A Survey Of Aquatic Plants In The Cross-Florida Barge Canal

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The aquatic plant control program in the Cross-Florida Barge Canal is part of an overall vegetation management effort on the canal. Vegetation management on the canal includes: a. aquatic plant control, b. planting of berms and dams for erosion control and wake reduction, c. planting of spoil banks and spoil areas to reduce siltation and erosion, d. fish and wildlife habitat improvement, e. pollution control and abatement to retard eutrophication, and f. mosquito control for public health purposes.

These various measures are interrelated; in some cases they are complementary and in others they conflict to some degree. The canal and its reservoirs have been zoned for certain uses, e.g. commercial navigation, fishing, wildlife habitat, etc. Thus the vegetation of an area is managed primarily for one purpose and secondarily for other uses. Zoning is not done solely by the Corps of Engineers, but is coordinated with State and Federal agencies such as the Florida Game and Fresh Water Fish Commission and the Federal Water Pollution Control Administration.

Having placed aquatic plant control in the larger perspective of vegetation management, let us examine the aquatic plant control portion closer. Vegetation is the product of two factors, the plants present and the environmental conditions. For a plant to become troublesome in an area it must first be present. Secondly, the environmental conditions must allow the plant to grow to a quantity that interferes with a desired use of the area. Environmental conditions in most of the state are favorable for extensive growth of Eurasian Watermilfoil (*Myriophyllum spicatum*). However, this plant, which is a problem in much of the eastern United States, is not a problem in most of Florida simply because it has not spread to these areas. If, and when, it is introduced it will become a problem. Brazilian elodea (*Egeria densa*) illustrates the second point. Several years ago this plant grew to such quantity in the Ocala Boat Basin that it interfered with boat traffic and control measures had to be taken. Conversely, the same plant has existed in stretches of the

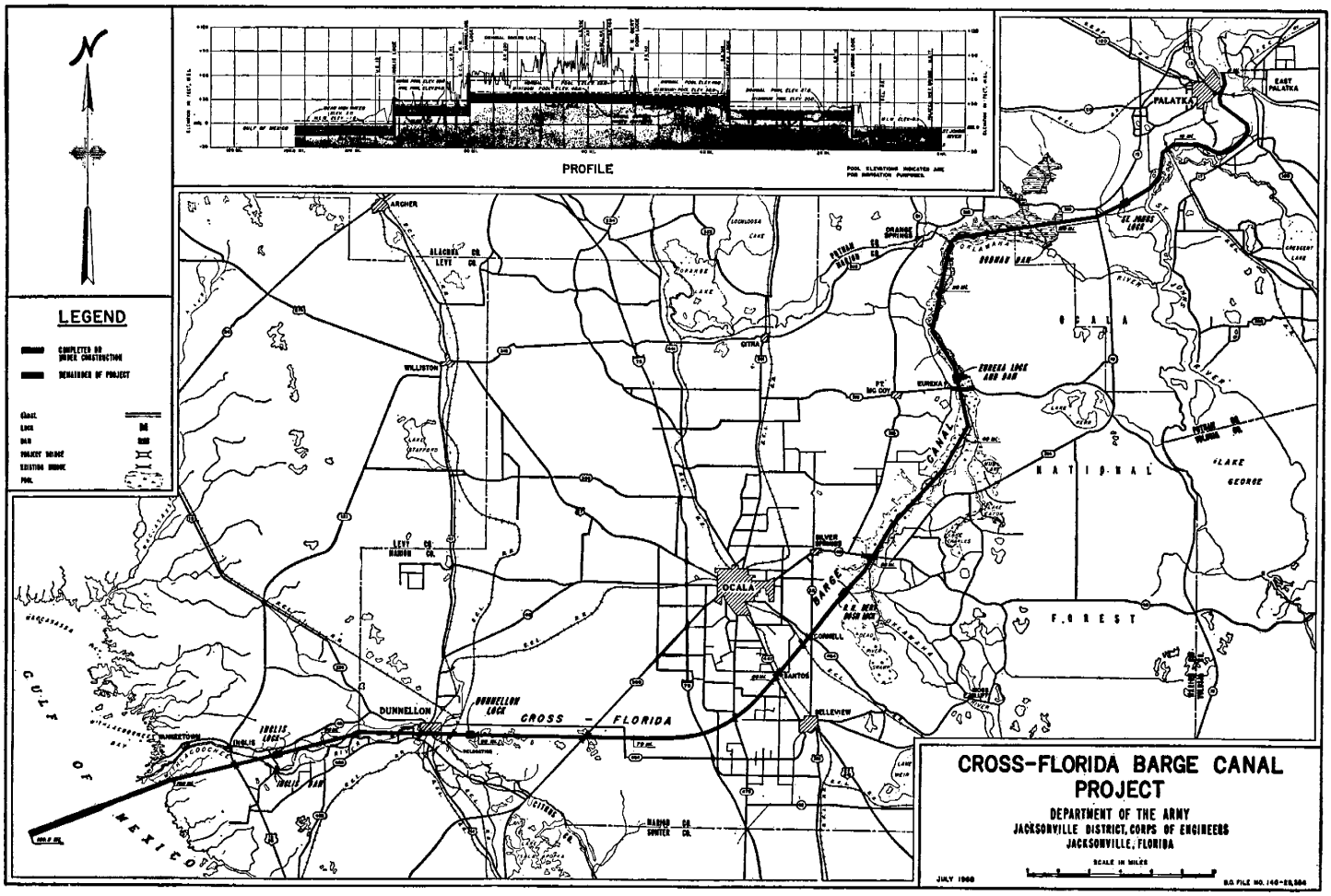

Figure 1.

Withlacoochee River for years, but due to a combination of unknown environmental factors, growth has not been extensive and the plant is not a problem at this time.

Control measures fall into two categories. The first is directed at the plant itself and involves such measures as herbicide application and mechanical removal. Another measure of this type is quarantine to prevent introduction of the plant into certain areas. The second type of control measure is aimed at the environment. The environment is manipulated so that it becomes less favorable for the growth of the plant. Biological control methods fall into this category, as does pollution control aimed at reducing nutrient levels.

At the present time, the Corps' methods for control of aquatic plants are directed at both the plant and the environment. Spraying of water hyacinth (*Eichhornia crassipes*) with 2,4-D has proved to be the most economical method for controlling this plant. Alligatorweed (*Alternanthera philoxeroides*) is being controlled by a flea beetle (*Agasicles* n. sp.) imported from South America. Nutrient levels in the canal waters are being monitored as part of the pollution control program.

Essential to a control program is surveillance to determine the presence and amount of potentially troublesome plants. From January through May 1969 a survey was made of the aquatic plants in both the completed portions of the canal and along the canal right-of-way from the St. Johns River to the Gulf of Mexico. The canal was divided into four parts for the survey: a. Rodman Reservoir — including all portions of the Oklawaha River downstream from Eureka Lock and Dam and the recently completed portion of the canal from the reservoir to the St. Johns River, b. Eureka Reservoir — including all portions of the Oklawaha River from Eureka Lock and Dam upstream to Moss Bluff Lock and Dam, c. Upland cortion— from Dosh Lock, south of Silver Springs, to Dunnellon, d. Inglis reservoir — including the present Inglis Reservoir, the Withlacoochee River from Inglis Dam to the Gulf, and the completed portion of the canal from Inglis Lock to the Gulf. In these four areas 59 species of aquatic plants were collected (table 1). Of these, the vast majority are native and exhibit little problem potential.

Rodman Reservoir has recently been raised to its operational level of 20 feet above mean sea level. While the reservoir was at elevation 16, 47 species were collected. Water hyacinth appears to be the main problem. The water hyacinth have recently been sprayed with 2,4-D by helicopter and airboat, and the situation appears to be well in hand.

Eureka Reservoir has not been impounded at present, however the Oklawaha River and several lakes which will be flooded by the pool were investigated. In the Eureka area 41 species were collected. Water hyacinth, of course, were present and again this plant can be controlled with present techniques. Brazilian elodea (*Egeria densa*) was found in the Oklawaha River at the old Hwy. 316 bridge just above Eureka Dam, and in the Ocala Boat Basin near the confluence of Silver Run and the Oklawaha River. This plant may become a problem in shallow, slow-moving portions of the reservoir.

At the time of the survey, construction had not begun on most of the upland portion of the canal, about 50 miles in length, which was consequently dry. However, Ross Prairie is in the canal alinement and a small pool will be formed in the area. Pickerel weed (*Pontederia lanceolata*) is the dominant plant in Ross Prairie at present, but when the later level is raised this plant is not expected to be a problem. A total of 11 species were found in this section. The ubiquitous water hyacinth will no doubt appear in time.

TABLE 1. DISTRIBUTION OF AQUATIC PLANTS IN THE CROSS-FLORIDA BARGE CANAL

Scientific name	Common name	Reservoir			
		Rodman	Eureka	Uplands	Inglis
Alternanthera philoxeroides	Alligator	*	*		*
Aster caroliniensis	Aster	*	*		*
Azolla caroliniana	Water velvet	*	*		*
Bacopa caroliniana	Water hyssop	*	*	*	*
Bidens laevis	Beggar's tick				*
Cephalanthus occidentalis	Buttonbush	*	*		*
Ceratophyllum demersum	Coontail	*	*		*
Cicuta mexicana	Water hemlock	*	*		*
Cladium jamaicense	Sawgrass	*	*		*
Egeria densa	Brazilian elodea	* (1)	*		*
Eichhornia crassipes	Water hyacinth	*	*		*
Eleocharis spp. (a)	Spikerush	*	*		*
Eriocaulon compressum	Pipewort	*			*
Hydrilla verticillata	Hydrilla				*
Hydrochloa caroliniensis	Southern watergrass	*			*
Hydrocotyle spp. (b)	Water pennywort	*	*	*	*
Juncus Effusus	Softrush	*	*		*
Lemna spp. (c)	Duckweed	*	*		*
Limnobium spongia	Frogbit	*			*
Ludwigia palustris	False loosestrife	*	*		
Mikania scandens	Climbing hempweed	*	*		*
Najas guadalupensis	Southern naiad	*	*		*
Nuphar advena	Spatterdock	*	*		*
Nymphaea odorata	White waterlily	*	*	*	*
Orontium aquaticum	Golden club	*	*		
Panicum spp. (d)	Maidencane, Paragrass, Torpedograss	*	*	*	*
Paspalum fluitans	Water paspalum	*			*
Pistia stratiotes	Water lettuce	*	*		*
Pithophora sp.	Algae	*	*	*	*
Polygonum spp. (e)	Smartweed	*			*
Pontederia lanceolata	Pickerelweed	*	*	*	*
Potamogenton spp. (f)	Pondweed	*			*
Proserpinaca palustris	Mermaid weed	*	*		
Rumex verticillatus	Swamp dock	*	*		
Sacchiolepis sthiata	Sacchiolepis	*			*
Sagittaria spp (g)	Arrowhead	*	*	*	*
Salvinia rotundifolia	Salvinia	*	*		*
Salix nigra	Willow	*	*	*	*
Scirpus spp. (h)	Bulrush	*	*		*
Spirodela polyrhiza	Giant duckweed		*		
Typha spp. (i)	Cattail	*	*		*
Utricularia spp. (j)	Bladderwort	*	*		*
Vallisneria neotropicalis	Eelgrass	*	*		*
Zizaniopsis miliacea	Giant cut-grass	*	*		*

(1) Located at Orange Springs after survey was completed.

(a) Eleocharis elongata, E. vivipara
(b) Hydrocotyle bonariensis, H. umbellata, H. verticillata
(c) Lemna minima, L. minor
(d) Panicum hemitomum, P. purpurascens, P. repens
(e) Polygonum densiflorum, P. hydropiperoides
(f) Potamogeton crispus, P. foliosus
(g) Sagittaria graminea, S. lancifolia, S. latifolia
(h) Scirpus cubensis, S. validus
(i) Typha angustifolia, T. domingensis, T. latifolia
(j) Utricularia foliosa, U. inflata, U. Subulata

In the Inglis Reservoir section 50 species were collected. This reservoir presents the most acute control problem along the canal route due to dense plant growth compounded by total lack of clearing when the reservoir was impounded in 1909. Water hyacinth in the reservoir, which drifted in from the Withlacoochee River, are being controlled with 2,4-D by the Florida Game and Fresh Water Fish Commission in a cooperative program with the Corps.

Hydrilla (*Hydrilla verticillata*), a submerged aquatic, currently occupies about 1,000 acres in the 3,000 acre Inglis reservoir. Research is presently underway to develop control methods for this Eurasian native. A large-scale field test using Copper sulfate and diquat will be conducted soon in an arm of the reservoir.

Large floating mats which were composed initially of water hyacinth, but later contained water pennywort (*Hydrocotyle umbellata*); beggar's tick (*Bidens laevis*); climbing hempweed (*Mikania scandens*), cattail (*Typha* spp.); water dock (*Rumex verticillatus*); smartweed (*Polygonum densiflorum*); water hemlock (*Cicuta Mexicana*); water paspalum (*Paspalum fluitans*); and willow (*Salix nigra*), have formed over large portions of the Inglis reservoir. The Corps is now in the process of determining an optimum amount and distribution of these mats in terms of fish, wildlife, navigation, and aquatic plant control considerations. Water lettuce (*Pistia stratiotes*) occasionally forms dense mats but this is considered only a minor problem.

Eurasian watermilfoil is presently established in the Crystal River area about 10 miles south of the western end of the canal. Floating fragments of this plant have reportedly been found at the mouth of the Withlacoochee River near Yankeetown. This plant is quite tolerant of brackish water and we are concerned that it may become established in the canal.

Alligatorweed was found throughout the area of the survey, but it is not a problem at this time because of the control exerted by the flea beetles.

As indicated by the number of species present in the Cross-Florida Barge Canal, a potential for aquatic plant problems exists. We hope to prevent the spread of certain plants to portions of the canal where they are not presently established. This we can only do with the cooperation of State authorities in establishing a quarantine program. Several proposals were considered by the 1969 Florida legislature which would enable such a quarantine to be established. Nutrient levels are rising in waters throughout the State, the nation, and the world, hastening the process of eutrophication. An attack on this problem must be multifaceted involving all levels of government. The Federal Water Pollution Control Administration is presently the focal point in this effort and we are cooperating fully with them. Thus we plan to control undesirable amounts of aquatic plants by the preventative measures of quarantine and pollution control, and by the remedial measures of biological control and selective herbicidal and mechanical treatment.

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