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Waterways Experiment
Station



Aquatic Plant Control Research Program

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Aerial view of the pond facility with Lewisville Lake in the background

The Lewisville Aquatic Plant Research Facility

by

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In March 1988, the US Army Engineer Waterways Experiment Station (WES) under an agreement with the US Army Engineer District, Fort Worth acquired the use of a 110-acre property formerly operated as a fish hatchery. The property, consisting of 55 earthen ponds and a laboratory building, is located in Lewisville,

Texas, adjacent to Lewisville Lake, a Corps of Engineers reservoir (Figure 1). The facility is being developed and used by the Aquatic Plant Control Research Program (APCRP) for studying the biology and ecology of aquatic plants as well as methods for their control.

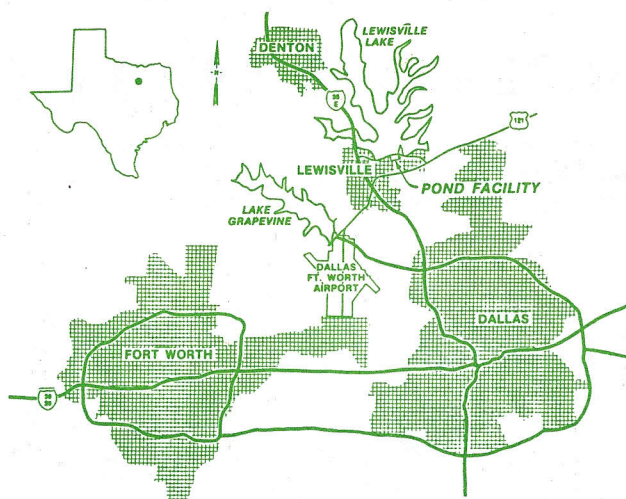


Figure 1. Location map

The ponds range in size between one-half and two acres, with maximum depths between 7 and 9 feet (Figure 2). Gravel roadways completely encircle the facility, and wide levees surround each of the ponds, providing vehicular access to all sides of each of the ponds.



Figure 2. Pond layout

Water for filling the ponds is supplied from Lewisville Lake by gravity flow. During times of peak demand the flow of water to the ponds can be augmented by a 50-horsepower electric pump installed at the outlet works. The ponds are equipped with independent controls for filling and draining, allowing investigators to vary water conditions as needed in each of the ponds. Water is supplied to each of the ponds through a 6-inch-diameter pipe equipped

with a gate valve. Water for filling the ponds is normally filtered through fine mesh polypropylene filters to remove fish eggs and larval organisms. Water is drained from the ponds through a gate valve similar to the one used for filling. Water draining from the ponds is filtered through a screen to prevent plant fragments from escaping the ponds. This filter screen consists of a wooden frame fitted with one-quarter inch hardware cloth on one side and aluminum window screen on the other. The screens fit securely into slots molded into the concrete drain structure. Water exiting the ponds enters a concrete-lined drainage ditch which is also fitted with filter screens above and below the point of entry.

A 3,200-square-foot building has been renovated and is being equipped for use as a laboratory. The laboratory is currently well-equipped for processing aquatic plant samples—large sorting/work areas, drying ovens, electronic balances, and grinding mills are available. Future development includes a laboratory for processing water and sediment samples. An open office area has been furnished with several desks to provide working space for visiting scientists and technicians.

A weather station has been installed at the site to continuously record environmental factors affecting plant growth such as light; temperatures of the air, water, soil, and sediments; wind speed and direction; and rainfall. Similar instruments are being installed in individual ponds where necessary to obtain critical environmental data.

The property also includes 3,400- and 1,200-square-foot open shed buildings housing 12 and 6, respectively, 3-foot by 20-foot by 2-foot-deep concrete raceways equipped with flowing lake water. The smaller of these sheds has been converted to a temporary greenhouse to hold sensitive waterhyacinth plants through the winter. Plans call for replacing the metal roof of the larger structure with clear fiberglass to allow the raceways to be used for conducting short-term, controlled studies on aquatic plants.

Pond Preparation

The ponds, drained since the closure of the fish hatchery in 1985, required clearing to remove trees and shrubby vegetation before filling in 1989. A small tractor has been purchased for mowing pond bottoms to prevent invasion of woody terrestrial vegetation during periods of nonuse.

After the ponds were cleared and filled, water levels were monitored to determine leakage rates. Ponds that hold water have been identified for immediate assignment to individual research projects. Ponds



Dry pond



Water supply



Filter



Drainage ditch



Drain screen



a. Mowing



b. Rototilling



c. Planting

Pond Preparation

exhibiting excessive water loss rates will require additional renovation before use.

Once a pond has been selected for use, the water is drained and the bottom allowed to dry. In order to prepare a smooth surface for planting, the bottom of the pond is rototilled. Establishment of the desired plant species is most easily accomplished by planting in concentric arcs starting at the deepest end of the pond and moving into shallower portions as the pond is slowly filled.

Current Research

A study of the life cycle of waterhyacinth was initiated in one of the ponds during the spring of 1989. The objective of this study is to identify potential weak periods in the life cycle of this species, during which application of control measures would be most effective.

A field test of the efficacy of a commercial formulation of a microbial pathogen was also conducted during 1989. This study was a collaborative effort between a private research and development company, EcoScience, and WES scientists.

Several additional research projects are scheduled to be conducted at the facility during 1990. The waterhyacinth work will be continued and expanded to include the collection of additional data on plant growth and metabolism. This data will be used for validation and refinement of a plant growth simulation model. This personal-computer-based model is used by Corps operational personnel to assist them in managing this troublesome plant.

A study of competition between introduced, weedy species and native, nonweedy species will also be initiated during 1990. This study will attempt to identify native species that can compete with introduced weeds such as hydrilla and Eurasian watermilfoil. The objective of this work is to identify methods for enhancing the establishment and persistence of competitive native species to slow the spread of invasive weeds.

Other experiments will determine the effects of different amounts of submersed aquatic vegetation on fish production, determine the efficacy and environmental effects of benthic barriers for control of submersed aquatic plants, and evaluate the efficacy of biocontrol agents for the control of submersed aquatic plants.

The acquisition of this facility by WES has expanded the research capabilities within the APCRP by filling the gap between small-scale laboratory studies and large-scale field testing. It is often difficult to extrapolate research results obtained in short-term



Waterhyacinth



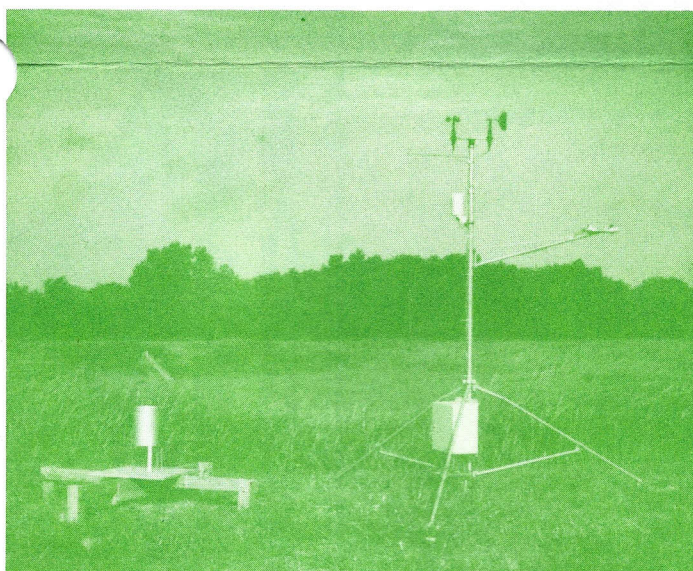
Biocontrol

laboratory studies to the prediction of events occurring over longer time scales in large and complex reservoirs and waterways. Research conducted in ponds will thus be of great value in extending research results to the real world.

In addition to its use in aquatic plant research, the facility is also suitable for conducting studies of other aquatic and wetland ecosystems. While primarily intended to serve the needs of WES researchers, ponds and laboratory space are also available to other

Federal and state agencies and universities for cooperative research endeavors.

For more information on the Lewisville Aquatic Plant Research Facility contact: Dr. R. Michael Smart, Rural Route 3, Box 446, Lewisville, TX 75056, (telephone: 214-436-2215) or Dr. R. Michael Smart, ATTN: CEWES-ES-A, US Army Engineer Waterways Experiment Station, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199.



Weather Station



Concrete Raceway

Under an agreement with the US Army Engineer District, Fort Worth, the US Army Engineer Waterways Experiment Station is operating a facility to support research being conducted under the Aquatic Plant Control Research Program. The research includes studies of the biology and ecology of aquatic plants as well as methods for controlling excessive growths of these plants. The Lewisville Aquatic Plant Research facility, reported on in this bulletin, expands the capabilities of the Corps by filling the gap between relatively short-term, small-scale laboratory studies and large-scale field testing.



AQUATIC PLANT CONTROL RESEARCH PROGRAM

This bulletin is published in accordance with Army Regulations 25-30. It has been prepared and distributed as one of the information dissemination functions of the Environmental Laboratory of the Waterways Experiment Station. It is principally intended to be a forum whereby information pertaining to and resulting from the Corps of Engineers' nationwide Aquatic Plant Control Research Program (APCRP) can be rapidly and widely disseminated to Corps District and Division offices as well as other Federal agencies, State agencies, universities, research institutes, corporations, and individuals. Contributions are solicited and will be considered for publication so long as they are relevant to the management of aquatic plants as set forth in the objectives of the APCRP, which are, in general, to provide tools and techniques for the control of problem aquatic plant infestations in the Nation's waterways. These management methods must be effective, economical, and environmentally compatible. The contents of this bulletin are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such products. This bulletin will be issued on an irregular basis as dictated by the quantity and importance of information to be disseminated. Communications are welcomed and should be addressed to the Environmental Laboratory, ATTN: J.L. Decell, US Army Engineer Waterways Experiment Station, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, or call AC 601/634-3494.


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