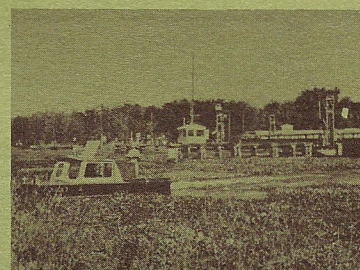
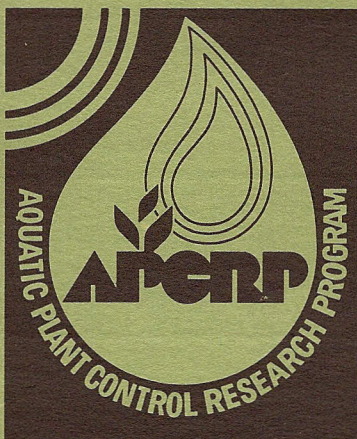
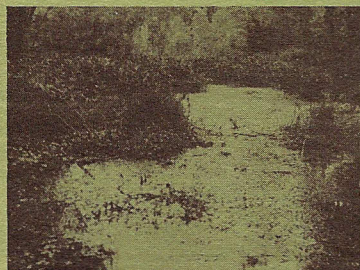
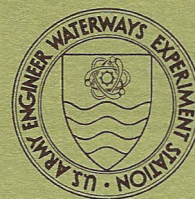
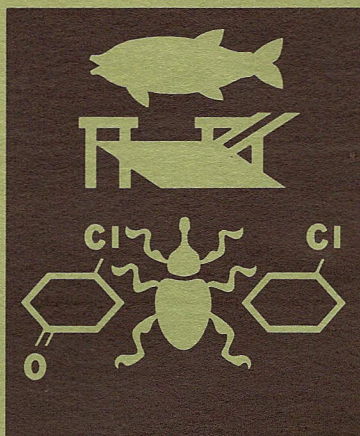


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# AQUATIC PLANT CONTROL RESEARCH PROGRAM

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## TECHNOLOGY TRANSFER FOR THE AQUATIC PLANT CONTROL RESEARCH PROGRAM

BY JOSEPH L. DECELL

### INTRODUCTION

During FY 77, the Office, Chief of Engineers (OCE), established priorities for the Corps of Engineers Aquatic Plant Control Program (APCP). These priorities are:

- Technology Transfer (Operations and Research)
- Research (Short- and Long-Term)
- Cost-Sharing Program (Operations)
- Planning

Technology transfer has been established as the overall objective of the APCP, and involves a joint effort between the Waterways Experiment Station (WES), the lead laboratory for aquatic plant control research, and Engineer District operations personnel.

### DEMONSTRATION PROJECTS

Two years ago the concept of large-scale demonstration projects was identified as one means for effecting rapid technology transfer from the Aquatic Plant Control Research Program (APCRP) to the users. These demonstration projects actively involve both research and operations personnel in an operational problem environment. Such projects differ from pure research experiments mainly in scale and in the minimum experimental controls that are imposed on the variables that may affect the outcome of the experiment. Conducted at a scale and in a manner representative of a full-scale field operations activity, they differ from pure operational projects in that the

results are carefully monitored over a specified period of time. The purpose of these projects is to integrate basic research results into the operations programs by rapidly adapting experimental results to actual field problems.

### LAKE CONWAY, FLORIDA, PROJECT

The first project initiated to demonstrate the transfer of technology was a field test, conducted in Lake Conway, Florida, using the white amur fish for control of submersed aquatic plants.

### ROBERT S. KERR LAKE, OKLAHOMA, PROJECT

In the research conducted by the

APCRP, the lack of a capability to effectively manage aquatic plants on a routine basis was recognized as a problem worthy of a large-scale effort. As a result of this recognition, a concept was developed to formalize guidelines for the development of management plans for aquatic plant control. During FY 77, a second demonstration project was initiated to test the management plan

development process as another means of effectively transferring technology. Events that took place in establishing this demonstration of technology transfer are shown below.

Each year the APCRP is required to hold a research planning meeting to identify research needs for the Corps' APCP. Equally important, this meeting provides the opportunity for operations personnel to identify their present aquatic plant problems. In October 1976 at the 11th Annual Meeting held at Atlantic Beach, Florida, Mr. Loren Mason of the Recreation-Resource Management

Branch of the Tulsa District identified a problem with *Myriophyllum spicatum* L. (Eurasian watermilfoil) in the Robert S. Kerr Lake (Figures 1 and 2). At that time, the infestation was estimated at over 600 acres, which was stated to be nearly a 100 percent increase over the reported 1975 infestation of 328 acres. It was further stated that, to date, no control methods had been taken to combat this continued

Figure 1.



*Myriophyllum spicatum* L. Eurasian Watermilfoil



Figure 2. Eurasian watermilfoil infestation

expansion of the Eurasian watermilfoil, although it was obvious that some action was necessary. At the conclusion of his presentation, Mr. Mason requested assistance in determining what should be done about this aquatic plant problem in Robert S. Kerr. Subsequently, personnel of WES, OCE, the Southwest Division (SWD), and the Tulsa District met to discuss a course of action that would present the true nature of the problem to the management levels of OCE and SWD. The first step identified was to meet with the management of SWD and of the Tulsa, Fort Worth, and Galveston Districts to summarize the aquatic plant problems of SWD and establish priorities for dealing with their

respective problems. The following paragraphs will identify the chronological sequence of events.

**December 1976**

A meeting was held in the SWD offices with representatives of the SWD Planning and Operations Divisions as well as the three District representatives responsible for aquatic plant control. Each representative presented a report of his district's present problems and control program status. It was agreed at this meeting that the Robert S. Kerr problem would first be addressed, with the problems of the Galveston and Fort Worth Districts to be addressed later.

**February 1977**

Personnel of the Aquatic Plant

Research Branch (APRB), WES, requested and received data pertinent to the Robert S. Kerr project. Included were project maps, weed infestation maps, water quality data, recreation data, water use-demand data, and physiographic and hydrologic data.

**February-April 1977**

Data were studied and compiled to provide a data base pertinent to those factors deemed critical to the successful management of aquatic plants. These factors are outlined in the APRB concept for management plan development, presented in general form in WES Miscellaneous Paper A-77-1. This concept provides a step-by-step procedure for the systematic assessment of the aquatic

plant problem in a body of water, the objective evaluation of all potential control measures, the consideration of water body user demands and environmental constraints, and the development of an operational plan including provisions for monitoring and updating. The concept is composed of the following five phases:

- I. Problem Identification and System Description
- II. Data Collection and Analysis
- III. Selection of Control Techniques
- IV. Operational Plan Development
- V. Operational Plan Implementation

The relation of the work efforts in these five phases is illustrated in the report in the form of a flow diagram. The APRB concept provides an objective generalized framework for the development of management plans. Also, by systematically carrying out the identified postimplementation monitoring, it provides for periodic assessments of effectiveness in relation to the original goal of acceptable control. This concept was used as the basis for developing a straw-man management plan, which included alternative control strategies, for consideration by the operations personnel of the Tulsa District.

#### May 1977

WES personnel presented the straw-man plan to Tulsa District personnel. After considering the alternative control strategies with respect to their present operational capabilities and resources, Tulsa District personnel selected one strategy and formulated their Aquatic Plant Control Operations Plan for the Robert S. Kerr Lake. The purpose and scope of the Tulsa plan was to initiate and continue a program to arrest the spread of Eurasian watermilfoil on Robert S. Kerr Lake and maintain it at

a desired level, to restore access to marinas, and to maintain navigability of the reservoir areas. The plan accurately characterized the overall problem scope and, supplemented with aerial mosaics, identified areas of infestation.

#### July 1977

Following the formalized plan, the Tulsa District implemented an active program for control of Eurasian watermilfoil in Robert S. Kerr Lake. This program, based on the selected option from the straw-man plan, opts for the use of the granular form of 2,4-D BEE. The initial treatment efforts in 1977 were directed toward a short-term or interim control effort with the long-range objectives of the plan to be addressed through treatments that would coincide with the growing season of calendar year 1978. Total formulation of 20 percent 2,4-D BEE applied at a rate of 100 lb/acre will be used to treat the 600-acre problem infestation.

The plan requires that detailed records be kept during and after treatment operations in order to provide the necessary data for assessing degree of control in terms of overall problem scope. Future aerial photo missions will be flown to document problem status with time as it relates to control efforts. At present the Tulsa District is continuing operations under this management plan.

#### FUTURE PROJECTS

Although the cycle from problem identification to an active operational control program was completed in the case of the Robert S. Kerr Lake problem, this represents but one test of the management plan development process. A second test of this process will be initiated sometime during FY 78 when the South Carolina Public Service Authority implements a management program for control of *Egeria densa* Planch. in Lake Marion of the Santee-Cooper system (Figure 3). The plan for this program was also developed following the formalized

framework of the APRB concept. More recently, coordination efforts have been completed as a prelude to developing a management plan for aquatic plant problems existing in Lake Seminole of the Mobile District. This test of the concept will differ from the two previous efforts in that more than one species of aquatic plants is causing problems in Lake Seminole. Primarily, the management plan to be developed there must address the problems being caused by *Hydrilla verticillata* Royle (hydrilla), *Zizaniopsis miliacea* (Michx.) Doell & Asch. (giant cutgrass) (Figure 4) and Eurasian watermilfoil. As more opportunities present themselves, additional tests of this approach to management will be established. In each case, the effectiveness of the procedure will be periodically assessed and refinements made based on recommendations of the operational users.

#### CONCLUSION

Collectively, these individual tests will comprise the large-scale demonstration project referred to earlier in this article. Eventually, the goal of having the capability to manage aquatic plants on a rational routine basis will be realized.

The effort conducted with the Tulsa District is a significant example of technology transfer in that it proves the necessity of a two-way flow for successful technology transfer. In addition, the follow-up information and data required to refine the process will confirm that continuous technology transfer is successful.

It is intended that the evaluation process of this demonstration effort will eventually result in official Corps guidelines for use by management.



Figure 3. Egeria infestation in Lake Marion



Figure 4. Giant cutgrass infestation, Lake Seminole, Florida

This bulletin is published in accordance with Army Regulation 310-2. It has been prepared and distributed as one of the information dissemination functions of the Mobility and Environmental Systems 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 APCR, 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. 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 Mobility and Environmental Systems Laboratory, ATTN: W. N. Rushing, U. S. Army Engineer Waterways Experiment Station, P. O. Box 631, Vicksburg, Miss. 39180, or call 601-636-3111, Ext. 3542.



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