RESOURCES

Stakeholder Information Sheets

Salmon Fact Sheets

Campus Planning Reports

Hatchery Case Studies

Project Case Studies

Course Assignments

LONG LIVE THE KINGS

Location: Seattle, WA

Year Founded: 1986

Website: www.lltk.org

Mission: Restore wild salmon and support sustainable fishing in the PNW

MISSION

"Our mission is to restore wild salmon and steelhead and support sustainable fishing in the Pacific Northwest. Since our founding in 1986, we have combined innovative field work, pioneering science, broad partnerships, and sophisticated new management tools to help decision-makers advance salmon recovery while balancing the needs of fish and people."

HISTORY OF ORGANIZATION

LLTK was founded in 1986 by a group of salmon enthusiasts who were concerned with the decline of wild salmon. The founders were intrigued with the idea of rebuilding and sustaining wild salmon populations in the near term by means of artificial propagation.

LLTK's first project was to transform a traditional hatchery on the Wishkah River into a workshop for innovative fish-rearing strategies targeting wild fish recovery. These rearing strategies mimicked nature, increased the population size through hatcher-reared fish supplementation and a restored habitat for all.

LLTK's founder, Jim Youngren, built Glenwood Springs Hatchery on Orcas Island in 1978. By utilizing springs on the island, he was able to develop rearing ponds. A Chinook salmon run was later installed due to the island's geographic isolation from wild spawning salmon. LLTK staff assumed operation in 1986, and the program continues supporting sport and commercial fishers from Washington to Alaska.

CURRENT FOCUS + WORK

LLTK has developed programs with a series of partnerships, combining on-the-ground field work with scientific innovation. Their focus on rebuilding populations, advancing science and retooling management, aims to help decision makers advance salmon recovery while balancing the needs of fish and people.

REBUILDING POPULATIONS

Hood Canal Steelhead Project

Project Overview

At the start of the project, the Hood Canal Steelhead population was at the brink of extinction. LLTK partnered with NOAA Fisheries and six other entities to test and assess innovative approaches to boost fish abundance. The approach centered around low-impact, time-limited hatchery interventions, and the study provided information about the efficacy of hatcheries as conservation tools throughout the Northwest.

The Problem

Washington's state fish, the steelhead, has been on the decline in Puget Sound. This species is listed threatened under the Federal Endangered Species Act. One hundred years ago, steelhead populations in Puget Sound ranged from 350,000 to 800,000 annually. Today, there are roughly 13,000 annually, and fewer then 1,500 return to the Hood Canal. Traditional hatcheries have lead to the decline of wild salmon by weakening the genetic fitness of these populations. LLTK has looked into artificial propagation utilizing new technologies as one tool for recovering wild populations.

The Solution

LLTK and partners developed the first-of-its-kind basin-wide study to assess the effects and effectiveness of hatchery supplementation using low-impact wild steelhead rearing techniques. Traditional hatcheries collect adult steelheads and spawn them artificially. The LLTK's program collects eggs from redds (nests) of adults until after they spawn in the wild, allowing for natural selection to occur. After the eggs hatch, spawns are reared for two years at their natural growth rates. Some of the spawns are reared for four to five years and released as adults to make immediate contributions. The project is in year nine of sixteen and has doubled the steelhead population in the Hood Canal.

ADVANCING SCIENTIFIC UNDERSTANDING

Hood Canal Bridge Ecosystem Impact Assessment

Project Overview

LLTK and partners are seeking to pinpoint the cause of high steelhead mortality and to gauge the Hood Canal Bridge's effect on water quality. As the assessment progresses the team will develop, test, refine, and carry out solutions to address adverse impacts of the bridge.

Figure 1. Hood Canal steelhead

The Problem

The Hood Canal Bridge carries State Route 105 across the Canal's northern outlet, connecting the Olympic and Kitsap Peninsulas. The floating bridge and its pontoons span 83% of the width of the Hood Canal and extend 15 feet underwater. Studies have shown that 65% of juvenile steelheads do not make it north to the Strait of Juan de Fuca, with evidence pointing to the bridge as a migration barrier. Furthermore, computer modeling suggests the bridge's pontoons may reduce circulation in and out of the canal by 12%.

The Solution

The team will identify how the pontoons affect migration, heighten fish densities, increase susceptibility to predation, and whether structural voids in the bridge are aggregating plankton and attracting salmon (see Figure 2). The team will pinpoint the causes of the problem in order to implement solutions.

RETOOLING MANAGEMENT

Salish Sea Marine Survival Project

Project Overview

Canadian and US researchers have teamed up to determine why juvenile Chinooks, cohos and steelheads are dying in the Salish Sea. This holistic study will uncover the physical, chemical and biological factors impacting salmon survival.

The Problem

Populations in the Salish Sea have declined up to 90%. Many factors are affecting the Salish Sea salmon populations such as changing water temperatures, reductions in food supply, marine mammal increase, contaminants and disease.

The Solution

Researchers are assessing young salmon and steelhead growth, health, and diet; monitoring marine conditions; tracking fish and marine mammal movements; and developing technologies to promote salmon recovery and sustainable fisheries. This study will provide results and tools for action that improves hatchery, harvest, and ecosystem management.

SOURCES:

- LLTK Home. (n.d.). Retrieved March 29, 2018, from https://lltk.org/

Figure 2. Juvenile chum salmon aggregating under the Hood Canal Bridge

MUCKLESHOOT INDIAN TRIBE

Location: Auburn, WA

Website: http://www.muckleshoot.nsn.us/

COLLECTIVE

Beginning

The Muckleshoot Tribe is a collection of peoples descended from the early inhabitants of the Duwamish and Upper Puyallup tribes. The name Muckleshoot came from the native name for the Reservation that was allocated for them in 1857. The people that make up the Muckleshoot Tribe have inhabited this area for thousands of years before the first white settlers came in the 1850's. The map on the right shows a comparison of the ancestral lands vs the current Reservation lands.

"The right of taking fish, at all usual and accustomed grounds and stations, is further secured to said Indians in common with all other citizens of the Territory, and of erecting temporary houses for the purpose of curing them, together with the privileges of hunting, gathering roots and berries, and pasturing their horses on open and unclaimed lands."

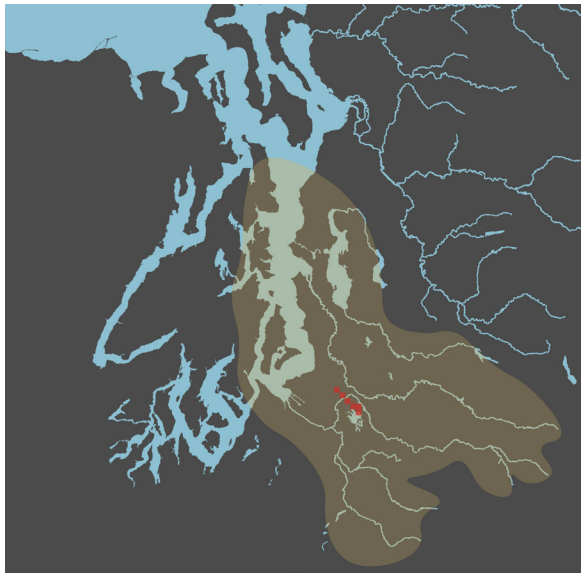
TREATY RITES

The Muckleshoot Reservation was a part of the Western Washington Treaty of 1954. This treaty both recognized the Tribes as a sovereign government, but also gave the Muckleshoot fishing rights. These rights, along with the promised amount of lands were not honored by the European aliens that had come to Washington State.

After years of oppression and poverty, as well as great effort, the Muckleshoot peoples finally won the rights promised them in the Treaty of Point Elliott and Treaty of Medicine Creek. The ruling by Judge Boldt finally entitled the Muckleshoot's as well as other tribes the right to 50% of the fishing harvest.

MUSKLESHOOT ANCESTRAL LANDS

Showing the area that Muckleshoot ancestors hunted and lived before the Treaty of 1954.



POST-RULING

Capitol gains

In the early 1990s, the Muckleshoot Tribe began investing monies from renewed access to fishing into bingo and casino gambling. Through continued success, the Tribe has been able to expand its holdings into other businesses. These holdings now include: Muckleshoot Seafood Products, the Muckleshoot Mini Mart, the Salish Tree Farm, the White River Amphitheater, the Salish Lodge, and Emerald Downs.

Figure 1. Muckleshoot Casino, opened April 1995

COMMUNITY INVESTMENT

Elders in the community, confronted with both fiscal success and responsibility, have made great effort to reinvest the new found wealth back into the community. The Muckleshoot Tribe not only invested money into the housing and educational programs for the Tribe, but has also donated to nearby communities.

The Tribe donates millions of dollars to hundreds of non-profits in the community. These programs include, but are not limited to, Learning Seed and Pediatric Interim Care. This makes the Muckleshoot Tribe the second largest employer in south King County.

Much of this money also goes into salmon restoration and protecting the fishing rights of the Tribe. The UW Aquatic Research Center would be one of many programs where the Muckleshoot Tribe is a significant financial partner.

IMPORTANCE OF CHINOOK

Many of the Native Peoples in the Duwamish and Columbia River valleys share in a sacred rite and ceremony. This shared ceremony happens when the salmon run begins. After allowing the run to go upstream unmolested, one chosen fisherman is allowed to ceremonially kill one salmon. This salmon is then shared with the entire tribe. The bones of the salmon are then returned to the water, and it is believed that it makes its way upstream to finish its life. Salmon are seen as sacred, and respecting the cycle so that it occurs for future generations is a deep rooted part of the Muckleshoot Tribe's values and traditions.

SOURCES:

- (N.D.). Retrieved April 02, 2018, from http://www.muckleshoot.nsn.us/default.aspxmuskle-shoot tribe
- (N.D.). Retrieved April 02, 2018, from http://www.npaihb.org/member-tribes/muskleshoot-tribe/#145047582039149a99642a785nwcouncil.org.
- (N.D.). Retrieved April 02, 2018, from http://www.nwcouncil.org/history/firstsalmon

SCHOOL OF AQUATIC AND FISHERY

Location: Seattle, WA

Year Founded: 1919 (Centennial in 2019!)

Website: fish.uw.edu

Mission: Protect our world's aquatic systems through high caliber teaching, research and partnerships.

Students: 120+ Undergraduate and 50+ Graduate

Degrees Offered:

- Doctor of Philosophy in Aquatic and Fishery Sciences
- Master of Science in Aquatic and Fishery Sciences
- Bachelor of Science in Aquatic and Fishery Sciences
- Minor in Aquatic and Fishery Sciences

MISSION

"The School of Aquatic and Fishery Sciences (SAFS) is dedicated to sustaining healthy marine and freshwater environments. Our faculty conduct innovative research from the organism to the ecosystem scale and are recognized leaders in aquatic biology, sustainable fisheries management, aquatic resource conservation, and resource management. We study natural systems and species and present solutions to foster the sustainable use of aquatic resources."

HISTORY OF ORGANIZATION

SAFS was founded in 1919 as the College of Fisheries (COF), the first in the United States. The School was founded by John N. Cobb, who served as the first director. The School survived through the depression and WWII, and expanded in the 1960s to finally become SAFS as we know it today in 2018.

CURRENT FOCUS + WORK

"At the heart of our work, we examine human-induced effects on ecosystems, such as habitat change and restoration, climate change and effects of invasive species." - fish.uw.edu/about

The school began with a focus on seafood and food-related processing, which evolved over the years to include fish propagation and aquaculture, and more recently to environmental and conservation-related research and work.

Today the school is a national and global hub of fisheries and aquatic research and has several satellite field stations and outreach programs.

FACULTY

34 Core Faculty

12 Administrative Staff Members

22 Research Staff Members

6 Adjunct Faculty

70 Affiliate Faculty

FACILITIES

SAFS occupies four buildings on UW's South Campus. They include:

- Fisheries Science (FSH)
- Marine Studies Building (MSB)
- Fisheries Teaching and Research Building (FTR)
- Fisheries Center

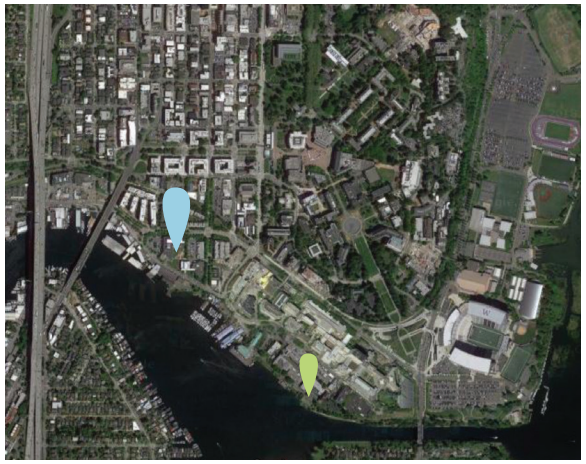


Figure 1. SAFS (Blue) and Old Hatchery (Green) locations

Figure 2. Mural inside Fisheries Science building

SCIENCES

UW COLLEGE OF THE ENVIRONMENT

The school has several research facilities including:

- SAFS Molecular Genetics Facility - inside MSB
- Washington Cooperative Fish and Wildlife Research Unit (WACFWRU)
- Alaska Salmon Program in Bristol Bay, Alaska. SAFS has six field stations in this area
- Big Beef Creek research station, on Hood Canal, Washington
- Shellfish research laboratory on Puget Sound at Manchester, Washington
- Research Collections:
- The UW Fish Collection, part of the UW Burke Museum of Natural History and Culture, housed in FTR.
- Fisheries Archive, housed in FSH

SAFS HATCHERY

The UW SAFS Hatchery was started in 1949 with Chinook and coho was added in 1959. Its early mission, soon after WWII, was testing the effects of radioactivity on salmonids' homing abilities. The hatchery was renovated in 2002 with a new design that better supported long term, multi-generational experiments planned by SAFS. However, the hatchery was closed in 2010 due to failing infrastructure, associated decline of faculty interest and support.

Chris Grue and graduate student Kerensa King used the hatchery salmon runs to study the effects of pesticides on coho reproduction in urban streams in Western Washington. Their study influenced researchers studying the causes of poor survival rates of returning adult coho to review the effects of contaminants associated with highway runoff.

Like the old facility, a new Aquatic Research Facility should have the capacity for many different kinds of experimental research.

AQUATIC RESEARCH TODAY

Active aquatic research continues today even without the salmon run and hatchery. Faculty and visiting researchers are looking at issues related to climate change and global health.

SOURCES:

- Duke, M. (2004). Newsletter of the School of Aquatic and Fishery Sciences, Autumn 2004. Retrieved April 01, 2018, from http://depts.washington.edu/safs/newsletter/archives/SAFS6.pdf
- Hines, S. (October 31, 2010). UW Losing 60-Year Tradition Of Salmon Returning To Campus. Retrieved April 01, 2018, from http://www.washington.edu/news/2010/10/31/uw-losing-60-year-tradition-of-salmon-returning-to-campus-2/
- UW School of Aquatics and Fishery Sciences. Retrieved April 01, 2018, https://fish.uw.edu
- Punt, A. (2018) From the Atom Bomb to Fish Runs: Research and Teaching in the SAFS Aquatic Facilities. Retrieved April 01, 2018, https://fish.uw.edu/wp-content/uploads/sites/4/2018/03/SAFS-News-aut-2017-win-2018-color.pdf

Figure 3. Former SAFS Hatchery on the Montlake Cut, c. 1961

Figure 4. Kids watch at the old hatchery, c. 1990s

WA DEPT. OF FISH AND WILDLIFE

HQ Location: Olympia, WA, six regional offices

Year Founded: 1890 (1st WA Fish Commisioner)

1994, today's WDFW was formed

Website: https://wdfw.wa.gov

Mission: Conservation of Washington's fish and wildlife resources and ecosystems.

Stats: 1,800 employees, $215 million annual operating budget

MISSION

"To preserve, protect and perpetuate fish, wildlife and ecosystems while providing sustainable fish and wildlife recreational and commercial opportunities."

- Goal 1: Conserve and protect native fish and wildlife
- Goal 2:Provide sustainable fishing, hunting, and other wildlife-related recreational and commercial experiences
- Goal 3: Promote a healthy economy, protect community character, maintain an overall high quality of life, and deliver high-quality customer service
- Goal 4: Build an effective and efficient organization by supporting our workforce, improving business processes, and investing in technology"

HISTORY OF ORGANIZATION

March 1890 - The first Fish Commissioner, James Crawford, was appointed by Governor Elisha Ferry

1891 - State Legislature appropriated funds for a salmon hatchery.

1895 - The first salmon hatchery was built and dedicated in 1895 on the Kalama River.

1915 - Legislature passed a new Game and Game-Fish Code that provided for a Chief Game Warden and a Fish Commissioner both managed under Chief Game Warden L. H. Darwin, Department of Fish and Game.

1921 - Legislature abolished the Fish Commission and replaced it with a Department of Fisheries with a Division of Fisheries and a Division of Game and Game Fish.

1932 - An initiative separated food fish and game fish and created a Department of Fisheries (for food fish) and a Department of Game (for game fish) under a six member Commission.

1987 - Legislature changed the Department of Game, with a Commission-appointed director, to the Department of Wildlife with a director appointed by the Governor.

1994 - Legislature merged Department of Wildlife and Department of Fisheries, creating Department of Fish and Wildlife (WDFW). WDFW has a 9-member Commission and the WDFW Director is appointed by the Commission."

CURRENT FOCUS + WORK

"The Washington Department of Fish and Wildlife (WDFW) is dedicated to preserving, protecting and perpetuating the State's fish and wildlife resources.

Washington Department of FISH and WILDLIFE

Figure 1. WDFW Logo

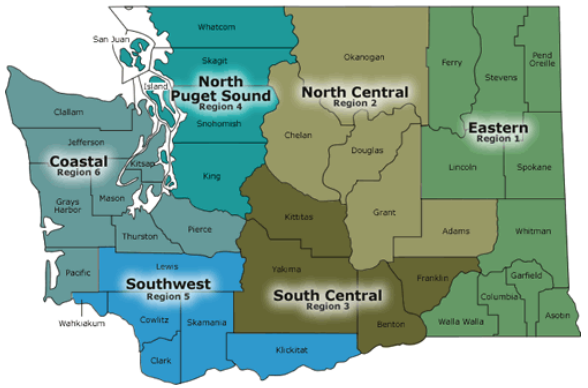


Figure 2. WDFW Regions Map.

The department operates under a dual mandate from the Washington Legislature to:

- Protect and enhance fish and wildlife and their habitats.
- Provide sustainable, fish- and wildlife-related recreational and commercial opportunities."

These mandates often conflict. How can you preserve and enhance ecosystems while also supporting access and extraction?

DEPARTMENTS

- Conservation
- Fishing
- Hunting
- Enforcement
- Wildlife Viewing
- Licencing and Permits
- Living with Wildlife Education

HATCHERIES

Sustainable fisheries, wild stock conservation.

For more than a century, WDFW hatcheries have produced fish for harvest. Today, hatcheries provide the foundation for the State's vastly popular recreational fisheries and the thousands of jobs that depend on them.

In recent years, hatcheries have taken on an additional new role. They are becoming an essential tool in the conservation of native salmon stocks. Indeed, as far back as 1977, long before any fish species was listed under the Endangered Species Act, a WDFW hatchery was being used to stave off extinction for a spring Chinook stock. Presently, about a third of the State's hatcheries are used in some capacity for wild stock conservation work.

To ensure hatcheries can carry out the dual role of wild stock conservation and sustainable fisheries in an environmentally sound manner, WDFW has joined with tribal, federal and private scientists to examine hatchery operations and determine what structural and operational changes are necessary. The goal of this unprecedented collaborative effort, launched in 2000 and facilitated by the non-profit conservation group Long Live the Kings, is to ensure the best available science is developed and applied in the years ahead as hatcheries fulfill their new dual role.

WDFW has 83 hatcheries in the state, which are actively involved in hatchery reform.

SOURCES:

- WA Department of Fish and Wildlife. (n.d.) Retrieved April 01, 2018, from https://wdfw.wa.gov
- Hatchery Reform Project. (n.d.) Retrieved April 01, 2018, from http://hatcheryreform.us

Figure 3. Cowlitz Hatchery

Figure 4. WDFW canine officer watching over a river.

FACT SHEET:
BASIC FACTS ABOUT PACIFIC NW SALMON

WHAT IS A SALMON

Salmon is the common name for several species of ray-finned fish in the family Salmonidae. Other fish in the same family include trout, char, grayling and whitefish. Salmon are native to tributaries of the North Atlantic (genus Salmo) and Pacific Ocean (genus Oncorhynchus). Many species of salmon have been introduced into non-native environments such as the Great Lakes of North America and Patagonia in South America. Salmon are intensively farmed in many parts of the world.

PACIFIC NW SALMON + RELATED FISH

- Pink: *Oncorhynchus gorbuscha*
- Sockeye: *Oncorhynchus nerka*
- Coho: *Oncorhynchus kisutch*
- Chum: *Oncorhynchus keta*
- Chinook: *Oncorhynchus tshawytscha*
- Steelhead: *Oncorhynchus mykiss* (formerly *Salmo gairdneri*)
- Cutthroat: *Salmo clarki clarki*

LIFECYCLE

Salmon are native to the world's two biggest oceans and the rivers draining into them. The Atlantic Ocean has only one species, the Atlantic salmon, while in the Pacific Ocean there are several species including pink, chum, sockeye, coho, Chinook and amago. Salmon spend their juvenile phase in rivers before migrating to sea to grow and mature. To complete their life cycle they return to their river of origin to spawn. The salmon who adopt this life cycle are called anadromous. The cycle begins in freshwater, when a redd, or a female's nest of eggs, is fertilized. These eggs remain in the gravel throughout the winter, and the embryos develop. In the spring, the eggs hatch and alevins emerge.

Adults return to their natal streams to spawn. Eggs are laid in deeper water with larger gravel, and need cool water and good water flow (to supply oxygen) to the developing embryos. Mortality of salmon in the early life stages is high due to natural predation and human-induced changes in habitat, such as siltation, high temperatures, low oxygen, loss of stream cover, and reductions in river flow. Estuaries and their associated wetlands provide vital nursery areas for the salmon prior to their departure to the open ocean. Wetlands help buffer the estuary from silt and pollutants, and provide important feeding and hiding areas.

FARMED SALMON

Salmon aquaculture is a major contributor to the world production of farmed finfish, representing about US$10 billion annually. Other commonly cultured fish species include: tilapia, catfish, sea bass, carp and bream. Salmon farming is significant in Chile, Norway, Scotland, Canada and the Faroe Islands; it is the source for most salmon consumed in the United States and Europe.

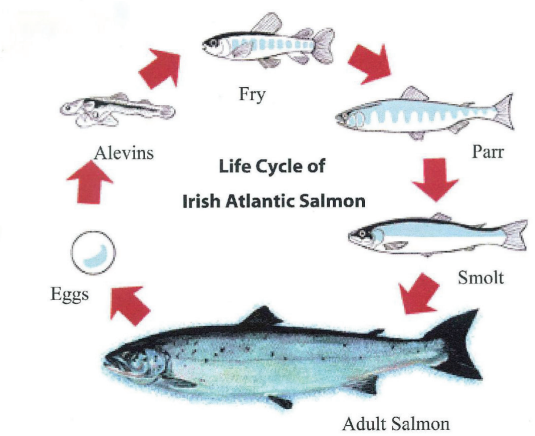


Figure 1. Salmon Life Cycle

Figure 2. Pacific salmon leaping at Willamette Falls, Oregon

Salmon are carnivorous. They are fed a meal produced from catching other wild fish and other marine organisms. Salmon farming leads to a high demand for wild forage fish. Salmon require large nutritional intakes of protein, and farmed salmon consume more fish than they generate as a final product. To produce one pound of farmed salmon, products from several pounds of wild fish are fed to them. As the salmon farming industry expands, it requires more wild forage fish for feed, at a time when 75% of the world's monitored fisheries are already near to or have exceeded their maximum sustainable yield. The industrial-scale extraction of wild forage fish for salmon farming affects the survivability of the wild predator fish which rely on them for food.

Work continues on substituting vegetable proteins for animal proteins in the salmon diet. This substitution results in lower levels of the highly valued omega-3 fatty acid content in the farmed product.

MANAGEMENT

The population of wild salmon declined markedly in recent decades, especially wild salmon in the Snake and Columbia River systems in northwestern United States.

Salmon population levels are of concern in some parts of the Pacific. Alaska fishery stocks are still abundant, and catches have been on the rise in recent decades, after the State initiated limitations in 1972. Some of the most important Alaskan salmon sustainable wild fisheries are located near the Kenai River, Copper River, and in Bristol Bay. Fish farming of Pacific salmon is outlawed in the United States Exclusive Economic Zone, however, there is a substantial network of publicly funded hatcheries, and the State of Alaska's fisheries management system is viewed as a leader in the management of wild fish stocks. In Canada, returning Skeena River wild salmon support commercial, subsistence and recreational fisheries, as well as the area's diverse wildlife on the coast and around communities hundreds of miles inland in the watershed. The status of wild salmon in Washington is mixed. Of 435 wild stocks of salmon and steelhead, only 187 of them were classified as healthy; 113 had an unknown status, one was extinct, 12 were in critical condition and 122 were experiencing depressed populations. The commercial salmon fisheries in California have been either severely curtailed or closed completely in recent years, due to critically low returns on the Klamath and or Sacramento rivers, causing millions of dollars in losses to commercial fishermen. Both Atlantic and Pacific salmon are popular sportfish.

Salmon populations have been established in the Great Lakes. Coho stocks were planted by the state of Michigan in the late 1960s to control the growing population of non-native alewife. Now Chinook (king), Atlantic, and coho (silver) salmon are annually stocked in all of the Great Lakes by most bordering states and provinces. These populations are not self-sustaining and do not provide much in the way of a commercial fishery, but have led to the development of a thriving sport fishery.

SOURCES:

- Seafood Choices Alliance (2005) It's all about salmon.
- "1878–2010, Historical Commercial Salmon Catches and Exvessel Values". Alaska Department of Fish and Game. Retrieved 6 August 2011.
- Viechnicki, Joe (3 August 2011). "Pink salmon numbers record setting in early season". KRBD Public Radio in Ketchikan, Alaska. Retrieved 6 August 2011.
- Vmedia.aprn.org|low fish returns in Southeast this summer have been tough on the region's hatcheries.

FACT SHEET:
SIGNIFICANCE OF SALMON IN THE PACIFIC NW

IMPORTANCE OF SALMON FOR SALISH TRIBES

Salish tribes

Salmon have long been a popular symbol of the Pacific Northwest. While the Pacific Northwest region provides great habitat for salmon, the Columbia Basin salmons play a vital part in the environment of the region. They help return ocean nutrients to the rivers and streams where they were born, nourishing natural life and ecosystems with their bodies.

For thousands of years, salmon also helped structure the lives of tribes and bands of the Pacific Northwest in many ways. Salmon is deeply interconnected with Salish Tribes in terms of culture, inter-tribal relationships, fishing technologies, religions, and especially economies. From ancient exchange routes to modern commercial fishing, salmon have been a huge portion of the economy in the region. Salmon are a fundamental part of Tribal religion, culture, and physical sustenance, such as:

- Salmon is a cultural and spiritual identity for Salish Tribes
- Salmon was the basis for economic trade
- Fishing is still the preferred livelihood for many Tribal members
- Salish Tribes consider salmon populations an indicator of water degradation
- Salmon has and continues to be a primary food source providing essential aspects for nutritional health

IMPORTANCE OF SALMON FOR SEATTLE

Historic and present culture

Seattle has been known for its large salmon populations. However, since the late 19th century, the number of fish in the region has declined drastically. Currently, six of eight Pacific Northwest "salmonid" species subtypes are listed as "threatened" or "endangered" under the Federal Endangered Species Act. These changes are due in large part to human overfishing, as well as environmental degradation, climate change, and habitat loss in the last century.

In the 1890s and 1900s, regulations were set in an attempt to preserve salmon populations, but were largely unsuccessful. Hatcheries were established to raise fish in captivity and keep populations high with varying success. As salmon populations continue to decline, fewer and fewer are available to be commercially and privately fished each year.

Recently, new genetic tools have allowed scientists to understand the diversity within wild salmon populations which is impossible to replicate in hatcheries. Preserving existing wild populations and restoring naturally spawning populations, can enhance the ability of salmon populations to adjust to changing environmental conditions.

Economy

Back in the early 1900s, hundreds of thousands of naturally spawning salmon and steelhead could be found in Puget Sound each year. Today there are only

Figure 1. Historical condition of the mouth of the Duwamish River

Figure 2. The man-made "Harbor Island" sits where the estuary once was

tens of thousands. This is an alarming change, for our environment and local economy. The declining population of salmon is a complex issue being studied by local groups. According to the Marine Survival Project, a group of more than 60 organizations are working to discover why salmon are disappearing from Puget Sound north to Canadian waters. The initial decline in that area can be traced to overfishing and the loss of freshwater and shallow marine habitat.

In Washington, fishing is big business, though it has seen a steep decline over time. Commercial fisheries in Washington generate an average of $1.6 billion annually, according to a 2010 Washington Department of Fish & Wildlife report. Commercial and recreational fisheries directly and indirectly supported an estimated 16,374 jobs in 2006, according to a major study conducted that year by the WDFW (Washington Department of Fish & Wildlife).

A report by the Institute for Fisheries Resources, a research affiliate of the Pacific Coast Federation of Fishermen's Associations, shows a post-development loss of more than $13 billion in commercial salmon harvest in the Columbia Basin.

Species	Evolutionarily Significant Unit	Administrative Status	Historic	Current
Coho	So. Oregon/No. California	Threatened-1997	NA	10,000
	Oregon Coast	Threatened-1998	1 million	39,000
Chinook	Snake River (fall & spring)	Threatened-1992	1.5 million	10,320
	Puget Sound	Threatened-1999	690,000	71,000[a]
	Lower Columbia	Threatened-1999	NA	40,000[a]
	Upper Willamette	Threatened-1999	NA	4,000
	Upper Columbia	Endangered-1999	NA	5,000[a]
Chum	Hood Canal & Columbia River	Threatened-1999	500,000	1,500-4,000
Sockeye	Snake River	Endangered-1991	NA	<600
	Ozette Lake	Threatened-1999	2,000-20,000	600

[a] Includes hatchery-raised fish.
NA indicates that population estimates are unknown.

Figure 3. Estimated Population of Threatened and Endangered Salmon Species in the Pacific NW

SOURCES:

- Chowder, D. S. (2018, February 07). Disappearance of wild salmon hurts local economy | Provided by Duke's Seafood & Chowder. Retrieved April 02, 2018, from https://www.seattletimes.com/sponsored/disappearance-of-wild-salmon-hurts-local-economy/
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- Fish, wildlife and Washington's economy S. (n.d.). Retrieved April 2, 2018, from https://www.bing.com/cr?IG=E1E839EEB2964A3CB5627BB824E16B5D&CID=3E4152CEEE096B791C2A590BEFA66AF1&rd=1&h=_mNAyhWiaW8UCg25a9m9Pf8Aa5CHhfw-kad7hpu0bE0&v=1&r=https://wdfw.wa.gov/publications/01145/wdfw_01145.pdf&p=DevEx,5067.1
- Salmon and the Economy - Wild Rivers Coast Alliance. (n.d.). Retrieved April 2, 2018, from http://www.bing.com/cr?IG=3DA0A79CD3A14636927635721ABB1548&CID=2BEEA7D6DE756B7A18D2AC13DFDA6AC4&rd=1&h=qYZUU_SvIcrm_kzihIck40C-2SqIdCyvGwHQ2h7t7PM&v=1&r=http://www.wildriverscoastalliance.com/wp-content/uploads/2015/04/salmon_handbook.pdf&p=DevEx,5069.1

FACT SHEET:
THREATS AND RECOVERY EFFORTS

A TIMELINE OF DECLINE

The question of whether wild salmon will continue to exist in western North America is not a new one. Throughout the last century and a half, "the decline of wild stocks [has been] caused by a combination of factors, including unfavorable ocean or climatic conditions; excessive commercial, recreational, and subsistence fishing; various farming and ranching practices; dams built for electricity generation, flood control, irrigation, and many other purposes; water diversions for agricultural, municipal, or commercial requirements; pollutants of many types; hatchery production used to supplement diminished runs or produce salmon for the retail market; degraded spawning and rearing habitat; predation by marine mammals, birds, and other fish species; competition, especially with exotic fish species; diseases and parasites; and many others (Augerot 2005)."

7 KEY TIMELINE EVENTS

- Before 1850, First Nation peoples in the Pacific Northwest relied on salmon as an integral backbone to their industries, civilizations, and cultures
- After the development of salmon canning technologies, the market potential for salmon increased, and large incoming European companies began taking over fishing areas in the Northwest
- Populations quickly declined, while regulations implemented in the early 1900s were largely unsuccessful
- Hatcheries and hatchery technologies were established shortly thereafter to help keep population levels up, with varying levels of success
- The first salmon species was added to the Endangered Species Act in 1991, with many species following suit
- By 1999, salmon in Washington, California, Oregon, and Idaho were already extinct in as much as 40% of their former spawning areas
- The Pacific Coastal Salmon Recovery Fund (PCSRF) was established by Congress in 2000 to reverse the declines of Pacific salmon

TODAY'S BIG DEBATE

Scientifically, opinions are diverse as to whether or not wild salmon runs can be restored. Some argue that this is technically feasible, and even possible without significant disruptions to how individuals and society relate with salmon on cultural, economical, and ecological levels. Others remain skeptical about the viability of wild salmon, and propose that if we are to even maintain salmon as a species, there must be extensive technocratic intervention, predominantly from spawning channels and hatcheries. The one unifying principle is that since humans became inextricably linked to the livelihood and evolution of this species, our current relationship with salmon is essentially one giant experiment. Both the threat and recovery of salmon now lies in our hands.

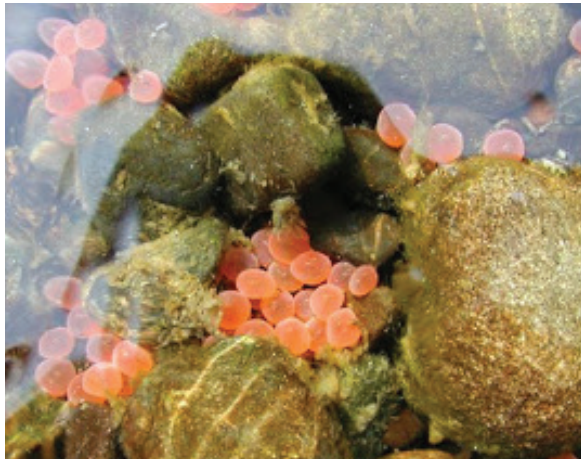


Figure 1. Habitat Loss is one of the largest threats to salmon

Figure 2. The intersection between hydropower and salmon

RECOVERY FOR WHOM?

Entangled Efforts Between Stakeholders

- Federal Law
- Tribal Treaty Rights
- Local Fishing Communities
- Industrial Economics
- Recreation and Sport
- Pacific Northwest Ecosystems
- Tourism and Symbolic Significance

Salmon Recovery Partners

Federal and state agencies, Indian tribes, local governments and watershed organizations, environmental groups, and volunteers are all involved in today's salmon recovery plans. Participating within each evolutionary significant unit and distinct population segment, this spectrum of stakeholders are working to actively develop recovery plan monitoring programs, or to modify existing monitoring. The National Oceanic and Atmospheric Administration (NOAA) Northwest Region RME Guidance for ESA listed Pacific Northwest Salmon and Steelhead lists the following as threats to salmon at large: loss of habitat, hydro-power production, over-utilization for commercial, recreational, scientific, or educational purposes, disease and predation, inadequacy of regulatory actions, hatchery production, and natural causes.

VARYING DEGREES OF SUCCESS

Just this year NOAA Fisheries will weigh whether Chinook salmon in the Upper Klamath and Trinity Rivers need federal protection under the Endangered Species Act, as sought in a petition from the Karuk Tribe and Salmon River Restoration Council. NOAA Fisheries now has one year from the date of the petition to conduct a status review for the fish and determine whether it should be listed as threatened or endangered. The status review evaluation will include an analysis of the best available scientific and commercial information about the population's abundance, productivity, distribution, life history, and threats. Organizations such as the PCSRF can then use these findings to continue and legitimize their work. In the words of PCSRF, "Pacific salmon and steelhead are much more than essential elements of a healthy Pacific Coast ecosystem; they are cultural icons woven into the fabric of local communities and economies. Salmon runs tie the region's people to the landscape, but pressures from a changing environment and human activities have compromised the strength of these runs. [...] The program is essential to preventing the extinction of the 28 listed salmon and steelhead species on the West Coast and, in many cases, has stabilized the populations and contributed to their recovery course."

SOURCES:

- NOAA Fisheries West Coast Region. (2012, December 12). Pacific Coastal Salmon Recovery Fund. Retrieved April 02, 2018, from http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/pacific_coastal_salmon_recovery_fund.html
- Crawford, B. A., & Rumsey, S. M. (january 2011). Guidance for Monitoring Recovery of Pacific Northwest Salmon & Steelhead listed under the Federal Endangered Species Act. National Marine Fisheries Service, NW Region. Retrieved April 1, 2018, from https://www.salmonrecovery.gov/Files/2011 APR files/New Folder 3/Crawford_and_Rumsey_2011_Guid_Monit_Rcvry_Salmn_Stlhd_2011.pdf.
- Mid Sound Fisheries Enhancement Group » A Brief History of Salmon Fishing in the Pacific Northwest. (n.d.). Retrieved April 02, 2018, from http://www.midsoundfisheries.org/a-brief-history-of-salmon-fishing-in-the-pacific-northwest/
- Figure 1: https://www.alaskaflyfishingonline.com/fieldnotes/eartheneggs.html
- Figure 2: https://www.hcn.org/articles/patagonia-backed-film-damnation-explores-river-salvation

2018 UW SEATTLE CAMPUS

MISSION

The primary mission of the University of Washington is the preservation, advancement, and dissemination of knowledge. The University preserves knowledge through its libraries and collections, its courses, and the scholarship of its faculty. It advances new knowledge through many forms of research, inquiry and discussion; and disseminates it through the classroom and the laboratory, scholarly exchanges, creative practice, international education, and public service. As one of the nation's most highly respected teaching and research institutions, the University is committed to maintaining an environment for objectivity and imaginative inquiry and for the original scholarship and research that ensure the production of new knowledge in the free exchange of facts, theories, and ideas.

The University fosters an environment in which its students can develop and exercise mature and independent judgment and an appreciation of the range and diversity of human achievement.

PURPOSE AND PROCESS

The University of Washington's long-term vision for the Seattle campus informs its 10- year conceptual plan for campus growth that balances the preservation of historic campus assets with intensive investment. Individual sector plans including the West Campus Development Framework, South Campus Study Phase II, East Campus Planning Study, and the Campus Landscape Framework are prior planning reports foundational to this CMP.

This CMP conserves and enhances the open space of the campus and guides future development. It describes characteristics and built environment components of the campus physical environment which shall guide future design and decisions that impact the campus, the environment, and surrounding communities. The scope of the CMP includes defining future open spaces, circulation patterns, building sites, and campus physical capacity along with planned growth. Impacts on the campus and the primary and secondary impact zones of surrounding communities are analyzed through the EIS process.

Both the City and the University recognize the need for coordinated planning that allows the University to continue to pursue its instruction, research, and service goals.

At the same time, the CMP planning process is intended to foresee, assess, and outline mitigation measures for the potential direct, indirect, and cumulative impacts of long-term development. This maximizes positive effects and minimizes adverse impacts upon the city and campus environments, particularly to communities surrounding the University, and promotes the health and vitality of residential, business, and academic communities.

Community outreach has been a major part of the planning process. The University believes this CMP reflects the interests of the large and diverse communities it serves. To achieve this, the University facilitated and encouraged meaningful and ongoing community involvement throughout the planning process.

Figure 1. West Campus Green

GUIDING PRINCIPLES

Five overarching principles drive the *2018 UW Seattle Campus Master Plan:*

- Flexible Framework: Create a long lasting flexible framework to guide the development consistent with University of Washington's education, research, and political missions.
- Learning Based Academic and Research Partnerships: Catalyze academic partnerships with allied industries
- Sustainable Development: Embody UW's commitment to sustainable land use through preservation and utilization of existing property and the balance of development, open space, and public use.
- Connectivity: Better connect the University both internally and with its broader context.
- Stewardship of Historical, Cultural, and Ecological

MASTER PLAN

Figure 2. Existing Building Heights

Resources: Continue responsible and proactive stewardship of the the UW's campus assets though preservation of cultural, historic, and ecological resources through strategic development.

WEST CAMPUS

UW's West Campus accommodates student housing, academic, research and cultural programs within an urban setting. The long term goals for this portion of campus are: connections to the waterfront, flexible building footprints, increase development capacity, enhancing connections with the other portions of campus, pedestrian scale development, and active ground floor active destinations. Enhanced waterfront and U-District connections are made possible by Brooklyn Ave. enhancements and the inclusion of the West Campus green.

SOUTH CAMPUS

UW's South Campus primarily serves Health Sciences and the Medical Center. It home to academic, research and clinical functions, as well as a relatively inaccessible waterfront. Future plans focus on increased development capacity, and the introduction of state-of-the-art facilities. Furthermore, the CMP advocates for an inviting, functional, and attractive public realm that celebrates the waterfront with a shared campus green. The south campus green will provide pedestrian and open space connections between Central and South Campus, along with with increased connections to East and West Campus.

EAST CAMPUS

East campus currently accommodates the Union Bay Natural Area, athletic, recreational, and other University facilities. Much of the East Campus is built on methane-producing landfill and constitutes a seismic liquefaction zone, adding cost to building construction in this location. The long term vision for this area focuses on preserving existing athletic facilities developing existing parking lots for academic uses, industry partnerships, and academic conference spaces. Future developments must increase connections with Central and South Campus, while integrating with the Union Bay Natural Area trail network.

BUILDING CHANGES

West Campus

The CMP indicates that the existing Fisheries Teaching Research Center, Marine Studies, and John M.

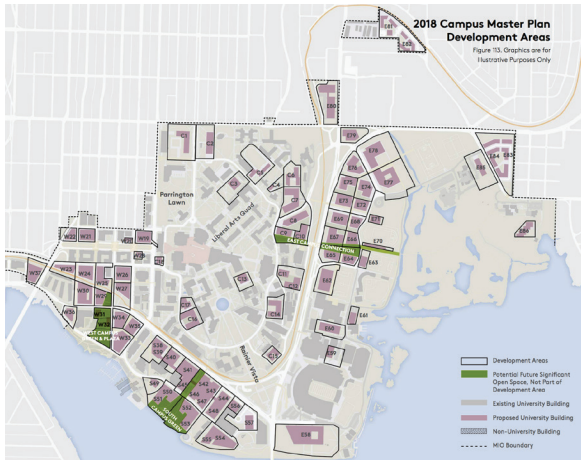


Figure 3. Proposed Development Areas

Wallace buildings are proposed to be removed for the development of the West Campus Green. Some significant buildings in proposed design are: W32: Wallace Hall Pavilion / Marine Studies / Fish Teaching and Research, W33: Ocean Research 2 / NOAA, and W36: Fisheries Parking Lot (see table 10).

South Campus

Much of the proposed shoreline development is adjacent to the South Campus Green. Currently the available space is underutilized and the select removal of structures and increased density allows for future academic and mixed use facilities. The CMP indicates that the portions of the Institute for Learning and Brain Sciences and the Fisheries Center are proposed to be removed. Significant buildings include: S53: SCSII Q / Portage Bay Building / Oceanography Building / Dock and Shed / Parking Lot (see table 11).

Figure 4. South Campus Development Plan

East Campus

Due to this areas past as a landfill, few buildings are proposed and the retention of exiting athletic facilities is a priority. Significant buildings include the E58: Parking Lot which can house academic, mixed use, transit, industry partnerships and academic conference centers (See table 12).

SHORELINE PUBLIC ACCESS

The UW campus contains 12,000 linear feet of shorelines. Waterfront areas and associated wetlands can include areas for nature study, a working waterfront for fish hatcheries, a marina and moorage of University research vessels.

West Campus

This portion of the shoreline is set within an urban commercial environment and the majority of the segment contains the City of Seattle's Portage Bay Park. Proposed pedestrian connections along the waterfront are made to link the varying uses and increase views

South Campus

This segment is situated within both the Urban Commercial Conservancy Management areas. The proposed South Campus Green allows for enhanced public connectivity while increasing views of Portage Bay. The existing hatchery falls within this segment of the shoreline

East Campus

This portion of the waterfront is situated within both the Conservancy Management and Conservancy Preservation zones. The segment spans from the Montlake Bridge through the Union Bay Natural Area. Access in these areas is limited to pedestrians and boats utilizing the boat access points. No access is provided to the peat islands in Union Bay.

THE CITY-UNIVERSITY AGREEMENT

Development Capacity: Net New Maximum Development (Gross Square Feet)

- West Campus: 3,000,000
- South Campus: 1,350,000
- East Campus: 750,000
- Site plan designating existing facilities, open space, landscaping and screening, use and location of proposed development
- Description of existing and proposed parking facilities and circulation systems

Figure 5. East Campus Development Plan

- Transportation management plan
- Future energy and utility needs, system capacities, and proposed means of increasing energy efficiency
- Alternative proposals
- Proposed development phases

UNDERUTILIZED AREAS

Building heights vary throughout campus, and align with the building height limits identified in the *2003 UW Seattle Campus Master Plan*. The 2003 CMP identified eight building height zones on campus, ranging from 37 feet along the waterfront to 240 feet in South Campus. The City's Shoreline Master Program generally limits building height to 30 feet for all development within 200 feet of the shoreline or associated wetlands. In many instances, especially

Figure 6. Open Space Typologies

for buildings constructed in prior decades, building heights are significantly lower than what is allowed, highlighting the potential for additional capacity on those sites.

Maximum heights of 2003 CMP zones are identified on table 10-12.

OPPORTUNITIES

Unique and Significant Landscape

Significant landscapes are identified in the Campus Landscape Framework Plan, and function as primary open spaces with cultural and historic value.

Open Space Typologies

Open space typologies vary according to the campus sectors.

- East Campus is characterized by wetlands, meadows, and recreation field open spaces.
- West Campus is characterized by courtyards, passage, and urban frontage open spaces.
- Central Campus is characterized by campus green and woodland grove open spaces.
- South Campus is characterized by constructed waterfront open spaces.

Circulation

The CMP has proposed a shoreline pedestrian pathway which could could be an ideal location for a showcase hatchery, connecting students and visitors to Washington's iconic species.

Figure 7. Connectivity Diagram

CONSTRAINTS

- The University owns approximately 639 acres within the campus boundaries (page 38). Five non-University owned properties are located within the MIO boundaries.
- The campus includes approximately 12,000 linear feet of shoreline which is subject to the regulations of the Seattle Shoreline Master Program adopted pursuant to the Shoreline Management Act of 1971. These regulations extend landward for 200 feet, and place stringent restrictions on approximately 55 acres of campus (page 108).
- West Campus is bisected by numerous City streets which may have implications for development.
- The campus contains substantial landscaped open space which the University is committed to conserve for historical, aesthetic, functional, and environmental reasons (see page 41).
- Detailed information regarding the existing conditions of the campus is included in this document as well as in the EIS and has been considered in the development of the master plan.

SOURCES:

- Campus Master Plan | Capital Planning & Development. (n.d.). Retrieved April 11, 2018, from http://www.bing.com/cr?IG=3E0B511053654EB2897779FFB4A1C-DEF&CID=203C58D800CB6232294B5316016463C7&rd=1&h=W0n5kG3erqHAADDpUhRyd-Pg3UD_8yIyxyqRK5Z6b9jg&v=1&r=http://cpd.uw.edu/campus-master-plan&p=DevEx,5069.1

CAMPUS IN MOTION: UW CAMPUS

Location: University of Washington Campus

Year Founded: 1904

Website: https://cpd.uw.edu/do/tours/campus-landscape-framework

Mission: Inform campus landscape decision making

MISSION

"The campus landscape framework (CLF) offers a foundation for our stewardship of the landscape for its contributions to the pedagogical, ecological, and social characters and qualities of the UW campus. We know that the landscape is the campus. The landscape is what students, staff, and faculty identify as the University. And the campus landscape is a significant open-space resource for the regional community. The framework grounds decisions impacting the campus landscape in the knowledge of the history of how the campus has come to be the loved and treasured resource, what is important to maintain, and where we need to invest our attention and resources to more fully nurture a socially and environmentally healthy campus. With the broad knowledge collated in this framework, the UW community and its leaders have an essential tool to make the most informed decisions for the future of the campus and the University." University Landscape Advisory Committee, June 25, 2015.

WHY DOES UW NEED A CLF?

The CLF takes a bold approach in positioning the landscape at the forefront of campus planning strategies. A combination of campus-wide initiatives and site-specific case studies, shaped by the innovative idea of "landscape imagination" give the UW an actionable framework to further enrich its historic 760-acre urban campus. The CLF reveals and celebrates the Seattle Campus landscape as a complex living landscape mosaic, constantly changing through time, and gives the university tools, both practical and visionary, for guiding that change.

WHAT'S IN A CLF?

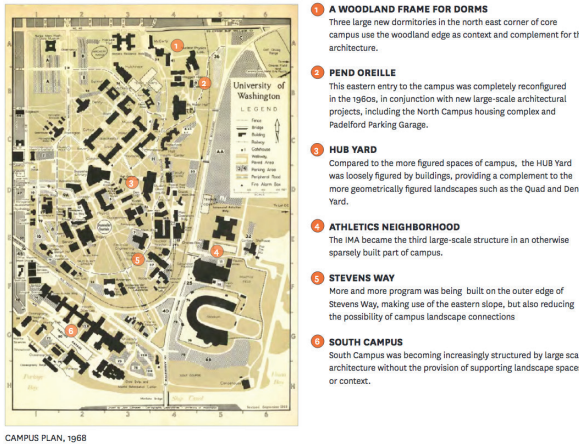
- Supporting the UW Mission
- Creating a Legacy: Landscape in Motion
- A Valuable Asset: The Campus Landscape Survey
- A Rich and Diverse Campus Setting
- Campus Ecology and Environment
- Campus Mobility
- Stewardship: Preserving & Enhancing the Legacy
- Appendices: Acknowledgments & Case Studies

RELEVANCE TO OUR PROJECT

In addition to the CLF's more broad approach to guiding the campus design and development, there are specific frameworks and recommendations highlighted for both South Campus area and the Salmon Hatchery site itself:

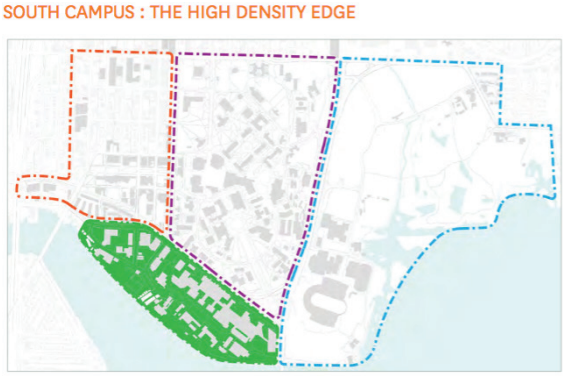
- Figure 1: In the 1968 Campus Plan, South Campus was becoming increasingly structured by large scale architecture without the provision of supporting landscape spaces or context
- Figure 2: The Salmon Hatchery site exists in the South Campus "High Density Edge," which serves as the University's primary waterfront laboratory, providing important access for research vessels. The landscape, with a few exceptions, does not have a strong positive program, but the potential of the waterfront as a major recreational amenity for the campus is significant. A focused reorganization of the architectural massing and the creation of a contiguous landscape with positive character and uses could raise the profile of this neighborhood and make it a fully integrated part of the wider campus.
- Figure 3: Comments collected for the CLF about South Campus
- Figure 4: The constructed waterfront includes constructed waterfront access, frequently with concrete edges low in ecological diversity, but high in recreation, passage, research, and moorings. It provides opportunities to be close to the water's edge, although creates an elevational separation between shoreline and water surface. Any changes to the constructed waterfront are guided by state regulations related to shoreline management and Federal regulations related to navigability. There is a need to create better access to the constructed waterfront from other parts of campus, as well as creating a continuous waterfront trail that unites the experience of UW's constructed and naturalized waterfronts.
- Figure 5: (5) Montlake Cut Connection: The pathway along the cut is an exciting and unique experience within the city of Seattle, improvements to the path at the E and W ends would make this an accessible connection between Union Bay and Portage Bay
- Figure 6: Potential as an Urban Ecological Awareness Site

LANDSCAPE FRAMEWORK



CAMPUS PLAN, 1968

Figure 1. 1968 Campus Master Plan



Total Area: 70 Acres, 30% Planted Area: 20 Acres, 36% Paved Area: 25 Acres, 34% Building Footprint Area: 25 Acres

Figure 2. South Campus Now

- "This area is perfect for walks and socializing, no matter the weather."
- "Great Place to take a break and watch the water for a while."
- "Walk along the shore for peace and quiet."
- "I love to walk to the cut for an outdoor lunch in the summer."
- "This little park on the water [Sakuma Park]. For a mental respite."
- "View and touch the water."
- "Leisure walk to daydream and look at boats and birds."

Figure 3. Comments from Loved Places on Campus

Figure 4. Constructed Waterfront within Campus

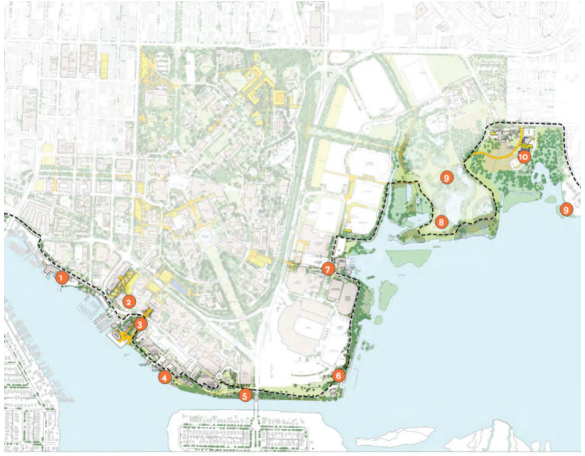


Figure 5. Existing Waterfront Trail Points of Interest

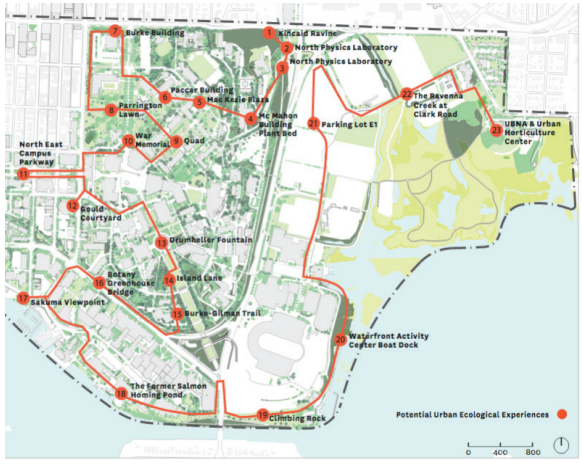


Figure 6. Potential Urban Ecological Awareness Map

CAMPUS AND CLIMATE:
EFFECTIVE ECOLOGIES

WEATHER AND CLIMATE

- Global Warming: Seattle and the larger Pacific Northwest can anticipate significant climate change related to global warming, as well as associated ecological and sociocultural impacts. According to the Washington Climate Change impacts Assessment prepared by The Climate impacts Group at the University of Washington in June 2009, climate change could affect regional ecology relative to temperature increase, intensity of precipitation, reduction of snow pack, and air quality.
- Temperature: Records indicate that the Pacific Northwest temperatures have increased 1.5F since 1920. Climate models from the intergovernmental Panel on Climate Change project increases in annual temperature on average of 2.0F by the 2020s, 3.2F by the 2040s, and 5.3F by the 2080s. Regional models indicate that climate warming rates will be greater in the 21st century than those observed in the 20th century.
- Precipitation and Hydrology: Regional climate model simulations generally predict increases in extreme high precipitation of the next half century, particularly around Puget Sound. April 1 snow pack is projected to decrease by 28% across the state by the 2020s, 40% by the 2040s, and 59% by the 2080s compared with 1916-2006 historical average. Peak river flow will shift from late spring (driven by snow melt) to winter (driven by precipitation). In the major river systems of the Puget Sound and lower elevation basins in the interior Columbia Basin, flood risk will likely increase, which in turn increases the risk of stream bed scouring of salmon spawning habitat. Design standards developed to accommodate mid-20th-century rainfall records and existing drainage infrastructure built in accordance with these standards may need to be modified. The amount of water stored in reservoirs will be lower from late spring through early fall, affecting water supply for campus or municipal use and other operation objectives, such as hydro-power production.
- Air Quality: Global warming will likely lead to significantly more heat and air pollution-related health impacts.

ECOLOGICAL ENHANCEMENT AND RESTORATION

Moving forward, campus ecosystem improvements can be designed with strong appeal to the primary users along a spectrum of formal garden to apparent naturalness or wildness. While continuing to prioritize human use, this would help re-balance the relationship with nature on a bustling urban campus like UW. Specific areas where there is significant room for ecological improvement, in the form of ecological horticulture principles, include alternatives for: lawns, planted beds, tree canopy (urban forest), naturally occurring/minimally managed landscapes, ecological corridors.

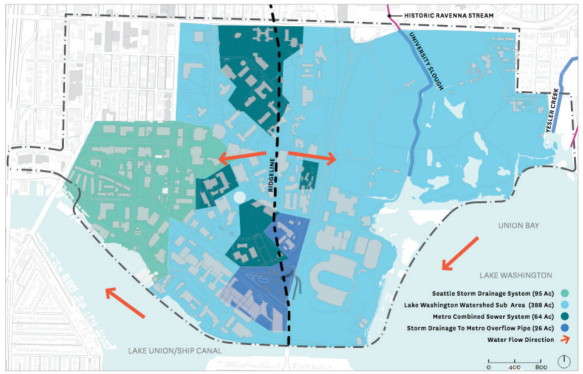


Figure 1. Campus Hydrology

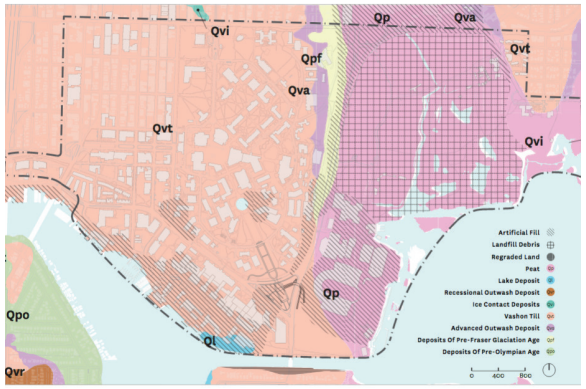


Figure 2. Campus Soils and Surficial Geology

GUIDING ECOLOGICAL AND HORTICULTURAL PRINCIPLES

- Let site conditions guide species selection
- Enhance plant community structure
- Promote diversity, resilience, and regeneration
- Understand and enhance micro-climates
- Apply strategic maintenance
- Manage stormwater ecologically
- "We strive to envision the whole campus landscape as an ecological sustainable urban system that satisfied University functions while promoting healthy aquatic and terrestrial ecosystems. Landscape should be viewed as more than an aesthetic amenity. Understanding the campus ecology and the vulnerability of certain ecosystems relative to new construction will help UW design, build, restore, maintain, and manage the built environment more knowledgeably." - CLF

CLF's Considerations for Campus Landscape Design

TRANSFORMATION OF THE OUTDOOR PHYSICAL ENIRONMENT SHOULD CONSIDER THE FOLLOWING, SUMMARIZED IN A SITE PROGRAM

1. THE CAMPUS MOSAIC
   - OPEN SPACE TYPE
   - PUBLIC TO PRIVATE TRANSITIONS
   - CONNECTIONS TO ADJACENT OPEN SPACES

2. MATERIALS
   - DURABILITY
   - TIMELESS DETAILING
   - SUSTAINABLE ASPECTS - CONTENT OR RECYCLABILITY
   - EASE OF REPAIR/REPLACMENT
   - CAMPUS STANDARDS (LIGHTING, BENCHES, BIKE)

3. HISTORIC QUALITY AND CHARACTER OF THE CAMPUS
   - CULTURAL SIGNIFICANCE
   - ACADEMIC SIGNIFICANCE
   - ENVIRONMENTAL SIGNIFICANCE

4. TREES & VEGETATION
   - DIVERSITY OF SPECIES
   - PRESERVATION OF MATURE SPECIMENS
   - URBAN FOREST GOALS & CAMPUS CHARACTER
   - EDUCATIONAL OPPORTUNITIES
   - WATER CONSCIOUS

5. MOBILITY
   - CAMPUS CONNECTIONS & ADA
   - SITE SPECIFIC CONNECTIONS
   - PEDESTRIAN - MINIMUM WIDTH?
   - BICYCLE - CONVENIENT BUT OUT OF HEAVY PED AREAS
   - VEHICULAR - SECONDARY TO THE BIKE ENVIRONMENT
   - PARKING FOR BICYCLES & CARS
   - SERVICE ACCESS
   - TRANSIT

6. MAINTENANCE
   - LEVEL OF CARE - VISIBILITY AND USE
   - ACCESS FOR STAFF & EQUIPMENT
   - IRRIGATION & WATER

7. INFRASTRUCTURE
   - STORMWATER OPPORTUNITES
   - SITE WALLS

HATCHERY CASE STUDY:
ISSAQUAH HATCHERY

Location: Issaquah, WA

Year Built: 1937

Mission: Production + Outreach

HATCHERY COMPONENTS

1. "Reaching Home" Sculptures
These sculptures represent male and female coho salmon during the mating sequence. See figure 4

2. Aquarium Room
These aquariums show the development of juvenile salmon, mimicking the conditions in Issaquah Creek.

3. Raceways
Fry are transplanted into these constructed ponds until they are mature enough to be released into Issaquah Creek.

4. Steve Bell Theater and Gift Shop
The theater displays a video about the annual miracle of salmon.

5. North Viewing Deck and Exhibits
A perfect spot to view to the natural habitat salmon.

6. Foortbridge
On this bridge one can see the weir directing spawning salmon into the fish ladder up to the homing ponds where they are artificially spawned.

7. South Viewing Area and Exhibits
Each fall, salmon can be observed spawning from this location.

8. "As The Salmon Swim" Interactive Exhibit
This exhibit illustrates the challenges salmon face at different stages of their lives.

9. Water Tower
The painting on this water tower depicts the various predators that salmon face.

10. Fish Ladder
This constructed ladder allows fish to jump through a series of pools to reach the homing ponds where they are artificially spawned.

11. Viewing Windows
These viewing windows allow visitors to get a close look at the spawning salmon. See figure 5.

12. Spawning Shed
The shed allows workers to collect and mix eggs and sperm from the spawning salmon for fertilization.

13. Native Plant Garden
The garden demonstrates 40 native Northwest species ideal for maintaining salmon habitat.

14. "Everything Given To Salmon is Returned" Exhibit
This exhibit illustrates how to create healthy salmon habitat vial to maintaining our Northwest forests.

15. Watershed Kiosk
This kiosk shows the Issaquah Creek Watershed and and the negative effects of urbanization and pollution.

16. Salmon Migration Map
The fiber-optic map shows the salmon migration route through the Salish Sea.

17. "Raven Rocks" Story Boulders
These stones depict the Native American tale about the raven that brought salmon to the people.

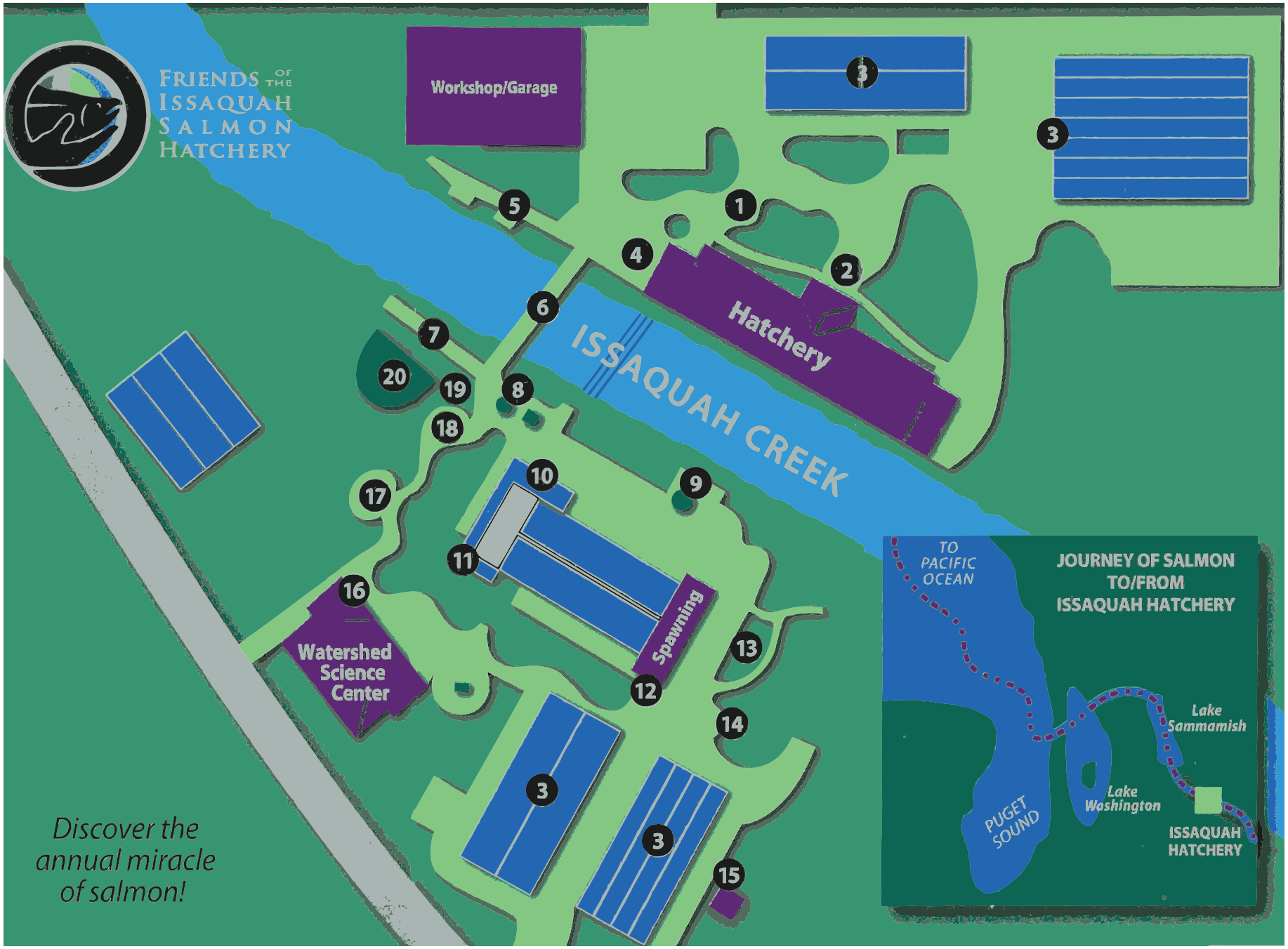
18. "Can You Beat the Odds" Exhibit
The exhibit depictes the hazards that salmon face as they return home to spawn

19. Solar Panel Exhibit
This exhibit shows how the hatchery utilizes solar power to provide sustainable energy solutions.

20. Wetlands Exhibit
The exhibit illustrates the importance these ecosystems are for salmon and all aquatic species

SOURCES:

- Issaquah Hatchery. (n.d.). Retrieved July 13, 2018, from https://www.issaquahfish.org/displays-exhibits/


FRIENDS OF THE ISSAQUAH SALMON HATCHERY
Workshop/Garage
Hatchery
ISSAQUAH CREEK
Watershed Science Center
Spawning
Discover the annual miracle of salmon!
JOURNEY OF SALMON TO/FROM ISSAQUAH HATCHERY
TO PACIFIC OCEAN
PUGET SOUND
Lake Washington
Lake Sammamish
ISSAQUAH HATCHERY

HATCHERY CASE STUDY:
OREGON HATCHERY RESEARCH CENTER

Location: Portland, OR

Owner: Oregon Dept. of Fish and Wildlife

Year Built: 1973

Urban Condition: Rural setting

Mission: Research + Production

PROJECT DESCRIPTION

The Oregon Hatchery Research Center is a unique facility specifically designed to support both basic and applied research into the mechanisms that may create differences between wild and hatchery fish, and ways to better manage these differences to meet fishery and conservation objectives.

The center is also charged with helping Oregonians understand the role and performance of hatcheries in responsibly using and protecting Oregon's native fishes.

Research facilities include four artificial stream channels that simulate actual stream conditions, four concrete raceways, a tank farm comprised of 44 fiberglass tanks, an analytical lab, and a complete wet lab with heated, chilled, filtered and UV-treated water.

The Center's research facilities have attracted scientists from as far way as Iceland, Japan and Korea, all of whom are studying topics related to the Center's core mission.

RESEARCH FOCUS

OHRC Goal 1: Understand mechanisms that may create differences between hatchery and wild fish

- Focus Area 1: Differences caused by mate selection
- Focus Area 2: Differences caused by hatchery rearing

OHRC Goal 2: Develop approaches to manage hatchery fish that conserve and protect native fish

- Focus Area 3: Methods to increase imprinting and homing back to the hatchery

COMPONENTS

Simulated Streams

The simulated streams are designed to mimic the natural conditions present within Fall Creek. The inclusion of gravel channels and fallen timbers provide mating habitat for spawning salmon. Water for the streams is pumped into tanks and raceways to promote the next generations homing ability.

- Simulated Streams: 5,000 sq. ft. each
- 20,000 sq. ft. total

Fish Raceway

The facility contains four raceways, constructed of concrete, that continuously circulate water to prevent disease and illness.

- Raceways: 900 sq. ft. each
- 3,600 sq. ft. total

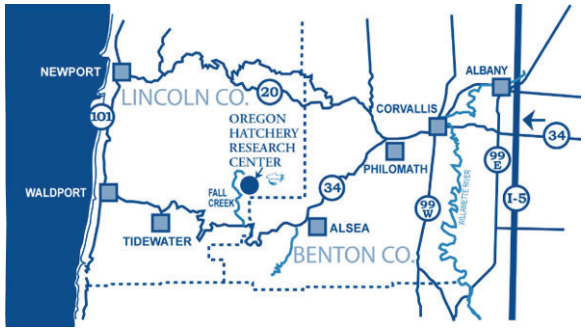


Figure 1. The ODFW Visitors' Guide-- Directions

Figure 2. Water intake from Fall Creek at the OHRC

Research Building

The research building is comprised of a series of a series of labs, offices, meeting spaces and conference rooms.

- Dry Lab: 1,125 sq. ft.
- Wet Lab: 1,300 sq. ft.
- Quarantine Lab: 170 sq. ft.
- Necropsy Lab: 235 sq. ft.
- Conference Rooms: 450 sq. ft.
- Offices: 1,000 sq. ft.
- Meeting Space: 1,200 sq. ft.
- 15,000 sq. ft. total (excluding 2nd floor)

Interpretive Center and Trail

The interpretive center and trail provides visitors with insights about salmon life cycles and habitat. These educational and artistic components promote ecological literacy (see figure 2).

- Interpretive Trail: 500 linear ft.
- Three kiosks
- Interpretive Center: 800 sq. ft

SOURCES:

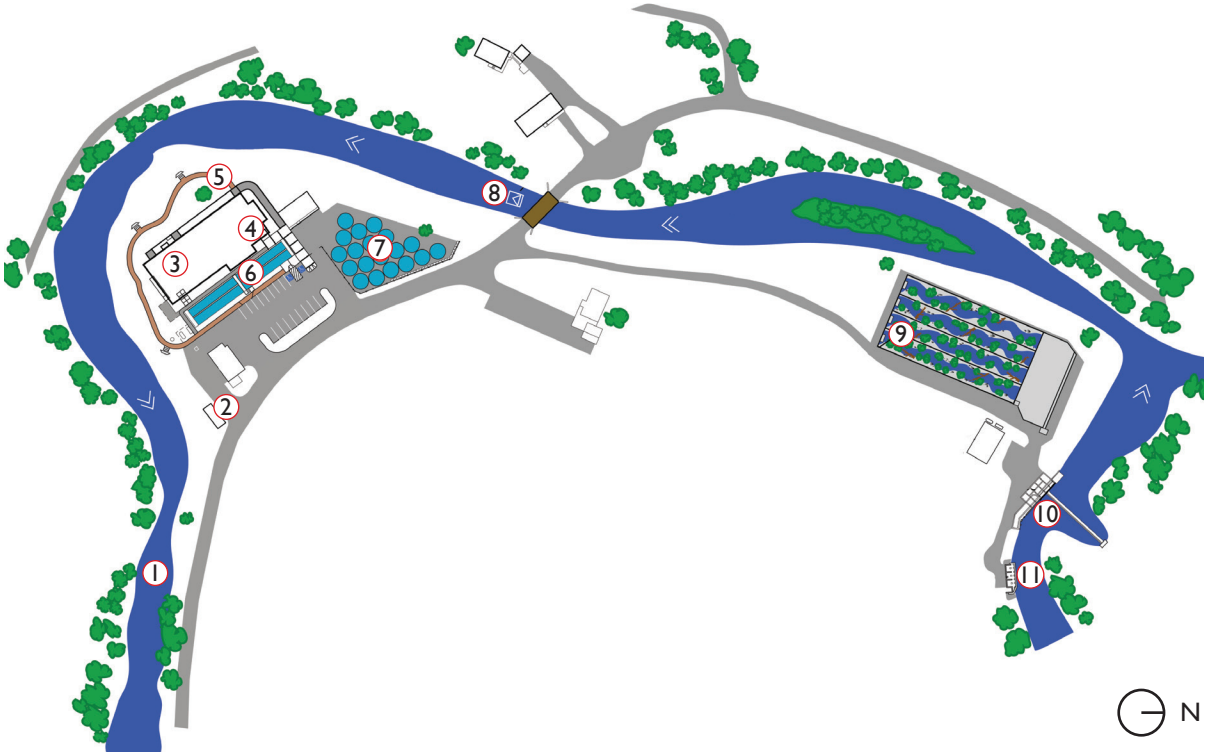
- About the Oregon Hatchery Research Center. (n.d.). Retrieved July 13, 2018, from https://www.dfw.state.or.us/fish/ohrc/about.asp

Site 1: Site Plan

Plan illustrating the various components of the Hatchery. Interpretive art and signage woven within various components of the research facility.

1. Fall Creek
2. Host Site
3. Research Building
4. Interpretive Center
5. Interpretive Trail
6. Fish Raceways
7. Fish Tanks
8. Floating Fish Trap
9. Artificial Streams
10. Fish Ladder
11. Water Intake Structure

Figure 12. Site Plan



HATCHERY CASE STUDY:

LEVI GEORGE SUPPLEMENTATION & RESEARCH FACILITY

Location: Cle Elem, WA

Owner: Yakama Nation

Year Built: 1997

Urban Condition: Rural setting

Mission: Research + Supplementation

Species: Spring Chinook

PROJECT DESCRIPTION

This hatchery is part of the Yakima Klickitat Fisheries Project (YKFP), The facility was named after Levi George, former chairman of the Yakima Indian Nation Tribal Council and an activist for Indian fishing rights.

This hatchery spawns fry from wild fish captured at the Roza Dam. This way, the fish in the hatchery are only one generation away from wild fish. Fish raised here are reared in 'naturalistic' conditions, and go on to spawn in the wild. The goal is to keep the fish from becoming 'domesticated.' These fish are repopulating in the Upper Yakima; since 1997, the number of adult returns has gone up by around 1000%.

RESEARCH FOCUS

This hatchery's research focus is to find ways to maintain or increase both harvest and natural production of spring Chinook in the Upper Yakima River basin, as well as increase ecosystem function. Research is used to both improve hatchery practices and address "critical uncertainties" in hatchery operation and fish fitness.

COMPONENTS

- Acclimation Tanks with Direct River Access
- Underwater Feeding System
- "Semi-Natural" Raceways
- Gravel-Bottom Spawning Channel
- Artificial Stream

This hatchery has several interesting, naturalistic components, including gravel-bottomed raceways and an underwater feeding system.

SOURCES:

- Klauss, N. (2014, July 30). Salmon hatchery holds open house. Retrieved April 01, 2018, from https://www.dailyrecordnews.com/members/salmon-hatchery-holds-open-house/article_d449a842-181c-11e4-a756-001a4bcf887a.html
- Yakima Basin Summer/Fall Chinook Project. (2008, October 15). Retrieved April 01, 2018, from http://yakamafish-nsn.gov/restore/projects/yakima-basin-summerfall-Chinook-project
- Cle Elum Supplementation and Research Facility. (n.d.). Retrieved April 01, 2018, from https://www.nwcouncil.org/fw/program/field-guide/2003-14/cle-elum
- Development And Operation Of The Cle Elum Supplementation Research Facility (2013). Retrieved April 01, 2018, http://hatcheryreform.us/wp-content/uploads/2016/05/Cle-Elum-Supplementation_AFS_2013.pdf

Figure 1. Yakima Klickitat Fisheries Project

Figure 2. "Semi-natural" raceways with underwater feeders.

Figure 3. Artifical Stream.

Figure 4. Gravel-bottomed raceways

Site 1: Site Plan

The hatchery lies just to the north of the Yakima River, at 800 Spring Chinook Way, Cle Elem, WA. Several natural and artificially constructed streams lie around the facility, connecting the tanks to the natural system.

Main Building
Semi-Natural Raceways
Gravel Spawning Channel
Artificial Stream
Yakima River

Figure 12. Aerial view of the hatchery. Source: Google Maps.

HATCHERY CASE STUDY:
UC DAVIS BODEGA MARINE LABORATORY

Location: Bodega Bay, Ca

Owner: UC Davis University

Year Built: 1966-1977

Urban Condition: Rural, coastal preserve

Mission: Through innovative research programs and teaching initiatives, the Bodega Marine Laboratory will lead the way to the multi-disciplinary scientific understanding required to solve complex environmental problems on the marine and terrestrial sides of the tide line in northern California.

HISTORY

For nearly 50 years the Bodega Marine Research Laboratory has provided training for students at UC Davis. Scientists have studied the area around the Laboratory since the 1920's. The research facility sits on 362 acres of marine reserve, including an estuary. Although the salmon program is discontinued the facility continues to host both research as well provided public access.

HANDS-ON EDUCATION

Although the Salmon Hatcheries and Research program are discontinued, the Bodega Marine Research Lab still supports research from within four different colleges within the university. The facility is focused on:

- Climate Change
- Coastal Oceanography
- Ecology, Evolution and Conservation
- Ocean Health
- Physiology
- Cameos Program

The Cameos program connects masters students with K-12 students within the community. The hope for this program is that masters students would gain life-long skills in inquiry-based teaching, science content, environmental observing technology, and cyber-infrastructure. K-12 teachers and students are presented with science role models and opportunities to practice all tasks performed by professional scientists, from creating research questions and collecting data to sharing results at scientific conferences.

SOURCES:

- About The Bodega Marine Laboratory. (N.d.). Retrieved April 02, 2018, From Http://Bml.ucdavis.edu/About/
- UCD's Bodega Lab Is A 'Marine Powerhouse'. (2015, September 13). Retrieved April 02, 2018, From Https://Www.davisenterprise.com/Local-News/Ucd/Bodega-Marine-Lab-Ucds-Facility-Is-A-Marine-Powerhouse

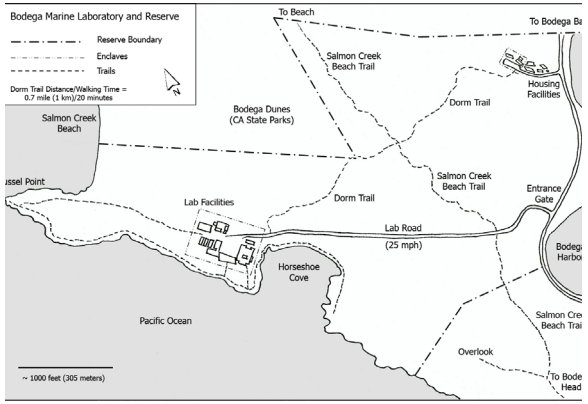


Figure 1. Bodega Research Facility and Reserve

Figure 2. Hands-on Education

Figure 3. Aerial view of the Bodega Marine Laboratory.
(Photo by Joe Proudman, the Washington Post)

PROJECT CASE STUDY

WILLAMETTE FALLS RIVERWALK, OREGON

Location: Oregon City, Oregon

Designer: Snøhetta, Mayer/Reed, DIALOG

Size: 22 acres / 960,000 sqft

Owner: City of Oregon City, Clackamas County

Project timeline: Beginning Summer 2018

Mission: Culture, Renovation, Public Space

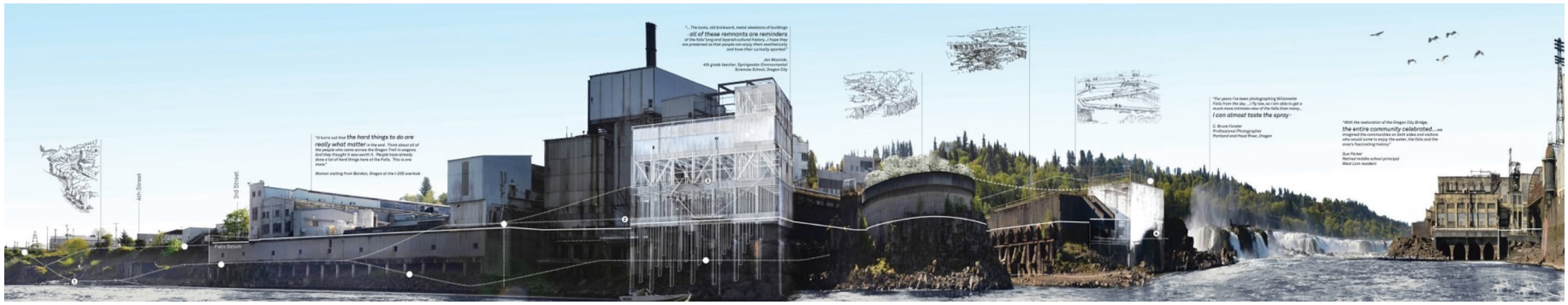


Figure 1 and 2. Plan and elevation concept

PROJECT DESCRIPTION

Willamette Falls is the second largest waterfall by volume in the United States. For over a century, the breathtaking site has been cut off from public access by industrial infrastructure built along the water's edge. Snøhetta is leading the design of the public spaces that will allow visitors to rediscover the full height of the falls and its rugged shoreline, uncovering swaths of the 22-acre site's historic basalt topography and reconnecting Oregon City to its spectacular waterfront.

The riverwalk will serve as a portal to the Northwest's collective history, reviving a former industrial site through its aggregated layers of natural, ecological, cultural, and geological history. Beginning at the entrance to Oregon City's historic downtown and ending at the crest of the falls themselves, the riverwalk is conceived as sequence of islands, an archipelago carved from ancient basalt and industrial steel, concrete, and wood alike. The new design treats the whole site as a single landscape, with a network of promenades and lofted pathways that lace through the physical strata of the site, immersing visitors in a tactile experience that celebrates the changing water level, the feeling of the spray on your skin, the dramatic play of light and the roar and presence of the falls.

The project aims to reconnect the city to the waterfront and its spectacular views of the falls, laying down the next historic layer - an experiential riverwalk that foretells a story of renewed economy, environmental sensitivity, and historic importance.

RELEVANCY

- Adapting old, unused, and underused buildings to an accessible public landscape
- Intertwined accessible and functional landscape, architecture, and infrastructure
- Many physical layers, including water
- Many layers of history

Figure 3, top: Existing conditions, aerial

SOURCES:

- A Site Unseen: Snøhetta to Transform the Industrial Site of America's Second-Largest Waterfall - Architizer Journal. (2017, November 07). Retrieved April 18, 2018, from https://architizer.com/blog/inspiration/industry/a-site-unseen-snohetta/
- Snohetta Concept Design Package (n.d.). Retrieved April 18, 2018, from http://www.willamettefallslegacy.org/wp-content/uploads/2017/06/170603_100-Concept-Design-Package.pdf
- Willamette Falls Riverwalk. (n.d.). Retrieved April 18, 2018, from https://snohetta.com/project/233-willamette-falls-riverwalk

Figure 4, above: Existing conditions, mill

PROJECT CASE STUDY
RESEARCH CENTER ICTA-ICP · UAB

Location: Barcelona, Spain
Owner: Universitat Autònoma de Barcelona
Designer: H Arquitectes + DATAAE
Year Built: 2014
Size: 89,000 ft^2
Mission: Environmental sciences and palaeontology

Figure 1. Research center and grounds

PROJECT DESCRIPTION

A passive, low-tech/high-tech combination academic building in Barcelona. On the ground floor there is a hall, bar, classrooms, meeting rooms and administration area. The next three floors hold the offices and laboratories; on the roof there are vegetable patches together with lounge areas. The semi-underground floor holds the parking and the engine rooms while the basement contains the warehouses and other laboratories.

BUILDING TECHNOLOGY

- LEED Gold Certification
- Passive heating and cooling via ventilation and geothermal
- Skin of building is an industrial greenhouse system!
- Automated control system of vents, heating and cooling, and etc. to maximize passive performance
- Individually controlled, insulated rooms to have flexibility and localized control for research
- Capture and reuse rain and greywater
- Cheap and recycled/recyclable wood material
- Maximized natural lighting

Three Levels of Climate Control

Climate A: in-between spaces, that are exclusively acclimatized/heated by passive and bioclimatic systems

Climate B: offices, that combine natural ventilation with radiant and semi-passive systems

Climate C: laboratories and classrooms that have a more hermetic and conventional functioning.

SOURCES:

- CENTRE DE RECERCA ICTA-ICP DE LA UAB 1102. (n.d.). Retrieved April 18, 2018, from http://www.harquitectes.com/projectes/centre-recerca-uab-icta-icp/

Figure 2, above left: Roof vegetable garden lab

Figure 3, left: Atrium showing contained wood rooms

Figure 4, above: Close up showing greenhouse facade

PROJECT CASE STUDY
COLD SPRING HARBOR

Location: Cold Spring Harbor, NY 11724

Year Founded: 1883

Website: http://cshfishhatchery.org/

Mission: Former Hatchery Turned Non-Profit

MISSION
After 99 years as a New York State trout hatchery, it was opened as a non-profit educational center dedicated to educating our visitors about the freshwater ecosystems of New York. They have the largest living collection of New York State freshwater reptiles, fishes and amphibians, and create rich public interaction opportunities.

ABOUT
The Cold Spring Harbor Fish Hatchery closed its doors as a New York State fish hatchery on March 31, 1982. The following day it was reopened as a non-profit educational center by the Friends of the Cold Spring Harbor Fish Hatchery, Inc. Its mission is to operate as an environmental education center and public aquarium that continues to raise and stock trout. We are proud to have the largest living collection of New York State freshwater reptiles, fishes and amphibians. The Hatchery is a fun place for your family to spend an afternoon together. Visitors can tour our two aquarium buildings and eight outdoor ponds, feed the hungry trout, and try our "Catch & Keep" fishing. Special events, such as Animal Passport Program and Hatching Turtle Day, offer the public an opportunity to learn more about the creatures that inhabit New York State's natural environment. Each year schools, scouts and other groups visit the Hatchery to learn about the freshwater ecosystems of New York State. Elementary level programs, such as Fins and Jaws, Habitats and Life Cycles, and secondary level programs, such as Pond Life and Freshwater Ecology, complement New York State learning standards and enrich the learning experiences of the students. The Hatchery's seasonal Egg Stripping program allows students to witness the centuries-old technique of fish breeding: egg taking and fertilization. With the continuing support from Hatchery members, government agencies, private organizations and foundations, the Hatchery has been able to expand its programming with outreach options. Working in conjunction with Trout in the Classroom, the Hatchery is able to bring Egg Stripping programs into schools. The ability of the Hatchery to serve the community as a gathering place for special family and educational events, attests to its dedicated mission to increase awareness and appreciation for the freshwater ecosystems of New York State.

RELEVANCE TO OUR PROJECT
- Salmonids and other kinds of aquatic research
- Working hatchery
- Innovative hatchery infrastructure
- Outreach and education mission

SPONSOR AN ANIMAL
The money donated to the "Sponsor an Animal" program goes toward enhancing the livelihood of our animals by aiding in purchasing food, maintaining the exhibit habitat, assisting in veterinary care, and expanding our educational programming, constructed and naturalized waterfronts.

MENTORSHIP & VOLUNTEERING
The Cold Spring Harbor Fish Hatchery & Aquarium offers volunteer opportunities for adults and high school students. Volunteers are needed to help out with the care of our animals, and or to assist at the Hatchery's special events and educational programs. No experience is necessary, training will be provided by members of the Hatchery's staff.

All images taken from http://cshfishhatchery.org/

PROJECT CASE STUDY
NAVITAS HARBOR FRONT

Location: Aarhus, Denmark

Year Founded: 2014

Website: http://www.landezine.com/index.php/2017/10/navitas-harbour-front-by-marianne-levinsen-landskab/

Team: Marianne Levinsen Landskab, Client: INCUBA, Engineering and Technical Engineering School, Lead consultant: Kjær & Richter, CCO

PROJECT GOAL

The project creates an outdoor space surrounding the building of Navitas, the Engineering and Technical Engineering School in Aarhus, by inviting city life into the harbor. The dominant landscape element is the distinctive terraced platform along the harbor as well as the inner courtyards, which form green oases in the middle of the large building. The staircase to the water is created with large terraced steps, where edges and flat surfaces create various seating opportunities. Tall silver willow trees are planted on the stairway, conveying the scale between building and space, as well as offering shade and shelter. Silver willow trees enhance the very distinctive character of the place and the silver shades of the leaves capture the feeling of the experience of the shift between water and light. Trees are illuminated in the evening from below – and appear in the dark as light and shining clouds over the square.

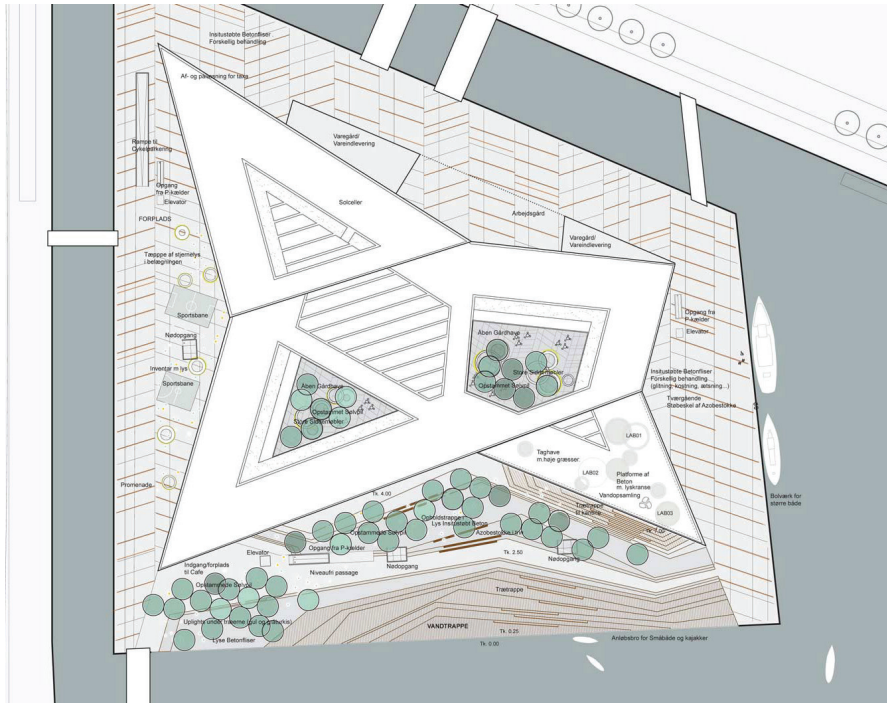
"A powerhouse of education, research, innovation, and entrepreneurship."

AROUND A RESEARCH BUILDING

Navitas Science and Innovation is one of the many buildings which have recently emerged on the waterfront in Aarhus, close to the new Aarhus East city quarter. Inside the building, it's clearly evidenced purpose is to boost cooperation between researchers, teachers, lecturers, and businesses by focusing on innovation and practical application of knowledge. The building also houses a number of students since this is where the Aarhus University School of Engineering is located. The 38,000 sq m star-shaped building, which was designed by architectural firms Kjær & Richter and Christensen og Co., is well worth a visit simply because of its architectural presence. And it is an international beacon of energy saving.

RELEVANCE TO OUR PROJECT

- Boosts co-operation between researchers, teachers, lecturers, and businesses
- Outdoor areas open to the general public: the marvelous outdoor areas around the building have become a popular oasis on the waterfront with stepped levels, perfect for taking a break!



All images taken from http://mariannelevinsen.dk/navitas-park.html

THINKING OUTSIDE THE TANK

PUSHING DESIGN THINKING

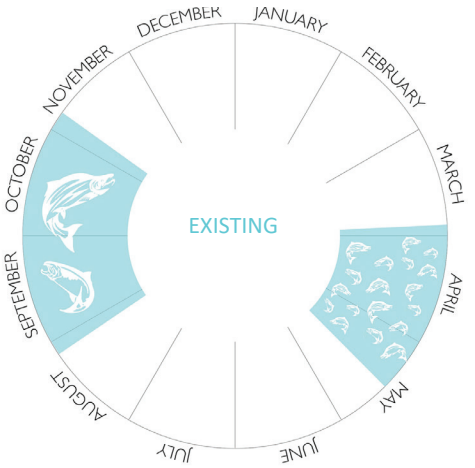
- Can hatchery infrasturcture be fully used year-round?
- How can we integrate the public into a research hatchery?
- Can hatchery infrastructure be softened or ‘naturalized?’
- What can designers do to improve and layer hatchery program?

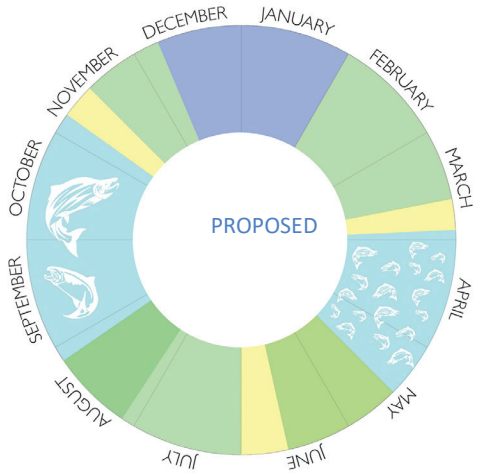
Homing ponds, fish ladders, spawning channels, and raceways were investigated and re-imagined in these two proposals.

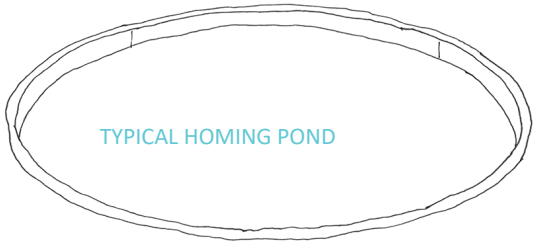
SINGLE PURPOSE HOMING PONDS . . .
WHAT A LOAD OF CARP!

By Adam Carreau

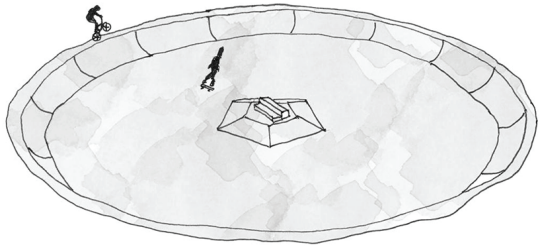
Traditionally, the UW Research Hatchery homing pond was used during the autumn for the return of adult salmon. The salmon were corralled, euthanized, then the eggs were artificially inseminated and brought to the incubation room. In the spring, the homing pond was used for the young coho and Chinook before they made their way to the ocean. Due to water temperatures, the salmon were pushed out by May 15th. The pond only needs to be covered when the salmon are juveniles and need protection from birds. This system is generally hard concrete, and is connected with the fish ladder.



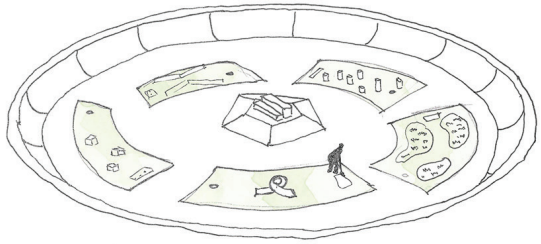




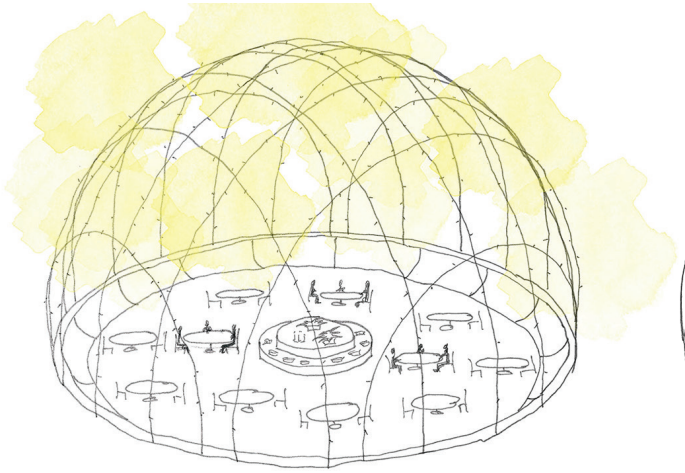
TYPICAL HOMING POND



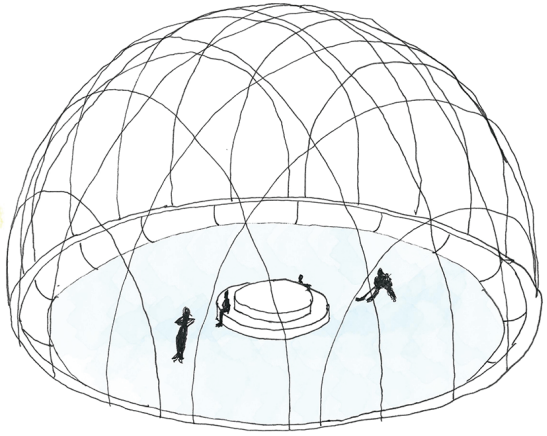
SKATE PARK



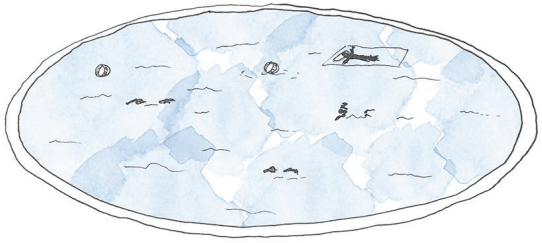
YARD GAMES



ILLUMINATED EVENT SPACE



ICE RINK



LAZY RIVER

ALGAE FARMING IN RACEWAYS

By Sophie Krause

RE-IMAGINING RACEWAYS

Notfishtanding the importance of a salmonid raceway in maintaining a structure that is easy to clean, and that will maintain a low uniform velocity and water quality gradient, they can still be re-imained as an inspiring educational tool as part of an Aquatic Research Facility.

ANYFIN IS POSSIBLE

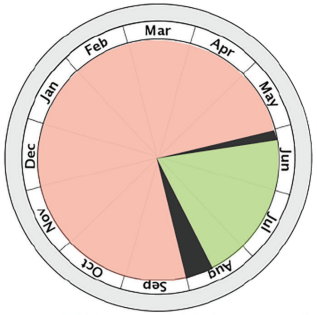
Anyfin is possible when the research oriented characteristics of the raceway structure are preserved, and then surrounded by biomimetic architectural elements that work to soften the landscape, clean hatchery waste water effluent, and invite its scientific users into a sense of play.

THE FISSHUE

The fisshue here is delineating a separation between the raceways use throughout the Chinook and coho rearing span, and the potential for temporary uses during the months of June - late August.

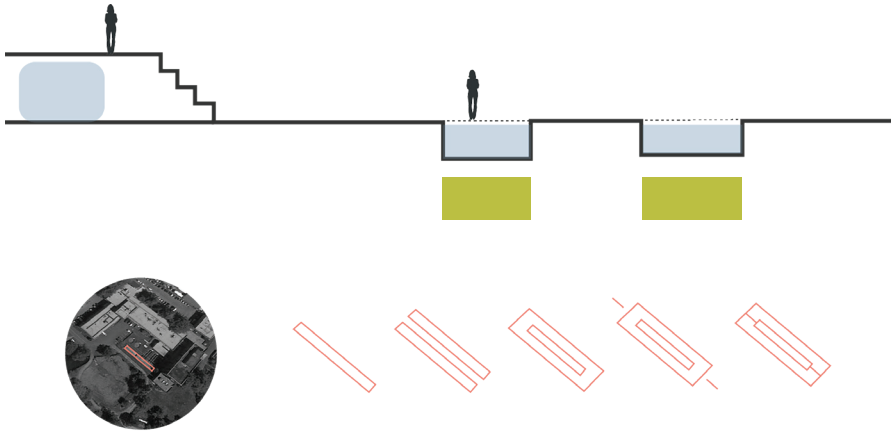
SOMEFIN OF INTEREST

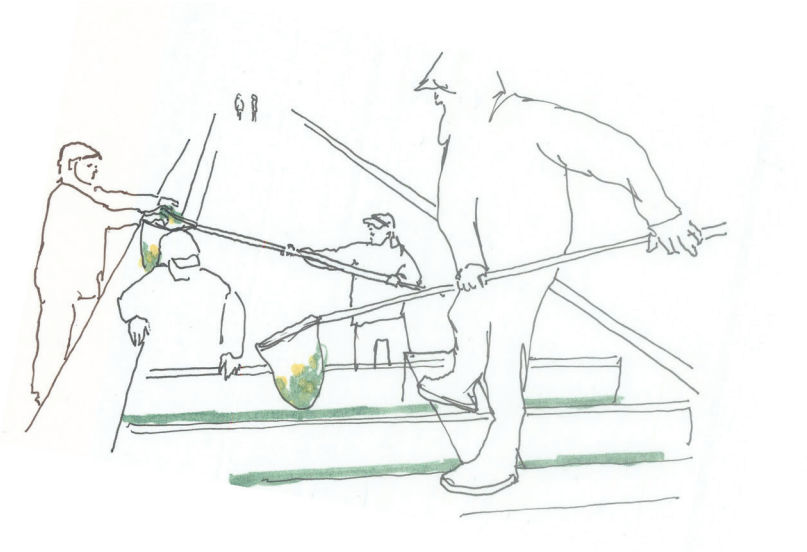
Somefin of increasing interest within the aquatic scientific community here at the University of Washington is the use of algae lipid production for making biofuels. During these summer months, raceway infrastructure could be used to assist these processes, which currently lack larger than laboratory beaker scale infrastructures.



YEAR ROUND USE

Primarily used for salmon rearing throughout most of the year, hatchery infrastructure could also be used for algal production during the warm summer months when salmon are no longer present.





https://www.greencarreports.com/news/1084336_u-s-perfectly-placed-for-algae-based-biofuel-production

The [University of Washington's Seattle] campus landscape is a living medium, growing and changing over time, but its materials and underlying meaning provide a continuity to the UW identity that is powerfully felt. The campus landscape is also the most accessible place for putting the values and lessons of the classroom into action: it is a working landscape where people learn, teach, observe, farm, garden, and conduct research, as well as a social landscape for meeting, gathering, play, and relaxation.

--Campus in Motion: UW's Campus Landscape Framework

REQUEST FOR PROPOSALS

UW Aquatic Research Facility Site Study

This Request for Proposals (RFP) is being distributed to a limited number of highly qualified design teams who have been short-listed-for the UW Aquatic Research Facility Site Study.

OVERVIEW

For over 60 years, the School of Aquatic and Fishery Sciences (SAFS) maintained a research salmon run and hatchery on campus along Portage Bay. However, in 2010, SAFS faculty decided to discontinue use of the salmon run and hatchery for research due to "new directions in fisheries research and budget cuts". Now, almost a decade later, SAFS faculty are leading an effort to re-establish a research run and hatchery facility on campus in cooperation with the Washington Dept. of Fish and Wildlife, the salmon focused non-profit Long Live the Kings, and the Muckleshoot Indian Tribe.

This RFP will explore site options to locate an Aquatic Research Facility on UW's Seattle campus. Teams will be tasked with developing a vision and program for the facility, identifying and assessing appropriate campus sites, and developing concept designs which consider both the existing context and UW's future campus plans. Teams will have an opportunity to hear directly from the stakeholders about their goals and priorities for the facility, to tour other hatchery facilities, and to discuss current needs and future plans for the Seattle campus with the Architect and Landscape Architect for the University. The teams will also hear from experts about Pacific NW salmon, environmental education and interpretative centers, and public space projects on Portage Bay. Teams are expected to synthesize this information with their own research and creativity as they develop strategies for locating and designing the new facility.

PROJECT SCOPE

This RFP will explore how the strategic site selection, programming, and site development of a new Aquatic Research Facility at UW might serve its primary function for research and learning while also activating campus life, enhancing our connection to the natural world, and engaging off-campus collaborators. Team should incorporate relevant goals and objectives from UW's Campus Master Plan and Campus Landscape Framework as they consider and evaluate potential locations for the facility.

As aspiring landscape and architecture designers, the teams are expected to investigate landscape phenomena, relationships, processes and systems to produce designs which embody creativity and a sophisticated sense of space, process and form. Teams are encouraged to develop strategies and craft places which focus on how the exterior components of the facility in particular accommodate research needs while fostering campus public life. The facility must function as a hub for aquatic research but should also be experienced as a place of advocacy for our connection to the natural world in general and Pacific NW salmon in particular. Consideration should be given to how the facility will function in its existing context and in future phases of campus development.

PROJECT ELEMENTS

Vision and Program

Each team should clearly express a vision for the Aquatic Research Facility which includes how the facility will meet stakeholder goals; will be incorporated into the existing and future campus; will be a robust and positive addition to campus life; and will encourage engagement with non-campus groups.

Each team should clearly express the program supported by the site including the size and requirements of all desired program elements.

Identify and Assess a Preferred Site

Each team should investigate the entire campus and identify multiple potential sites for the facility. Then through a rigorous site assessment process, each team should select a preferred site. Teams should clearly articulate an argument in support of the preferred site in relation to their vision and program and the site assessment process.

Each team should document and present the preferred site's opportunities and constraints as related to program, context and character, operations and maintenance, utilities, access, zoning and shoreline district requirements, historic uses of the site, potential future expansion, sustainability, and cost.

Concept Design

Each team should develop a concept design for their preferred site which considers how research and learning, campus life, and ecology can interweave on a site. Concept designs should be aspirational, articulate and well-crafted. Designs should embed and reveal the dynamic and experiential qualities of landscape and urban settings.

Each design should incorporate all elements of the program as well as identify opportunities for future expansion. Designs should respond to the existing site context as well as future planned contexts.

DELIVERABLES

Vision statement
Program
Preferred Site opportunities and constraints
Context diagram
Site photos
Site plan indicating all design elements
Site sections
Bird's eye rendering
Vignettes
Diagrams (future phases, dynamic elements, circulation, public and restricted access areas, and operations.)
Booklet

TIMELINE

RFP Issued: March 26
Review Presentations: May 30, time tbd. No late submissions will be accepted.
Stakeholder Presentations: June 4, time tbd
Consult the included Schedule for dates of required tours, presentations and discussions.

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ACTIVATING RESEARCH, LEARNING + CAMPUS LIFE

AN AQUATIC RESEARCH FACILITY SITE STUDY AT UW

A1[ASSIGNMENT 1]: RESEARCH + CASE STUDIES

Assigned Mon 3.26 Pin up Mon 4.2

Now that we have been short-listed for the UW Aquatic Research Facility Site Study RFP, we need to consider what we know and don't know about the focus of the project, the goals of the stakeholders and potential precedents. We are being asked to consider possible sites for an aquatic research facility, but what is an aquatic research hatchery? What is researched there? Who are the stakeholders and what is important to them? How will they use a research hatchery? Are there existing research hatcheries that might guide us in our work? Often designers begin a project with research, we will too.

As you prepare your research, consider what information you can present visually rather than in paragraphs of text. Prepare well organized, visually compelling "fact sheets" for your topics. Your fact sheets may be multiple pages. Use the templates provided on our canvas site. Salmon and Stakeholder fact sheets will be portrait orientation, letter-sized. Case Study sheets will be landscape orientation, 11x17.

Working in two groups of 2 and one group of 3(*), we will research the following:

Salmon

- Basic facts and information about salmon:
  - what is a salmon, what salmon species are in the Pacific NW, what is the salmon lifecycle, who are its predators; what is the habitat for salmon across their lifespan, what do they eat, which species live in Lake Washington, where do they start and return to
- Significance of salmon in the Pacific NW:
  - What is/was the importance of salmon for Salish tribes, what are Salish tribes' rights related to salmon, what is/was the importance of salmon for Seattle's historic/present culture and economy
- *Current status of salmon:
  - Endangered Species Act listing and current status, historic/present threats to salmon, historic/present recovery efforts, what are the issues with salmon habitat in urban settings, what are issues for salmon returning to Lake Washington, what can be done to lessen urban impacts to salmon

Stakeholders

- Basic information about the stakeholder organizations: what is their mission, what are their programs and research, what is their focus, where do they work, what types of education and outreach do they do
  - Long Live the King (LLtK)
  - Muckleshoot Indian Tribe
  - *UW School of Aquatics and Fisheries Science (SAFS) and Wash. Dept. of Fish and Wildlife (WDFW)

Case Studies: Research Hatcheries

- Fact sheet for case studies including: where is it (urban, rural, on a river, on the Pacific waterfront, mission and goals (research, production, public education), overall size, list of components with approximate sizes (if possible), who runs it. Include captioned photos and site and building plans.
  - Oregon Hatchery Research Center
  - UC David Bodega Marine Laboratory
  - *Issaquah and Yakima Hatcheries

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ACTIVATING RESEARCH, LEARNING + CAMPUS LIFE

AN AQUATIC RESEARCH FACILITY SITE STUDY AT UW

A2[ASSIGNMENT 2]: VISION | MISSION STATEMENT

Assigned Wed 4.4 Due Fri 4.6 (end of day) (submit a pdf with all parts on canvas)

Part I

Based on conversations with the Stakeholders today, develop a vision and mission statement for the new Aquatic Facility. Begin by considering the stakeholders' priorities and "hopes" for the facility, being sure to include thoughts on research, outreach and production. Next, using your lens as a landscape architect/architect, consider what might be added that will bring value to the project and would in line with the stakeholders' thoughts. Your mission statement should describe what the facility and researchers will DO. The vision should describe what the facility and research hope WILL HAPPEN.

You may develop a series of (categorized) bullet points which cover the various aspects of the project and serve as "goals or values", ie: research goals, outreach and education goals, infrastructure and energy goals, etc. However, also develop (through iterations of editing) a 1-2 sentence statement for the project. ***Remember, you are creating a vision, it should be aspirational.***

Part II

Collect, create or otherwise develop imagery that reflects your mission statement and vision. This might include precedent (natural and man-made) photos, systems diagrams, interpretative images, provocative images, etc.

Examples:

WASHINGTON PARK ARBORETUM - https://botanicgardens.uw.edu/about/

Our mission is sustaining managed to natural ecosystems and the human spirit through plant research, display, and education.

WDFW - https://wdfw.wa.gov/about/mission_goals.html

Our Mission

To preserve, protect and perpetuate fish, wildlife and ecosystems while providing sustainable fish and wildlife recreational and commercial opportunities.

Vision

Conservation of Washington's fish and wildlife resources and ecosystems.

WDFW defines "Conservation" as:

Protection, preservation, management, or restoration of natural environments and the ecological communities that inhabit them; including management of human use for public benefit and sustainable social and economic needs.

(Adapted from The American Heritage® Science Dictionary Copyright © 2005)

Department Goals

To achieve its mission, WDFW will continue to focus its activities on the following four goals:

- Goal 1: Conserve and protect native fish and wildlife
- Goal 2: Provide sustainable fishing, hunting, and other wildlife-related recreational and commercial experiences
- Goal 3: Promote a healthy economy, protect community character, maintain an overall high quality of life, and deliver high-quality customer service
- Goal 4: Build an effective and efficient organization by supporting our workforce, improving business processes, and investing in technology

LOUISIANA CHILDREN'S MUSEUM - LCM.org

Our Mission

Louisiana Children's Museum contributes to the region's future prosperity by engaging children's potential and making that potential visible. Through play, shared explorations, and in dialogue with adults, LCM connects children to each other, adults, their environments and communities.

Vision

Louisiana Children's Museum envisions a world where communities value children, strengthen and support families, and improve life outcomes by ensuring access to safe, innovative, learning, and play experiences.

Values

Each Child's Potential:

- The child's potential and capabilities inspire and guide us in our work.
- We recognize the critical role childhood experiences play in strengthening children's capabilities.
- We respond to the enormous challenges limiting opportunities for too many of our community's children.
- We engage in areas where changing long-term life outcomes are possible including well-being, literacy, and adult engagement.
- We create dynamic play and learning environments, exhibits, and programs informed by essential experiences that contribute to children's optimal development.

Engaged Communities:

- We are committed to building stronger, connected communities through active engagement.
- Our network of partners engages with the community around children to widen the circle of opportunity and prosperity for all children.
- We play active and varied roles in bringing new perspectives to the culture of childhood.
- We connect families, neighborhoods, and communities to build a robust ecosystem for childhood across generations, neighborhoods, and cultures.
- We make our intentions transparent and our work visible to our visitors, our partners, and policy-makers.

Learning:

- We are a learning organization; we value learning for ourselves, for children and for families.
- We advance the critical role of play in learning in each experience and environment we create.
- We engage in dialogue with parents and caregivers to support their role in children's learning.
- We learn from documentation, as process and as a tool, to make children's thinking and learning visible.
- We learn from visitors, partners, and museum colleagues to increase our value to the community.

A Dynamic Community:

- Our culturally rich, diverse and dynamic community belongs to all children.
- We are welcoming and accessible to all families and children, of all backgrounds and circumstances.
- We seek options and opportunities for inclusion in our play and learning experiences that support the potential of all children.
- We value the local cultural assets that connect us and create play and learning experiences that reflect our region.

Stewardship and Resilience:

- Stewardship and resilience inform our choices and decisions today to increase our capacity in meeting future challenges and opportunities.
- We believe that resilient systems for the city and its children are critical to a brighter and more prosperous future for all.
- We recognize and value the talents of staff and volunteers, fostering their development and actively improving the organizational culture.
- We adhere to innovative, sustainable and green practices in our building and operations.
- We seek multiple, stable, long-term sources of revenue to provide greater financial sustainability.

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ACTIVATING RESEARCH, LEARNING + CAMPUS LIFE

AN AQUATIC RESEARCH FACILITY SITE STUDY AT UW

A3[ASSIGNMENT 3]: UW PLANNING PRIORITIES + PLANS | LAND USE + ZONING

Assigned Wed 4.4 Pin Up Wed 4.11

For Assignment 3, we will take a deep dive into UW's planning priorities and City of Seattle zoning and land use regulations, focusing on UW waterfront edge properties. As we have discussed, UW Capital Projects and Planning is a fifth "stakeholder" for the project. Over the last few years, UW has worked with design consultants to develop the UW Seattle Campus Master Plan by Sasaki (2017), Campus in Motion: UW's Campus Landscape Framework by Michael Van Valkenburgh Associates (2015) and the UW South Campus Study (2016) by Perkins + Will. Each of these documents set the agenda for campus development over the next 20 years. Needless to say, our work should conform with these documents. Next week Rebecca Barnes, Architect for the University will join us to discuss and answer questions about the reports. In addition to UW's development aspirations, we will need to consider and understand what is allowed and/or required per City and State zoning and land use regulations. These are outlined in the Campus Master Plan (CMP) and available from the City's website.

Part I

Working individually or in teams, the following should be researched and documented (you may use multiple pages for documentation). Some questions you might ask yourself are provided but as you research, you should be evaluating what is significant and relevant for the project. Remember to collect important maps, diagrams, charts, etc as you conduct your research.

Seattle Campus Master Plan**

- What are the main priorities? Which are relevant to our project?
- What opportunities might exist? What constraints?
- What parts of campus are underutilized and open to growth?
- How will the waterfront edge of the campus be different in future years?
- What buildings are being preserved, which buildings will be removed?
- What are the agreements with the City?

Campus in Motion: UW's Campus Landscape Framework**

- What are the main priorities? Which are relevant to our project?
- What opportunities might exist? What constraints?
- What are some current (now completed?) and future projects for the campus?
- What are beloved spaces on campus? What is their character?
- How can UW use its campus effectively in terms of climate change and increased density and building heights?

UW South Campus Study*

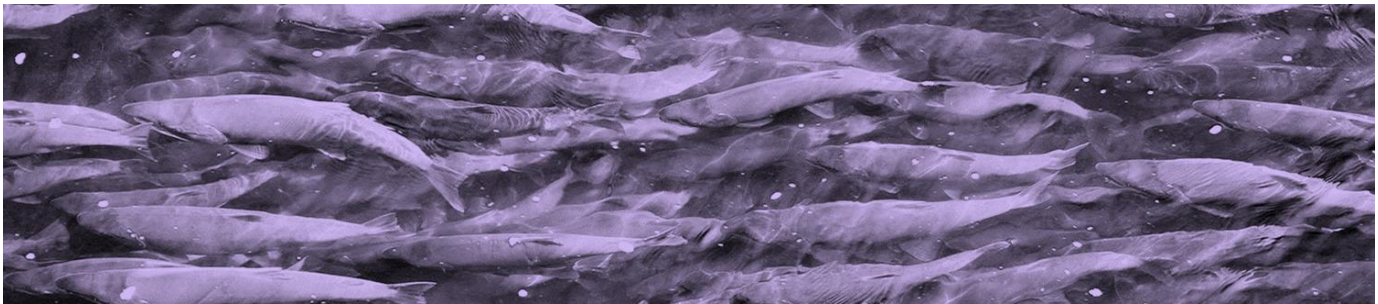
- What are the main priorities? Which are relevant to our project?
- What opportunities might exist? What constraints?
- What parts of campus are underutilized and open to growth?
- How will the waterfront edge of the campus be different in future years?
- What buildings are being preserved, which buildings will be removed?

City of Seattle Zoning and Land Use Regulations + State Regulations*

- What are the zoning regulations within campus?
- How is it different from the existing campus?
- What are specific land use regulations on campus? Along the water's edge?
- What types of activities are permissible on campus? Along the water's edge?

Freshwater Fish Lab Feasibility Studies – August 1994 and May 1990*

In 1990 and again in 1994, Feasibility Studies were commissioned by UW for a Freshwater Fish Lab. Both studies looked at the former Bryant site (site of the new Portage Bay Park) for the facility. Although much as changed since the studies, they may still be useful in terms of program elements, space requirements and systems.



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ACTIVATING RESEARCH, LEARNING + CAMPUS LIFE

AN AQUATIC RESEARCH FACILITY SITE STUDY AT UW

A4[ASSIGNMENT 4]: MORE CASE STUDIES

Assigned Wed 4.11 Pin Up Wed 4.18

It's time to be inspired and inspiring! For Assignment 4, everyone will need to identify and document 5 case studies. Try and find examples that push beyond those you have previously studied or are well-known, ie, no Bullitt Center. Don't limit yourself to local or even US-based case studies. Consider your documentation of the case study as both an informational and "promotional" brochure. Highlight what is of interest to you and why it is relevant to our project. Images are a must. Produce a diagram or two if needed to help others understand the significance of your case study. Minimum 2 pages for each case study.

Case Study 1: Interpretative or Educational Approach
This case study could have an environmental focus or not. If not, be clear about why it is relevant to our project and your approach to education, outreach or interpretation. Consider both interior- and exterior-focused interpretation. Consider outreach for K-12, families, college-students, community members. Search for examples that do more than simply a sign or plaque for explanation and provide a more experiential approach. Should there be an online presence?

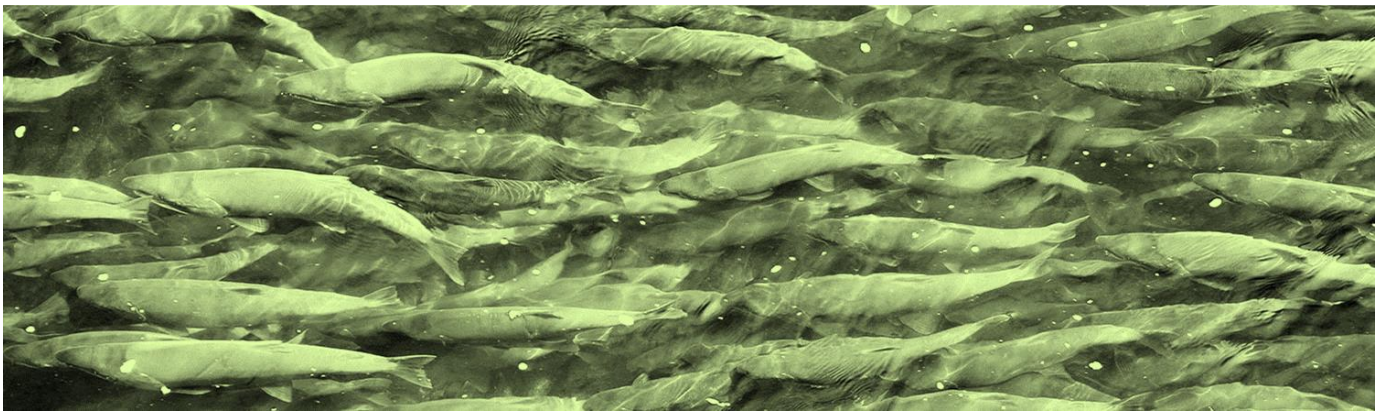
Case Study 2: Campus Open Space or Open Space Strategy
This case study should focus on how the Research Facility can integrate and enhance campus public life. Look for projects that create dynamic, well-loved campus spaces and/or trails, especially those on a historically important campus in an urban setting (sound familiar?). Consider the importance of access to water. Consider furnishings, adjacent uses, views, access, etc.

Case Study 3: Smart Building Technologies or System
For this case study, focus on architecture projects using or proposing innovative building systems or technologies. Could be how to deal with water, waste, energy production and use, recycled building materials, sustainable building materials, passive energy strategies, etc.

Case Study 4: Smart Site Technologies or System
Similar to Case Study 3 but focus on site strategies. Again, water, waste, energy production and use, recycled buildings materials, etc.

Case Study 5: Amazing Inside Out Project
This case study should focus on a project that incorporates architecture and landscape is a way that is inspiring and seamless. Consider the spatial, material, and formal strategies used on the project. How do interior and exterior spaces relate to and support each other. What is one's experience when one is inside vs outside?

Dream big!!



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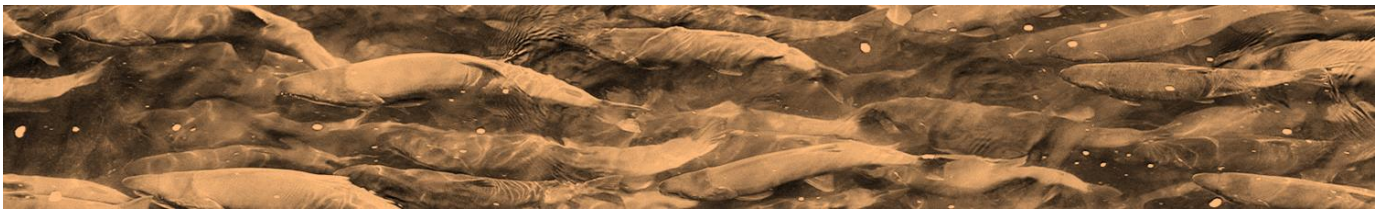
A5[ASSIGNMENT 5]: SITE INVESTIGATION

Assigned Wed 4.18 Pin Up Mon 4.23



Rather than conceive of sites as having one single bounding condition, site construction posits the site boundaries shift in relation to the position – the physical location and ideological stance – of their beholder.

…

Although considered a predesign activity, site analysis inevitably prefigures and reflects design intentions. This logics and values structuring initial site observations are always and already prescribed by ideas about the future modifications imagined for a place, and conversely, the analysis process initiates a way of thinking about place that resonates through all subsequent phases of design.

–Andrea Kahn, "Defining Urban Sites", *Site Matters*

For Assignment 5, we will work in our site teams to explore, dissect and (re)build the sites. Teams should gather all necessary resources: GIS files, topographic plans and nautical charts, site photos and sketches, etc. Teams should prepare the following documents in the Booklet format (new templates provided). Plans will be done on a template to be printed at 17"x22" (half scale is letter-sized).

Site Investigation Documents:

Existing Conditions Plan

- All existing features: structures, paths, walls, paved surfaces, vegetation, shoreline, views, natural features, utilities, etc. shown and labeled
- Scale: 1"=40', include graphic scale.
- Topography + Bathymetry – at least 2-ft contours – indicate any changes in water level (ie, when Lake Washington is raised/lowered). This can be a separate plan from the Existing Conditions Plan if it is getting too complicated.

Site Context Map(s)

Each team will need to determine what scales/areas are needed to adequately describe the site's context. At a minimum, each team should have a map(s) showing:

- the site in relation to the entire campus
- adjacent/relevant properties, structures, natural features, transportation connections, views, utilities, etc.
- Site in relation to salmon geography

Site Photos

- Photos showing significant views, structures, vegetation, land features, etc
- All photos should be labeled and keyed to a site plan

Zoning + Regulations Plan

- Plan drawing indicating all zoning, building, permit requirements/restrictions
- Indicate ownership of all land, structures, waterways, etc

Site History

- Timeline with text and images of significant dates/events related to the site
- Written history of the site, its development, uses, significant facts.
- Documentation of all structures – text and images – include when constructed, any significant adjustments, etc

Existing Site Material Matrix

- Site photos documenting textures and materials on site.
- Order photos on both axes

Site Model

Existing site including topography + bathymetry and all structures, etc. Scale: 1" = 20'

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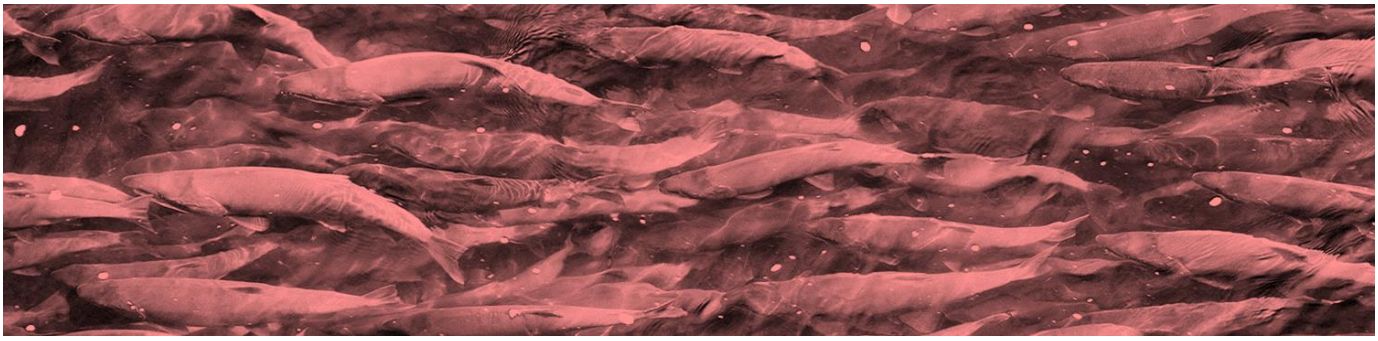
ACTIVATING RESEARCH, LEARNING + CAMPUS LIFE

AN AQUATIC RESEARCH FACILITY SITE STUDY AT UW

A6[ASSIGNMENT 6]: SITE ANALYSIS + SITE CONCEPTS

Assigned Mon 4.23 Pin Up Wed 5.2



It is time for a deep dive on your journey to spawn site designs! For Assignment 6, each site team will analyze their site based on our list of Site Criteria. The goal of the assignment is to understand what works and doesn't work about your site. What will be the opportunities and obstacles? What will be the issues and constraints? Given these, how will you craft an argument for why your site and what should happen on it? What parts of the site would be best for which program? What parts of the site can be retained? What parts must be adjusted? Then you will work in your Design Teams to develop initial site approaches and concepts.

Site Analysis [Site Teams]

1. Develop a list of each of the following for your site:
   - Opportunities
   - Obstacles
   - Issues
   - Constraints

2. Develop diagrams as needed to describe the lists above and to frame your argument.
3. Create a board(s) [spread(s)] for each category.

Site Concepts [Design Teams]

1. Concept plan(s) and section(s)
2. Vignettes or precedent images
3. Diagrams
4. Site models

Site Criteria

SITE + INFRASTRUCTURE

- Cold water access
- Utilities
- Zoning + Permitting
- Environmental Impact
- Construction Feasibility
- Existing conditions

SITE CONTEXT

- Proximity to SAFS / Labs
- Mobility and human access
- Proximity of amenities
- Visibility / foot traffic
- Compatibility of Adjacent uses

DEVELOPMENT + COST

- Order of magnitude/Cost comparisons
- Development feasibility
- CMP / CLF Compatibility
- Coupling / Piggy-backing opportunities
- Operations + Maintenance (security, maintenance impacts, operational costs, etc)

PROGRAM + STAKEHOLDER WANTS

- Fish access to site
- Available space (interior and exterior)
- Ability to function as an urban pilot project

NARRATIVE + EXPERIENCE

- Connection to the Salmon Story
- Site Histories
- Human Experience
- Positive contribution (multiple scales)

Pin-up: Wednesday, 5.2 3:00-4:30, Gould 114

Format:

Site X [40 min total]

Site Analysis 20 minutes

Your entire team's site analysis presentation should be no longer than 5 minutes.

Site Concept 10 minutes x 2

Each Design Team will get 10 minutes. Your presentation should be no longer than 3 minutes.

Site Y [40 min total]

Site Analysis 20 minutes

Your entire team's site analysis presentation should be no longer than 5 minutes.

Site Concept 10 minutes x 2

Each Design Team will get 10 minutes. Your presentation should be no longer than 3 minutes.

Digital presentation with prints of key boards/spreads at 17x22 or 34x44. Site Models

Reviewers:

- Kristine Kinney, UW Planning
- Mark Johnson, Signal Architecture
- Jim Stoner, Hainline [Owner's Rep + Construction Management]
- Chris Grue, SAFS

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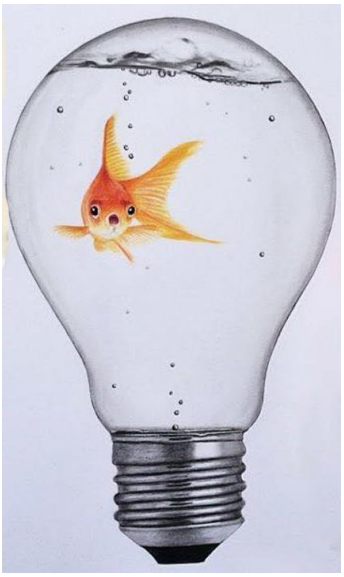
ACTIVATING RESEARCH, LEARNING + CAMPUS LIFE

AN AQUATIC RESEARCH FACILITY SITE STUDY AT UW

A7.1 THINKING OUTSIDE THE TANK: reely fintastic ideas

Assigned Fri 5.4
Due Mon 5.7 Pin up by 2:15 pm Monday outside Gould 322 (and along the south wall if additional space if needed)(although I sure wish this was in the FISHbowl ☺)



This weekend, your task is to reimagine fish hatchery infrastructure. Conventional infrastructure at fish hatcheries is dull, generic, singular in purpose and from a design perspective, simple and uninspired. How can you modify or redesign a rectangular, concrete trough to be more dynamic, integrated, interactive, heuristic and engaging while still serving its fish rearing purpose? Remember to refer to all research, seminar presentations, etc.

Considerations

- **Understanding function of existing infrastructure**. When it is in use/not in use in terms of the life cycle of salmon but also when calendar/academic year? How must it be maintained? Assume all infrastructure must be emptied and cleaned/sterilized between each round of salmon rearing to maintain integrity of research and humane care of fish. In other words, if you wanted to add plants to a piece of infrastructure, the plants would either need to be in a separate portion of the infrastructure from the fish or in a container so they could be removed during cleaning.
- **Understanding level of security and other protections for existing infrastructure**. Does the infrastructure need to be fenced or separated from visitors (always, sometimes, never), does the infrastructure require netting or other predator deterrents (always, sometimes, never)? How can these elements be architecture/integrated into the design rather than look like after thoughts or add-ons? How can visitors interact with the infrastructure without compromising its security and scientific value?
- **Multiple uses for reimagined infrastructure.** What other uses or functions can the reimagined infrastructure provide? Are they simultaneous to fish rearing functions, sequential, episodic? Do they relate to visitor experience/outreach; other academic units or educational opportunities; sustainability + smart building/site strategies; phasing? How do they relate to your site and program?
- **Desired design elements and aesthetic.** What is the "style" or "look" of your reimagined infrastructure? How does it relate to other design elements, the site, the larger context? How does it add to the site experience and narrative? How can the infrastructure be designed to enhance a visitor's experience and learning? How can the infrastructure be reimagined to accommodate a single visitor vs groups? What comfort elements are needed for researchers, fish, visitors, ie cover from rain, seating, railings?

Assignments

- Pond and ladder: Nina, Elijah, Adam
- Raceways and tanks for rearing: Jingjing, Sophie
- Spawning channels: Jiyoung, Weicheng

Requirements

- All work is to be done individually but you can, of course, discuss and share ideas and brainstorming.
- All information must be on a single, thoughtfully-organized, graphically-strong 34 in x 44 in board – landscape orientation. Use the template provided. (google drive – charrette)
  Pin up by 2:15 pm Monday outside Gould 322 (and along the south wall if additional space if needed).

To include on your board:

- Title (clever fishy puns encouraged!)
- Photo or other image of standard/existing infrastructure with description of purpose of infrastructure for fish rearing, dimensions or scale figure, and indication of material(s)

- Diagram explaining when and how infrastructure and reimagined infrastructure is used for fish rearing within context of salmon life cycle (fall chinook and fall coho)
- Diagram explaining indicating when infrastructure and reimagined infrastructure is in use and in what capacity (fish rearing and non-fish rearing activities) throughout calendar year
- Description of reimagined infrastructure and how it meets project goals.
- Precedent and/or design images for reimagined infrastructure for fish rearing uses
- Precedent and/or design images for reimagined infrastructure for non-fish rearing uses
- Description of maintenance and operations of reimagined infrastructure for fish rearing and non-fish rearing use; clearly indicate non-fish rearing uses
- Site plan and site section showing conceptual layout of reimagined infrastructure on your site

Note: Images, diagrams and descriptions may be combined but all listed information should be included and legible.

Remember these are important: Craft. Spelling and use of grammar. Creativity of ideas. Clear expression of intended goals. Relationship of design to site, its surroundings and program.

Information about Existing Infrastructure

Fall Chinook (raising approx. 250,000 fish)
Fall Coho (raising approx. 150,000 fish)

Late August - October
Chinook return to spawn – using ladder, homing pond and spawning channels
Chinook eggs in incubation room or spawning channels
Consider how adults will be captured and sorted to determine ripening (if ready to spawn) relative to a more natural homing pond. For example - adults could enter the homing pond then be encouraged through stream flow to move up into a "ladder" that has a crowder etc. This removed the fish processing part from the pond itself.

October - November
Chinook eggs in incubation room or spawning channels
Coho return to spawn – using ladder, homing pond and spawning channels
Coho eggs in incubation room or spawning channels

December - February
Chinook and coho in incubation room and spawning channels
By end of February, Chinook and coho fry move to inside raceways

March - April
Chinook and Coho move outside to raceways
Chinook and coho juveniles getting ready to leave – use ladder to get to homing pond; in homing pond because too large for raceways
Chinook will move outside to raceways prior to coho and then again will move into homing pond before coho.

May
At the beginning of May, all juvenile fish have option of leaving pond via ladder into Lake or Montlake Cut.
All remaining fish are forced out by May 15 due to temperature of lake water.

June – Late August
No fish. Exterior raceways, spawning channels, ladder and pond not used. All facilities are cleaned etc. If a more natural edge in the pond were used it would need to be planted with plant species that could accommodate a draw down so that the waste trap etc could be cleaned.

See also handout from Issaquah Hatchery.

Have fun and *CARP*e diem!

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ACTIVATING RESEARCH, LEARNING + CAMPUS LIFE

AN AQUATIC RESEARCH FACILITY SITE STUDY AT UW

PROGRAM

Program:

EXISTING (Interior) – 6,700 sf

- Research hatchery room – 3000 sf
- Lab 1 + 2 (Wet labs) – 2 x 350 sf
- Lab 3 – 750 sf
- Other Labs – 1,000 sf
- Incubation room – 450 sf
- Office – 150 sf
- Storage – 350 sf
- Bathrooms – 300 sf

PROPOSED (Interior) – 8,000 sf (minimum)

- Research hatchery room – 2 x 3000 sf
- Incubation room – 450 sf
- Office – 150 sf
- Storage – 350 sf
- Meeting room – 500 sf
- Interpretative elements – 300 sf
- Bathrooms – 300 sf

Other potential optional elements:

- SAFS offices relocated from Fisheries Teaching Bldg and Marine Sciences Bldg (both buildings will be demolished to accommodate the West Campus Green)
- Other UW academic units
- Other non-UW partners
- Restaurant/café/other food service

EXISTING (Exterior) – @40,000 sf

- Homing Pond + viewing area
- Fish Ladder
- Pump House
- Rectangular raceways (4) (netted + fenced)
- Round tanks (2) (netted + fenced)
- Large Rectangular raceway (1) (netted + fenced)
- Loading dock
- Parking spaces
- Trails/walkways

PROPOSED (Exterior) – tbd

- Homing Pond + viewing area (partial/temporary cover)
- Fish Ladder
- Raceways + Tanks (fully netted + fenced when in use)
- Spawning Channels (optional) (fully netted + fenced when in use)
- Pump House
- Sedimentation Pond (truck access required)
- Loading dock
- Interpretative elements
- Trails/walkways
- Waterfront Trail
- Bus parking/drop-off
- Bike parking
- Parking spaces (1 ADA; 2 recommended but optional)

Site Criteria:

SITE + INFRASTRUCTURE

- Cold water access
- Utilities
- Zoning + Permitting
- Environmental Impact
- Construction Feasibility
- Existing conditions

SITE CONTEXT

- Proximity to SAFS / Labs
- Mobility and human access
- Proximity of amenities
- Visibility / foot traffic
- Compatibility of Adjacent uses

DEVELOPMENT + COST

- Order of magnitude/Cost comparisons
- Development feasibility
- CMP / CLF Compatibility
- Coupling / Piggy-backing opportunities
- Operations + Maintenance (security, maintenance impacts, operational costs, etc)

PROGRAM + STAKEHOLDER WANTS

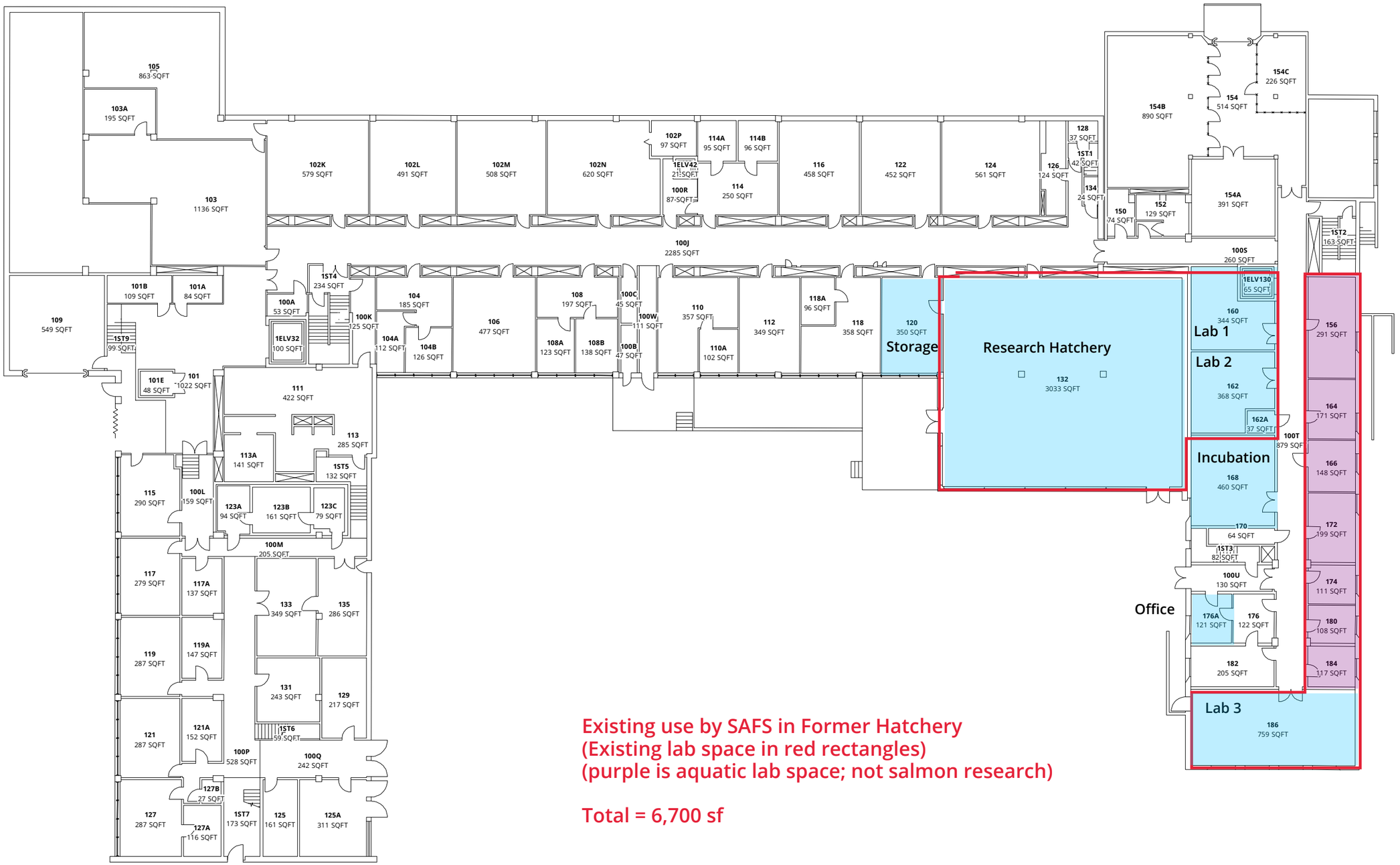
- Stakeholder priorities: 1: Research 2: Outreach 3: Production
- Fish access to site
- Available space (interior and exterior)
- Ability to function as an urban pilot project

NARRATIVE + EXPERIENCE

- Connection to the Salmon Story
- Site Histories
- Human Experience
- Positive contribution (multiple scales)

UNIVERSITY of WASHINGTON

Room Numbers & SQFT



Existing use by SAFS in Former Hatchery
(Existing lab space in red rectangles)
(purple is aquatic lab space; not salmon research)

Total = 6,700 sf

*The SQFT used in this map is based on the FICM standard of measurement

Map Scale: NTS

MAPS
Mapping Assets, Properties, and Spaces

Portage Bay Building
1st Floor
FloorID: 1163_01
Printed On: 1/5/2018

UW CBE - Department of Landscape Architecture
Julie Parrett – parrettj@uw.edu

ACTIVATING RESEARCH, LEARNING + CAMPUS LIFE

AN AQUATIC RESEARCH FACILITY SITE STUDY AT UW

A7.3 [ASSIGNMENT 7.3]: FINAL REVIEW

Site Identification and Assessment

Site Identification and Context Diagram

SWOT Assessment (preferably is a diagram but can be bullet points)

- Site Strengths and Opportunities / Site Weaknesses and Threats
- Provide additional images/maps/etc as needed to describe everything that is relevant (site scale/context scale/watershed scale)

Concept Designs:

Vision/Mission Statement

- Mission: single, succinct statement – must address stakeholders' goals of research, outreach and production and 'aquatic research beyond salmon research'
- Vision: should provide additional detail, can be list of "goals"

EXISTING

History of Site

- Include images/photos/maps/etc that are relevant to your concept design

History of SAFS

- Include images/photos/maps/text that are relevant to your concept design

Existing Context Plan (University/neighborhood scale)

- North Arrow
- Delineation of your site
- Key items labeled/identified

Existing Context Plan (site surroundings)

- North Arrow
- Delineation of your site
- Key items labeled/identified

Existing Site Photos

- Include key plan showing where photos were taken and what direction looking
- Include caption for each site photo

Existing Site + Analysis Plan (site scale)

- Include labels
- North arrow
- Analysis that is important to your design (adjacent programs, views, circulation, etc)
- This can be multiple plans/diagrams if that is easier

Existing Site Zoning and Regulations (may be combined with site analysis if legible)

Campus Master Plan for Site and Site Context

- Delineation of your site
- Key items labeled/identified

PROPOSED

Site Plan

- Rendered with call-outs or legend of key features
- North arrow
- Include first floor floorplan if you have one

Site Sections (min 2)

- Rendered with call-outs or legend of key features

Site Plan Detail Plans (as needed)

- Use to describe complex or important features in more detail

Program Diagram (can be overlaid floorplans) – first floor plan should include simplified site plan

Include what is restricted versus open to the public (can be separate diagram if easier)

- Identify with color and labels/key:

  Blue = research/production program

Purple = support program

Green = outreach program

Other public program (color as appropriate – may need 4th or 5th colors)

- Research hatchery
- Flexible wet lab room
- Incubation room
- Exterior rearing elements: raceways, tanks, crowder + processing area, homing pond, spawning channels, fish ladder/stream
- Pump house
- Water storage + temperature control
- Sedimentation tank
- Office
- Storage
- Loading dock
- Truck Access
- Meeting room/auditorium
- Interpretative features
- Bathrooms
- Walkways/trails
- Seating
- Waterfront trail

Optional

- Additional wet/dry labs
- Additional faculty offices
- Classrooms
- Space for other academic units (not SAFS)
- Café/food service
- Gathering

Phasing Diagram (if appropriate)

- Show all phases

Water System Diagram

Fish Propagation Diagram

Material Palette Diagram/plan

- Include photos of proposed materials/precedents

Plant Palette Diagram/plan

- Include photos
- Can be separated by canopy/understory/groundcover OR by area (wooded/marsh/path)

Circulation Diagram

- Separate per public vs not public visitors

Precedents

- Can be presented per area or generally as concept inspiration

Lighting Diagram

Seasonal Programming/Use/changes Diagram

Conceptual Diagrams

Power Views (min. 4)

- Should focus on what will be most important to stakeholders
- At least one view must be a birds eye view
- At least one view must be one where viewer feels in the space
- Should indicate materials, scale, forms

Site Model

Program:

EXISTING (Interior) – 6,700 sf

- Research hatchery room – 3000 sf
- Lab 1 + 2 (Wet labs) – 2 x 350 sf
- Lab 3 – 750 sf
- Other Labs – 1,000 sf
- Incubation room – 450 sf
- Office – 150 sf
- Storage – 350 sf
- Bathrooms – 300 sf

PROPOSED (Interior) – 8,000 sf (minimum)

- Research hatchery room – 2 x 3000 sf
- Incubation room – 450 sf
- Office – 150 sf
- Storage – 350 sf
- Meeting room – 500 sf
- Interpretative elements – 300 sf
- Bathrooms – 300 sf

Other potential optional elements:

- SAFS offices relocated from Fisheries Teaching Bldg and Marine Sciences Bldg (both buildings will be demolished to accommodate the West Campus Green)
- Other UW academic units
- Other non-UW partners
- Restaurant/café/other food service

EXISTING (Exterior) – @40,000 sf

- Homing Pond + viewing area
- Fish Ladder
- Pump House
- Rectangular raceways (4) (netted + fenced)
- Round tanks (2) (netted + fenced)
- Large Rectangular raceway (1) (netted + fenced)
- Loading dock
- Parking spaces
- Trails/walkways

PROPOSED (Exterior) – tbd

- Homing Pond + viewing area (partial/temporary cover)
- Fish Ladder
- Raceways + Tanks (fully netted + fenced when in use)
- Spawning Channels (optional) (fully netted + fenced when in use)
- Pump House
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