

Environmental Research Laboratory - Corvallis

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Laboratory Series

Environmental Research Laboratory-Corvallis

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Environmental Research Laboratory-Corvallis
United States Environmental Protection Agency
200 SW 35th Street
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Laboratory Functions

The Environmental Research Laboratory-Corvallis is the U.S. Environmental Protection Agency's national

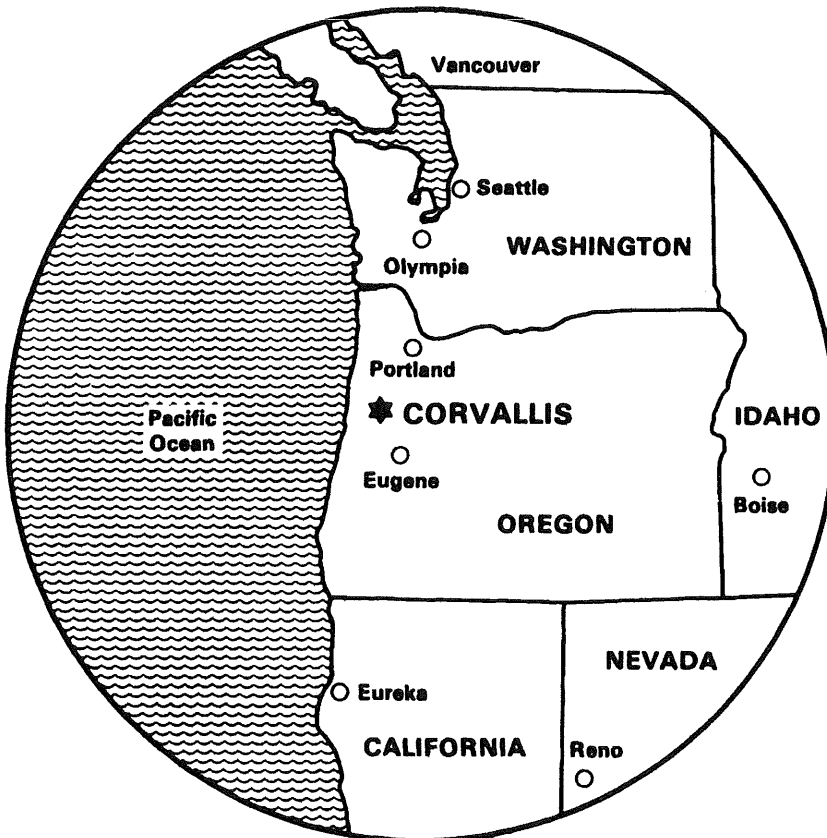
center for research in terrestrial and watershed ecology, and in the ecological effects of atmospheric pollutants, including acid rain. In the 1960s and early 1970s the laboratory was solely a water quality research facility. But the mission broadened over the years, and now the laboratory conducts research on the ecological effects of pollutants as they move through air, soil, and water into the food chain. Scientific disciplines include chemistry, biology, forestry, fisheries, geography, micro-

biology, soils science, geology, statistics, mathematical modeling, plant and animal physiology, hydrology, limnology, horticulture, agronomy, and ecology.

Laboratory research programs are organized into several broad areas, including the ecological effects of airborne pollutants such as ozone and acid rain; the effects of toxic chemicals on plants, animals, and ecosystems; the assessment and restoration of contaminated or degraded environments; the characterization and assessment of the vulnerability of ecological systems, such as wetlands, to human impacts; and the ecological risks from the terrestrial release of bioengineered organisms and other biological control agents.

Research is targeted to development of scientific information required for air, water, pesticide, hazardous waste, Superfund, and toxic-substance regulations developed by the Agency in response to existing legislation. Other research is addressing areas involving potential legislation and regulations.

The laboratory's research approach to the analysis of environmental processes is generally holistic, with individual research projects contributing to an understanding of specific processes occurring within an eco-system. Research consists of laboratory, aquarium, greenhouse, aviary, and field studies on the acute and chronic effects of environmental pollution. Mathematical modeling, experimental design, and statistical analysis are applied to help understand and predict changes in natural and stressed environments.



Key Personnel

Thomas A. Murphy, Director
James C. McCarty, Deputy Director
Charles L. Frank, Administrative Officer
Raymond G. Wilhour, Chief, Air Branch
Robert T. Lackey, Associate Chief, Air Branch
Dixon H. Landers, Leader, Aquatic Team
Daniel H. McKenzie, Leader, Watershed Team
Roger L. Blair, Leader, Forest Team
David T. Tingey, Leader, Ozone Team
Jay J. Messer, Leader, Regional Ecological Analysis Team
Spencer A. Peterson, Chief, Hazardous Waste and Water Branch
Peter Chapman, Leader, Hazardous Waste/Sediment Team
Eric M. Preston, Leader, Wetlands Team
Harold V. Kibby, Chief, Toxic and Pesticides Branch
John M. Emlen, Leader, Plant Uptake and Effects Team
Bill A. Williams, Leader, Animal Toxicology Team
Ramon J. Seidler, Leader, Biotechnology Team

Laboratory History

In 1961 amendments to the Federal Water Pollution Control Act authorized the establishment of seven laboratories in specified regions of the United States. The Pacific Northwest Water Laboratory was one of these, and Oregon State University was selected as the site. The University had strong research programs in areas of interest to the laboratory and cooperation was extensive from the start. Temporary offices were opened in 1963; the main laboratory building was completed in 1966. The laboratory was initially part of the U.S. Public Health Service.

In 1967 the laboratory was transferred to the Federal Water Pollution Control Administration within the Department of the Interior, and its mission shifted from regional, technical support to the conduct and management of national research in water pollution control. The laboratory became a leader for research on lake eutrophication, coastal pollution, water quality criteria (primarily metals), gas supersaturation, thermal pollution, sediment criteria, and waste treatment for pulp, paper, and food processing industries.

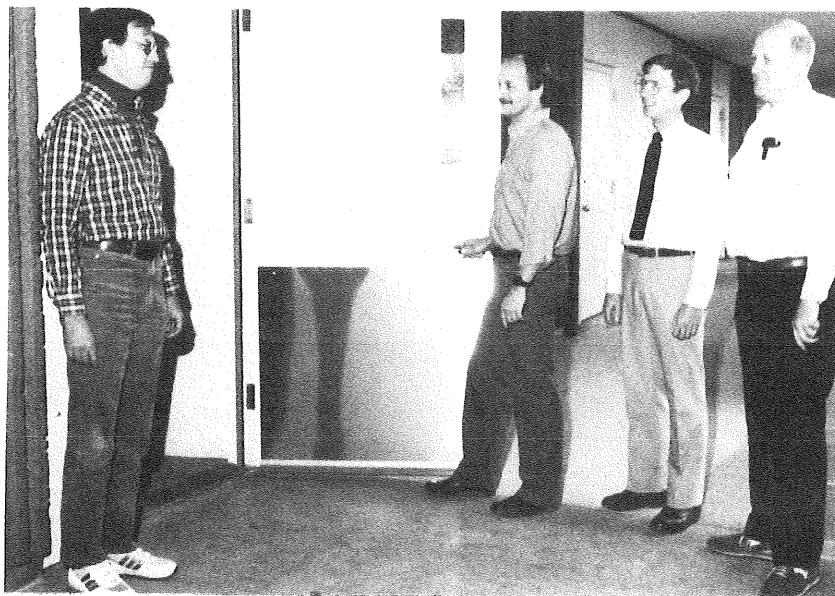
The laboratory became part of the newly formed Environmental Protection Agency (EPA) in 1970, and soon thereafter was named one of four national research centers. A nationwide network of nine laboratories and six field stations reported to Corvallis. The Center's activities expanded rapidly far beyond the original mandate of research on causes and effects of water pollution. In 1972 EPA scientists studying air pollution effects on vegetation were transferred from an EPA laboratory in North Carolina to Corvallis. This marked the entrance of the Corvallis

laboratory into the emerging field of air pollution studies.

In 1975 reorganization dismantled EPA's research centers, requiring the research laboratories to report to the Washington D.C. headquarters. The revamped Corvallis laboratory was named the Environmental Research Laboratory (ERL-Corvallis), and responsibilities broadened again to include diverse programs in freshwater, marine, and terrestrial environment research. Other EPA national research laboratories with related missions are located at Ada, Oklahoma (ground-



Key personnel at EPA's research laboratory in Corvallis, Oregon, are: *top, from left*, Bob Lackey, Dan McKenzie, Ray Seidler, Jim McCarty, Chuck Frank, Hal Kibby, and Spence Peterson. *Bottom, from left*, Eric Preston, Dixon Landers, Tom Murphy, and Dave Tingey. (Not pictured: Ray Wilhour, Roger Blair, Jay Messer, Peter Chapman, John Emlen, and Bill Williams.)



water); Duluth, Minnesota (aquatic criteria); Narragansett, Rhode Island (marine); Gulf Breeze, Florida (estuaries); and Athens, Georgia (fate and transport of pollutants).

Since 1978, the EPA has continued to strengthen the six complementary laboratories mentioned above. Similar programs have been consolidated, giving each laboratory a unique purpose and scope of work. Marine research formerly done at Corvallis is now a field station of the Narragansett laboratory. Most research on water quality criteria for freshwater at Corvallis was recently assigned to the Duluth laboratory. At Corvallis there has been a steady increase in resources and responsibilities for the EPA's terrestrial and multi-media research, particularly effects of air pollution on forests, crops, watersheds, wetlands, lakes, and streams; risks of toxic chemicals to wildlife, plants, and terrestrial ecosystems; ecological consequences of release of genetically altered organisms; cumulative effects of wetlands alteration; ecological effects of hazardous waste disposal; and effects of stratospheric

modifications (increasing "greenhouse" gases).

Current Research Programs

There are approximately 235 employees (federal and contract) at the Environmental Research Laboratory-Corvallis. Research is organized into three branches.

The Air Branch conducts research on effects of air-borne pollutants on aquatic and terrestrial ecosystems. Scientists provide EPA leadership on effects of acidic deposition, one of the most important present-day ecological problems. A concern is the ultimate effect on fish populations in acidified lakes and streams, and impacts on fisheries on a regional scale. Acid deposition research involves regional surveys, process studies, and predictive modeling on not only the nation's waters and wetlands, but on soils, watersheds, and forests as well. The Air Branch also provides international leadership on the impacts of ozone and associated pollutants on crops and forests.

The Hazardous Waste and Water Branch conducts research on ways to

assess and reclaim contaminated or degraded environments; develop procedures to evaluate hazards and conduct integrated environmental risk assessments for chemically contaminated soils, waters, and sediments; evaluate the impact of wetlands loss and procedures for their mitigation; and restore degraded lakes and wetlands. Current fisheries research in this Branch involves: (1) the use of fish communities for monitoring water resource quality, (2) regional adjustments and applications of Karr's index of biotic integrity, and (3) regional field studies relating the distribution and abundance of fish species to regional patterns in watershed and stream types.

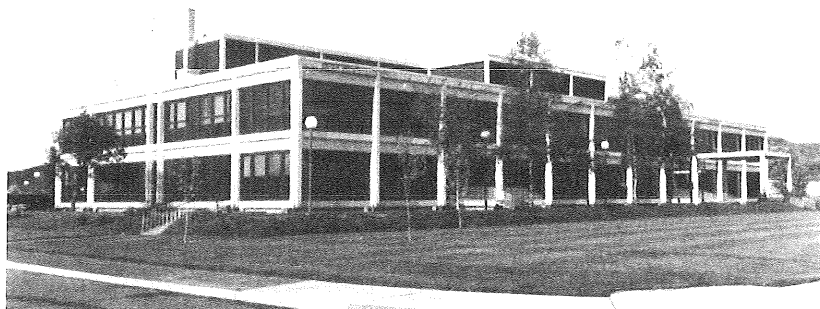
The Toxics and Pesticides Branch conducts research on effects of pollutants and risks of toxic chemicals to plants, animals, and terrestrial ecosystems. Staff develop methods to predict uptake, movement, and metabolism of chemicals in plants; assess potential toxicity of chemicals to plants; predict effects and assess impacts of toxic chemicals on wildlife; and determine risks of genetically engineered microorganisms to terrestrial ecosystems.

Research Facilities

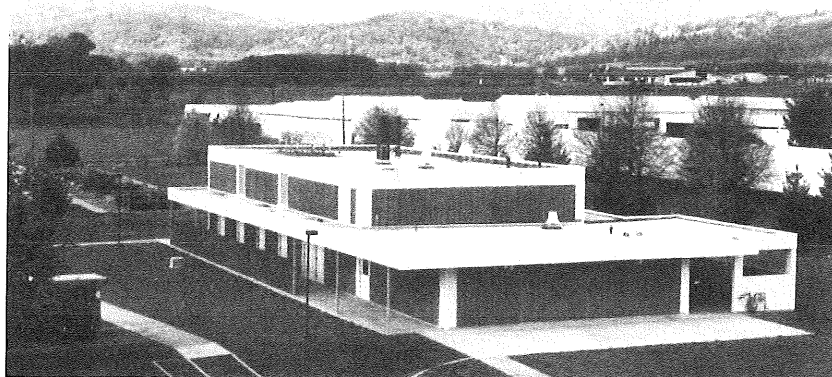
ERL-Corvallis is located on two 10-acre sites. One site (main laboratory) is surrounded by the Oregon State University campus. The other 10-acre site (Western Fish Toxicological Station) is 4 miles away and near the banks of the Willamette River. The main building houses a variety of laboratories, the library, administrative offices, and the computer center.

A terrestrial ecology laboratory, adjacent to the main laboratory, contains 13,000 square feet including four 900-square-foot greenhouse modules. These units house four distinctly different kinds of research projects: toxic effects studies, gaseous air pollution studies, effects of heavy metals on vegetation, and plant propagation and plant growth studies.

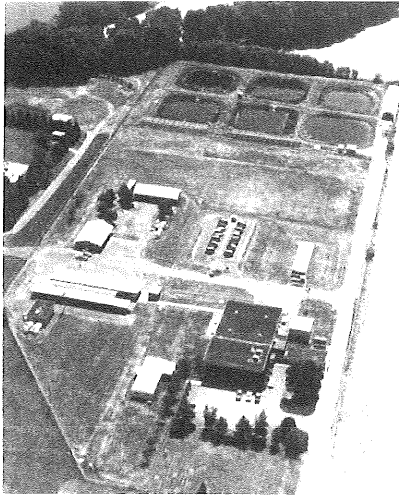
The field exposure facility consists of 18 large open-top exposure chambers, nursery site, automated irrigation system, experimental garden plot, and a control trailer containing automated pollutant delivery/control and data acquisition/management systems. This field site is a unique setting for research addressing environmental issues of national importance, such as



The main laboratory building houses administrative offices, biological, chemical, and microbiological facilities.



The new wildlife toxicology building is used for raising and testing toxic effects on birds and small mammals.



The Western Fish Station on the Willamette River (5 miles from the main laboratory) has extensive facilities for raising and testing aquatic organisms. The six large experimental ponds provide "natural" waterfowl habitat for current research. This facility was the site of EPA's early fisheries research on gas bubble disease and the effects of metals and organic pollutants of fish.

dry/wet deposition effects on conifers, deciduous trees, and crops.

A new wildlife toxicology building is used for investigations of chemical risk to wildlife, primarily avians. Bobwhite quail and mallard ducks are the primary test species. The new building has 4,000 square feet of research space for data collection, feed preparation, and bird cages. The research is directed toward investigation and evaluation of laboratory testing protocols recommended by the EPA in response to the federal Insecticide, Fungicide, and Rodenticide Act and the Toxic Substances Control Act.

Research ponds near the Willamette River provide a facility to conduct research on the chronic effects of chemicals on birds. This field-like setting permits the collection of realistic exposure and effects data for wildlife risk assessment studies.

Cooperating Agencies

ERL-Corvallis supports visiting scientists. Each year several eminent sci-

entists conduct research on-site with Corvallis scientists. The laboratory also provides research associateships for post doctoral and senior research fellows through the National Research Council. Frequently, internationally known scientists work cooperatively with laboratory personnel for extended periods. Research often takes on an international flavor with cooperative programs with Canada, West Germany, England, Norway, Sweden, and India.

ERL-Corvallis cooperates closely with EPA program offices and laboratories to implement many research efforts on complex research problems. Other government agencies, universities, and private industry are involved, often through formal inter-agency agreements and contracts to fund specific research projects. There are currently more than 120 extramural research projects in progress, most of which are with university scientists who work closely with their Corvallis counterparts. 