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Establishment of Waterhyacinth Weevil Populations in Louisiana

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ABSTRACT

Two species of waterhyacinth weevils were introduced into Louisiana in 1974. Several field nursery areas were established for use as collection sites for distribution of waterhyacinth weevils on a statewide basis. During a four-year period, 158,026 *Neochetina eichhorniae* Warner were released at 492 locations and 5,652 *Neochetina bruchi* Hustache at 10 locations. Waterhyacinth weevil populations in South Louisiana are expanding and appear to be stressing waterhyacinth populations in several locations.

INTRODUCTION

Waterhyacinth (*Eichhorniae crassipes* (Mart.) Solms) is the most economically important aquatic plant infesting Louisiana waters. Within the various types of fresh water wetlands in Louisiana, estimated to cover 2.59 million ha, approximately 1.9 million ha are considered to be suitable habitat for growth of waterhyacinth. Aerial surveys conducted in April and November, 1977 disclosed an estimated 88,000 ha and 480,000 ha respectively of waterhyacinth in Louisiana. Subsequent surveys conducted in April, 1978 revealed approximately 117,000 ha of waterhyacinth which is expected to increase to approximately 413,750 ha by November, 1978. A large percentage of this infestation occurs in the dense swamps of South Louisiana, where access by spray crews is limited. Water levels in most of these areas range from 5 cm to 0.6 m, thus providing inaccessible nursery areas which produce a continuous supply of waterhyacinth to connecting waterways.

The Aquatic Plant Research and Control Section of the Louisiana Department of Wildlife and Fisheries is charged with the responsibility for controlling waterhyacinth and other aquatic plant infestations within Louisiana's public waters. Funds allocated to this program for the 1977-78 fiscal year total 1.6 million dollars, the majority of which is used for the purchase of chemicals. Chemical control with 2,4-dichlorophenoxyacetic acid (2,4-D) began in 1946 and continues today. Improvement of both equipment and application techniques has greatly increased the effectiveness of Louisiana's waterhyacinth control program.

Increased emphasis is being placed upon developing methods to control waterhyacinth in the previously mentioned inaccessible swamp areas. One of the methods considered for this control was the introduction of host-specific biological agents. Two species of South American weevils (*N. eichhorniae* and *N. bruchi*) have been studied and found to be host specific to waterhyacinth (2, 3, 4, 5). As a result, both of these species have been released in Florida. Approval was granted by the Louisiana Department of Agriculture in 1974 to introduce these two species of waterhyacinth weevils into Louisiana.

METHODS AND MATERIALS

N. eichhorniae. In cooperation with the U. S. Army Corps of Engineers, the Department obtained 113 adult *N. eichhorniae* in March, 1974 from the U. S. Department of Agriculture, Ft. Lauderdale, Florida, and successfully established a reproducing population in a small greenhouse located at Baton Rouge. In July, 1974, adult weevils were placed in waterhyacinth infestations (200 weevils in each location) near Monroe, Alexandria, Henderson, Breaux Bridge, and Sorrento. Two additional nursery areas near Ramah and Marksville were established in 1975. Because of successful overwintering of weevil populations at all five 1974 release sites, the greenhouse phase of this operation was discontinued.

N. eichhorniae nursery areas near Alexandria and Sorrento were selected as collection sites for the weevils which were released on a statewide basis in September, 1976. Large weevil populations at the previously described locations made a statewide release program feasible. Waterhyacinth spray crews were utilized for the collection and distribution during the initial phase of this operation. Waterhyacinth plants infested with weevils varying in stages of development from egg to adult were placed in 250 liter plastic bags and transported to new release sites, using boats, air boats, and all-terrain vehicles. At the release sites, the weevil infested plants were removed from the bags and placed in waterhyacinth mats. To obtain the average number of adults released per site, a sample of bags were randomly selected and the adult weevils physically removed and counted. This method of collection and distribution was discontinued in October, 1976 as distances from the collection point to release sites increased. Although this method was considered to provide the highest probability of establishment of a weevil population at the release site, the number of collections and releases were limited due to labor and inefficiency of handling waterhyacinth.

To increase the speed of collection and release, spray crews began collecting adult *N. eichhorniae*. Following the collection of a substantial number of weevils, a Bell Model 206B Jet Ranger was utilized as a transport vehicle to fly insects to new release sites. Small, 0.5 liter, cold drink cups

containing 200 adult weevils and several waterhyacinth leaves (used to prevent desiccation) were dropped from the helicopter as it hovered over dense waterhyacinth infestations in isolated areas. Perforated plastic tops contained the weevils until time of drop from the helicopter. This method of release proved to be highly successful in allowing waterhyacinth weevils to be placed in remote areas inaccessible by any other means (Figure 1). A total of 24,400 weevils were released from the helicopter in 1976.

The severe winter of 1976 drastically reduced waterhyacinth and weevil populations near Alexandria making it unsuitable as a collection site. Therefore, adult *N. eichhorniae* were collected from the nursery area near Sorrento beginning in September, 1977. Four hundred adults were placed in each cup. Again, the helicopter was used as a transport vehicle.

N. bruchi. One hundred *N. bruchi* eggs were obtained from the U. S. Department of Agriculture Biological Control Laboratory, Gainesville, Florida, in July, 1974. Fifty-five eggs hatched and the larvae were implanted in waterhyacinth leaves in the Baton Rouge greenhouse. Adult *N. bruchi* feeding activity was not observed until September, 1974. This population multiplied during the spring of 1975 and two field nursery areas were established, one in an isolated canal west of Krotz Springs and the other 0.8 km south of Interstate 10 in the Atchafalaya Basin. Three hundred adult *N. bruchi* were released at each location (Table 1). Two additional nursery sites were established in

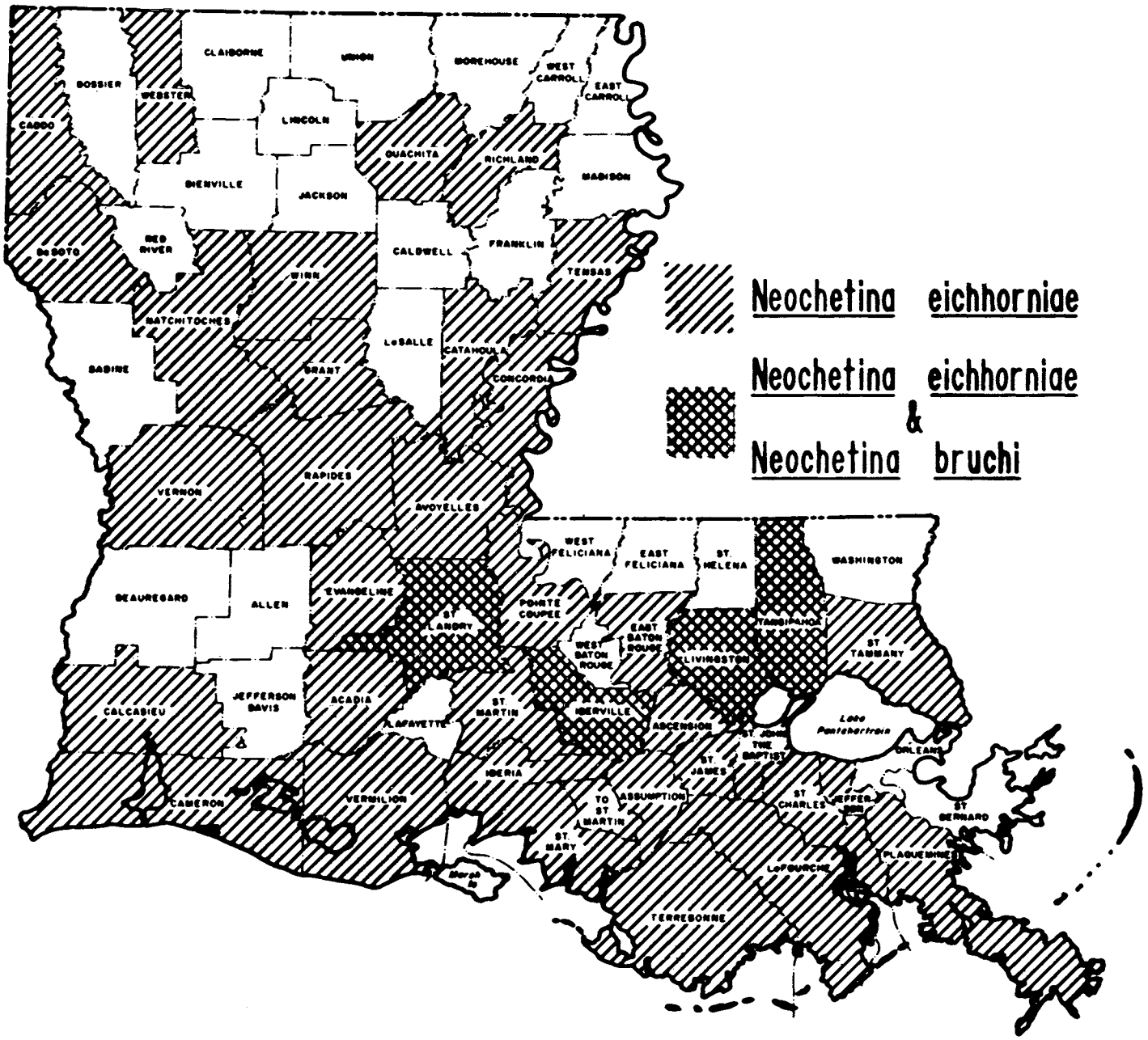

Figure 1. Louisiana parishes where *Neochetina eichhorniae* and *Neochetina bruchi* were released, 1974-1977.

TABLE 1. *Neochetina eichhorniae* AND *Neochetina bruchi* RELEASES MADE IN LOUISIANA DURING A FOUR-YEAR PERIOD.

Year	*Neochetina eichhorniae* No. Released	No. Locations	*Neochetina bruchi* No. Released	No. Locations
1974	900	5	—	—
1975	526	3	600	2
1976	40,200	193	452	2
1977	116,400	291	4,600	6
TOTALS	158,026	492	5,652	10

October, 1976. Three hundred adult weevils were released in a borrow pit south of Krotz Springs and 152 were released in a swampy area on La. Highway 22 near Whitehall.

The *N. bruchi* population at Whitehall increased to collectable levels during 1977. Subsequently, 4,600 *N. bruchi* were collected at the Whitehall site during late 1977 and released at six locations in Iberville and Tangipahoa Parishes (Table 1).

DISCUSSION

The Louisiana Department of Wildlife and Fisheries has been very successful to date in establishing reproducing populations of *N. eichhorniae* and *N. bruchi* (Table 1). Greater success has been achieved in the southern parishes because of warmer winters and larger waterhyacinth infestations. *N. eichhorniae* survived the winters of 1974 and 1975 as far north as Monroe. However, the severe winters of 1976 and 1977 drastically reduced waterhyacinth populations in North Louisiana. Many areas did not reestablish plant populations until the latter part of the growing season. Without waterhyacinth, the weevils cannot propagate or survive (5, 6). The weevil populations in the southern parishes survived the 1976 and 1977 winters and continued to expand during the following growing seasons.

During the 1976 release operations, *N. eichhorniae* adults were observed 22.5 km from the original 1974 release site near Sorrento. *N. eichhorniae* were observed in an isolated waterhyacinth infested borrow pit north of Hammond on December 9, 1977. The closest release site is 37 km with no connecting waterways. Weevil damage has been observed in many other isolated areas far from release locations.

Observations of stress being placed upon waterhyacinth plants by weevils were observed during the spring of 1976. Flowering appeared to be reduced at the Sorrento and Alexandria nursery areas. Aerial observations of approximately 16,200 ha of swamp surrounding the Sorrento area revealed no apparent flowering of waterhyacinth plants during 1977. Vegetative reproduction appeared to be reduced at the Sorrento nursery area during 1977 as compared to the previous 10 years.[1] The combination of damage by *N. eichhorniae* and the 1977 winter have eliminated waterhyacinth plants from the Sorrento nursery area. Waterhyacinth infestations in the surrounding swamp also appear to have been reduced by this dual action.

Because of better success in establishing good *N. eichhorniae* nursery areas, most of our work has been with this species. *N. bruchi* populations are increasing but are presently being invaded by *N. eichhorniae*. It is doubtful that a pure *N. bruchi* population can presently be established in Louisiana to be used for collection and release on a large scale basis.

DeLoach (1) reports optimum control of waterhyacinth could possibly be achieved by introducing both species of weevils. The Department is optimistic that both species of waterhyacinth weevils are aiding waterhyacinth control programs, especially in areas inaccessible to herbicide spray crews. The Aquatic Plant Research and Control Section of the Louisiana Department of Wildlife and Fisheries will continue to monitor the spread of both species of waterhyacinth weevils released in Louisiana. Severe winters as those experienced in 1976 and 1977 may severely limit waterhyacinth weevil populations in North Lousiana.

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