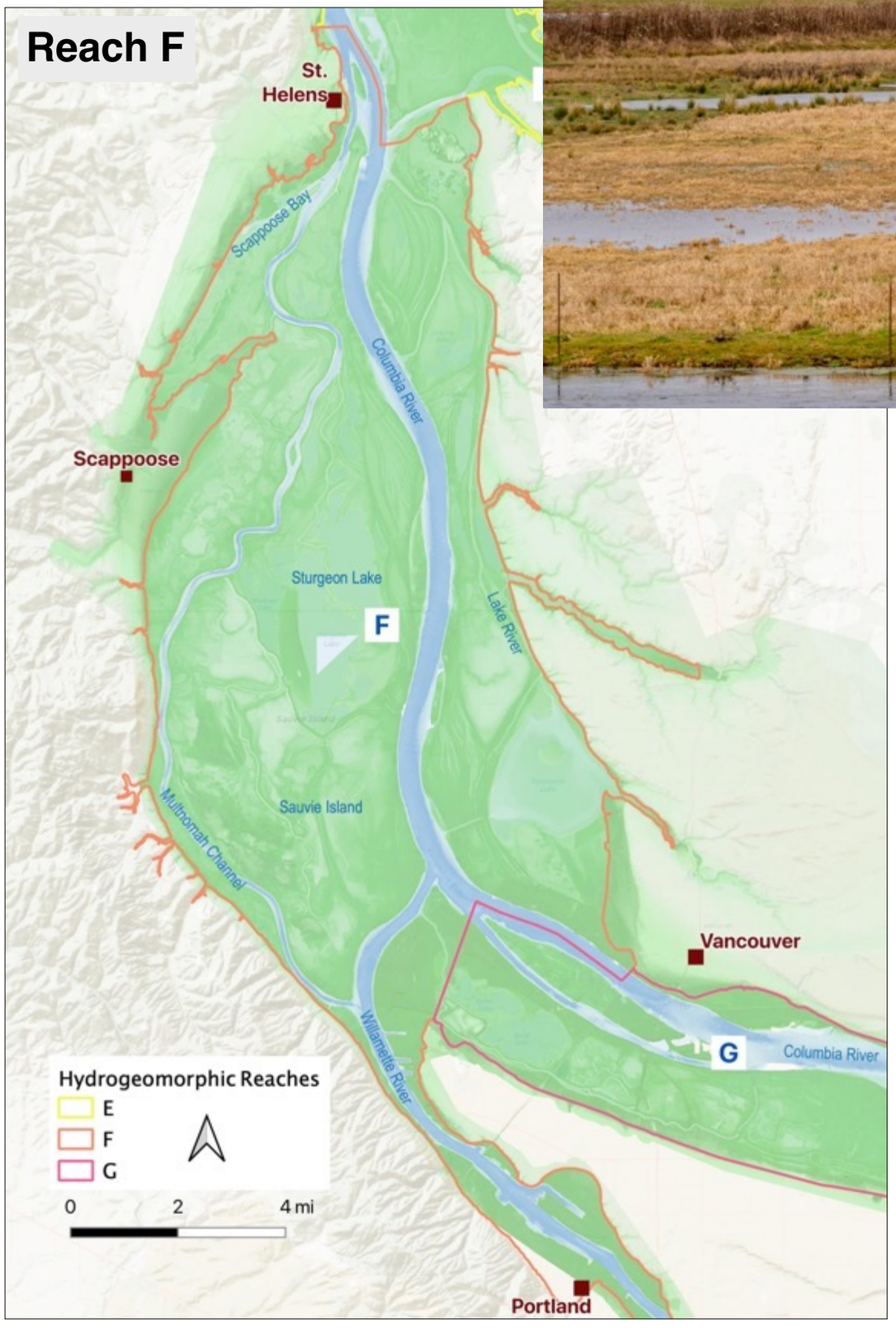


Reach A

Reach B

"Reach A: This reach extends from the river's mouth to the Astoria-Megler bridge, a dynamic area where estuary and ocean waters are extensively mixed. It has the highest salinity in the estuary and strong currents…."

"Reach B: From the Astoria-Megler bridge to Cathlamet, Washington, this is the widest valley bottom of the estuary…"



"…the widest floodplain reach of the upper estuary…"

Habitat

Descriptive; emphasize differences through the estuary, and at individual locations.

- *herbaceous wetlands*
- *shrub-scrub wetlands*
- *forested wetlands*
- *shrub-scrub uplands*
- *upland forest.*

Upper Estuary; Freshwater

Lower Estuary; Tidally Influenced

Example:

Forested Wetlands

**Referenced LCEP, PMEP, WMSWCD (Sauvie Island & Multnomah Channel Bottomlands Conservation Opportunities)*

Habitat

Shrub-scrub wetlands, upper estuary

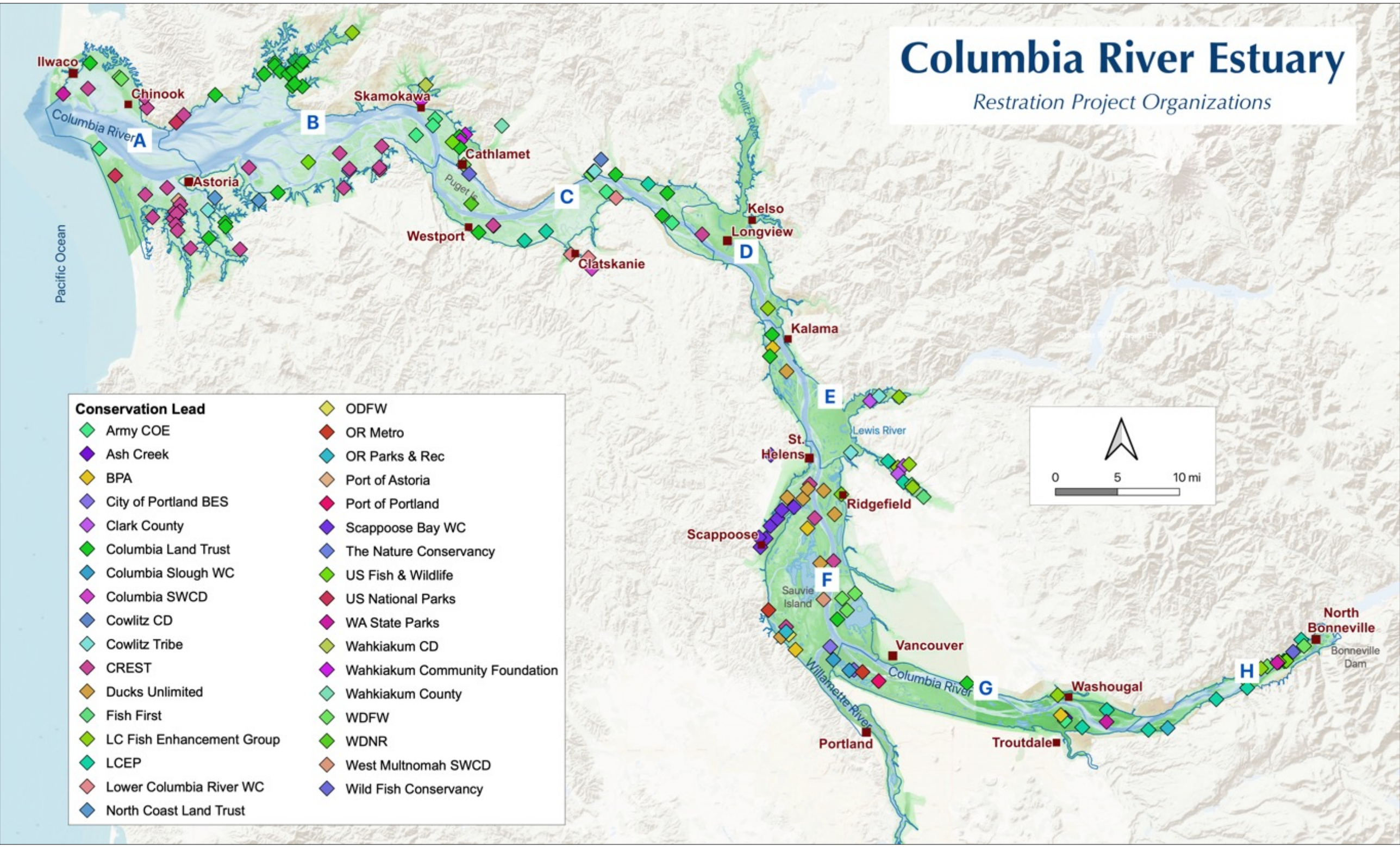
Habitat

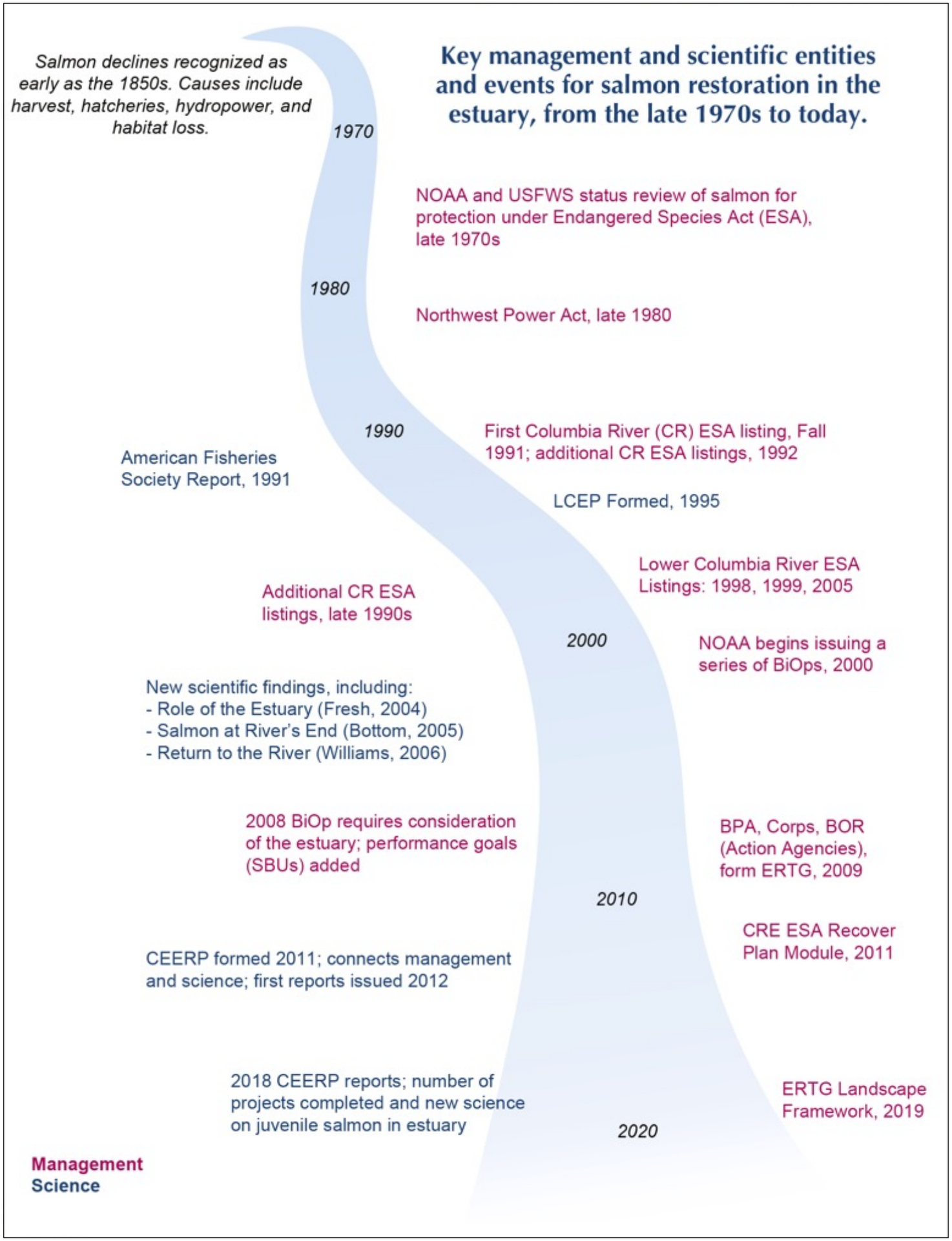
Tidal Wetlands

“This composite is a 97-acre tidal wetland fringed by a mix of conifer and deciduous species. The site was reconnected to tidal influence by CREST as part of a fish passage correction near Chinook, Washington.”

3- Management; recognizing the importance of the estuary

Making sense of decisions stemming from new research, and the many entities with different interests, funding, supporters, etc.





Changes in late 1990s and early 2000s; how new science shaped decisions.

Example: sampling studies of juvenile salmon first occurred in estuary tidal marshes in 2002.

KEY ENTITIES AND REGULATIONS

- National Marine Fisheries Service (NMFS) — part of National Oceanic and Atmospheric Administration (NOAA), is the regulatory agency for marine and anadromous fish, including Pacific salmon and steelhead.
- United States Fish and Wildlife Service (USFWS) regulates freshwater fish.
- Endangered Species Act (ESA) — U.S. federal law (1973) requires federal and state governments to protect species threatened with extinction.
- NMFS and USFWS write Biological Opinions (BiOps) — these analyze the effects of proposed federal actions. Sometimes they write a Reasonable and Prudent Alternative, which modifies the action to avoid damaging ESA-listed species.
- Bonneville Power Administration (BPA) — federal power marketing administration that sells power from hydroelectric projects in the Northwest (nonprofit).
- U.S. Army Corps of Engineers (Corps) — and US Bureau of Reclamation (BOR) — operate the federal Columbia River dams.
- Action Agencies (AA) — BPA, Corps, and BOR; these entities oversee and fund restoration projects within the Columbia River basin.
- Survival Benefit Units (SBUs) — performance goals for estuary restoration; included in 2008 BiOp and replaced by Project Benefit Units (PBUs) in 2020.
- Expert Regional Technical Group (ERTG) — reviews ecosystem restoration projects proposed by the AAs within the estuary's floodplain, with projects primarily scored by the assignment of SBUs/PBUs.
- Columbia Estuary Ecosystem Restoration Program (CEERP) — formed by BPA and the Corps to implement federal ecosystem restoration actions, and research, monitoring, and evaluation (RME) in the estuary.
- Restoration Sponsors — major entities that implement projects funded by AAs; including Columbia Land Trust (CLT), Columbia River Estuary Study Task Force (CREST), Lower Columbia Estuary Partnership (LCEP), and the Cowlitz Indian Tribe.
- Entities that provide technical and financial support for restoration projects include the Oregon Department of Fish & Wildlife (ODFW), Oregon Watershed Enhancement Board (OWEB), Washington State Salmon Recovery Funding Board (WRFB), Washington Department of Fish and Wildlife (WDFW), and many others.

TIMELINE OF EVENTS

- 1980 — The Northwest Power Act authorized Idaho, Montana, Oregon, and Washington to develop a regional power plan and a fish and wildlife program to balance the northwest's environment and energy needs.
- Late 1970s — NOAA and USFW, based on continued declining populations, began a status review to determine which populations might deserve protection under the Endangered Species Act (ESA).
- 1991 — American Fisheries report listing 214 depleted, naturally spawning Pacific salmon stocks.
- 1991-1992 — First ESA listings of Columbia River salmon.
- 1996 — NPA amended to "consider the impact of ocean conditions on fish and wildlife populations" when recommending hydropower mitigation projects for the Columbia River basin.
- 1999-2005 — Additional published research on role of estuary for salmon life history.
- 19997-98 — Oregon Plan for Salmon; OWEB begins funding Watershed Councils.
- 1999 — Washington creates Salmon Recovery Funding Board.
- 2000 — NOAA begins issuing a series of BiOps for Columbia River.
- 2008 — BiOp includes requirement for consideration of estuary, adds performance goals
- 2009 — NMFS publishes the Columbia River. Estuary ESA Recovery Plan Module for Salmon and Steelhead.
- 2011 — CEERP created, connecting management and scientific communities.
- 2012 — CEERP publishes first Strategy Report & Synthesis Memorandum; followed by Action Plan in 2013.
- 2018 — CEERP Synthesis Memorandum summarizes new estuary salmon findings: ecosystem restoration is improving habitat conditions for juvenile salmon in the estuary.
- 2019 — ERTG Landscape Principles released from ERTG.
- 2020 — new Columbia River estuary BiOp.

Scappoose Bay Watershed Council; local involvement in the estuary.

The Scappoose Bay Watershed Council (Council) is a non-profit entity run by a volunteer board of directors. In its over 20 years of operation, the number of staff has varied from none to as many as five full and part-time. Funding is solely through grants and partnership support.

Scappoose Bay Watershed is unique in the Columbia River estuary by its location on the Multnomah Channel, a 'distributary' (a river branch flowing away from the mainstream) of the Willamette River that flows over 20 miles along the west side of Sauvie Island. The Scappoose Bay Watershed has five major tributaries and salmon populations use both the upper, forested reaches and lower floodplains. Although technically part of the Willamette River, populations of Lower Columbia River salmon, including coho, winter steelhead, and sea run cutthroat trout use Scappoose Bay streams for spawning and rearing. Willamette River stocks may also use the lower reaches of these streams, and Lower Columbia fall Chinook and chum salmon were once abundant here.

In the first 20 years of existence, the Council completed several major studies and planning documents. These identified the conditions limiting salmon populations, and detailed specific locations and types of projects to improve habitat. Over 45 fish barriers were corrected by replacing undersized culverts with larger ones or bridges. Council management began to understand this was the 'low-hanging fruit' – salmon could get back up the tributaries, but continued research revealed the toll historical logging and development had taken.

The Council now works primarily on three fronts. Projects may enhance the upper reaches by adding large wood back into the streams, work to add roughness and complexity along the lower floodplain, and almost always have a component to increase riparian vegetation. The Council operates a native plant nursery to provide large numbers of plants to both individuals and Council projects.

But the Council also builds community. As an outreach entity, staff interact with landowners, business people, government, and long-time residents to understand concerns about development, flooding, fish and wildlife issues, and long-term livability within the watershed. Through restoration efforts the Council brought in over one million dollars in 2018 that was spent locally to hire contractors and purchase supplies and materials for projects.

This is an example of one of the many small entities working throughout the estuary. They are close to local communities and attentive to issues important to those who make this area their home, while working to support Lower Columbia salmon populations.

Golden paintbrush, lupine and blue-eyed Mary (left to right) are pollinator plants native to the Columbia River estuary and used in restoration projects. The watershed council runs a native plant nursery for education and restoration activities.

Stream restoration along South Scappoose Creek included pulling back incised banks to form shallower slopes and the addition of a large wood structure to create channel roughness. Photos show site with native vegetation prior to fall planting (left, top and bottom).

Planting native vegetation after adding large wood to Milton Creek (below).

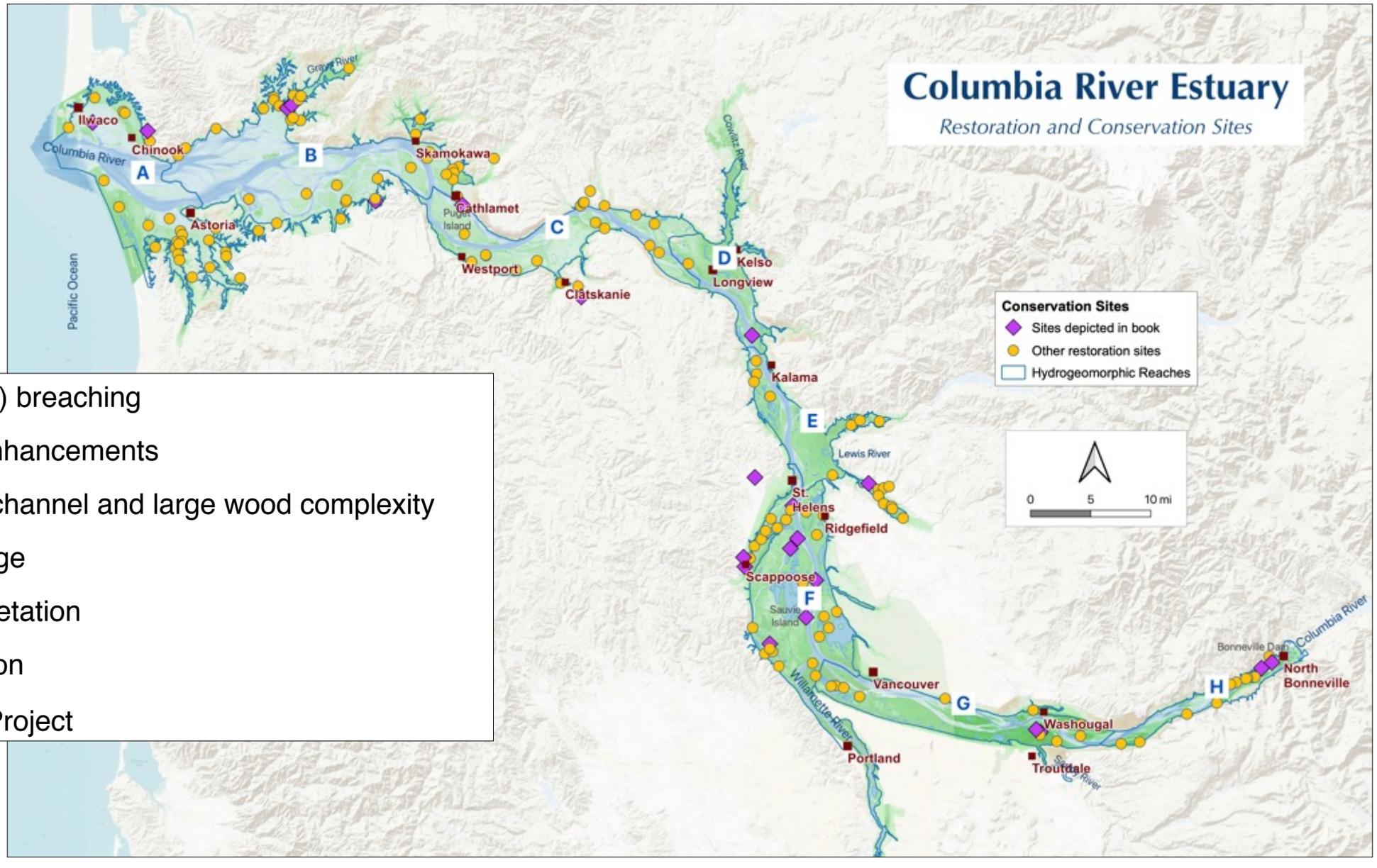
4- Restoration and Conservation, People and Projects

Restoration and Conservation, People and Projects

"Every salmon conservation or restoration effort in the estuary begins with an individual and an idea — a landowner seeking more natural habitat, a restoration practitioner who sees an area that can be enhanced, or a fisherman who believes there is a better way to manage the limited numbers of returning salmon…"

Heart of the story… roughly by project type; emphasizes the people involved.

- Dike (levee) breaching
- Wetland Enhancements
- Increased channel and large wood complexity
- Fish passage
- Native Vegetation
- Conservation
- Fish Trap Project



Levee breach on Gnat Creek; Cathlamet Bay

New connection on Sauvie Island; Crane Lake to Domeyer Lake

Wetland Enhancement, Sauvie Island

Tom Josephson explaining wetland water elevation control and changes.

Reconnected wetland on Sauvie Island

Personal Stories; Kammy Kern-Korot
(West Multnomah Soil & Water Conservation District)

Kammy Kern-Korot

The energy Kammy brings to her work intrigued me from our first meeting. She comes to a project with new ideas and ways to apply them. The results are readily visible through completed projects and with the ongoing outreach and relationships she has with landowners.

Seeing the results of what she does is one of the most enjoyable aspects of her work; there is immediate feedback visible. She also loves working with landowners who are passionate about natural resources, getting to educate folks, and the constant learning that supports her work.

Between a Bachelor Degree with majors in political science and Spanish, and a graduate degree in natural resources, Kammy worked for the Peace Corps in West Africa and "saw how natural resources affect human's ability to survive and thrive." As a senior conservationist for the West Multnomah Soil & Water Conservation District for over 15 years, Kammy is a resource to help landowners do voluntary work on their land and works to "connect folks to resources and technical expertise to meet their land management objectives."

There is no "typical day" — it varies by season but even within a given day there may be a mix of team meetings, administration, conservation plan and grant writing, meeting on-site with landowners (for an hour or a day), or supervising planting and monitoring activities. A big part of her work is simply educating — landowners, peers, community members. Her passion for understanding local plants, wildlife, and their interaction with local waterways transfers to those around her.

Kammy at project sites near Portland (left, and opposite page middle and lower right).

Her favorite plant is Oregon white oak, one of many species planted at restoration sites (opposite page, lower left).

Taking a break along a hike, Kammy sits on an oak branch (opposite page, upper right).

Responsiveness to project opportunities is important — she recently received a request from someone wanting to buy land to restore oak woodland and savanna habitat; she was able to connect them to resources. The Oregon white oak is a key species in our region. As her favorite species, the oak is not just beautiful (she loves its form), but it represents an ecosystem that's been neglected and needs more love! It's a hotspot for wildlife, and "it's ours!", as it exists nowhere else in the world. Locally, the estuary is important, but it's not just about the fish.

From her experience, she sees how local communities could offer additional support to landowners seeking to restore or better care for their property. This could be done through such things as reduced permit fees for restoration actions or expanded tax benefits for land supporting wildlife and open space (similar to what is available for agriculture and forest uses). She sees positive results now in the form of heightened awareness of natural resource issues and in local action of resource projects. For example, many organizations and nurseries now offer classes on planting for pollinators, naturescaping, and related activities.

The ecosystem is complex, but Kammy believes there are a lot of simple things people can do to make a difference — plant native trees to create shade and sequester carbon, flowering shrubs and wildflowers for pollinators, learn what the high priority weeds are and how to manage them, or be aware of what you put on your lawn or what you use to wash your deck. On a larger scale, understanding more about climate change and the importance of natural hydrology or how we've altered it with our power system — these are all things folks can do. Kammy would like each of us to "feel empowered to do something."

Channel Roughness - North Scappoose Creek

North Scappoose Creek

A composite of restoration work along North Scappoose, nine months after construction.

Channel Connections, West Sand Island

(Baker Bay) — CREST

Upper Tributaries; Dave Stewart (ODFW)

Dave Stewart

I followed Dave through several upper tributary creeks that support spawning and juvenile salmon rearing. He surveyed conditions as we found our way across riffles, going around jumbles of roots to avoid deep pools, or stepping over a downed log. I'm sure I slowed him down, but his enthusiasm for this work is unbounded.

Dave has worked for nearly 20 years along these streams, first as a researcher for the Oregon Department of Fish and Wildlife (ODFW) Research Lab and the Department of Environmental Quality Biological Section before moving to ODFW's Tillamook district office as a Conservation Biologist. He is now the Habitat Restoration Biologist for ODFW's North Willamette District.

Walking these streams is invaluable to those who follow with proposals and funding to put large wood back into the streams and rebuild the spawning tributaries for coho, steelhead and Chinook.

On our recent outing on the Clatskanie River, he immediately pointed out the visible bedrock, a result of lack of wood to hold gravel, and likely historic splash damming that would have sent large amounts of cut timber through this section — tearing away existing natural debris and scouring gravel. Without gravel, salmon cannot build their redds, limiting spawning. We found three Lower Columbia River Winter Steelhead redds along the 0.7 miles we walked, not nearly as many as the 25 to 50 per mile may have been historically. Each redd we saw were just upstream of a riffle. The gravel was larger than I expected, but the redds were about 2 feet long and an obvious mound.

Dave points out a steelhead redd (lower right, next page), while hiking and surveying the Clatskanie River.

Dave knows well how these streams function. He walks them with an eye to ideal locations for adding wood to collect gravel, create pools, and add shade. On each outing, he is locating possible places to add logs and log jams. Ideally there would be 100 pieces of wood per mile in a mix of single logs and log jams. As current conditions include nearby roads, placement is critical, so he scouts locations to encourage floodplain re-activation or a side tributary while considering access for a standing log to be felled into position.

When I asked why the existing standing trees were not supporting ideal stream conditions, he readily pointed out their size. The alders on the surrounding floodplain were tall, but not large enough in diameter to stay long in the stream when they fall. Trees approximately 0.6 meters (22 inches) in diameter at breast height (just above the root wad) are ideal. Then he pointed out the few standing Douglas fir; "The riparian area used to be covered in these; when these fall into the creek they stay forever." These trees catch additional logs, hold gravel, build pools, and create riffles — exactly the type of conditions salmon need.

Dave's territory extends from Silverton downstream along the Willamette to the Columbia and west past Clatskanie. Dave's work and ODFW's support were invaluable to understanding where and what the most beneficial projects are to pursue. His knowledge and enthusiasm guided my work, and the sheer number of stream miles he has hiked has played a significant role in restoring the upper reaches of Columbia River tributaries for salmon spawning and rearing habitat.

Overhanging maples and large Douglas fir are two tree species adding diversity, shade, and future large wood to the river (top two images).

Upper Tributaries

Fish Passages — Milton Creek (Dart Creek)

Fish Passage and Upper Tributaries

Fish passage to historic spawning and rearing streams is key to salmon population diversity. Large, visible dams on the Columbia River's mainstream and major tributaries are significant issues for salmon passage, but well before these were built, hundreds of smaller dams and culverts were constructed for municipal water supplies, stock watering, irrigation, mining, power generation, and access to upper watershed forests.[5] Large portions of watersheds have been cut off to divert water, limit flooding, and generate electricity. Dams and weirs constructed in lower portions of tributaries block access to miles of critical spawning and rearing streams.

Access to upper portions of estuary tributaries and those in the entire Columbia River basin is necessary to provide cooler, well-mixed (oxygenated) water where redds are built in the gravel beds.

Many of these upper reaches of native streams are fully blocked to returning salmon, but stretches may also have limited access due to undersized culverts (flow velocities increase dramatically in smaller culverts). Or a culvert is perched such that at low flows the water drop is greater than salmon can navigate.

Removing a culvert or replacing an undersized one with a larger structure such as a bridge, an open arch culvert, or even a larger culvert, has been applied in restoring streams in the estuary for many years. In the Scappoose Bay Watershed, over 47 fish passages were corrected through restoration efforts between 2002 and 2018, and several more are in the planning stages. These efforts opened many miles of upper tributary streams to spawning steelhead and coho salmon.

Pre- and post-construction of a culvert on Dart Creek, a tributary to Milton Creek in the Scappoose Bay watershed. The original culvert was undersized, perched at low flows, and failing. Replacement with an open-arch culvert opened fish passage access to upper portions of this stream.

Salmon swimming through a new culvert (top), photo by David Herasimtschuk / Freshwaters Illustrated.

Stream flow diversion is often necessary during culvert construction projects; any fish stranded are captured and released downstream. Pacific lamprey were found along with other fish in Dart Creek (bottom).

Native Vegetation

Specific plant species are selected to make the best use of their natural properties. For example, herbaceous plants such as slough sedge *(Carex obnupta)* are planted low on the slopes of restored streams because they have fast-growing root systems to collect and hold soil and are accustomed to being fully under water. Native willows are used extensively in riparian restoration projects; they grow rapidly and can quickly out-compete invasive species.

There are many advantages of using native plants for both small and large areas. They are adapted to the local climate, thus requiring less water and maintenance. They also support native wildlife including birds, bees, and many others, and foster local biodiversity.

Kammy Kern-Korot takes a photo of native vegetation restored on Sauvie Island.

Weed Warriors

The Weed Warriors are a loosely-formed group of hard-working, weed-killing individuals who have been tackling English ivy *(Hedera helix)*, Armenian blackberry *(Rubus armeniacus)*, and other invasive plants on and around Sauvie Island for many years. For a few hours almost every Tuesday morning, they meet with gloves, clippers, and other tools to release native species from the invasive plants that limit sunlight and nutrients for species that would otherwise thrive in these areas.

Started by Jane Hartline and with strong support by Shawn Looney and many regular members, the group removed ivy from long stretches along Highway 30 near Linnton and has recently been clearing blackberries along the trails in Wapato State Greenway on Sauvie Island.

Joining the group for several months, I discovered the joy of what can be accomplished in just a few hours a week. Discovering a fern under a patch of blackberries or seeing a native shrub released from behind a screen of seemingly endless vines — all while enjoying being outdoors — is a wonderful way to refocus on local surroundings.

Mike Rubenstein and Jane Hartline release native trees from blackberry vines in Wapato State Greenway on Sauvie Island (upper photos). The group also works to clear the understory along the trails (lower photo).

Their efforts have encouraged Oregon Parks and Recreation (the Greenway's landowner) to address invasive species on areas in the Greenway where they can bring in larger equipment.

Fish Trap — Research; Wild Fish Conservancy

Testing a historical method, updated to reduce bycatch and protect wild salmon.

- Multi-year project, spurred by a local fisherman
- Supported by WA Dept. Fish & Wildlife, WFC
- Proved validity of near 100% survival for wild salmon caught and released
- Value of freshly-caught salmon for markets
- Currently testing another site on Oregon side
- Received approval of method from WDFW as an “emerging commercial fishery”

“Fish selected for harvest are moved quickly by net from the water to Blair’s waiting process containers, and immediately iced. Biologists collect information on all fish (harvested or released) including size, species, origin and additional data.”

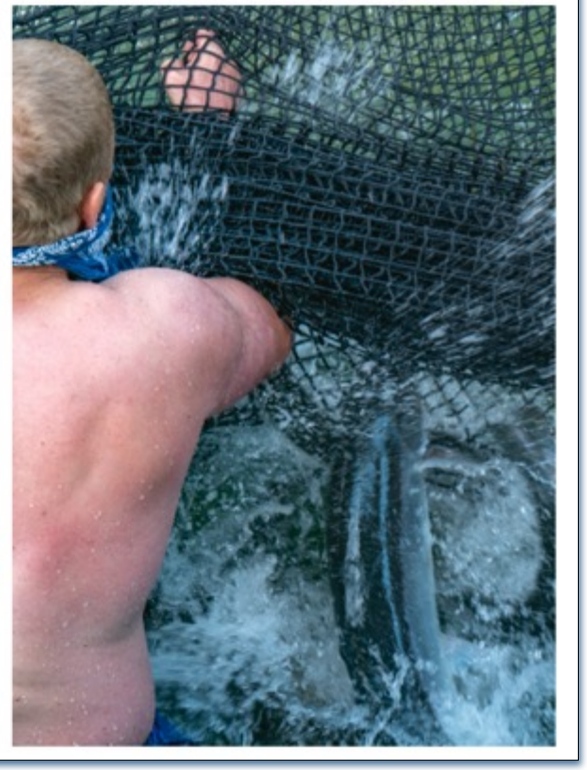
Fish Trap

Fish Trap Operation

There are long periods of quiet on the fish trap while waiting for tide changes and salmon to find their way into the system. As the salmon enter though, the energy level increases significantly, and multiple times during the day the actions of spilling, data collection, and fish release take over.

The process of research and harvest includes multiple steps. (this page and next)

- *Lookouts, watching for incoming fish and filling chambers (top)*
- *Net-pulling and spilling (middle and bottom right)*
- *Harvest (or release), is done swiftly and carefully (bottom left).*




PAIA
FISHMARKET

Additional Fish Photos; from Conrad Gowell, Wild Fish Conservancy

Restoration and Conservation, People and Projects

Projects

- Gnat Creek; CREST, dike breech and wetland enhancement
- Sauvie Island; multiple wetland enhancements, Sturgeon Lake reconnection
- Lower McCarthy Creek; wetland enhancement and reconnections
- Sand Island, Baker Bay; CREST, channel connections and complexity
- Kalama and Hardy Creeks; Lower Columbia Fish Enhancement Group, channel roughness
- Dart Creek; SBWC, Fish Passage
- Fish Trap; Wild Fish Conservancy, alternative fishing gear

People interviewed; many presented as Sidebars

- Tom Josephson, CREST
- Kammy Kern-Korot, WMSWCD
- Ken and Lorna Hill; North Scappoose Creek - channel roughness
- Dave Stewart; ODFW, upper tributaries
- Weed Warriors; Jane Hartline and many others
- Blair Peterson; Cathlamet fisherman
- Dan Bottom; National Oceanic and Atmospheric Administration (retired)

Closing Thoughts

"What have I learned…

"What is the future of Pacific Salmon populations in the estuary?

"I consider restoring salmon runs to be an absolute necessity to support the economic and ecological system of the Columbia River. It seems to me a key to succeeding at this is an approach that values the ideas and on-the-ground efforts of many, from all levels of experience."

Positive level of commitment and engagement by those working in the field, and the new ideas brought to the work… adapting to new science.

Thank you to everyone who made the book possible

Dan Bottom — multiple reviews, input, and advice

Tim Mattson, Kathleen Mattson, Dave Miller, Janelle St. Pierre — reviews and layout ideas

Kammy Kern-Korot, Tom Josephson, Dave Stewart, Blair Peterson, and others — interviewed for stories

Noah Mattson, Tricia Daly-Welle, Jamie Glasgow — writing contributors

Conrad Gowell — fish photography

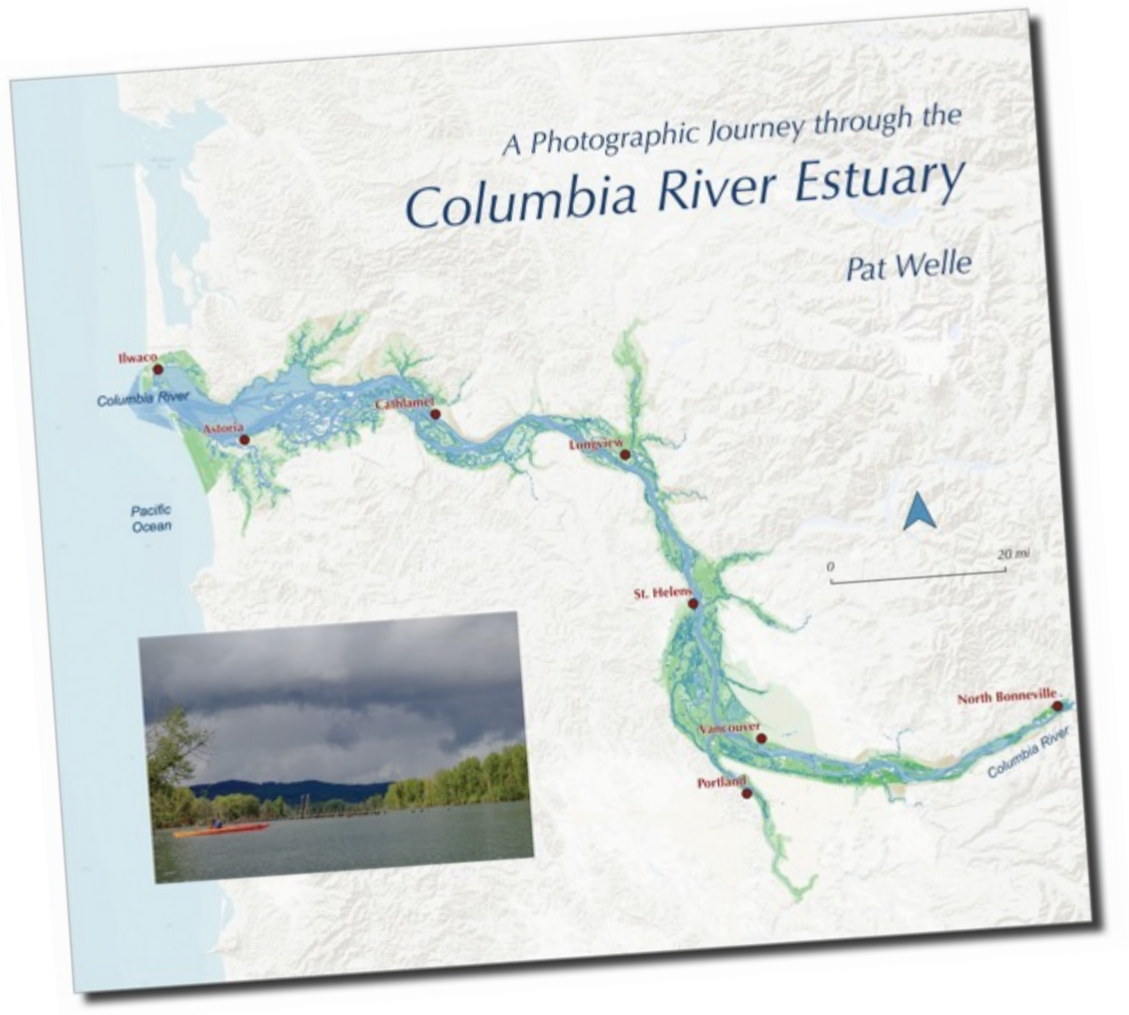
Keith Marcoe — mapping support

Barbara White and many others — ongoing advice and reviews throughout project

Book Distribution

In Columbia River Maritime Museum, and multiple bookstores in Astoria and southwest Washington; available on website.

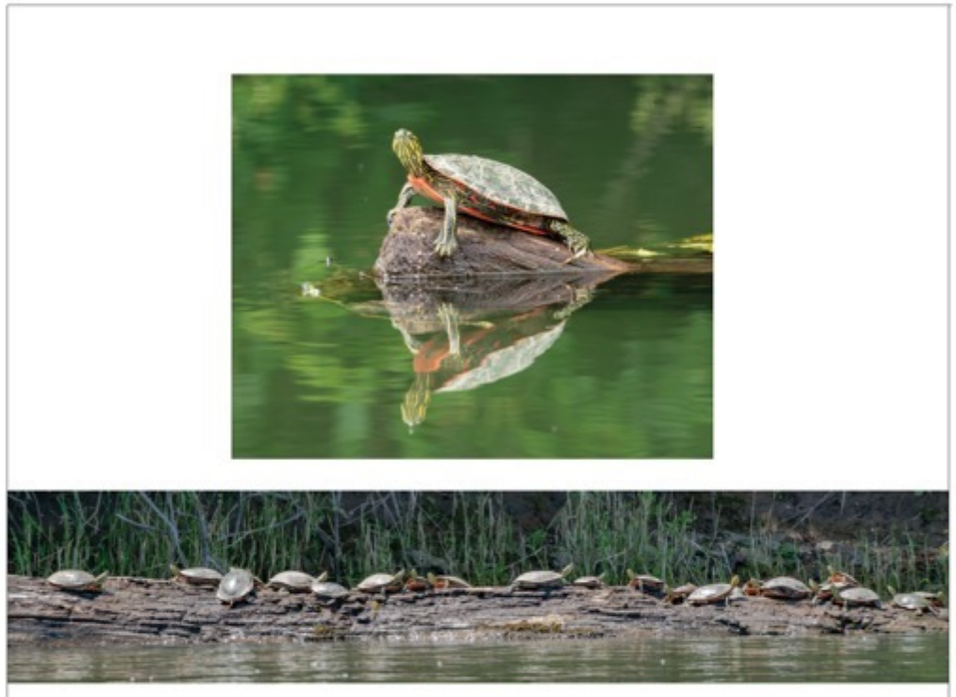
Bring the book to libraries, local museums, universities, and bookstores throughout estuary. Awareness of the book through presentations, online events.



hardbound, 10x8"; 54 pages

The "companion" book:

A Photographic Journey through the Columbia River Estuary



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Morning in Ilwaco harbor (above); Waikiki beach at the mouth of the Columbia River (opposite page).

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Nature's View
(monthly, online journal)

sign-up online or
email me to put you on the list

Nature's View, September 2021

We had a visitor a few weeks ago...

Long-billed Curlew *(Numenius americans)*

This long-billed curlew flew into our yard near the wetland bordering Willapa Bay in mid-August. They are a migratory species here, spending summers on grasslands and prairies. The Willapa National Wildlife Refuge Project Leader noted "they are a common migrant, but not a common sight." A friend and I enjoyed watching as the bird walked (strutted!) about the yard, then headed west toward our open field.

Transitions of the Evergreen Huckleberry

The Evergreen huckleberry *(Vaccinium ovatum)* grows very well in the lush forests around Willapa Bay. I find it in both shady and sunny locations, often on the edges of the forests; it's a great place to see small birds, hiding and foraging. These images are some of the many changes I watched through the summer transition; mid-June, July and August *(l-r)*.

Nature's View, October 2021

The changing light of fall has arrived.

Willapa Bay and Long Island under September moonlight.

I'm enjoying these longer periods of warmer light, and the quiet sounds of mornings and evenings. With the cooler, moister weather, even the plants seem to have offered up a sense of relief!

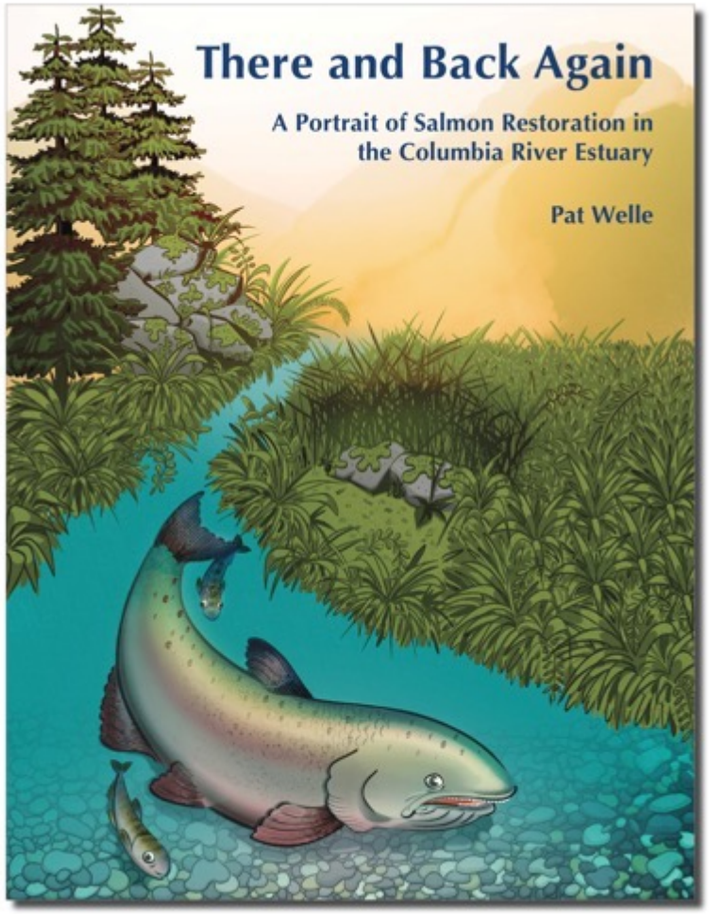
Thank you!

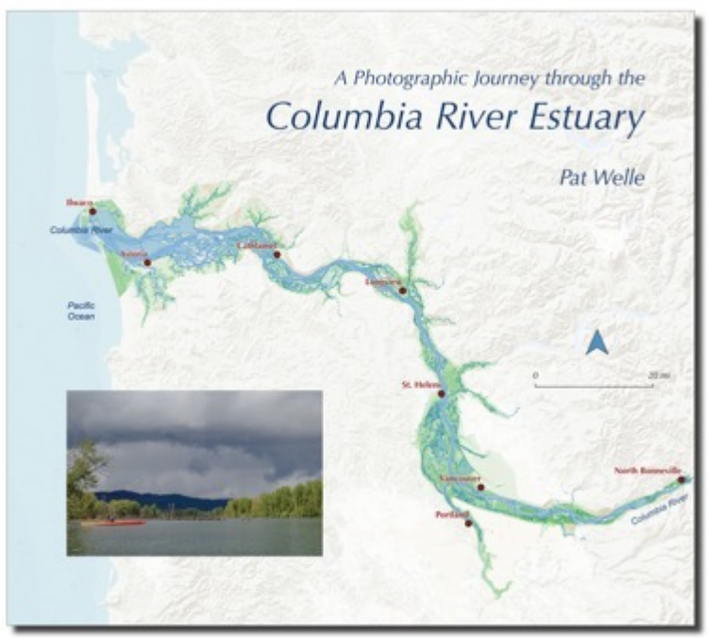
Both books are available online (includes free shipping)

There and Back Again: $46; A Photographic Journey: $28

Use code: ***LCRWC*** *for 10% discount through November 30*

www.patwelle.com





Please help me tell our story!

Email with any questions; or ideas / requests for other presentations:

pat@patwelle.com

Pat Welle PHOTOGRAPHY