Expansion of Transplanted Giant Bulrush in Central Florida Lakes

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Abstract: Giant bulrush (*Scirpus californicus*) proved to be an excellent aquatic plant for transplanting into lakes. Bulrush has a desirable growth pattern and acts as a natural congregating area for freshwater sportfish. Growth densities allow good angler utilization. Consistent survival and rapid growth response after transplanting was documented in all study lakes.

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Aquatic plant communities are an important part of the supporting habitat for freshwater sport fisheries in Florida. Unfortunately, aquatic vegetation has declined due to stabilized water levels and eutrophication. Current fisheries management is oriented towards habitat enhancement and establishment of desirable aquatic vegetation in littoral zones. Wegener and Williams (1974) attributed increased sportfish production in Lake Tohopekaliga to a 16% increase in desirable aquatic plants and associated fish food organisms following an extreme drawdown. Substrate provided by aquatic macrophytes resulted in increased production of important fish food organisms such as scuds, freshwater shrimp, aquatic earthworms and larval mayflies. Aggus and Elliot (1975) documented a significant increase in growth and survival of largemouth bass (*Micropterus salmoides*) fry during the first 3 months of life in shoreline areas containing submerged vegetation.

The value of substrate provided by aquatic vegetation in eutrophic systems with anerobic bottoms was evaluated by Langford, et al. (1981). They attributed a total recovery of sportfish in 2 eutrophic lakes to expansion of a submerged aquatic plant. Expansion was directly related to increased production of invertebrates, forage fish species, and juvenile largemouth bass.

Subsequently, the entire centrarchid sportfishery showed a dramatic increase.

Some aquatic plants have characteristics which complicate management in freshwater systems. Hydrilla (*Hydrilla verticillata*), for example, is beneficial to sportfish but often requires intensive management to maintain desirable coverage. Other aquatic plants due to physiological limitations require bottom exposure and soil aeration to stimulate regrowth (Whitlow and Harris 1979). Since many water bodies cannot be fluctuated due to physical or socio-economic reasons, desirable aquatic plants capable of thriving under stable water conditions will play an important role in future lake management.

Transplanting offers a potential management tool provided specimens are selected which have significant value and can survive following implantation. Such plants must have a desirable growth pattern and must be easily controlled in the event excessive growth occurs. Ager and Kerce (1970) documented the growth of giant bulrush in deep marsh areas and submerged vegetation zones which were only periodically exposed. This was probably due to the ability of this plant to transport photosynthetic oxygen from the stems to the root system (Langeland 1981), an adaption inherent in many aquatic vascular plants. The value and desirability of giant bulrush in freshwater fisheries was documented by Holcomb and Wegener (1971). They found that giant bulrush communities served as important spawning areas for centrarchids and became natural fish attractors in Lake Tohopekaliga as documented by heavy fishing pressure.

Many species of aquatic plants have been transplanted in Florida lakes without success. This paper documents the success of several giant bulrush transplanting projects in Florida.

Methods

Three study areas were selected for comparison. Lake Thonotosassa, located near Plant City, Florida is a 330 ha natural lake with a history of stabilized water levels, dense algae blooms, and declining diversity in aquatic macrophytes. Emergent vegetation in the shallow littoral zone consisted of a few small patches of panic grasses (*Panicum* spp.) and scattered narrow bands of cattail (*Typha latifolia*).

Lake Henry, a 347 ha natural lake near Winter Haven, Florida has only minor fluctuation capabilities. This slightly eutrophic lake was nearly void of aquatic vegetation except for small patches of pickerelweed (*Pontederia cordata*) and cattails.

East Pond is a 3 ha artificial impoundment located in Zolfo Springs, Florida. It has a shallow interior marsh which contained few aquatic macrophytes prior to transplanting. Transplanting was conducted following a drawdown which exposed the central marsh.

Placement of giant bulrush was in sandy substrate except in East Pond which contained considerable amounts of clay. A section of rhizome with stems attached was planted approximately 10 to 15 cm into the hydrosoil in water depths ranging from 0.3 to 1.3 m.

Total surface area expansion of giant bulrush was monitored at each study lake in square meters. Total stem counts were made in 2 selected plots in Lake Thonotosassa. Stems counted were green and extending above the surface of the water. These counts were discontinued after June, 1981 due to the large numbers encountered and extent of surface area coverage.

Results

Lake Henry

Feasibility transplants of bulrush in Lake Henry were initially made in 1975. Survival and growth success of this small plot led to the idea of transplanting other study sites. Monitoring of this original plot began in November, 1979 and revealed an increase from 10 to 160 m^2 in the past 3 years (Fig. 1).

During the Lake Henry experiment other plants were also tested including American lotus (*Nelumbo lutea*), spatterdock (*Nuphar luteum*), and 2 species of aquatic grasses (*Panicum geminatum* and *P. hemitomon*). While some of these species were established, none were as successful as bulrush nor did they show significant expansion.

Lake Thonotosassa

Giant bulrush has become well established with increasing growth since transplanting. It has expanded lakewide from 19.4 m^2 since monitoring began in April, 1979 to 244 m^2 by May, 1982 (Fig. 2).

Stem counts at 2 sample stations also revealed significant increases. Site 1 was transplanted with 6 stems in August, 1979 which steadily increased to 832 stems by June, 1981 (Fig. 3). Surface coverage at site 1, although variable, increased from <1 m^2 in August, 1979 to 95 m^2 by May, 1982. Site 2 was transplanted in June, 1979 by sparsely distributing 80 stems over an area of approximately 3 m^2 (Fig. 4). This station steadily increased in both stem count and area coverage, with the exception of the March, 1981 sampling period. Lack of expansion at that time was attributed to frost damage in February, 1981. A net increase of approximately 53 m^2 occurred during the 3 years of study.

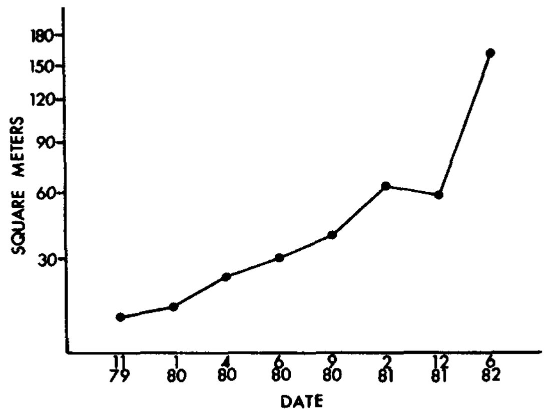

Figure 1. Expansion of Transplanted Giant Bulrush in Lake Henry from November, 1979 to June, 1982. (Data Expressed on Semi-logarithmic Scale)

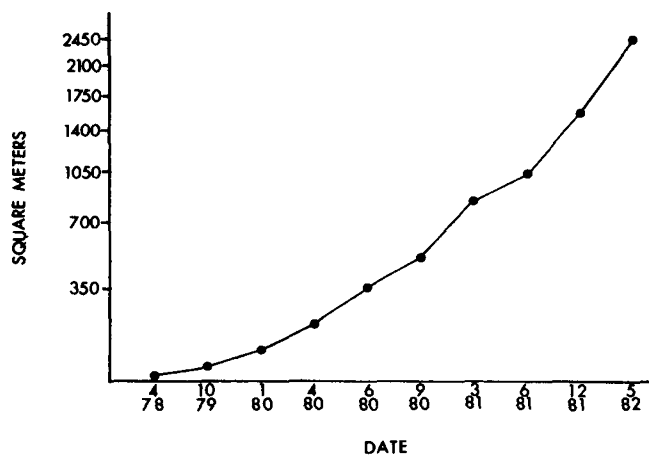

Figure 2. Total Surface Area of Transplanted Giant Bulrush in Lake Thonotosassa from April, 1979 to May, 1982. (Data Expressed on Semi-logarithmic Scale)

East Pond

Early expansion of bulrush in East Pond (Fig. 5) was affected by chemical spraying for hyacinch control prior to April, 1980. During subsequent monitoring periods net growth was nearly static. March, 1981 data also shows a decline resulting from severe frost damage during the winter of 1980. At this time no green shoots were visible above the water line. Afterwards an extreme drawdown stimulated regrowth from undamaged root systems resulting in total recovery and expansion. Since the drawndown only partial reflooding has occurred, further contributing to rapid expansion of bulrush in East Pond.

Discussion

Giant bulrush transplants at all study sites showed positive benefits for restoration of littoral zone habitat and sportfishing areas. The degree of im-

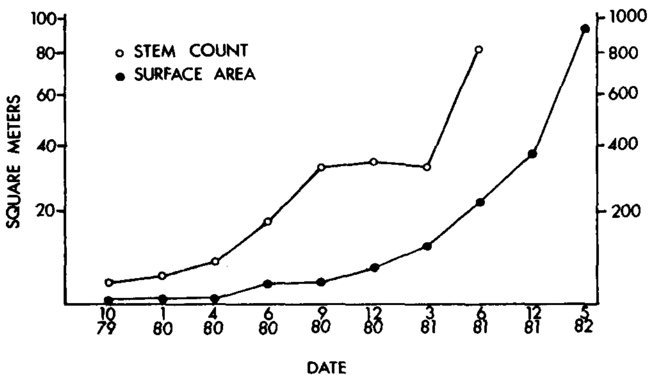

Figure 3. Surface Area and Total Stem Count of Transplanted Giant Bulrush at Site 1 in Lake Thonotosassa from October, 1979 to May, 1982. (Data Expressed on Semi-logarithmic Scale)

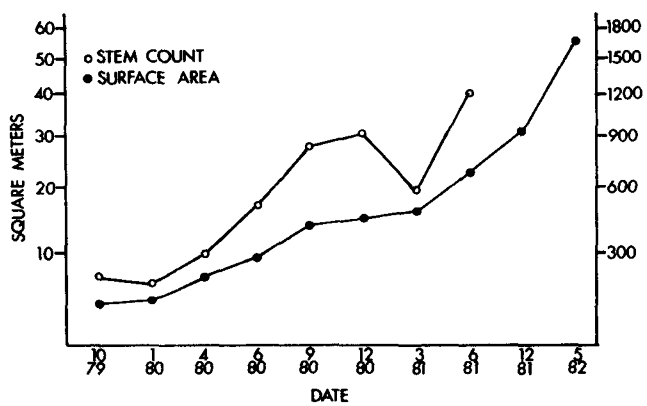

Figure 4. Surface Area and Total Stem Count of Transplanted Giant Bulrush at Site 2 in Lake Thonotosassa, from October, 1979 to May, 1982. (Data Expressed on Semi-logarithmic Scale)

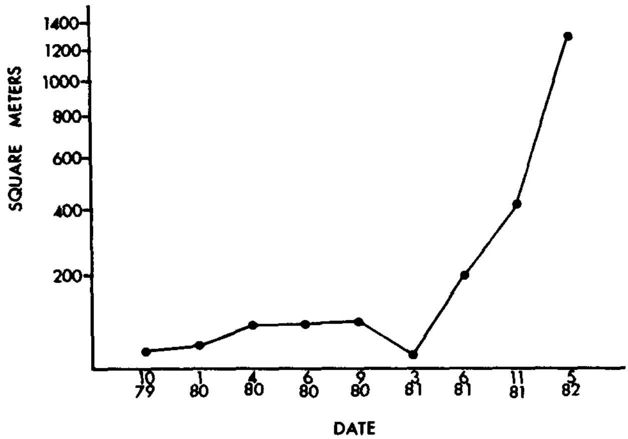

Figure 5. Surface Area of Transplanted Giant Bulrush in East Pond from October, 1979 to May, 1982. (Data Expressed on Semi-logarithic Scale)

pact increased through time with almost immediate benefits in small systems such as East Pond. In larger lakes such as Thonotosassa and Henry the immediate benefit is that of a fish attractor effect.

Compared to artificial attractor construction, the economic advantages of an expanding plot of bulrush becomes immediately obvious. Only 6 man-days were required to collect and transplant giant bulrush in Lake Thonotosassa. Total cost of transplanting was \$11.80 m^2, but after 2 years of growth, the actual investment was only \$0.70 m^2. This reduction was derived by dividing the initial cost by the square meters of transplanted giant bulrush existing in Lake Thonotosassa 2 years after transplanting. For comparison, installation of a brush fish attractor is approximately \$2.00 m^2 in Florida (Buntz 1977). Furthermore, the brush attractors need refurbishing on a periodic basis to remain effective.

Angler utilization of various habitat types in Lake Thonotosassa was documented during February, 1982 (Table 1). Fourteen sampling days were selected to coincide with peak season fishing effort.

Vegetated habitat received 83% of the fishing pressure even though open water comprised more than 98% of the total surface area. Bulrush received more angler pressure per unit of surface coverage than other vegetation types. Although limited sampling, this demonstrates the importance that anglers placed upon bulrush and agrees with findings by Holcomb and Wegener (1971).

An important aspect of this study was the consistency of giant bulrush's survival and expansion following transplanting. In addition to these study

Table 1. Angler Utilization in Lake Thonotosassa, Florida (February, 1982)

Habitat Type	Total Surface Area	Percent Angler Utilization
Open water	327.5 ha	17
Giant bulrush	0.2	13
Cattail	1.3	23
Cypress	2.4	38
Maidencane	0.2	9
Total	331.6 ha	100%

sites, transplants have been made in several other natural lakes, reclaimed phosphate lakes, and small ponds. Results are similar to those documented in this study.

The growth pattern established by transplanted bulrush creates an "edge effect" providing desirable structure for both fish and fisherman. The increased cover and attachment area will eventually result in improved sportfish production in degraded lakes if expansion continues. Transplanting desirable plants such as bulrush may preclude establishment of less desirable or nuisance vegetation, making future management of littoral zones more predictable and beneficial for recreational use.

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