Note: This information is provided for reference purposes only. Although the information provided here was accurate and current when first created, it is now outdated.

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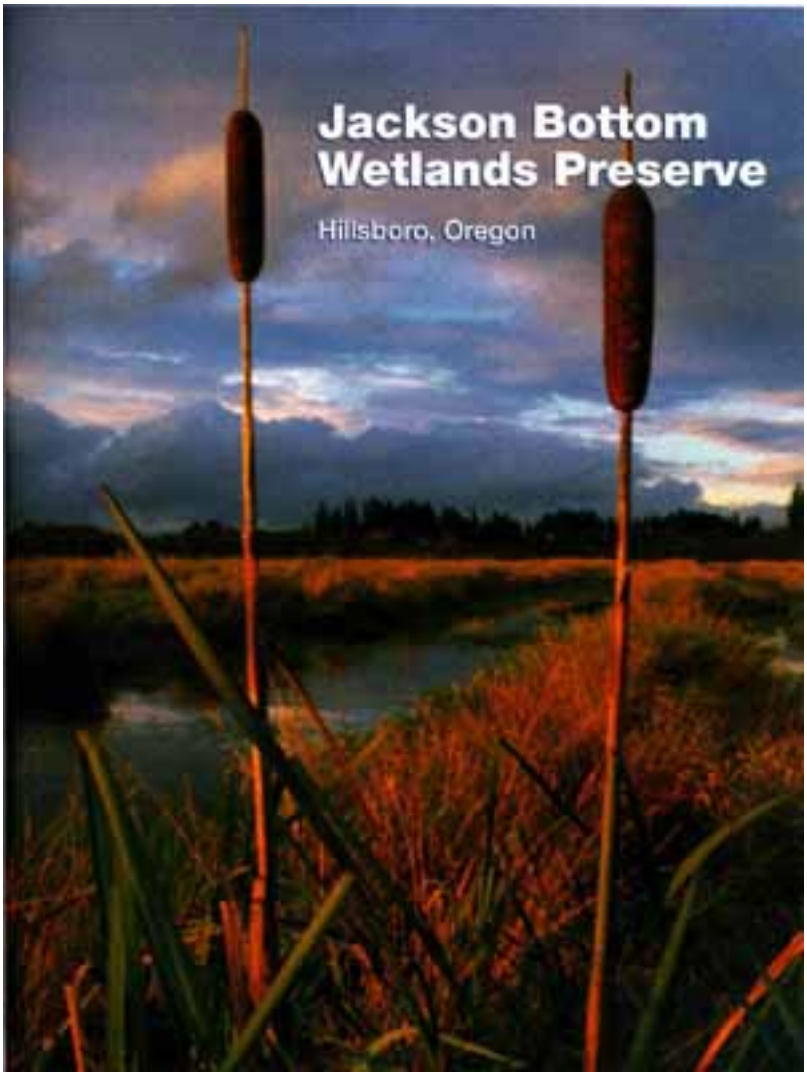
Hillsboro, OR - Jackson Bottom Wetlands Preserve



Working together for water quality, wildlife habitat, education and passive recreation.

At the south edge of Hillsboro, Oregon, lies the damp, tranquil sanctuary of the Jackson Bottom Wetlands Preserve. Nearly 650 acres of low-lying floodplain on the edge of the Tualatin River, about 80 percent of the area is classified as wetlands.

Early mapmakers dismissed the damp bottomlands as a “mirey swamp” suitable only for dredging, draining, and farming. Over the years, agricultural and sewage disposal practices created a highly degraded landscape of limited value for wildlife use, dominated by introduced grasses.

Since 1979, the Jackson Bottom Steering Committee has been working together on an innovative project aimed at changing those conditions and transforming this "mirey swamp" into a wildlife and water quality "living laboratory." The Steering Committee, made up of a unique alliance of economic interests, environmental groups and public agencies, spent the first 10 years on efforts directed primarily toward improving the area's wildlife habitat and passive recreation values.

In 1989, the coalition broadened its efforts and began investigating the use of natural and constructed wetland systems for water quality management as part of the Unified Sewerage Agency's effort to improve water quality in the Tualatin River.

At the Jackson Bottom Wetlands, the Steering Committee has a unique opportunity to manage the wetland's multiple goals. Jackson Bottom provides a chance to increase the diversity of resident and transient wildlife, improve water quality, provide rich research and educational experiences, offer passive and non-consumptive forms of recreation, and attract tourists in an area of rapidly expanding urban population.

The 1989 Jackson Bottom Concept Master Plan clearly outlined the main goals of the Jackson Bottom Wetlands Preserve.

Enhancement for Wildlife: Attract a more diverse wildlife population by expanding and restoring the preserve to provide food and shelter to a variety of birds and animals.

Water Quality Management: Develop the Jackson Bottom Experimental Wetland to investigate the feasibility of using wetlands to "polish" effluent from a secondary wastewater treatment plant for the removal of phosphorus and nitrogen before discharging to the water quality-limited Tualatin River.

Passive Recreation: Provide access to areas of the wetland and the Tualatin River for hiking, bird watching, angling and other passive natural resource-associated activities.

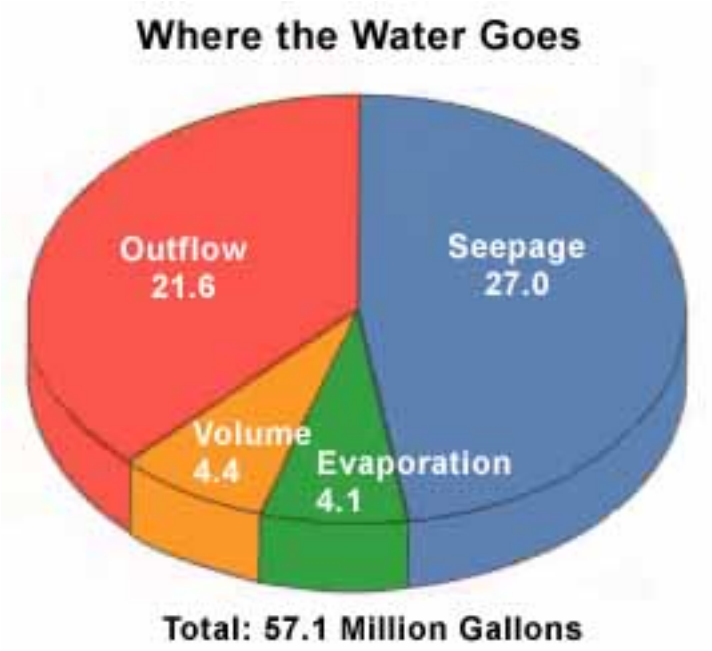
Education and Research: Encourage educational use through interpretive signs and displays, development of educational materials for schools and groups, providing site tours and assisting researchers with research projects.

The Jackson Bottom Steering Committee

- City of Hillsboro
- Unified Sewerage Agency (USA)
- Oregon Department of Fish and Wildlife
- Greater Hillsboro Chamber of Commerce
- Washington County Soil and Water Conservation District
- Portland Audubon Society
- Friends of Jackson Bottom
- Oregon Graduate Institute
- Washington County Education Service District
- The Wetlands Conservancy
- Portland Bureau of Environmental Services
- Pacific University
- U.S. Fish and Wildlife Service

Wetlands Water Source

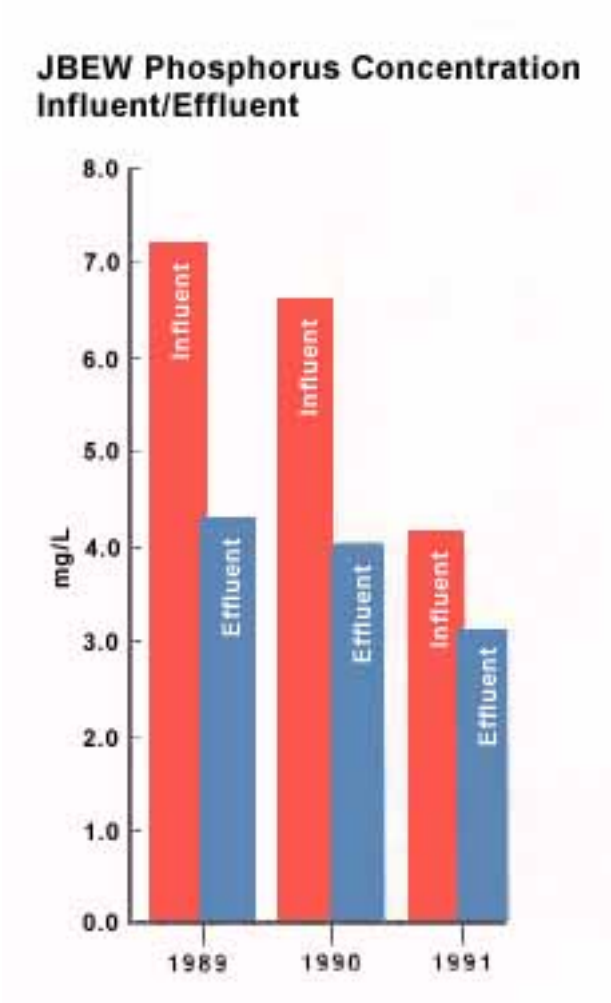
Historically, the damp landscape of Jackson Bottom owes its source of water to the regular flooding of the Tualatin River. The flooding creates the bottomland wetlands which make up the majority of Jackson Bottom.

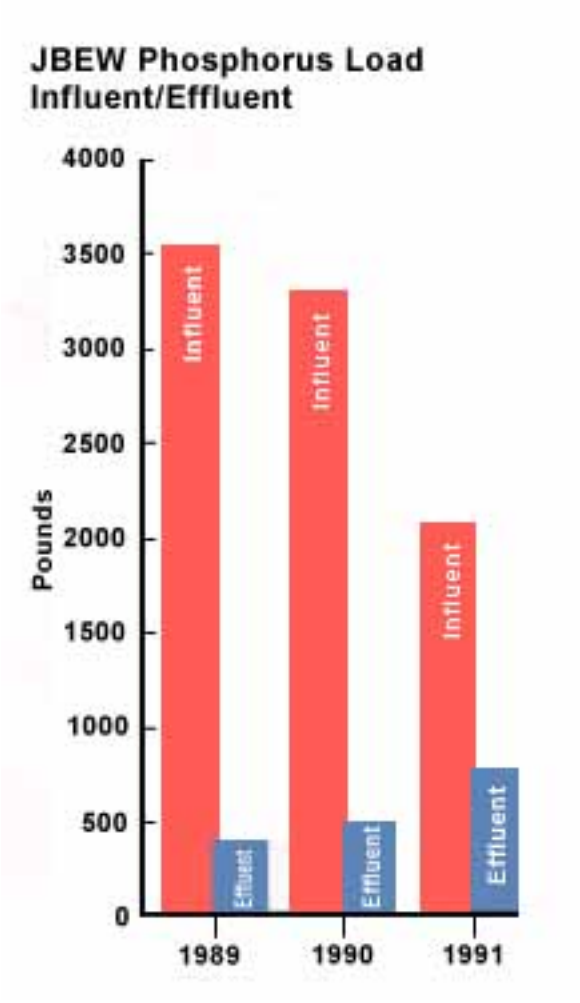


Today, water from regular winter flood is supplemented in the summer by secondarily treated effluent from a nearby Unified Sewerage Agency treatment plant. This cleaned wastewater helps to maintain the restored wildlife habitat. In return, the wetlands filter the effluent before it's returned to the river.

Since 1979, enhancement projects have created and restored several types of wetlands once typical in the basin. The additional wetland types include deep and shallow ponds, wet meadows, riparian wetlands and fresh-water marshes. Edging the east side are also forested wetlands and upland habitat.

Putting the Polish on Wetlands for Water Quality Management





Wetlands, ponds and lagoons have long played a role in wastewater treatment. In many areas, partially treated wastewater is filtered through wetlands for suspended solids (SS) and biochemical oxygen demand (BOD) removal.

The Jackson Bottom Experimental Wetland (JBEW) is taking this process one step further. Using secondarily treated effluent from the Unified Sewerage Agency's (USA) Hillsboro Wastewater Treatment Plant, USA's researchers are investigating the use of wetlands to “polish” the wastewater for removal of phosphorus and nitrogen. These nutrients are abundant in the effluent of conventional secondary treatment plants. This experimental program is part of USA“s comprehensive effort to reduce loads of phosphorus and nitrogen entering the water quality-limited Tualatin River.

Built in the summer of 1988 with operation beginning in 1989, the JBEW occupies about 15 acres on the eastern edge of the Jackson Bottom Wetlands Preserve. The Experimental Wetland is actually a series of 17 parallel cells, each built to contain effluent for varying amounts of time, with different soil types and different vegetation patterns. Since July 1989, testing has been conducted to measure the success rates of the soils and vegetation to "polish" the effluent.

Jackson Bottom Experimental Wetland Design and Operational Criteria

Cell Design Criteria; 15.6 Acre Wetland (17 Parallel Cells)

Cell	Size, Capacity	Total
Width	18.3 to 22.4 ft	
Length	1250 to 1280 ft	
Depth	46 percent at 1 ft 54 percent at 3 ft.	
Surface Area	22,000 to 30,600 sq. ft	430,600 sq. ft
	0.5 to 0.7 acres	9.9 acres
Water Level	0.5 to 2.75 ft	
Volume	254,000 to 427,000 gal	4.8 mil gal.
Introduced	Cattail *(Typha latifolia)*	
Vegetation	Sago pondweed *(Potamogeton pectinatus)*	
Soil		
Cove Series	5.4 acres	
Wapato silty loam	6.2 acres	
Labish mucky clay	3.4 acres	

JBEW Operational Parameters

	1989	1990	1991
Days	77	108	118

Operational Period		July 25-Oct 17	June 25-Oct 10	June 19-Oct 10
Hydraulic Loading Rate	cm/d	7.0	4.0	5.5
	in/d	2.8	1.6	2.6
Average Flow/cell	gpm	30	19	24
Detention Time	days	5-10	5-27	4-12
Mass Loading Rates				
Phosphorus	kg/ha/da	5.2	3.4	2.4
	lb/ac/da	4.6	3.0	2.1
Nitrogen	kg/ha/da	14.9	7.7	11.0
	lb/ac/da	13.2	6.9	9.8

After three years of testing and extended research on JBEW, interesting results have surfaced . The Experimental Wetland is improving the quality of the effluent—it is lower in both phosphorus and nitrogen when it leaves the cells. Research has shown, although plants serve important functions in the filtering, the soils have proved to be the main elements in binding up the phosphorus, thereby preventing it from reaching the nearby Tualatin River.

Water quality is the focus of the JBEW, but education and wildlife have also benefited from this innovative project. The construction of the wetlands has provided food, nesting and rich habitat for many wetland species. The Experimental Wetland has also provided valuable educational opportunities for teachers, students and researchers from schools and universities throughout the region.

As research continues to determine how to best meet the state's water quality standards, the Jackson Bottom Wetlands Preserve serves as a model for improving water quality and managing multiple goals.

JBEW Outflow Data, Three Year Average

	Influent	Effluent
Biochemical Oxygen Demand (mg/L)	5.1	3.0
Chemical Oxygen Demand (mg/L)	42	47
Alkalinity (mg/L)	86	126
Total Solids (mg/L)	312	326
Total Dissolved Solids (mg/L)	304	316

Total Suspended Solids (mg/L)	7.7	9.6
Ammonia-N (mg/L)	8.4	3.0
Total Kjeldahl Nitrogen-N (mg/L)	11.9	4.8
Nitrate/Nitrite-N (mg/L)	7.3	0.5
Total Phosphorus	6.3	3.8
Soluble Ortho Phosphorus-N (mg/L)	5.0	3.0
Chloride (mg/L)	59	66
Enterococcus (#/100 ml)	3	75
Chlorophyll a (ug/L)	0.9	28.7

Groundwater Monitoring Data

Shallow Wells Within JBEW

	Drinking Water Std	**1989**	**1990**	**1991**
Nitrate/Nitrite (mg/L)	10	0.39	0.04	0.02
Chloride (mg/L)	250	102	63	49
pH	6.0-9.0	7.2	6.4	6.6

The Dynamics of a Real-World Experiment

Gathering data from a dynamic, real-world experiment presents challenges. Variables that can easily be controlled in a lab, may be unpredictable in a dynamic process.

JBEW researchers have worked to carefully control the variables within their reach, yet remain flexible enough to adjust for changes in a dynamic system. Among the impacts that have affected the JBEW are:

- **Non-native vegetation.** Planted vegetation (cattails, sago pondweed) struggled to compete with the non-native plants (reed canary grass, Lemna, Azola) that dominate much of Jackson Bottom.
- **Phosphate detergent ban.**In 1991, a region-wide phosphate detergent ban dramatically reduced the concentration of phosphorus in USA's effluent. As a result, the amount of phosphorus entering JBEW dropped as did the percent removal.
- **Plant operations.** In 1991, the Hillsboro Treatment Plant was no longer able to operate in nitrification mode due to a 25 percent increase in service area. This resulted in higher ammonia and lower nitrate effluent entering JBEW.

Enhancement for Wildlife

Jackson Bottom is part of a larger Tualatin River wildlife/wetland corridor. This rich corridor provides essential stop-over feeding and resting spots for migrating waterfowl traveling the Pacific Flyway. It is also an important habitat for other species of wildlife. Much of this habitat has been lost to agriculture and development. But with projects like the Jackson Bottom Wetlands Preserve, crucial links in this increasingly fragmented ecosystem are being reconnected, enhanced and protected.

Though degraded by past human practices, Jackson Bottom is coming alive with a newly developed diversity thanks to the dedicated efforts of Oregon Department of Fish and Wildlife, the Friends of Jackson Bottom, Ducks Unlimited and other groups. What was once a flat meadow of exotic reed canary grass, with little feeding or nesting opportunities for native species of wildlife, is now being transformed into a complex patchwork of wetlands and upland

habitat. The wildlife ponds and marshes created using recycled wastewater are bordered by cattails, reeds and rushes, native willows, dogwood, ash and elderberry. This increased diversity of plants provides food and shelter for migratory waterfowl, shorebirds and other wetland wildlife. Resident populations now include Canada geese, many species of ducks, rails, herons, osprey, bald eagles, nesting red tailed hawks, harriers, and several owl species. Larger mammals include rare sightings of deer, elk, mink, beaver, coyote and fox.

Until the habitat has sufficiently recovered, nesting sites are supplemented with floating goose platforms and boxes for swallows, bats, wood ducks and kestrels. The enhancement projects offer the opportunity to become involved with wildlife agencies and provide rich habitat for wildlife.

Education, Research and Passive Recreation

From early morning walks in the thick morning fog to sophisticated research by soil scientists, there are many opportunities to enjoy and learn from this natural resource without harming it.

Research, education and passive recreation activities are a major component of the 1989 Jackson Bottom Concept Master Plan. Research efforts conducted by the Unified Sewerage Agency, the Oregon Graduate Institute and other regional colleges and universities are providing answers and posing new questions about ecosystems and their role in water quality management.

Education is a top priority, too. Spearheaded by the Wetland Coordinator and Friends of Jackson Bottom, students and teachers are learning about this astonishing natural system through tours and field work. The Friends group has developed wetlands curriculum and sponsors a variety of events year-round. In 1992, a state grant enabled Jackson Bottom to hire a part-time Wetlands Educator to coordinate a pilot educational program.

Trails, viewsites and viewing shelters offer visitors a glimpse into the workings of this rich ecosystem. The Kingfisher Marsh Interpretive Trail, designed and built by the Friends group, offers visitors a mile long walk through wetland and upland habitat along the rarely seen Tualatin River. Future plans call for more trails and improved river access.

For information on the Jackson Bottom Wetlands Preserve and the Jackson Bottom Experimental Wetlands, please contact:

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Nest photo on page 156 and family photo on page 161 courtesy of Friends of Jackson Bottom. The salamander photo on page 157 courtesy of Audubon Society of Portland, Oregon.