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MANAGEMENT OF NEEDLERUSH FOR IMPROVING WATERFOWL HABITAT IN MARYLAND

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Control of needlerush (*Juncus roemerianus*) for improving waterfowl habitat has received much attention in the Southeast in recent years. Solid stands of needlerush have no value for waterfowl but receive considerable use when interspersed with water areas or other vegetational types. As needlerush dominates about 600,000 acres of marshlands (Shaw and Fredine, 1956), there are significant potentialities for habitat improvement. For example, at the Chassahowitzka National Wildlife Refuge in Florida, increased waterfowl use followed control of this plant (Myers, 1955).

Our investigations on needlerush control in Maryland were started in 1952. The objectives were to develop and refine procedures for control, then find how best to apply these procedures as a tool for improving waterfowl habitat.

These investigations capitalized on findings from studies by Francis M. Uhler [1] in Maryland, Barber (1952) and Wilson (1952-54) in North Carolina, and Myers (1955, 1959) in Florida. Most of our work was done on a cooperative basis. William Nicholson, formerly of the Maryland Game and Inland Fish Commission, and John R. Longwell, Maryland Department of Research and Education, participated in these studies. Clark Webster, formerly with the U. S. Fish and Wildlife Service, and student assistants Edward Burgee, Otto Florschutz, James B. Whelan, and Gerald Townsend helped in the field investigations during successive summers. Chemical companies furnished herbicides and technical advice.

STUDY PROCEDURES

Previous studies by Barber (1952) showed that needlerush is most susceptible to treatment during the period of flowering through early fruiting. Accordingly,

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our treatments were made during this time and to a limited extent at later stages of growth. Our studies were conducted at the Blackwater National Wildlife Refuge, Kent Island, and the Taylors Island and the Deal Island Wildlife Management Areas.

Chemicals that Barber found ineffective were not re-tested except when used in combination with other herbicides. Treatments were made with different formulations of 2, 4-D, including esters, salts, and the acetamide; silvex; TCA; dalapon, 2, 2, 3-TPA; monuron, neburon; 2, 3, 6-TBA; amitrol; erbon; CBMM; simazin; a mixture of dalapon and silvex, commercially called Garlon; and mixtures of 2, 4-D and TCA. Approximately 300 plots of needlerush were treated at different stages of growth and in different ecological situations.

In the initial phase of the study, herbicides at graded dosages were applied with hand-pressure sprayers on plots ranging from 1/40 to 1/25 acre. Water or oil carrier was used with the herbicide at the rate of 200 to 250 gallons per acre. Treatments showing promise were replicated on larger areas with power spray equipment, and carrier was used at the rate of 400 to 500 gallons per acre.

Studies were made also on the rate of encroachment of needlerush in different ecological situations, particularly in relation to water depth. A series of culm counts was made at station plots for 3 years and on a general basis for as many as 5 years. Observations on succession of needlerush by other plants were made during periods of 5 to 8 years. These studies showed the condition under which needlerush will not re-encroach in treated areas and the types of situations where desirable plant succession takes place.

A series of observations on waterfowl use of needlerush marshes was made to ascertain the ecological conditions under which these areas can be of value to waterfowl.

RESULTS

Evaluations on control plots were not made until the year after treatment. Results of the early studies, which were given in part by Steenis (1954), Steenis, Webster and Nicholson (1955) and by Martin, Erickson and Steenis (1957), will be incorporated here again for completeness. Studies indicated that salts and esters of 2, 4-D applied at 15 to 20 pounds acid equivalent per acre in 200 gallons of carrier, yielded 90-100 percent control if there was adequate coverage. Since it was difficult to obtain good coverage with power spray equipment at this low rate of carrier, the amount of carrier was increased to 400 gallons per acre. Then, however, a larger amount of herbicide (30 pounds per acre) was needed. The amount of 2, 4-D could be cut down considerably if it was mixed with TCA. A combination of 10 pounds of 2, 4-D per acre and 50-100 pounds of TCA per acre (both acid equivalent) yielded effective control, even at later stages of growth. However, this mixture was more expensive than 2, 4-D alone and was difficult to apply because TCA corroded the equipment. More recent studies showed that another compound, 2, 4-D acetamide (commercially called Emid), was even more effective. It yielded 100 percent control when applied at rates as low as 10 pounds (acid equivalent) per acre. Emid now appears to be the most economical chemical to use; the cost is approximately $15.00 per acre. Silvex applied at approximately 15 pounds per acre also yielded good results. Other herbicides were not effective.

Studies on the encroachment of needlerush revealed that it readily reinvaded sporadically flooded treatment areas. Plots of 1/40 and 1/20 acre where herbicidal treatments were 90-100 percent effective were completely revegetated by needlerush within a 3- to 4-year period. However, in those areas where there was almost continual flooding by an inch or more of water, invasion was extremely limited or did not occur at all.

In treated plots containing saturated soil subject to dewatering, several plants important to waterfowl, including different bullrushes (*Scirpus* spp.) and dwarf spikerush (*Eleocharis parvula*) appeared at first but later gave way to needlerush. Plant succession after treatments of flooded sites was a slow process. The second year after treatment, dead culms of needlerush completely covered the plot. In the third year there were patches of open water. In the fourth year, breakdown of plant remains was sufficient to expose the plot and by the fifth year there was enough decomposition and stablization of the bottom to

allow invasion of the highly desired duck-food plants, sago pondweed (*Potamogeton pectinatus*) and wigeongrass (*Ruppia maritima*).

Observations indicated that when needlerush was interspersed with other vegetation, particularly submerged food plants, it could be of considerable importance to waterfowl. In these situations, dense stiff culms of needlerush furnished needed cover. An interspersion of marsh with 40 to 60 percent open water was attractive to ducks, particularly black ducks, when there was a series of openings ranging from ¼ acre to 3 acres in size. The larger openings also were suitable for hunting.

These preliminary observations of waterfowl preferences have justified application on an operation basis. A large-scale program is now underway to flood needlerush marshes by constructing low dams in tidal creeks and to create openings by herbicide treatments.

SUMMARY

Needlerush, one of the most prominent plants of the southern coastal marshes, dominates an area of about 600,000 acres. Studies in Maryland showed that derivatives of 2, 4-D, particularly 2, 4-D acetamide, provide the most effective, economical control. Continuous flooding of treated areas prevents reinvasion of needlerush. Marshes dominated by needlerush can be improved for waterfowl by flooding and herbicidal treatments that create an intersperstion of marsh and open water suitable for the growth of submerged food plants.

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