

FISHERY MANAGEMENT ASSESSMENT

SQUAW CREEK

NATIONAL WILDLIFE REFUGE

Holt County, Missouri

January 1, 1987

Prepared by

Jim Milligan

U.S. Fish and Wildlife Service  
Fishery Management Biologist  
Genoa OFA  
Genoa, Wisconsin

FISHERY MANAGEMENT ASSESSMENT  
SQUAW CREEK  
NATIONAL WILDLIFE REFUGE

Summary Statement

Recommendations contained in this assessment are developed in accordance with FWS policy and goals for fishery management on National Wildlife Refuges. Refuge waters are evaluated with respect to their ability to sustain viable sport fish populations while minimizing conflicts with the primary and other multipurpose uses of the Refuge. Waters having limited or no fishery management potential are described with documentation to support their removal from active sport fishery management programs. Recommendations are to maintain the current fishing program and make no further attempts to enhance the sport fishery unless the primary purpose or overall management strategy for the Refuge changes. Future Refuge water management developments may provide opportunities to manage for optimum forage fish populations to benefit avian piscivores. Control of undesirable species such as carp and bullheads and the introduction of more desirable forage fish species would be major elements of such a management program.

## I. INTRODUCTION

Squaw Creek NWR was established in 1935 as a preserve for migratory birds and other resident wildlife. The primary objective of the Refuge is to provide a resting and feeding area during spring and fall migrations. Peak fall populations vary from 200,000 to 400,000 geese with similar numbers of ducks. Spring population peaks are considerably smaller. Snow geese and mallards are the predominant species but many Canada and white-fronted geese, dabbling ducks, diving ducks, shorebirds and numerous other migratory birds utilize the Refuge. Up to 300 bald eagles use the Refuge during winter months.

The Refuge provides a wide variety of outdoor recreation opportunities such as hiking, picnicking, wildlife observation and interpretive exhibits. Appendix A provides a summary of public use activity hours and visits for FY-1985. Annual visitation varies between 50,000 and 100,000 visits with fishing trips making up approximately one percent of the total.

## II. AQUATIC RESOURCES

The Refuge encompasses 6,919 acres of Missouri River floodplain in Northwest Missouri. A total of 2,360 acres of this is in shallow, wetland impoundments. (Table I.) Extensive levees and dikes contain the pools with numerous control structures used to regulate water levels in accordance with annual water management plans. (Appendix B, Refuge Maps.) The major emphasis of water management is on moist soil production to provide vegetation and invertebrate populations for migratory waterfowl. Most pools are drawdown or drained, as feasible,

every year, but one of the two main pools (Eagle and Pelican) is always kept full throughout the summer to provide a source of water for other management needs and a minimum amount of shallow marsh for fall migrants in the event of a drought. These two pools are alternately drawn down and drained on a two or three year cycle to control invasion of cattail and lotus as well as promoting moist soil and invertebrate production.

Mean depth in the pools is normally less than two feet, depending upon water level, with a maximum of five feet in the ditches. A typical drawdown cycle involves draining the pools in late spring or early summer to promote moist soil plant development followed by slow filling in the fall to encourage invertebrate production and make the area available to migrating birds. Periodic draining may also be useful in controlling rough fish populations during periods when winterkill does not.

TABLE I: Squaw Creek Refuge Pools

Pool	Surface Acres
Eagle	900
Pelican	600
Mallard	250
Pintail	200
Cattail	130
Bluff	120
Snow Goose	100
Long Slough	60

Normal precipitation, averaging about 35 inches annually, and Squaw and Davis Creeks provide the primary water sources for the Refuge. The creeks' drainage basins comprise about 60,000 acres of uplands devoted to intensive agriculture. Very high rates of erosion cause the creeks to be heavily silt-laden except at low flows. Extensive siltation has occurred in Refuge pools as a result of this poor quality water and periodic flood events. The Refuge management attempts to avoid taking on silt-laden water, but levies are frequently overtopped during heavy rainfall and spring flood events.

Fish populations in the pools are typical of those in the creeks. Fish are reintroduced annually through normal filling or flood events. Those that do not return to the creeks when pools are drained are left stranded. Summerkill of fish may occur due to the shallow water and high oxygen demand. Most pools freeze solid in wintertime and those kept full to provide a reservoir of water (Eagle and Pelican) experience frequent winterkills. Eagle pool had a major fish kill, primarily carp, in the winter of 1985-86.

The morphometry of the impoundments and the water management strategy result in Eagle and Pelican pools having resident fish populations for no more than two or three years while fish in the other pools normally persist only one year. Fishery surveys of the creeks and pools have not been conducted in recent years. The presence of carp, buffalo (sp.), yellow bullhead, black bullhead, shortnose gar, carpsucker (Quillback), green sunfish, mooneye, fathead minnows, orange spotted sunfish, channel catfish, bluegill, largemouth bass, white crappie, paddlefish and redbfin shiners was documented by surveys in the late 1950's and early 1960's. Carp and bullheads are the dominant species today as evidenced by angler catches.

### III. MANAGEMENT HISTORY

The earliest available record of fishery management at Squaw Creek NWR dates to June 5, 1949. Blackbass, bluegill and crappie were stocked in the Northwest pool (495 Acres) and the Main Pool (3,585 Acres). (Appendix C - Fish Stocking Record). The Northwest pool is now known as Mallard Marsh and the Main Pool has been divided into Eagle and Pelican Pools and Long Slough.

A fishery survey was conducted in May, 1953 on the Main pool. The Refuge was divided into three large pools at this time and only the Main pool was considered even marginally suitable for fishery management. Recommendations were made to install fish attractors and open the Refuge to commercial seining for carp and buffalo harvest and gar removal.

From 1952 to 1956 a severe drought struck this area of Northwest Missouri. Fish rescue operations were discussed, but deemed impractical as the problem was widespread throughout the midwest. A special season for rough fish seining was permitted in August, 1953. Reportedly, over 17 tons of fish comprising 75% buffalo, 24% carp and 1% bullheads were removed. All fish remaining in Refuge pools were reportedly dead by 9/3/53. Since no mention is made of bass, bluegill and crappie, it is assumed the 1949 stocking was a failure.

The water situation improved briefly in 1954 and fish were reintroduced to Refuge pools via Squaw Creek. Another survey was conducted in 1955. Species composition was similar to that found in 1953 although relative abundance was lower. It was noted that only mediocre fishing could ever be expected due to the marginal fish habitat. Extreme shallowness and persistent rough fish problems were cited as limiting factors. Channel catfish, largemouth bass and white crappie fingerlings were stocked in the Main pool at the rate of 10,000 of each species.

By 1957, biologists had concluded that Refuge waters were essentially unmanageable. It was suggested that no further fish management efforts be extended other than to permit maximum harvest of existing rough fish populations. Carp, carpsucker and buffalo dominated the fishery. Fish stocked in 1955 appeared to contribute little or nothing to the fishery.

Two small ponds were dredged in inactive drainage ditches near the Northwest corner of what is now known as Mallard Marsh during 1958 in response to local interest in improved fishing. They covered about two acres each and were designated as North (No. 1) and South (No. 2) ponds. Bullheads were eradicated with rotenone and the ponds stocked with largemouth bass and bluegill in 1959.

The two ponds were opened to fishing on May 1, 1961 and immediately overharvested with approximately 400 adult bass being removed by May 23. Fishing in Refuge pools provided catches of bullheads, carp, buffalo and an occasional channel catfish.

By 1964 the ponds were contaminated with carp and bullheads and contained stunted bluegill populations. They were renovated with rotenone and restocked with largemouth bass, bluegill and channel catfish.

A 1968 seine survey indicated that the North pond was contaminated with carp and bullheads. It was noted as being subject to frequent flooding by Squaw Creek. The South pond contained stunted bluegill. Recommendations were to maintain the North pond as a carp and bullhead fishery and stock 250 largemouth bass fingerlings in the South pond. The bass were shipped via U.S. Mail in September and were pronounced D.O.A.

There is no record of any subsequent efforts to manage Squaw Creek NWR fishery resources. A Fishery Assistance biologist visited the Refuge in 1979 to review the recreational fishing program and inspect potential pond sites. The old ponds had filled in to the point of being unmanageable for sustained game fish populations. Potential new pond sites are very limited. It was concluded that construction of one or two small ponds would not contribute much to local fishing opportunities in an area which already contains many privately owned farm ponds. Small ponds are quickly over-exploited when subject to unrestricted public access and require extensive management and enforcement effort to maintain desirable fish communities. Refuge pools were considered to be even less suitable for fishery management purposes than in earlier years due to sedimentation and revised water management objectives.

Periodic contact with the Refuge has been maintained by Fisheries Assistance since 1979. The last visit was in 1984 to discuss fishery management planning requirements for the Refuge pursuant to MBO VI.D.

#### IV. FISHING PROGRAM

The Refuge is currently open to fishing all year in accordance with State of Missouri regulations. Bank fishing is permitted in ditches, Squaw and Davis Creeks and pool margins along major access roads. (Figure 1.) This represents the majority of fishable water on the Refuge. Bowfishing, spearing and gigging are not permitted due to conflicts with other Refuge programs and the safety hazard involved with these activities where a large number of participants are concentrated in a small area. Ice fishing is permitted, but is generally impractical since most pools freeze solid after the fall migration has passed.





## FISHING AT SQUAW CREEK NATIONAL WILDLIFE REFUGE

Sport fishing is permitted at Squaw Creek National Wildlife Refuge in accordance with State of Missouri fishing regulations with the following exceptions:

Sport fishing is permitted **ALL YEAR IN THE AREAS DESIGNATED ON THE MAP BELOW.**

Few fish survive the winter in the refuge's marshes and pools because the shallow waters freeze solid. However, fish re-enter them in the spring from Squaw and Davis Creeks.

Carp and bullhead are the fish you can expect to catch from refuge waters.

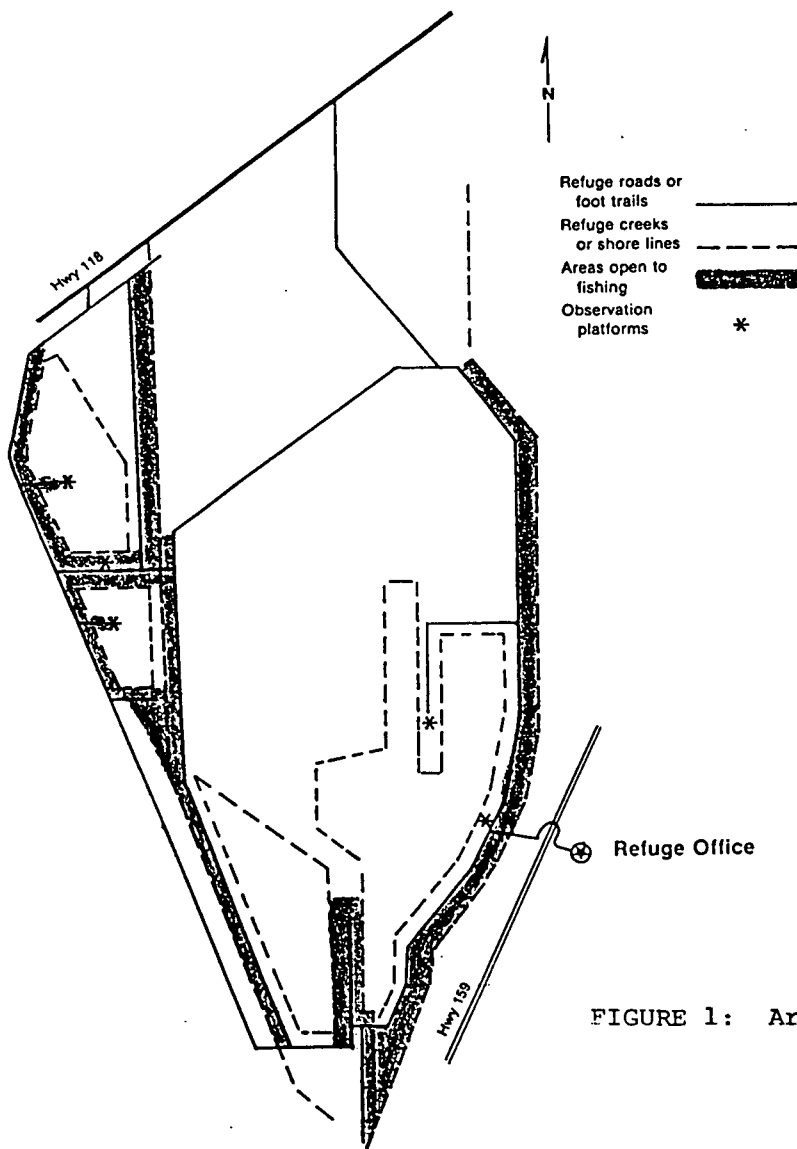


FIGURE 1: Areas open to fishing.



U.S. DEPARTMENT OF THE INTERIOR  
Fish and Wildlife Service



Snagging, or grabbing as it is known locally is permitted for rough fish. This usually takes place in March, April and May and accounts for about 90% of the total annual fishing activity. Carp concentrate below the radial gates at the South end of the Refuge when pools are being drained. Snagging for these fish appears to be fairly popular among local "sportsmen". An estimated 8,000 pounds of carp were harvested in this fashion during the spring of 1986.

Fishing has never been a major activity at the Refuge and has declined in recent years. Fiscal Year 1985 fishing activity hours are only 40% of FY-82 levels. Total visits have decreased 21% and average trip length has gone from 3.83 hrs/trip to 1.47 hrs/trip over the same time period. (Table II.) Overall fishing activity and trip length (hrs/trip) have steadily declined since FY-1982. Possible reasons for this decline or the peak number of visits in 1983 are unknown. The current fishing programs appear to satisfy the local demand for carp and bullhead fishing.

TABLE II: SQUAW CREEK NWR FISHING ACTIVITY \*

Fiscal Year	Visits	Activity Hours	Trip Length (hrs/trip)
1985	430	630	1.47
1984	960	1,785	1.86
1983	1,100	2,060	1.87
1982	545	1,090	3.83
1981	215	430	2.00
Average	650	1,399	2.15

\* From PPBE Output Reports

V. DISCUSSION

Squaw Creek NWR has no permanent water capable of supporting sustained game fish populations. Extensive dredging, flood protection and barriers to rough fish intrusion would be needed to create an acceptable aquatic environment in any of the pools. A project to develop permanent deep water pools for fishing would seriously conflict with current Refuge objectives and water management plans. Periodic flooding, summerkill, winterkill and intrusion of rough fish are major limiting factors to any fish management program at Squaw Creek.

Fishing accounts for approximately one percent of total Refuge visits and the majority of this is spring snagging for carp below the main water control structure at the lower end of the Refuge. The remaining fishing activity is pole and line fishing for carp and bullheads in ditches, creeks and pool margins. Fishing opportunities appear to be completely satisfying local demands for these activities on the Refuge.

There is no record of commercial fishing ever having taken place at the Refuge other than the fish salvage permitted in 1953. Current water management precludes the development of rough fish populations which would be acceptable to commercial fishermen. In any case, shallow water combined with dense beds of aquatic macrophytes would render such activity virtually impossible.

Forage fish management for piscivorous birds is a possibility. Carp and bullheads provide some avian forage, but quickly outgrow optimum forage size for many species. Golden shiners, common shiners, fathead minnows or other Cyprinidae may be candidate species. The species selected would have to be tolerant of low dissolved oxygen conditions. Permanent water would have to be maintained and protected from flooding and intrusion by undesirable species. Fishery management strategies to

benefit fish eating birds have not been well developed. Any efforts at such management would be on an experimental basis. Future water management developments may create forage fish management opportunities if Refuge management objectives were targeted toward increased use by avian piscivores.

VI. RECOMMENDATIONS

- 1) Maintain current fishing program on the Refuge as is.
- 2) Encourage maximum harvest of rough fish populations.
- 3) Make no further attempts to manage for game fish populations or enhance sport fishing opportunities in Refuge waters.
- 4) Consider forage fish management opportunities to benefit avian piscivores in future Refuge planning efforts.
- 5) Fishery Assistance services will continue to be available to the Refuge Manager for fishery work as the manager may deem necessary. Such activities may include periodic surveys to evaluate species composition and relative abundance as they relate to primary objectives of the Refuge. Assistance in rough fish control, forage fish production and contaminants surveys is also available.

Submitted by: Jim Milligan Date 1/20/87  
Jim Milligan  
Fishery Biologist  
Genoa OFA  
Genoa, WI

Concurrence: Berlin Heck Date 1/23/87  
Berlin Heck  
Refuge Manager  
Squaw Creek NWR  
Mound City, MO

John R. Leonard Date 1/30/87  
John Leonard  
Area Supervisor  
Division I, Fisheries  
Twin Cities, MN

VISITS MONTH

SQUAW CREEK  
3-3560-SQC

ACTIVITY NAME	OCT-82	NOV-82	DEC-82	JAN-83	FEB-83	MAR-83	APR-83	MAY-83	JUN-83	JUL-83	AUG-83	SEP-83	12 MONTH TOTAL
<b>INTERPRETATION</b>													
WILDL TOUR RT-MOTORIZED CONDUCTED	155	10	0	0	0	0	0	0	0	0	0	0	165
VISITOR CONTACT STATION INTERP EXHIBITS-DEMONST SELF GUIDED CONDUCTED	0	2000	2000	200	200	200	200	250	250	200	200	350	6050
OTHER ON-REFUGE PROGRAM	4000	6000	3000	500	800	900	900	1100	1000	1000	1000	1500	21700
	400	527	1110	0	0	100	170	275	0	60	0	100	2742
	0	0	0	170	30	47	0	0	0	0	0	0	247
<b>RECREATION-WILDLIFE CONSUMPTIVE</b>													
FISHING WARMWATER OTHER CONSUMP WILDL REC	0	0	0	0	0	30	100	600	300	50	10	10	1100
	0	0	0	0	0	0	30	100	0	0	0	0	130
<b>RECREATION-WILDLIFE NON-CONSUMP</b>													
CAMPING PICNICKING WILD/WILDLANDS OBSERV FOOT LAND VEHICLE PHOTOGRAPHY	0	205	115	0	0	28	0	0	0	0	0	0	348
	600	800	300	20	100	100	200	400	450	200	200	350	3720
	1500	2000	1500	300	700	700	900	900	800	200	100	500	10100
	8500	11500	6000	1500	3000	3000	3200	4000	3700	2200	2000	5000	53600
	100	400	250	400	300	200	200	200	100	50	50	100	2350
<b>RECREATION - NON-WILDLIFE</b>													
CAMPING PICNICKING	0	40	0	0	0	0	0	20	0	0	0	0	60
	0	0	0	0	0	0	0	0	100	0	50	100	250
TOTAL INTERPRETATION	4555	8537	6110	870	1030	1247	1270	1625	1250	1260	1200	1950	30904
TOTAL EDUCATION	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL HUNTING	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL FISHING	0	0	0	0	0	30	100	600	300	50	10	10	1100
TOTAL OTHER CONS WILDL. REC	0	0	0	0	0	0	30	100	0	0	0	0	130
TOTAL NON-CONSUMPTIVE REC	10700	14905	8165	2220	4100	4028	4500	5500	5050	2650	2350	5950	70118
TOTAL NON-WILDLIFE REC	0	40	0	0	0	0	0	20	100	0	50	100	310
TOTAL PUBLIC USE	15255	23482	14275	3090	5130	5305	5900	7845	6700	3960	3610	8010	102562
TOTAL WILDLIFE ORIENTED	15255	23442	14275	3090	5130	5305	5900	7825	6600	3960	3560	7910	102252
TOTAL NON-WILDLIFE ORIENTED	0	40	0	0	0	0	0	20	100	0	50	100	310

SQUAW CREEK  
3-3560-SQC

12 MONTH  
TOTAL

FY 83

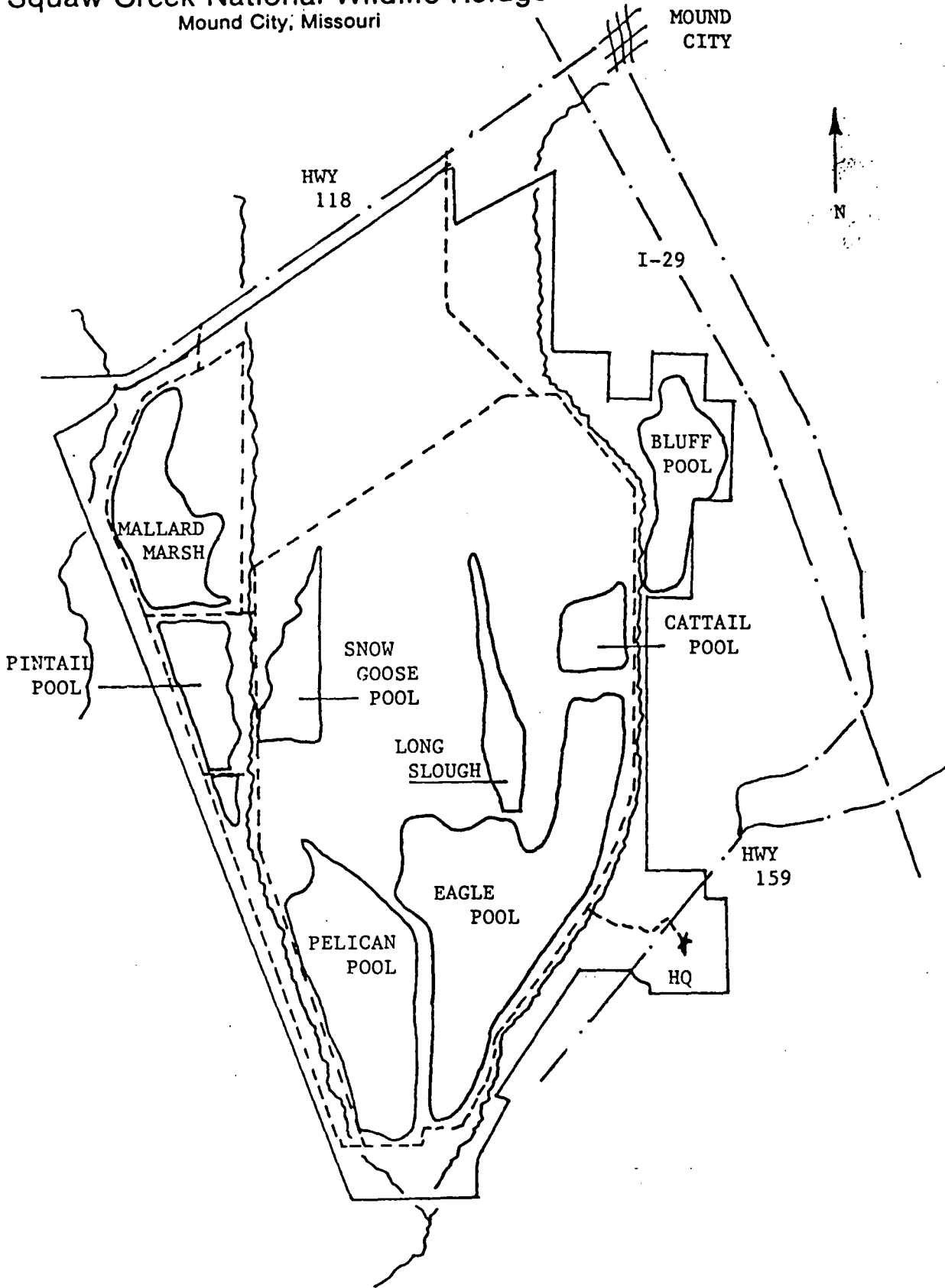
ACTIVITY NAME	OCT-82	NOV-82	DEC-82	JAN-83	FEB-83	MAR-83	APR-83	MAY-83	JUN-83	JUL-83	AUG-83	SEP-83	12 MONTH TOTAL
<b>INTERPRETATION</b>													
WILDL TOUR RT-MOTORIZED CONDUCTED	465	20	0	0	0	0	0	0	0	0	0	0	485
VISITOR CONTACT STATION INTERP EXHIBITS-DEMONST	0	330	330	34	34	34	34	43	43	34	34	88	1038
SELF GUIDED CONDUCTED	333	500	250	50	75	80	80	98	90	90	90	150	1886
OTHER ON-REFUGE PROGRAM	300	395	1000	0	0	100	128	206	0	120	0	75	2324
	0	0	0	125	22	35	0	0	0	0	0	0	182
<b>RECREATION-WILDLIFE CONSUMPTIVE</b>													
<b>FISHING</b>													
WARMWATER	0	0	0	0	0	30	100	1200	600	100	20	10	2060
OTHER CONSUMP WILDL REC	0	0	0	0	0	0	30	100	0	0	0	0	130
<b>RECREATION-WILDLIFE NON-CONSUMP</b>													
CAMPING	0	6000	3000	0	0	1120	0	0	0	0	0	0	10120
PICNICKING	300	400	150	10	50	50	100	200	225	100	100	175	1860
WILDL/WILDLANDS OBSERV FOOT	1500	2000	1500	200	525	525	675	675	600	150	75	375	8800
LAND VEHICLE PHOTOGRAPHY	8500	11500	6000	1500	3000	3000	3200	4000	3700	2200	2000	5000	53600
	200	800	500	800	600	400	400	400	200	100	100	200	4700
<b>RECREATION - NON-WILDLIFE</b>													
CAMPING	0	1200	0	0	0	0	0	10	0	0	0	0	1210
PICNICKING	0	0	0	0	0	0	0	0	100	0	50	100	250
<b>TOTALS</b>													
TOTAL INTERPRETATION	1098	1245	1580	209	131	249	242	347	133	244	124	313	5915
TOTAL EDUCATION	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL HUNTING	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL FISHING	0	0	0	0	0	30	100	1200	600	100	20	10	2060
TOTAL OTHER CONS WILDL. REC	0	0	0	0	0	0	30	100	0	0	0	0	130
TOTAL NON-CONSUMPTIVE REC	10500	20700	11150	2510	4175	5095	4375	5275	4725	2550	2275	5750	79080
TOTAL NON-WILDLIFE REC	0	1200	0	0	0	0	0	10	100	0	50	100	1460
TOTAL PUBLIC USE	11598	23145	12730	2719	4306	5374	4747	6932	5558	2894	2469	6173	88645
TOTAL WILDLIFE ORIENTED	11598	21945	12730	2719	4306	5374	4747	6922	5458	2894	2419	6073	87185
TOTAL NON-WILDLIFE ORIENTED	0	1200	0	0	0	0	0	10	100	0	50	100	1460

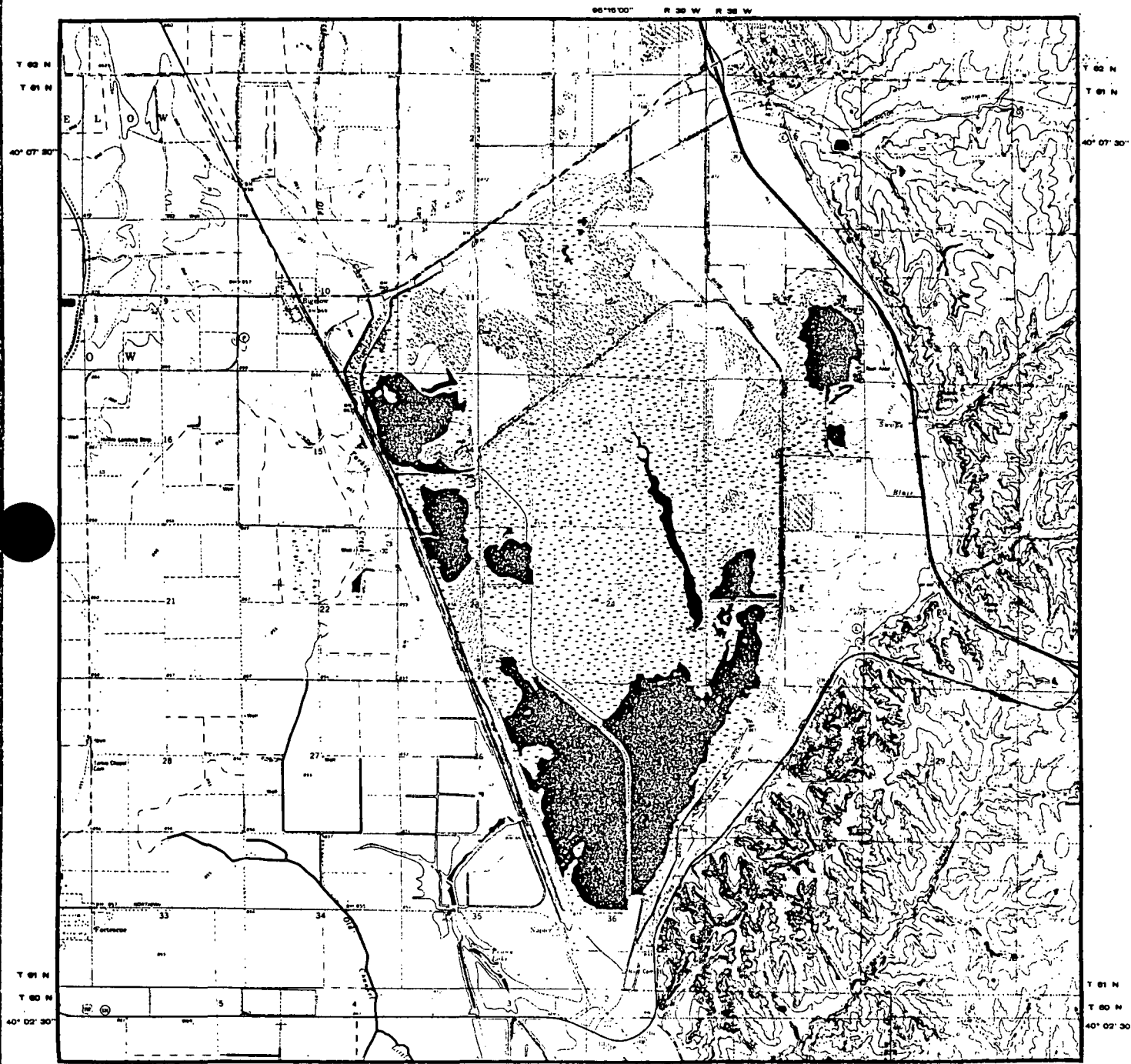
APPENDIX B  
Refuge Maps



# Squaw Creek National Wildlife Refuge

Mound City, Missouri





# SQUAW CREEK NATIONAL WILDLIFE REFUGE

U.S. FISH AND WILDLIFE SERVICE  
DEPARTMENT OF THE INTERIOR



SCALE 1:24,000  
CONTOUR INTERVAL 10 FEET



APPENDIX C

Fish Stocking Record

FISH STOCKING RECORD

Squaw Creek NWR

Date	Impoundment	Species	Number	Size	Weight (lbs.)
1949	Northwest Pool*	Crappie	3,150	150/lb.	21
1949	" "	Blackbass	2,550	150/lb.	17
1949	" "	Bluegill	3,200	200/lb.	16
1949	Main Pool **	Crappie	9,900	150/lb.	66
1949	" "	Blackbass	10,500	150/lb.	70
1949	" "	Bluegill	10,000	100/lb.	50
1955	Main Pool **	Largemouth Bass	10,000	Fing.	--
1955	" "	Channel Catfish	10,000	Fing.	--
1955	" "	White Crappie	10,000	Fing.	--
1959	North Pond	Largemouth Bass	200	Fing.	--
1959	" "	Bluegill	200	Fing.	--
1959	South Pond	Largemouth Bass	200	Fing.	--
1959	" "	Bluegill	200	Fing.	--
1964	North Pond	Largemouth Bass	500	Fing.	--
1964	" "	Bluegill	500	Fing.	--
1964	" "	Channel Catfish	250	Fing.	--
1964	South Pond	Largemouth Bass	300	Fing.	--
1964	" "	Bluegill	300	Fing.	--
1964	" "	Channel Catfish	200	Fing.	--

\* Northwest Pool is now Mallard Marsh

\*\* Main Pool is now Pelican and Eagle Pools and Long Slough

MAR 9 1987

Regional Refuge Supervisor, FWS, Twin Cities, MN (RF2)

Fisheries Management

Refuge Manager, Squaw Creek NWR, Mound City, MO

I concur with Jim Milligan's recommendations stated in the attached Fishery Management Assessment for Squaw Creek NWR. You should continue to maintain the existing public fishing program and make no further attempts to manage the game fish population or enhance sport fishing opportunities on the refuge.

I greatly appreciate Jim's help in managing the fishery resource on the refuge.

/s/ John W. Ellis

John W. Ellis

Attachment

bcc: Jim Milligan, Genoa OFA  
John Leonard, FSI

RF2:JWellis:llm:3/6/87:x4701

UNITED STATES GOVERNMENT  
memorandum

DATE: 2-26-87

REPLY TO  
ATTN OF:

Jim Milligan, Fishery Biologist, FWS, Genoa, WI

SUBJECT: Fisheries Management - Squaw Creek NWR

TO: Refuge Manager, Squaw Creek NWR, FWS, Mound City, MO.

The attached assessment has been provided to document the current fishery program at Squaw Creek NWR. It was prepared from information provided by the Refuge Manager and Fisheries Assistance files. Aquatic resources of the Refuge have been inspected and the Refuge's fishery program and potential discussed with the Manager.

The assessment indicates that existing Refuge waters are unmanageable for sustained sport fish populations. Drastic alteration to provide permanent, deep water pools would be required to develop marginally manageable fishery resources. Forage fish management to benefit piscivorous birds is a possibility, but flooding, siltation, winterkill, summerkill and contamination by undesirable fish species are limiting factors.

The current fishing program provides ample opportunity for the limited angling public desiring to fish for carp and bullheads in refuge waters. The existing program appears to satisfy local demand for such activity and does not conflict with other Refuge objectives.

I briefly discussed fishery management of Squaw Creek NWR with Mr. Lee Redmond, Fisheries Management Supervisor, Missouri Department of Conservation (MDC), in March, 1986. He indicated that MDC did not consider Squaw Creek waters to be manageable fishery resources.

I recommend that the existing public fishing program be maintained and conclude that additional sport fishery management efforts and fishery management planning are not presently needed at Squaw Creek NWR. Fisheries personnel will continue to be available to assist the Refuge Manager in any way possible.

Jim Milligan



cc: AW/RF-2  
AF/FS-1  
File

JMM/kal

OPTIONAL FORM NO. 10  
(REV. 1-80)  
GSA FPMR (41 CFR) 101-11.6  
5010-114