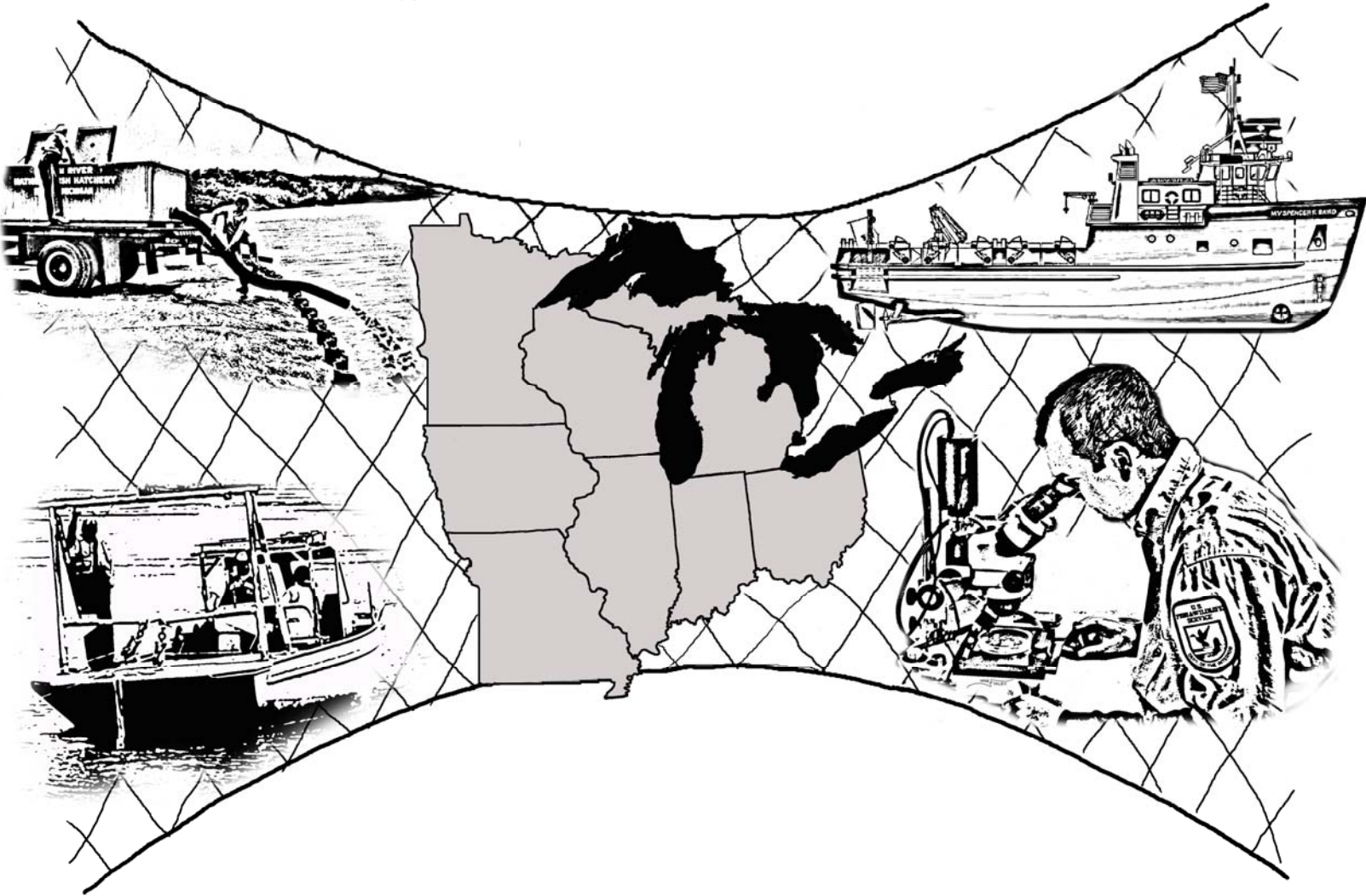


U.S. Fish & Wildlife Service

Region 3 Fisheries

FMP 2006-001

Fisheries Management Plan for Scott Air Force Base



Department of the Interior
U.S. Fish and Wildlife Service
Great Lakes-Big Rivers Region
Carterville Fisheries Resources Office
Richard F. Echols



I. Disclaimer

- The mention of trade names or commercial products in this report does not constitute endorsement or recommendation for use by the Federal government.

II. Nondiscrimination Clause

- Equal opportunity to participate in and benefit from programs and activities of the U.S. Fish and Wildlife Service is available to all individuals regardless of race, religion, color, or physical or mental disability. For more information please contact:

U.S. Department of the Interior
Office for Equal Opportunity
1849 C. Street, N.W.
Washington, D.C. 20240

III. Mission Statement

- The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people.

Table of Contents

I. Disclaimer	2
II. Nondiscrimination Clause	2
III. Mission Statement	2
IV. Introduction	4
V. Description of the Area	4
VI. Unit Plans	
A. Unit Plan 1. – Scott Lake	4-12
1. Unit Description	4
2. Fisheries Management History	5-8
a. Initial Fish Stocking Efforts	5
b. Monitoring	5
c. Largemouth Bass Management	5-6
d. Bluegill / Redear Sunfish Management	7
e. Channel Catfish Management	7
f. Crappie Management	7-8
3. Current Regulations	8
4. Fishery Management Challenges	8
5. Aquatic Vegetation	9-10
6. Goals / Objectives / Tasks / Evaluations	11-12
B. Unit Plan 2. – Cardinal Lake	12-17
1. Unit Description	12-13
2. Fisheries Management History	13-14
a. Initial Fish Stocking Efforts	13
b. Monitoring	13
c. Largemouth Bass Management	13-14
d. Bluegill / Redear Sunfish Management	14
e. Channel Catfish Management	14
f. Management of other Fishes	14
3. Current Regulations	15
4. Fishery Management Challenges	15
5. Aquatic Vegetation	15
6. Goals / Objectives / Tasks / Evaluations	15-17
VII. Tables	18-21

IV. Introduction

This management plan was prepared by the Carterville Fisheries Resources Office (CFRO) of the United States Fish and Wildlife Service (USFWS) for Scott Air Force Base. The USFWS provides technical assistance in fisheries management under the Integrated Natural Resources Management Plan for Scott Air Force Base Memorandum of Agreement. This plan outlines the history of fisheries management at Scott Air Force Base as well as goals, objectives, tasks, and evaluations that serve as a guide for the future management of aquatic resources on the installation. The primary intent of this plan is to insure the protection, enhancement, and wise use of aquatic resources located at Scott AFB. This plan is designed to be informally reviewed on an annual basis and formally every five years.

V. Description of the Area and History of Land Use

Scott Air Force Base is a 2,560 acre facility located 25 miles southeast of St. Louis, Missouri in southwestern Illinois. Just prior to the acquisition of the first 624 acres by the federal government in 1917, the land-use was converted from tall grass prairie and mixed hardwood forest to agriculture. The development of the base has converted much of the agricultural lands as well as the remaining prairie and forest to residential, commercial use and permanent turf grass. Tract 36 remains as agricultural-use under a lease agreement. Tract AL-1 is leased as a pasture/hay site under another lease agreement. A complete description of the facility, its mission, climate, physiography, and soils can be found in the Integrated Natural Resources Management Plan for Scott Air Force Base.

VI. Unit Plans

A. Unit Plan 1 – Scott Lake

1. Unit Description

Scott Lake was constructed for recreational purposes in 1960. A 500 foot long earthen dam holds back water forming Scott Lake. The dam runs north to south along the eastern side of the lake. A spillway is located at the southern end of the dam. At full pool, Scott Lake is a 15 acre impoundment with a volume of 36.4 acre ft. The maximum depth is 15 ft. and an average depth of 2.42 ft. The surface area can be reduced to as little as 10 acres and 20 acre feet during drought conditions. The total length of shoreline is 5,100 ft. Two islands, each less than one half acre, add another 1,300 feet of shoreline. Open water west of the islands is very shallow and prone to levels of aquatic vegetation that prevent fishing, boating, and other recreation. The three main coves and intermittent stream that feed the lake are also very shallow and typically covered with aquatic vegetation during the summer months. An open water area of 5 acres immediately in front of the dam averages 6 feet in depth and has remained relatively free of vegetation.

The land to the immediate north and east is largely wooded. A campground lies to the southeast corner of the lake. The lake appears to have filled in considerably over time from on base

construction. Shallow depths and nutrient loading from surface water runoff of turfgrass areas are likely responsible for excessive growth of aquatic vegetation.

2. Fisheries Management History

a. Initial Fish Stocking Efforts

Fisheries management assistance of Scott Lake by the Office CFRO goes back to at least 1980. On May 28, 1980 Scott Lake was renovated with Rotenone to remove “rough” fish. Seining indicated that no rough fish survived the rotenone treatment, and restocking began on July 3, 1980. Table 1 details official fish stocking in Scott Lake since 1980. The initial stocking consisted of 1800 small largemouth bass (*Micropterus salmoides*) fingerlings. Additional fingerlings were stocked on September 4, 1980 including 7,000 bluegill (*Lepomis macrochirus*) and 7,000 redear sunfish (*Lepomis microlophus*). On October 14, 1980, 600 channel catfish (*Ictalurus punctatus*) fingerlings were stocked. These fish represented the initial stocking.

In the spring of 1981, 50 largemouth bass broodstock, 250 8-inch largemouth bass, and 600 1-inch largemouth bass were introduced to augment the previous year’s stocking. The June 2002 stocking of 600 1-inch largemouth bass was the last time fingerling fish were stocked in Scott Lake. This represented a change in direction from stocking small fingerlings to establish fish populations to augmenting fish populations by stocking larger fish that are beyond the consumable size of the maturing fish community.

b. Monitoring

Yearly electrofishing surveys have taken place in May / June of each year since 1985 with the exceptions of 1987 and 1989. Results of the surveys have been presented in yearly reports from 1985 to the present. In 2003, 77 largemouth bass, 33 bluegill, and 14 white crappie were sacrificed to determine age. This allows managers to get an idea of the age structure and growth rates of fish populations. Gill nets were employed in a number of years to determine abundance of channel catfish and white crappie, two species that can elude sampling by electrofishing under certain circumstances. The following describes the history and of fish management and justifications for recommendations in Scott Lake on a species specific basis.

c. Largemouth Bass Management

Removal of rough fish to allow development of quality populations of game fish for recreational angling was outlined as a goal and was used to justify the renovation of Scott Lake in 1980. Establishment of a reproducing population of largemouth bass was successful by 1982. Both the quality and quantity of largemouth bass available to anglers have fluctuated dramatically over the past 22 years. This is primarily a result of inconsistent aquatic vegetation coverage in the lake. During years of high coverage, bass find it difficult to forage effectively. Vegetation can prevent successful spawning of bass, and can cause overabundant year classes of bluegill and crappie that rob bass nests of eggs.

A relative weight index is a measure of how plump a fish is at a given length. Preferred ranges fall between 90 and 110 for largemouth bass. Values less than 90 indicate that bass are below

their optimum weight for their length. Low average relative weights can be a result of too little available forage or an overabundant bass population. The variability in relative weights since 1990 is most likely due to inconsistencies in aquatic vegetation control. Forage fish avoid predation by hiding in vegetation and become largely unavailable to predators. Even though harvest of 12 inch largemouth bass would most likely improve the size and quality of the remaining bass, the CFRO has been reluctant to recommend any harvest of largemouth bass because of the potential of both white and black crappie to become overpopulated.

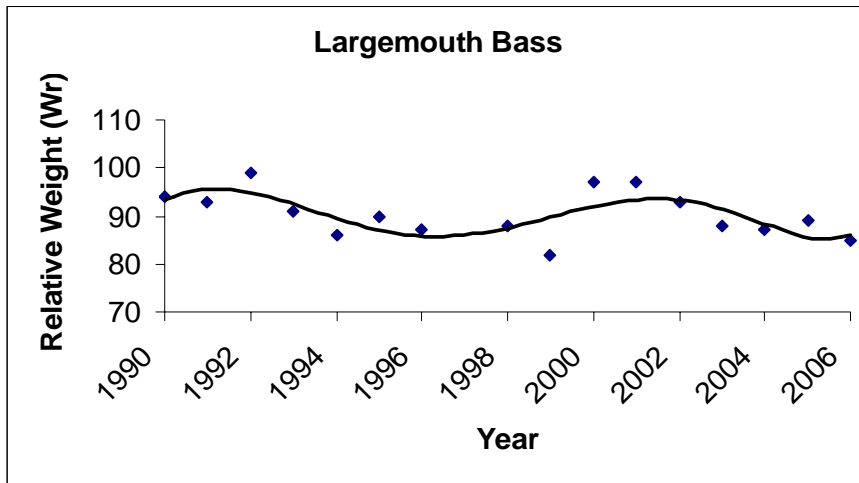


Figure 1. Scott Lake largemouth bass relative weights from 1990 to 2006.

Proportionate stock density (PSD) is one of the most common means by which to describe fish populations. PSD is the proportion of fish of quality size present within a stock. For largemouth bass, stock size is 8 inches and quality size is 12 inches. For bluegill, stock size is 3 inches and quality size is 6 inches. Desired ranges for largemouth bass are between 40 and 60, and for bluegill 20 and 40. Figure 2 shows trends of PSD ratios of largemouth bass in relation to PSD ratios of bluegill since 1985. Again, this index has been highly variable over the years most likely as a result of inconsistent vegetation control.

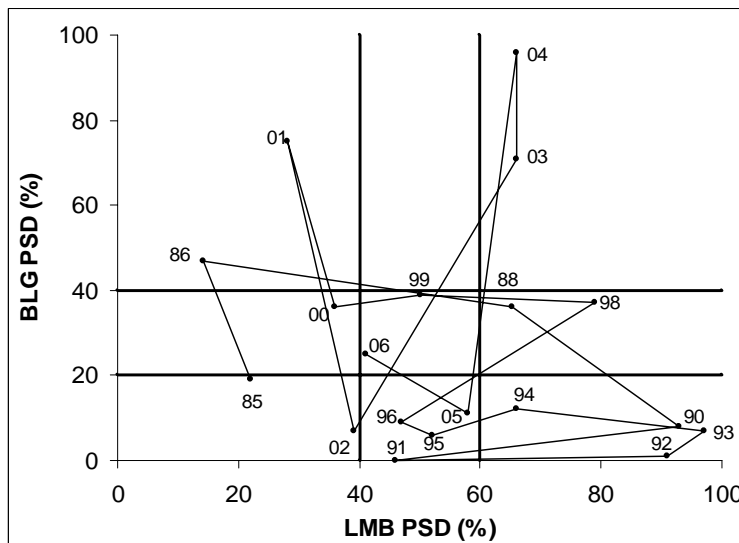


Figure 2. Largemouth bass and bluegill PSD at Scott Lake from 1985 to 2006. Note that data from 1987, 1989, and 1997 are missing.

d. Bluegill / Redear Sunfish Management

The initial bluegill stocking was a success and a reproducing population was established by 1982. An additional 6,000 redear sunfish fingerlings were stocked in the fall of 2001 to supplement the initial stocking. Though never as abundant, the redear sunfish have offered good quality fishing in most years. The quality and quantity of bluegill available to anglers has been highly variable, again due to inconsistent aquatic vegetation management. Harvest has always been allowed for both species.

e. Channel Catfish Management

Each year between 1984 and 1987, channel catfish were stocked in an effort to create a high-quality fishery for this species. During these 4 years, a total of 3,500 fish were stocked, or an average of 875 per year. Fish of 8 – 10 inches were stocked because of the presence of large numbers of mature largemouth bass. The establishment of a channel catfish population in Scott Lake was deemed successful, and the emphasis changed to maintaining the catfish population. Between 1988 and 2002, 1-2 lb. channel catfish were stocked every 1 to 5 years to replace those lost to natural mortality and heavy harvest. The total number of fish stocked in these years was 2,750 or an average of 183 per year. Supplemental stocking is required to maintain channel catfish populations in most impoundments because of angler harvest, the lack of spawning habitat and the presence of largemouth bass that efficiently consume catfish fingerlings. Channel catfish have not been stocked since 2002.

f. Crappie Management

White crappie (*Pomoxis annularis*) first appeared in electrofishing samples in 1985. Introduction of this species was most likely a result of an unauthorized stocking. It is widely accepted that both crappie species, but particularly the white crappie, present the potential to overpopulate in reservoirs. Many managers do not recommend stocking crappie in any impoundment less than 50 acres. Crappie from overpopulated lakes are typically small inferior fish. They have the potential to out compete largemouth bass for available forage reducing largemouth bass numbers. Subsequent reductions in bass numbers often result in increases in bluegill populations, but reductions in quality. The potential for this problem increases in small shallow reservoirs with abundant vegetation such as Scott Lake. It has been the policy of the CFRO to encourage large numbers of largemouth bass. When largemouth bass numbers are high, they can effectively keep crappie populations low. Over harvest of largemouth bass may allow crappie populations to increase to undesirable levels. Past recommendations of a catch-and-release bass fishery were largely based on the presence of white crappie. Keeping largemouth populations high may have had negative effects on the quality of the bass fishery (higher numbers = smaller individuals), however the only sure fix for a runaway crappie population is renovation by lake draining or killing all fish and starting over such as was done in 1980.

This policy has had its desired effect. The typical catch of crappie during sampling efforts has been 1 to 2 percent of the total catch except for a three year period beginning in 1999 (Figure 2). The catch went from 2% in 1996 to 19% the following year, and peaked at 35% in 1998. This pulse in white crappie numbers most likely resulted from one very successful spawn. The strong largemouth bass population was able to absorb the increase and prevented a situation that could only be corrected by complete renovation. As a measure of precaution, 110 additional largemouth bass were stocked in 1998 to put additional pressure on white crappie. By 2000, the situation reversed itself with white crappie catch returning to 2%, and has remained at that point except for 2 brief rises in 2001 (9.6%) and 2003 (8.8%). These small increases could represent true measures of abundance or could be a result of inconsistencies related to water temperature or vegetation coverage.

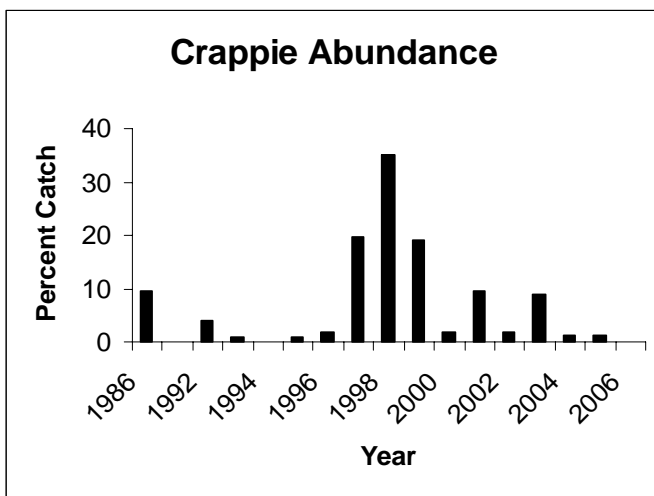


Figure 3. Crappie abundance as a percent of total catch from electrofishing samples between 1986 and 2006.

3. Current Regulations

Scott Lake currently has a catch and release regulation on largemouth bass. All largemouth bass caught must be immediately returned to the water unharmed. Bluegill, channel catfish, and crappie may be harvested. Paddle boating is permitted and canoe rentals are available, but fishing from a boat is prohibited.

4. Fishery Management Challenges

Aquatic vegetation abundance is the single greatest factor in determining the balance and quality of the sport fishery in Scott Lake. In years where vegetation is properly controlled, the quality and condition of bass and bluegill shows improvement. In years where vegetation control is ineffective or not accomplished, quality and condition of sport fish declines. Harvest is a vital tool in managing fish populations. A flexible harvest protocol based on the results of yearly surveys is necessary to maintain a quality fishery.

The presence of white and black crappie presents a potential problem. Measures should be undertaken to keep these populations low.

5. Aquatic Vegetation

The CFRO has always maintained that 10 to 25% weed coverage is desirable in a sportfishing lake for optimal growth and balance of the fishery. Our records indicate that control of vegetation first became a priority in 1987 with the stocking of 63 triploid grass carp (*Ctenopharyngodon idella*) (Table 1.). In the spring of 1988, algal growth was considered excessive and on June 1, 1988 75 lbs. of copper sulfate was deposited in calculated amounts around the shoreline of Scott Lake. Additional grass carp were stocked in 1989 and 1995. Annual fisheries management reports from 1993 to 2000 indicated that aquatic vegetation was for the most part under control. From 2001 to the present, control of vegetation has been sporadic and ineffective. Current conditions are illustrated in figure 4.



Figure 4. Photograph of Scott Lake on August 8/7/2006 showing a functioning diffusing aeration system and excessive vegetation mats comprised of filamentous algae and duckweed.

An excerpt from the 2001 annual report best summarizes the problems with excessive aquatic vegetation.

2001 Management Recommendations:

The largest issue regarding Scott Lake is the aquatic vegetation, which when too abundant can have a multitude of negative impacts. During the 2001 spring survey aquatic vegetation was present along the majority of the shoreline, substantially limiting angler access to the lake. The aquatic vegetation is also impacting the recreational fishing quality of the lake by altering the predator-prey community. Over the last several years the lake has shifted from a high quality largemouth bass fishery to a high quality bluegill fishery. If the aquatic vegetation is left unchecked, it is likely that few, if any, fish of either species will be able to effectively forage and reach harvestable or quality sizes. Panfish can rapidly over-populate a lake and become stunted at small sizes of little recreational value when predation is too low to control recruitment. Perhaps the

most serious threat posed by the abundance of aquatic vegetation is the possibility of a fish kill from depleted dissolved oxygen concentrations. Just as plants utilize the sunshine to produce oxygen during the daytime, plants consume oxygen during darkness. An overabundant aquatic vegetation population can have a higher oxygen demand at night than is available in the lake. When this occurs, oxygen in a lake becomes depleted during early morning hours and causes fish to suffocate. Larger fish are generally the most susceptible to low dissolved oxygen concentrations. A fish kill from depleted oxygen concentrations can have devastating effects on a recreational fishery.

Rapid decay of aquatic weeds can also reduce oxygen levels to the point where fish kills can occur. The bottom based air diffusion system (figure 4) currently in place may not be enough to prevent fish kills when large amounts of weeds are killed. This was evidenced on July 17 and 18, 2006 when 1,500+ fish died after treatment of weeds on July 13.

In August 1992, the CFRO formulated a plan to control aquatic plants chemically. The lake was broken into treatment units and doses were calculated (Table 2). Figure 5 shows a map of the lake with treatment units labeled.

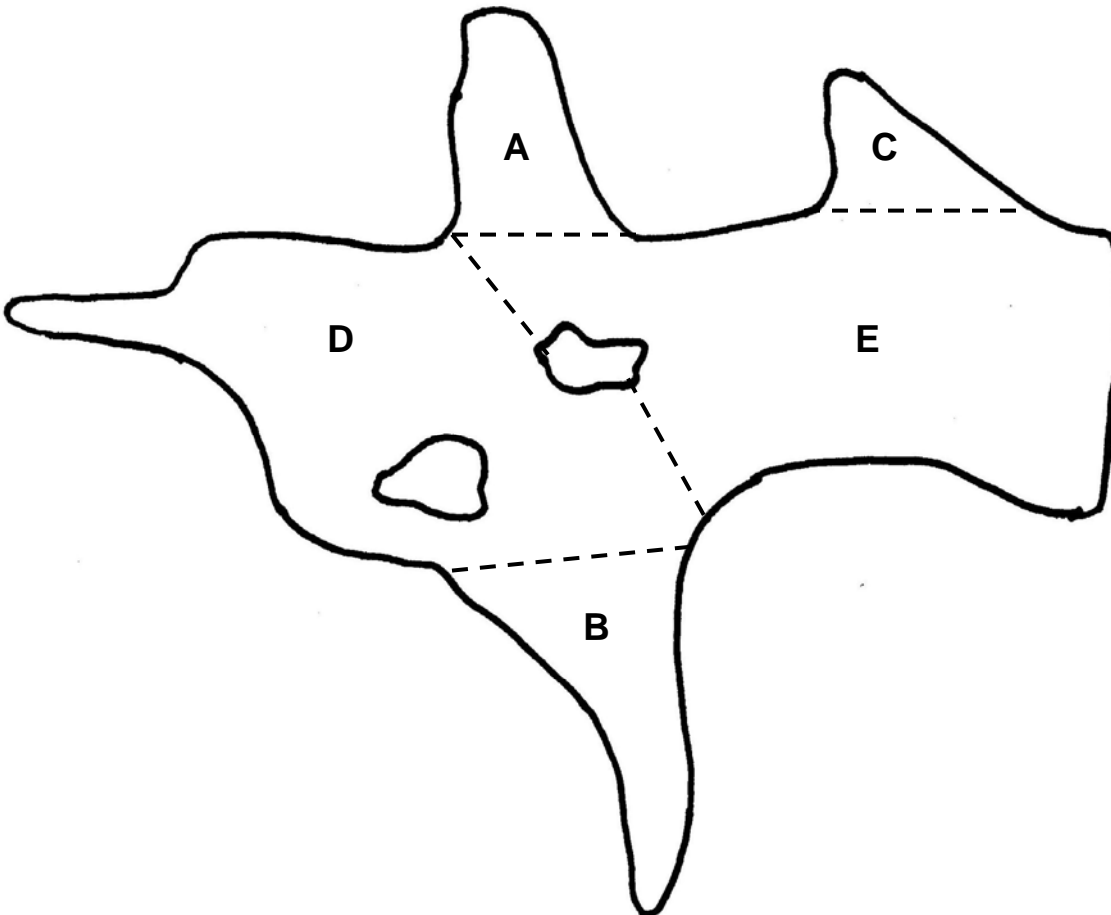


Figure 5. Map of Scott Lake divided into units for treatment of aquatic weeds.

6. Goals / Objectives

The overall goal is to maximize the recreational opportunities of Scott Lake. Specifically, the following items have been identified as areas needing improvement or continued maintenance.

- a. Goal 1. Manage the fish community of Scott Lake as a quality recreational fishery for warmwater species.

Tasks

- Continue to conduct annual spring electrofishing surveys of Scott Lake (April or May).
- Conduct age and growth analysis every 2 - 3 years.
- Maintain a catch-and-release fishery for largemouth bass until the July 2006 fish kill can be evaluated in the 2007 annual report.
- Work towards allowing harvest of intermediate sized largemouth bass while protecting large individuals.
- Encourage harvest of all crappie.
- Stock 500 1 to 1.5 lb channel catfish per year.
- Place signage asking anglers to harvest any crappie and grass carp caught.
- Place signage reminding anglers not to dump contents of bait buckets in Scott Lake.

Evaluation

- Evaluation of the balance of the fishery will be presented in the annual report and will be based on the spring electrofishing sample, results of age and growth analysis, creel survey and questionnaire.
- A balanced fishery will be defined as having largemouth bass PSDs between 40 and 60%, bluegill PSDs between 20 and 40%, largemouth bass average relative weight of 90 – 110, and bluegill average relative weight of 90 – 110.

- b. Goal 2. Maintain aquatic vegetation at 10 to 25 % of the surface area.

Tasks

- Change policy from a reactionary to a preemptive approach.
- Aeration should not be relied upon to prevent fish kills associated with decreased oxygen levels from dying vegetation after herbicide treatment.
- Apply a lake colorant yearly by March 15 in the concentration that will allow light penetration for growth of aquatic vegetation to a depth of 2 feet. This should allow the 10 – 25% vegetation coverage that is desirable.
- Treatment of excess algae before May 15: Copper sulfate not to exceed 1/2 of the surface area with a 2 week interval before a second treatment.
- Treatment of excess algae after May 15: Copper sulfate not to exceed 1/3 of the surface area with a 2 week interval before a second treatment.
- Suspend all but spot treatment (access points, favored fishing points) of aquatic vegetation when water temperatures exceed 85°F or when the weather forecast calls for an extended period of cloudy weather over the following 10 days.

- Treat duckweed with 45 ppm flurodone (Sonar or Avast) only when duckweed becomes excessive.
 - Spot treat primrose with glyphosate (Rodeo) or diquat (Reward) along with a strong nonionic surfactant as needed.
- c. Goal 2. Minimize chances of introducing aquatic nuisance species
- Place signage reminding anglers not to dump contents of bait buckets in Cardinal Lake.
- c. Goal 3. Minimize chances of introducing aquatic nuisance species
- d. Goal 4. Incorporate the desires of the fishers in the management plan.
- Tasks
- Require fishers to fill out a questionnaire provided by CFRO before obtaining a fishing permit.
 - Provide an optional creel survey and drop box at strategic locations around Scott Lake. The creel survey will be provided by CFRO. The drop box will be provided by Scott Air Force Base.
 - Questionnaires and creel surveys will be mailed to CFRO by Scott Air Force Base personnel for evaluation.
- e. Goal 5. Improve fishing access to Scott Lake.
- Tasks
- Change regulations to allow fishing from unmotorized boats.
 - Maintain 100% control of aquatic vegetation along stretches of shoreline favored by anglers.
- f. Goal 6. Keep lake at full pool by maintaining the integrity of the earthen dam.
- Tasks
- Mow grass on dam three times per year.
 - Make annual inspections of the dam for burrowing rodents.
 - Keep dam free of woody vegetation.
- g. Goal 7. Increase sales of fishing permits.
- Tasks
- Fishing permit sales will be a measure of the success of implementation of the above tasks.
 - Communicate to base personnel that the Conservation Office is taking an active role in improving recreational opportunities at Scott Lake by informal means as well as angler educational meetings.

B. Unit Plan 2 – Cardinal Lake

1. Unit Description

Cardinal Lake is a 6.5 acre lake located immediately south of and across a road from Scott Lake. It has a maximum depth of 12 feet. The construction of Cardinal Lake was completed in 1995. The lake has steep sides and generally has little habitat heterogeneity. Treated waste water from Scott Air Force Base is used to fill the lake. A second source of water is Silver Creek. Measures have been taken to limit the use of water from Silver Creek so as not to introduce any aquatic nuisance species. Cardinal Lake is subject to phytoplankton and filamentous algae blooms, but has very little submersed aquatic vegetation.

2. Fisheries Management History

a. Initial fish stocking efforts

Fisheries management of Cardinal Lake by the CFRO of the USFWS began in 1995. The initial recommendations (Table 4) called for 4,500 bluegill fingerlings, 1,800 redear sunfish fingerlings, and 6,500 fathead minnows to be stocked in the spring of 1995. The CFRO also recommended stocking 650 largemouth bass in the fall of 1995. The CFRO has no records indicating that this initial stocking was accomplished per the recommendations; however, the species have all been documented as occurring in Cardinal Lake.

Yearly electrofishing surveys have taken place in May or June of each year since 1996. Results of the surveys have been presented in yearly reports from 1996 to the present. The initial survey showed no rough fish. Ample fish of all stocked species were present and in good condition.

Problems with the balance of largemouth bass and bluegill populations were first reported in 1998. Concern over the poor condition of the bass was first reported in 1999. Largemouth bass of 6 inches were captured indicating a successful spawn in 1997. Very few bluegill were reported in 1998, and all were large adults. This indicated that bluegill fry were not surviving because of excessive foraging pressure from largemouth bass and the lack of aquatic weed growth. This trend has only worsened in more recent years.

b. Monitoring

Yearly electrofishing surveys have taken place in May / June of each year since 1996. Results of the surveys have been presented in yearly reports from 1996 to the present. Gill nets were employed in a number of years to determine abundance of channel catfish and white crappie, two species that can elude sampling by electrofishing under certain circumstances. The following describes the history and of fish management and justifications for recommendations in Cardinal Lake on a species specific basis.

c. Largemouth Bass Management

The average relative weight of largemouth bass (figure 6) has indicated a general decline in condition with a low of 82 in 2002. A small rebounding trend in relative weight occurred in 2003 and 2004 after 2,221 3 – 5 inch bluegill were stocked in 2003. Poor condition of largemouth bass are due in large part to the failure to establish a sufficient forage base, primarily bluegill.

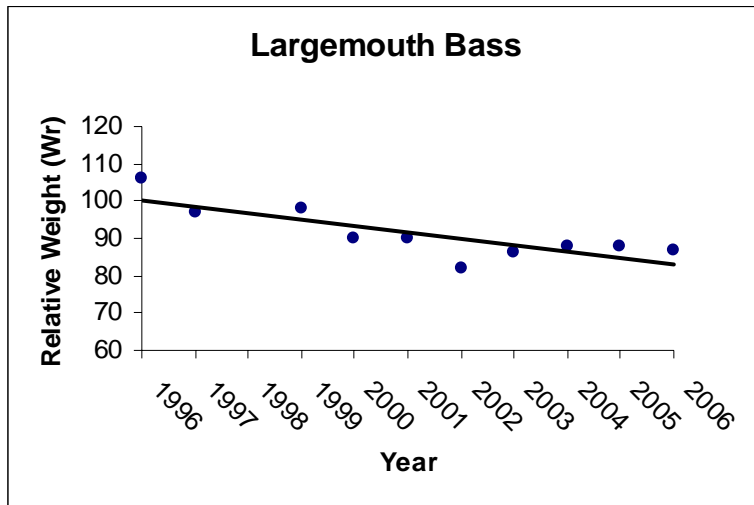


Figure 6. Cardinal Lake largemouth bass relative weights from 1998 to 2006.

d. Bluegill / Redear Sunfish Management

Establishment of a sustainable bluegill population has not yet been attained. The early success in establishing a largemouth bass population and lack of vegetative cover has limited recruitment of bluegill fry. During the establishment of sportfish populations in Cardinal Lake, the CFRO recommended that there be no harvest of any fish. Written correspondence between CFRO personnel and Scott Air Force Base indicates that this regulation was implemented. By 1998, this regulation was amended to allow harvest of redear, bluegill, and crappie. In hindsight, this regulation adjustment was unwarranted and only delayed establishment of a balanced fishery.

In response to the low numbers of bluegill in the 2002 electrofishing sample, 2221 3-5" bluegill were stocked in 2003. Brush piles were added to give refuge to bluegill. The hope was that these fish would be large enough not to be consumed by the largemouth bass, reach maturity, and produce offspring that the bass would consume. Many of the bluegill stocked in 2003 were likely consumed, however before reaching maturity.

e. Channel Catfish Management

Channel catfish management has not been a priority in Cardinal Lake.

f. Management of other Fishes

Grass carp and white crappie have been observed in yearly electrofishing samples. Grass carp should be removed when captured and should not be considered for stocking until vegetation coverage exceeds 25%. White crappie should always be removed.

3. Current Regulations

Cardinal Lake currently has a catch and release regulation on largemouth bass. All largemouth bass caught must be immediately returned to the water unharmed. Bluegill, channel catfish, and crappie may be harvested. Paddle boating is permitted and canoe rentals are available, but fishing from a boat is prohibited.

4. Fishery Management Challenges

A stable balanced fishery has never existed in Cardinal Lake. Largemouth bass are plentiful, but in poor condition. Bluegill are scarce, but in good condition. Lack of cover, lack of vegetation, steep banks, and harvest of bluegill and redear have hindered recruitment of panfish.

5. Aquatic Vegetation

Unlike Scott Lake with its overabundant aquatic vegetation, Cardinal Lake has never had the 10 to 25% vegetative coverage that fish managers look for in small impoundments. Although no official record of grass carp stocking in Cardinal Lake exists, electrofishing samples have indicated that grass carp are present. The design of the lake with its steep sides is not conducive to the establishment of rooted aquatic plants, because light cannot penetrate to the bottom of the lake. During much of the year, the lake holds a substantial algal bloom that further prevents light penetration. Figure 7 shows what Cardinal Lake looks like on a typical summer day.



Figure 7. View of Cardinal Lake on 8/7/2006. Notice the lack of aquatic vegetation.

6. Goals / Objectives / Tasks / Evaluations

The overall goal is to maximize the recreational opportunities of Cardinal Lake. Specifically, the following items have been identified as areas needing improvement or continued maintenance.

- a. Goal 1. Manage the fish community of Scott Lake as a quality recreational fishery for warmwater species.

Tasks

- Continue to conduct annual spring surveys (April or May) of Scott Lake.
- Conduct age and growth analysis every 2 - 3 years.
- Encourage harvest of all crappie.
- Place signage asking anglers to harvest any crappie and grass carp caught.

Option 1. Work towards a balanced warmwater fishery.

- Allow liberal harvest of intermediate sized largemouth bass until a balanced fishery is achieved.
- Cease harvest of bluegill and redear sunfish until a balanced fishery is achieved.
- Stock 200 adult bluegill (> 6 inches) per year until a balanced fishery is achieved.

Evaluation

- Evaluation of the balance of the fishery will be presented in the annual report and will be based on the spring electrofishing sample, creel survey and questionnaire.
- A balanced fishery will be defined as having largemouth bass PSDs between 40 and 60%, bluegill PSDs between 20 and 40%, largemouth bass average relative weight of 90 – 110, and bluegill average relative weight of 90 – 110.

Option 2. Create a put and take channel catfish fishery.

- Stock harvestable sized channel catfish up to 1,000 per year as funding permits.
- Allow liberal harvest of intermediate sized largemouth bass until a balanced fishery is achieved.
- Cease harvest of bluegill and redear sunfish until a balanced fishery is achieved.

Evaluation

- Evaluation of the balance of the fishery will be presented in the annual report and will be based on the spring electrofishing sample, creel survey and questionnaire.

- b. Goal 2. Maintain aquatic vegetation or fish habitat structures at 10 to 25 % of the surface area.

Tasks

- Continue placement of Christmas tree structures on an annual basis.
- Do not stock grass carp until warranted by overabundant aquatic vegetation.
- Treatment of excess algae before May 15: Copper sulfate not to exceed 1/2 of the surface area with a 2 week interval before a second treatment.
- Treatment of excess algae after May 15: Copper sulfate not to exceed 1/3 of the surface area with a 2 week interval before a second treatment.
- Suspend all but spot treatment (access points) of aquatic vegetation when water temperatures exceed 85°F or when the weather forecast calls for an extended period of cloudy weather over the following 10 days.

- c. Goal 3. Minimize chances of introducing aquatic nuisance species

- Place signage reminding anglers not to dump contents of bait buckets in Cardinal Lake.
- Avoid using water from Silver Creek to fill Cardinal Lake

d. Goal 4. Incorporate the desires of the fishers in the management plan.

Tasks

- Require fishers to fill out a questionnaire provided by CFRO before obtaining a fishing permit.
- Provide an optional creel survey and drop box at strategic locations around Cardinal Lake. The creel survey will be provided by CFRO. The drop box will be provided by Scott Air Force Base.
- Questionnaires and creel surveys will be mailed to CFRO by Scott Air Force Base personnel for evaluation.

e. Goal 5. Improve fishing access to Cardinal Lake.

Task

- Change regulations to allow fishing from unmotorized boats.

g. Goal 6. Keep lake at full pool by maintaining the integrity of the earthen dam.

Tasks

- Mow grass on dam three times per year.
- Make annual inspections of the dam for burrowing rodents.
- Keep dam free of woody vegetation.

f. Goal 6. Increase sales of fishing permits.

Task

- Communicate to fishers that the Conservation Office is taking an active role in improving recreational opportunities at Scott Lake by informal means as well as angler educational meetings.

Evaluation

- Fishing permit sales will be a measure of the success of implementation of the above tasks.

Table 1. Fish stocking record for Scott Lake from 1980 to 2006.

Date	Species	Number	Pounds	Size	Source
7/3/1980	Largemouth Bass	1800		fingerlings	
9/4/1980	Bluegill	7000		fingerlings	
9/4/1980	Redear Sunfish	7000		fingerlings	
10/14/1980	Channel Catfish	600		fingerlings broodstock, 1-4	
4/19/1981	Largemouth Bass	50		#	
6/1/1981	Largemouth Bass	600		fingerlings	
6/1/1981	Largemouth Bass	250		8-inch	
8/6/1981	Redear Sunfish	6000		1-2 inches	
6/4/1982	Largemouth Bass	600		1-inch	LGSFH (a)
9/26/1984	Channel Catfish	750		8-10 inches	
9/24/1985	Channel Catfish	600		8-10 inches	
1986	Channel Catfish	1000			
1987	Channel Catfish	1000			
1987	Channel Catfish	250			
1987	Grass Carp	63		8-inches	
9/1/1989	Channel Catfish	390	500	8-10 inches	
1989	Grass Carp	30		8-inches	
1990	Channel Catfish	670	1000	1-1.5 #	
3/1/1991	Largemouth Bass	300		6-8 inches	
3/1/1991	Channel Catfish		300	1-1.5 #	
4/22/1991	Largemouth Bass	146		8-12 inches	LGSFH
4/22/1991	Largemouth Bass	146		8-12 inches	LGSFH
11/1/1992	Largemouth Bass	500		5-6 inches	LHFF (b)
9/1/1993	Channel Catfish		666	1-1.5 #	LHFF
1995	Grass Carp	70			
1998	Channel Catfish		500	1-1.5 #	
1998	Largemouth Bass	110		6-inch	
1999	?				
2000	?				
2001	?				
2002	Channel Catfish		750	1-2#	LHFF
2002	Grass Carp	20		8-12 inches	LHFF

a = Little Grassy State Fish Hatchery

b = Logan Hollow Fish Farm

Table 2. Treatment areas and quantities of chemical to be used in Scott Lake.

Section	SA (acres)	V (acre ft.)	# CuSO ₄	oz. Sonar AS (45 ppb)	oz. Sonar AS (90 ppb)	gal. Lake Colorant	gal. Endothol
A	2	1.2	4	4.6	9.2		1.5
B	2.5	1	4	3.8	7.7		1.3
C	2	2.8	8	11.0	22.0		3.6
D	5	12.9	34	50.3	100.6		16.8
E	3.5	18.5	50	72.2	144.3		24.1
Total	15	36.4	100	141.9	283.8	9.1	47.3

Table 3. Initial stocking recommendations for Cardinal Lake.

Stocking Recommendations			
Date	Species	Number	Size
early spring 1995	Bluegill	4500	
early spring 1995	Redear Sunfish Largemouth	1800	
fall 1995	Bass	650	
early spring 1995	Fathead Minnows	6500	32.5# at 200/#

Table 4. Official stocking record of Cardinal Lake. Initial stocking record is missing.

Stocking Record				
Date	Species	Number	Size	Source
spring 2003	Bluegill	1110	3-5 inch	Logan Hollow Fish Farm
fall 2003	Bluegill	1111	3-5 inch	Logan Hollow Fish Farm