

TABLE XXV
REGROWTH RESULTS OF DRY GROUND PLATS TREATED IN 1953

Plat No.	Date Treated	Herbicide*	Concentration Per Gallon of Water	1953	1954	1955
				Apparent Result†	Apparent Result†	Apparent Result†
A-1.....	9/24	2, 4, 5-7	2 oz.	E	E	G-E
A-2.....	9/24	BK #22	2 oz.	E	F	P
A-3.....	9/24	Ammate	12 oz.	E	G	F
A-4.....	9/24	PBC	12 oz.	E	P	P
A-5.....	9/24	TCA	12 oz.	E	E	E
A-6.....	9/24	2, 4-D	2 oz.	E	F	P
A-7.....	9/24	CMU p'der	12 oz.	G	E	E
A-8.....	9/24	CMU pellets	12 oz.	P	G	P

* See Footnote **, Table XX.

† See Footnote *, Table II.

WATERFOWL MANAGEMENT ON MULTIPLE-USE RESERVOIRS IN TENNESSEE

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COLOR SLIDES

1. *Dam and Lake.* In Tennessee during the past 25 years, a great boom in the creation of reservoirs for flood control, power, and navigation has resulted in the impoundment of over 600,000 acres of water. T. V. A. and the Corps of Engineers have been the major contributors to this situation.

2. *Watauga Lake With Drawdown Shown.* In the eastern part of the State storage reservoirs are present from which water is drawn to maintain navigable levels, to produce power in the lower mainstem reservoirs and to provide flood storage. In these storage reservoirs, fluctuation of water levels is often violent, sometimes utilizing much of the water in the reservoir.

3. *Kentucky Lake Near Paris Landing.* Mainstem reservoirs are generally shallower, broader, and less subject to extreme fluctuation than the storage lakes. This photo shows a scene on Kentucky Lake where waters extend for 184 miles through two states, Kentucky and Tennessee, and contains 156,000 acres of water at normal pool elevation. It is on these mainstem reservoirs with less violent fluctuation that waterfowl habitat development is undertaken with large scale projects.

4. *Buttonbush on Mud Flats.* One of the problems involved in providing better habitat on power reservoirs is that of utilizing mud flats, etc., which are exposed by late summer or early fall drawdown. Obnoxious plants soon take over this marginal land and have to be controlled by:

5. *Tractor Plowing Mud Flats.* Plowing up the willow and buttonbush which creep into the area of operation, or—

6. *Axe Used on Buttonbush.* Using axes and bush cutters to remove the larger growths and prepare the land for agricultural manipulation.

7. *Rye Grass on Mud Flats.* After preparation of the land and often only by seeding of recently exposed mud flats, planting of green materials such as rye grass is accomplished. These plantings commence in late August and continue until October 15.

8. *Japanese Millet on Mud Flats.* Past experiments with Japanese millet indicate that if planted on mud flats in mid-August, excellent results may be obtained by producing both seed and green material for early migrants.

9. *New Hope Mud Flats and Upland Fields.* Where land is suitable, upland fields adjacent to the lake are leased from T. V. A. or the Corps of Engineers

and agricultural crops suitable for duck food are planted. Geese benefit more than ducks from plantings in these areas. Here upland fields planted to corn, buckwheat, millet, etc., blend into mud flats which, when exposed by late summer and early fall drawdown, are planted to rye grass and Japanese millet.

10. *Yellow Creek Showing Flooded Willows.* Where areas are dewatered early in the summer, such as managed lakes and dewatering projects, willows are a major problem if the land cannot be farmed or treated chemically for coppice control. Here stumps and marshy areas prevent annual farming operations and these willows must be cut and the stumps poisoned in order to keep the area open.

11. *Wild Millet at Yellow Creek.* On Yellow Creek, a seasonally managed lake for waterfowl, removal of thick willow growth and plowing of the land resulted in the production of this thick stand of wild millet. This crop will be flooded in fall and winter. Smartweed also responds to this treatment.

12. *Lateral Pool Site on Kentucky Lake.* While T. V. A. malaria control policies do not permit construction of constant level pools on their reservoirs, the production of aquatic waterfowl foods on many other locations may be accomplished by the damming off of such arms of lakes as is shown here. Costs for a dam at this location would be relatively small and the aquatic foods produced would be especially attractive to diving ducks. Proximity to large water areas gives the necessary protection needed along with food supplies to hold the ducks.

13. *Constant Level Lake Showing Aquatics.* Many possibilities exist on farm lakes and ponds having constant levels and which produce large quantities of food such as you see here. Such lakes, located within a few miles of large reservoirs, undoubtedly attract waterfowl from the foodless fluctuating waters of such reservoirs and they in turn provide protection by their large size.

14. *West Sandy Dewatering Project (Summer);* 15. *West Sandy Pump Station.* On Kentucky Lake in Tennessee and Wheeler Lake in Alabama, T. V. A. has constructed several dewatering projects for the purpose of more economically controlling the malaria mosquito. This is done by damming off an arm of the lake and pumping what would ordinarily be part of the lake during the spring, summer and early fall months, thus keeping water off the timber and fields located behind the dam. In this case, the pumping station seen here will pump over a million gallons of water every four minutes. This activity allows timber to survive and produce valuable mast; crops may be grown on fields within the project and in winter, when no malaria problem exists, water may be permitted to flood the project merely by cutting off the pumps and permitting the lake to seek its own level.

16. *Buckwheat.* Often, land is slow drying out and late summer crops are necessary to produce food for waterfowl. Buckwheat is one of the best.

17. *Corn and Milo.* Corn is one of the best of waterfowl foods when flooded and milo is also very good. If milo is not flooded it will be subject to heavy use by blackbirds and other non-game birds.

18. *Peas;* 19. *Wheat;* 20. *Browntop Millet;* 21. *Smartweed;* 22. *Yellow Creek, Smartweed and Blind.* Other crops used extensively are peas, wheat (for winter greens), browntop millet and smartweed. Crops are produced by using State-owned tractors, by sharecropping and contracting with local farmers. This year about 3,000 acres will be developed for waterfowl food on the State project. Smartweed and wild millet, both excellent natural duck foods, are produced by simply turning and disking open lands in marshy or low areas once every two or three years. In this scene, a drained lake bed after brushing and farming as described has produced a fine stand of mixed smartweed and millet.

23. *West Sandy Flooded;* 24. *2nd Shot West Sandy Flooded.* In mid-fall water is permitted to fill in behind the dewatering project dikes and scenes such as you see here greet the ducks when they arrive. In this area several hundred acres of agricultural crops, plus many more hundreds of acres of smartweed and millet are flooded and "ready for the eating." Eight such dewatering projects are present in Tennessee and a total of 15,500 acres in the T. V. A. system is treated in like manner each year.

25. *Danville Island*; 26. *Plowing at Danville Island*. Many islands such as this one dot the face of Kentucky Lake and other T. V. A. reservoirs. Full utilization of the development possibilities on these islands creates better goose habitat and spreads these big birds over a wider area. Crops planted on these islands consist mainly of buckwheat, rye grass, browntop millet, Japanese millet and wheat.

27. *Barge, Boats, Plane*. To work island areas it is necessary to possess floating equipment such as you see here. The plane, while necessary on lakes as large as Kentucky Lake, may not be a MUST item elsewhere; however, this particular plane has been extremely valuable for census work, photography and cheap transportation in getting to remote areas.

28. *Geese Flying Overhead*; 29. *Ducks Flying Overhead*; 30. *Ducks in Dry Corn Field*; 31. *Ducks and Geese at Refuge*. One of the great satisfactions in the work being done in Tennessee is in the fact that one may work during the summer and early fall and see the results of his work in the swelling numbers of birds utilizing the fruits of that work that same year. Scenes such as are being shown rapidly here are commonplace where food is present and a refuge is provided. The last shot is of a concentrated group of ducks and blue geese on Duck River Refuge, Kentucky Lake.

32. *Geese in Trap*; 33. *Bands Goose*; 34. *Bands Male Duck*; 35. *Bands Female Duck*; 36. *Map Showing Recoveries*. Since 1949, a total of 6,611 ducks and geese has been banded in Tennessee by Federal and State wildlife agencies and the Atomic Energy Commission at Oak Ridge, Tennessee. Practically all banding has been in fall and winter and, as a result, many of the recoveries have been of a local nature; however, much good information has been obtained as a result of this project. For instance, by comparing recoveries of birds banded in East and West Tennessee, we now know that the birds moving into East Tennessee are more transient than those of West Tennessee as 28 percent of the East Tennessee birds are killed south of the State while only 8 percent of those banded in West Tennessee are taken further south. Of particular interest is the blending of the Atlantic and Mississippi Flyways in Tennessee as is indicated by banding recoveries. Also, on the basis of band recoveries from "foreign" birds, we have a rough measure of hunting pressure in the three grand divisions of the State. In 1953-54, 73 percent of foreign band recoveries were taken in West Tennessee, 8.7 percent in Middle Tennessee and 18 percent in East Tennessee.

37. *Hiwassee Island Refuge Sign*; 38. *Corn on Hiwassee Refuge*. Tardiness in discussing refuges is by no means an indication that they are relegated to the background in Tennessee—to the contrary, it is thought that refuges are an absolute necessity to successful waterfowl management anywhere. The scenes here are from a refuge established in East Tennessee in 1940, at which time only 18 geese were seen wintering on the area. This small refuge is known as the Hiwassee Island Refuge and in the winter of 1953-54 wintered an estimated 15,000 Canada geese.

39. *Upper Duck River Refuge, Kentucky Lake*; 40. *Sulfur Well Peninsula*; 41. *Sulfur Well Peninsula*. On Kentucky Lake, the U. S. Fish and Wildlife Service maintains the relatively large (50,000 acres) Tennessee National Wildlife Refuge and this sanctuary might be described as the backbone of the waterfowl program in that area. Up to 250,000 ducks at one time have been seen on Kentucky Lake since one year after its impoundment. Refuge personnel work in a similar manner to State operations on hunting areas. In the scene here we have a good example of efforts toward soil stabilization and improvement in the terraces and contour farming being done. The last shot of this peninsula shows green crops in early spring after the geese and ducks have gone.

42. *Hunters' Cars at West Sandy Pump House*. Public hunting areas such as the West Sandy Dewatering Project are popular hunting areas as may be seen from cars at this one parking spot. About 20 other parking areas are located around the flooded bottoms. As many as 950 hunters have shot in this area at one time with resultant overcrowding and poor hunting success per individual hunter.

43. *Canada Goose Killed.* A steady increase in the number of Canada geese on State developed hunting areas and on refuges over the past several years is bringing an ever-increasing interest to focus on this fine bird.

44. *Ducks Killed.* It's nothing new to any of this group that the furnishing of hunting for young people is a mighty stride toward reduction of juvenile delinquency. This young man has spent a profitable morning in a public hunting area. His luck was commensurate with his skill as a caller.

45. *Boys With Snow Geese*; 46. *Man With Ducks Killed*; 47. *Map of Wetlands, Refuges and Main Reservoirs.* There is no doubt but that creation of the T. V. A. and Army Engineer lakes over the past several years has contributed to the increased interest in waterfowl hunting, as has the development of better habitat through project operations. In the last 20 years, waterfowl hunting in Tennessee has increased 488 percent, 104 percent of this being in the ten-year period from 1944 to 1954. Overcrowding of waterfowl hunting areas indicates the need for more hunting land and/or restriction on hunting methods on public hunting grounds. Steps are being taken in both directions at this time.

48. *Obion River Ditch.* One of the factors causing overcrowding of public hunting areas is the effect of drainage operations on formerly good waterfowl habitat. Here we have a once-flooded timbered area which has been drained by agricultural interests. No further waterfowl use can be expected.

49. *Moss Island Area, Obion and Mississippi Rivers*; 50. *Open Lake, Mississippi River.* This scene represents thousands of acres of alluvial bottomlands in West Tennessee at present unaffected by drainage and excellent waterfowl habitat; but in the future plans of the Corps of Engineers and owners of this land, practically every foot of it will be drained for the so-called improvement of agriculture, forestry, and other interests. Needless to say, when this is done the ducks are gone to stay.

51. *Private Hunt Club Sign*; 52. *Public hunting Area Sign.* Signs such as you see here are all too common in the bottomlands of West Tennessee and have further aggravated the competition for places to hunt. To partially offset this condition and to prevent its spread, Tennessee has started leasing areas for hunting and fishing rights only and signs such as this one appear thereon. Over 29,000 acres of land are now under lease for hunting and fishing at this time.

53. *Old Hickory Dam.* Still more waterfowl areas will soon be available in Tennessee as the result of additional reservoirs being impounded by the Corps of Engineers. Here is Old Hickory Dam, located near Nashville, which will impound some 27,000 acres of water. Tentative plans for waterfowl habitat development have already been worked out between the Engineers and the Game and Fish Commission.

54. *Cheatham Bottoms.* Bottomlands such as these will be partially covered with water upon impoundment of Army Engineer reservoirs and will offer good opportunities for furnishing attractive waterfowl areas.

55. *Wood Duck Box, Aluminum.* The wood duck is getting attention also. This type of box was furnished by the hundreds of Middle Tennessee sportsmen's clubs a year ago and have been erected throughout most of the State. So far, practically no utilization by wood ducks has been recorded.

56. *Duck Shooting Tower at Nilo Game Farms.* Throughout this paper references to overcrowding have been very common and I believe we all realize that the big problem is furnishing enough hunting to all who demand it. Perhaps the type of hunting done as shown here is one of the future answers. This is a tower at Nilo Game Farms, Alton, Illinois, where ducks trained to fly to a certain pond are released and shot at from blinds located between the tower and the blinds. Eleven such shoots are operating in Illinois alone today. In some a charge of \$5.00 per duck killed is made.