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FEDERAL AID TO FISH RESTORATION
ANNUAL PERFORMANCE REPORT
SMALL LAKES INVESTIGATIONS
PROJECT NO. F-90-R-6



Study No. 408.3 - Classification of Iowa Lakes and Their Fish Standing Stock

Job No. 2 - Fish population characteristics and biomass of each
lake group

PERIOD COVERED: 1 JULY 1982-30 JUNE 1983

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ANNUAL PERFORMANCE REPORT

RESEARCH PROJECT SEGMENT

STATE: Iowa NAME: Classification of Iowa Lakes and
PROJECT NO.: F-90-R-6 Their Fish Standing Stock
STUDY NO.: 408.3 TITLE: Fish population characteristics
JOB NO.: 2 and biomass of each lake group

Period Covered: 1 July, 1982 through 30 June, 1983

ABSTRACT: Cove rotenone sampling was used to determine standing stocks and species composition of fish in eleven lakes. Two lakes of groups I, II, and IV plus four lakes in group III and one lake in group V were sampled. Fish standing stocks ranged from 949 lbs/ac to 442 lbs/ac and the percent of total standing stock acceptable to anglers was 5 to 62%. One lake in group V had 40 lbs/ac acceptable to anglers while the two lakes in group I had an average of 316 lbs/ac acceptable to anglers. Group II and IV lakes generally had higher total standing stocks while groups I and II had higher standing stocks of "keeper" fish.

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INTRODUCTION

Most Iowa lakes are constructed without proper consideration for those factors that ultimately determine lake quality. Factors such as watershed area, usage and erosion potential were only recently recognized as important factors influencing lake quality. Volume development, mean depth, thermal stratification, shoreline development, and basin slope are also important in predicting lake quality, but seldom considered in lake construction. Chemical parameters such as total hardness, alkalinity, nitrates, nitrites, sulfate and chloride are usually given attention in predicting water quality, but little can be done to alter the lakes water chemical parameters during or after lake construction. The physical factors can be altered very little once a lake is constructed but drastically affect the lake's sport fishery and cost of maintaining quality fishing. These factors can be determined and altered prior to lake construction and will ultimately influence lake site and construction. The exact relationship between the above physical parameters and well being and biomass of different fish species are unknown for Iowa lakes. An understanding of these relationships will assist in development of fish management programs for existing lakes and in describing the fisheries potential of proposed lakes. Fish standing stock and the proportion acceptable to anglers are important factors influencing angler harvest.

STUDY BACKGROUND

All study lakes and watersheds were described by Bachmann (1979 A Physical Survey of 107 Iowa Lakes). Parameters measured were: watershed area, soil associations, land use, description of topography in watershed, lake area, shoreline length, maximum and mean depth, volume, shoreline development, watershed/lake area ratio, annual precipitation, runoff, evaporation, and presence of thermal stratification. Chemical parameters measured included: nitrogen, total hardness, total alkalinity, dissolved oxygen, specific conductance, sulfate and chloride. A vertical profile of temperature, oxygen, phosphorus, pH and chloride was also constructed for each of the 107 Iowa lakes.

Fifty seven Iowa lakes were classified into five distinct groups using mean basin slope (\bar{S}) and adjusted siltation index (AI), Hill (1981). The groups were formed using the following criteria: Group I, mean basin slope (\bar{S}) above 12% and adjusted siltation (AI) 50-250; Group II, (\bar{S}) 7 to 12% and (AI) 50-250; Group III, (\bar{S}) below 7% and (AI) 50-250; Group IV, (\bar{S}) above 7% and (AI) 250-600; Group V, (\bar{S}) below 7% and/or very high (AI). Three lakes were chosen from Groups I, II, IV, and V for cove rotenone sampling of the fish populations. Four cove sampling lakes were chosen from Group III. Group I contains Iowa's best fishing lakes while the lakes in group V provide the poorest quality fishing.

Five lakes sampled in 1981 showed fish standing stocks ranged from 802 lbs/ac to 450 lbs/ac and the percent of the total standing stock acceptable to anglers was 90 to 306 lbs/ac, Hill (1982). Group I and II lakes generally had lower total fish standing stocks but higher stocks acceptable to anglers while group V lakes had higher total fish standing stocks but lower stocks acceptable to anglers.

METHODS AND PROCEDURES

Eleven lakes were sampled in 1982 (Table 1). Two lakes in lake group I, two lakes in group II, four lakes in group III, two lakes in group IV, and one in the last group. Lakes ranged in size from 14 to 812 surface acres. All are public recreation lakes and are either county or state owned.

Morphometric maps of each lake to be sampled were studied and coves measured. Three coves in each lake were generally chosen for rotenone sampling, but occasionally two coves were chosen if the third cove did not lend itself to being isolated. Coves selected for sampling were measured with an alidade to accurately estimate area, depths were taken to compute cove water volume, and selected coves were isolated from the lake with polyethylene block nets. Attempts were made to isolate one-third to one-half acre coves to insure a total of sampling area of approximately one acre in the smaller lakes, while attempts were made to isolate two to three acres in larger lakes (over 200 acres).

Coves were electrofished after isolation and attempts were made to capture all fish stunned. Fish were measured and the upper half of the caudal fin removed. Marking was used to estimate the percentage of fish by species and size recovered after rotenone application.

Table 1. Five Iowa lake groups and eleven lakes sampled with rotenone during 1982.

Lake Group	Lake Name	Area	Lake Group	Lake Name	Area
I	Red Haw	64	IV	Williamson Res.	30
I	Mormon Trail	35	IV	Thayer	14
II	Miami	104	V	Rock Creek	602
II	Macbride	812			
III	Green Valley	428			
III	Lacey Keosauqua	61			
III	Wapello	289			
III	Iowa	107			

Rotenone used was 2½% synergized and was applied at a rate of three parts per million (ppm) (Table 2). A portion of the toxicant was pumped through a weighted perforated pipe to distribute the toxicant along the bottom, while the remainder of the toxicant was sprayed on the water surface. Immediately after rotenone application, fish were collected until no fish were observed. Fish were collected the day of application plus the three following days. Catch for each day was sorted by species and length. Individual fish weights were taken from large fish (over 12 inches total length TL) while aggregate weights were taken from smaller fish. Previously marked fish were enumerated by species and length. Standing stock was calculated by multiplying the total weight of fish

recovered by the recovery percentage. Standing stock was adjusted using cove adjustment figures, Hayne, et. al. (1967).

Table 2. Ingredients and E.P.A. Reg. No. of fish toxicant used in cove sampling

LIQUID-EMULSIFIABLE FISH TOXICANT	
ACTIVE INGREDIENTS:	
Rotenone -----	2.5%
Other cube extractives -----	5.0%
Piperonyl Butoxide, Technical* -----	2.5%
INERT INGREDIENTS -----	90.0%
TOTAL:	100%

*Equivalent to 2.0% Butylcarbityl
(6-propylpiperonyl) ester and .5%
related compounds

EPA Reg. No. 432--50

The portion of the fish standing stock acceptable to anglers was calculated by assuming anglers would accept bluegill and redear sunfish 6 in. TL or larger, crappie 8 in. TL or larger, largemouth bass 10 in. TL or larger, channel catfish 10 in. TL or larger, and black bullhead 8 in. TL or larger. Carp, buffalo, white sucker, and grass carp were assumed non-acceptable to anglers.

FINDINGS

Red Haw Lake

Red Haw Lake, a group I lakes is located in Red Haw State Park, Lucas County, Iowa. It is surrounded by timberland and cropland, but most of the immediate watershed is stateowned timber. It has a \bar{S} and AI of 16.4% and 206, respectively.

Total fish standing stock was estimated at 442 lbs/ac and was composed of nine species (Table 3). Bluegill were the most numerous and had a biomass of 168 lbs/ac of which 111 lbs/ac are angler acceptable. Largemouth bass stock was 98 lbs/ac while channel catfish standing stock was 99 lbs/ac. Red-ear sunfish, yellow perch and golden shiner each had standing stocks of less than 6 lbs/ac. Two hundred forty eight lbs/ac of the total standing stock of 442 lbs/ac were angler acceptable.

Table 3. Estimated standing stock (lbs/ac) by length group and total standing stock of fish in Red Haw Lake during 1982.

Length Group(in)	Species								
	Lm Bass.	Bluegill	White Crappie	Redear Sunfish	Warmouth	Yellow Perch	Black Bullhead	Channel Catfish	Golden Shiner
0-3	0	17	4		1	4	5	1	1
3-6	19	40	4		13				1
6-8	23	66	8	5	12		4	2	
8-10	29	45						16	
10-12	25						11	55	
12-14								25	
Total	98	168	16	5	26	4	20	99	2

Total: 442

Angler Acceptable: 248

Area: 64 acres

Mormon Trail Lake

Mormon Trail Lake is owned by Adair County Conservation Board and is contained in a small park. It has a watershed composed of mostly grassland and cropland. It is protected from siltation by two silt dams and has a \bar{S} of 14.7% and a AI of 111.

Total fish standing stock was estimated at 737 lbs/ac, and was made up of seven species (Table 4). Fifty two percent or 385 lbs/ac of the total fish standing stock were of sufficient size for anglers. Bluegill and channel catfish standing stocks were 183 lbs/ac and 204 lbs/ac, respectively. Largemouth bass contributed 99 lbs/ac, while white crappie added an additional 151 lbs/ac. Few aquatic macrophytes were present because of the 94 lbs/ac of grass carp. Black bullhead and green sunfish were minor species, adding only 5 lbs/ac to the total fish standing stock.

Table 4. Estimated standing stock (lbs/ac) by length group and total standing stock of fish in Mormon Trail Lake during 1982.

Length Group (in)	Species						
	Lm Bass	Bluegill	White Crappie	Channel Catfish	Black Bullhead	Green Sunfish	Grass Carp
0-3	1	8				1	
3-6	2	102	46		1	1	
6-8	14	73	55		2		
8-10	13		22	10			
10-12	28		11	70			
12-14			17	15			
14-18	41			32			
18-24				77			
24-30							94
Total	99	183	151	204	3	2	94

Total: 737 Angler Acceptable: 385 Area: 35 acres

Miami Lake

Miami Lake is a county-owned 104 acre, group II lake, located in Monroe County, Iowa. It has a S of 9.1% and an AI of 216. Most of its watershed is grassland and timber.

Nine fish species with standing stocks ranging from 3 lbs/ac of green sunfish to 289 lbs/ac of white crappie made up the estimated total standing stock of 914 lbs/ac (Table 5). Four hundred and sixty two lbs/ac or 50% of the total biomass was angler acceptable. Channel catfish contributed 242 lbs/ac, bluegill contributed 208 lbs/ac, largemouth bass added 85 lbs/ac, and black bullheads contributed 42 lbs/ac. Miami Lake was one of two group II lakes which contained carp, but in low densities (19 lbs/ac).

Table 5. Estimated standing stock (lbs/ac) by length group and total standing stock of fish in Miami Lake during 1982.

Length Group (in)	Species								
	Lm Bass	Bluegill	White Crappie	Redear	Black Bullhead	Channel Catfish	Green Sunfish	Golden Shiner	Carp
0-3		1					1		
3-6	1	156	108	2			3		
6-8	2	50	66	15	11	7	2	3	1
8-10	16	1	107	3	20	12			1
10-12	16		8		4	24			
12-14	21				7	20			
14-16	6					24			3
16-18	4					25			
18-20	8					41			5
20-22	11					28			
22-24						37			12
24-26						25			
Total	85	208	289	20	42	242	6	3	19
Total: 914		Angler Acceptable: 462				Area: 104 acres			

Lake MacBride

Lake MacBride, a 812 acre group II lake, is located in Lake MacBride State Park, Johnson County, Iowa. It is surrounded by timber and limited cropland, and has a S of 8.1% and an AI of 181.

Total fish standing stock was estimated at 914 lbs/ac and was composed of 12 species of which nine were major species (Table 6). Common carp was the most dominant species with a biomass of 474 lbs/ac. Bluegill estimated biomass was 150 lbs/ac of which 33 lbs/ac were acceptable to anglers. White crappie added 114 lbs/ac and all except 3 lbs/ac were small enough to not interest anglers. Channel catfish contributed most of the fishery at Lake MacBride with 71 lbs/ac acceptable to anglers. This lake was the only group II lake sampled which contained gizzard shad. Gizzard shad biomass was estimated to be 30 lbs/ac.

Table 6. Estimated standing stock (lbs/ac) by length group and total standing stock of fish in Lake MacBride during 1982.

Length Group (in)	Lm Bass	Spotted Bass	Bluegill	White Crappie	Black Bullhead	Channel Catfish	Carp	Gizzard Shad	Tiger Musky	White Sucker	Walleye
0-3		1	2		3			2			
3-6	2	1	115	97	4			2			
6-8		2	33	14	3			5			
8-10	10			3				18			
10-12	6	5				16		3			
12-14	14					8			5	4	
14-16						11	11				1
16-18							101				
18-20						29	127				
20-22							31				
22-24						23	204				
Total	32	9	150	114	10	87	474	30	5	4	1

Total: 949

Angler Acceptable: 155

Area: 812 acres

Green Valley Lake

Green Valley Lake, is a group III 428 acre lake located in Green Valley State Park, Union County, Iowa. It is surrounded primarily by gently sloping cropland and the perimeter covered with grassland. It has a S of 5.2% and an AI of 94.

Seven fish species in Green Valley Lake had a combined estimated standing stock of 848 lbs/ac, of which 541 lbs/ac or 63% was angler acceptable (Table 7). This lake was renovated in 1974 with Antimycin A and the stockings of bluegill and black crappie produced large subsequent year classes. Bluegill and black crappie were the two most dominant species, collectively contributing 688 lbs/ac or 81% of the total fish biomass. Three hundred eighteen lbs/ac of bluegill and 190 lbs/ac of black crappie are acceptable to anglers. Channel catfish biomass was estimated to be 42 lbs/ac and all were longer than 16 inches (TL). Forty eight lbs/ac of black bullheads were angler acceptable. Largemouth bass biomass was 52 lbs/ac, while green sunfish and northern pike collectively added 4 lbs/ac.

Table 7. Estimated standing stock (lbs/ac) by length group and total standing stock of fish in Green Valley Lake during 1982.

Length Group (in)	Species						
	Lm Bass	Bluegill	Black Crappie	Channel Catfish	Black Bullhead	Green Sunfish	Northern Pike
0-3		2	1				
3-6		62	8		7	2	
6-8	2	318	214		7		
8-10	1		83				
10-12	2						
12-14	16				48		
14-16	4						
16-18	8			10			
18-20	20			11			
20-24				21			
32-34							2
Total	52	382	306	42	62	2	2

Total: 848

Angler Acceptable: 541

Area: 428 Acres

Lacey Keosauqua Lake

Lacey Keosauqua Lake is located in Lacey Keosauqua State Park in Van Buren County, Iowa. It has an area of 61 acres, a S of 5.8%, and AI of 185 and is surrounded by timberland but most of the watershed is cropland.

This lake was chemically renovated immediately after the cove rotenone biomass estimate was made. Total fish standing stock in Lacey Keosauqua was 412 lbs/ac of which 139 lbs/ac were angler acceptable (Table 8). Seven species were present in the samples with bluegill contributing 134 lbs/ac and channel catfish adding 104 lbs/ac and all channel catfish collected were over 12 inches (TL). Black bullhead added 49 lbs/ac, white crappie added 31 lbs/ac, warmouth bass contributed 26 lbs/ac and largemouth bass biomass was 19 lbs/ac.

Table 8. Estimated standing stock (lbs/ac) by length group and total standing stock of fish in Lacey Keosauqua Lake during 1982.

Length Group(in)	Species						
	Lm Bass	Bluegill	White Crappie	Warmouth	Green Sunfish	Channel Catfish	Black Bullhead
0-3		18		1	10		
3-6	1	72		19	39		
6-8	4	44	9	6			2
8-10	3		22				12
10-12	3						35
12-14	8					50	
16-18						13	
28-30						41	
Total	19	134	31	26	49	104	49

Total: 412

Angler Acceptable: 139

Area: 61 acres

Wapello Lake

Wapello Lake, a group III 289 acre lake, is located in Wapello State Park. This Davis County, Iowa lake is surrounded by timber with cropland further back in the watershed. It has a \bar{S} of 4.5% and an AI of 118.

Eleven fish species collectively comprised 499 lbs/ac of which 172 lbs/ac or 34% was angler acceptable (Table 9). Bluegill was the only species with a standing stock over 100 lbs/ac with carp adding 92 lbs/ac of lengths from 6 to 32 inches (TL). Standing stock estimates of largemouth bass was 35 lbs/ac, black bullhead 28 lbs/ac, white crappie 68 lbs/ac, and gizzard shad 26 lbs/ac. Warmouth bass, redear sunfish, green sunfish, contributed less than 10 lbs/ac. Grass carp ranging in length from 12-20 inches (TL) had a biomass of 11 lbs/ac.

Table 9. Estimated standing stock (lbs/ac) by length group and total standing stock of fish in Wapello Lake during 1982.

Length Group(in)	Species										
	Lm Bass	Bluegill	White Crappie	Redear	War-mouth	Green Sunfish	Channel Catfish	Black Bullhead	Gizzard Shad	Carp	Grass Carp
0-3		2	3			1		2			
3-6		86	13	1	5	4		4	16		
6-8		30	30	4	4	1	2	8	5		
8-10	2		20	1			2	16			
10-12	7		2				4	5	3		
12-14	4						17	3	2		2
14-16	6						14				
16-18	8						16				4
18-20	8						20				5
20-24							9				22
24-28											53
28-32											17
Total	35	118	68	6	9	6	84	28	26	92	11
Total: 499		Angler Acceptable: 172					Area: 289 acres				

Iowa Lake

Iowa Lake is a 107 acre county owned lake in Iowa County surrounded by timber and cropland. It is a group III lake and has a S of 7.0% and an AI of 152.

Intensively managed Iowa Lake had a total estimated fish biomass of 496 lbs/ac of which 313 lbs/ac or 63% was angler acceptable (Table 10). Six species were collected with channel catfish and largemouth bass the most dominant. Channel catfish biomass was 208 lbs/ac and all except 19 lbs/ac were longer than 10 inch (TL). Largemouth bass biomass was 140 lbs/ac and was comprised of fish ranging in total length from 2 - 18 inches. Biomass estimates of bluegill, white crappie, redear sunfish, and black bullhead were 66 lbs/ac, 29 lbs/ac, 26 lbs/ac, and 27 lbs/ac, respectively.

Table 10. Estimated standing stock (lbs/ac) by length group and total standing stock of fish in Iowa Lake during 1982.

Length Group (in)	Species					
	Lm Bass	Bluegill	White Crappie	Redear	Channel Catfish	Black Bullhead
0-3	3	8	18			1
3-6	4	36	3	2	1	5
6-8	11	22	8	2	5	9
8-10	25			18	13	8
10-12	44			4	20	4
12-14	18				31	
14-16	22				17	
16-18	13				27	
18-20					28	
20-24					22	
24 —					44	
Total	140	66	29	26	208	27

Total: 496

Angler Acceptable: 313

Area: 107 acres

Williamson Reservoir

Williamson Reservoir is a group IV lake with a surface area of 30 acres. It is owned by Lucas County Conservation Board and is surrounded by timber and a majority of cropland. Mean slope is 9.5 and AI is 441.

Seven fish species were collected in Williamson Reservoir and their collective biomass was estimated to be 665 lbs/ac (Table 11). Two hundred thirty four lbs/ac or 35% was angler acceptable. Bluegill and black bullhead accounted for 436 lbs/ac. Channel catfish biomass estimate was 93 lbs/ac, while the largemouth bass and white crappie biomass estimates were 69 lbs/ac and 54 lbs/ac, respectively. Redear and green sunfish biomass estimates were less than 10 lbs/ac.

Table 11. Estimated standing stock (lbs/ac) by length group and total standing stock of fish in Williamson Reservoir during 1982.

Length Group(in)	Species						
	Lm Bass	Bluegill	White Crappie	Redear	Green Sunfish	Channel Catfish	Black Bullhead
0-3		11			2	1	1
3-6		124	7	1	5		2
6-8	1	73	38	1	1	2	23
8-10	2		9	3		8	178
10-12	12					13	25
12-14	13					22	
14-16	16					8	
16-18	8					26	
18-20	17					14	
Total	69	208	54	5	8	93	228

Total: 665

Angler Acceptable: 234

Area: 30 acres

Thayer Lake

Thayer Lake is an intensively managed 14 acre, group IV lake located in Union County, Iowa. It is owned by the Union County Conservation Board and is surrounded by cropland. This lake has a \bar{S} of 7.7% and an AI value of 329.

Thayer Lake's fish biomass is made up of eight species with bluegill and channel catfish contributing 256 lbs/ac and 211 lbs/ac, respectively (Table 12). Total fish standing stock estimate was 787 lbs/ac and 369 lbs/ac was acceptable to anglers. Nearly 100 lbs/ac of channel catfish were large enough for harvest. Bluegill standing stock sufficiently large enough for anglers was 136 lbs/ac. Redear sunfish standing stock was 120 lbs/ac and nearly 90 lbs/ac were longer than 6 inch TL. Largemouth bass biomass was 44 lbs/ac, about half of the white crappie standing stock. Biomass estimates of hybrid sunfish, green sunfish and yellow bullheads were 53 lbs/ac, 19 lbs/ac, and 3 lbs/ac, respectively.

Table 12. Estimated standing stock (lbs/ac) by length group and total standing stock of fish in Thayer Lake during 1982.

Length Group (in)	Species							
	Lm Bass	Bluegill	White Crappie	Redear	Hybrid Sunfish	Green Sunfish	Channel Catfish	Yellow Bullhead
0-3	2	12	6		1	3		
3-6	1	108	44	25	32	15		1
6-8	12	136	18	53	20	1	25	2
8-10	4		13	42			90	
10-12	11						15	
12-14	14						48	
14-16							8	
16-18							25	
Total	44	256	81	120	53	19	211	3

Total: 787

Angler Acceptable: 369

Area: 14 acres

Rock Creek Lake

Rock Creek Lake is a 602 man-made lake located in a state park in Jasper County, Iowa. It was the only group V lake sampled in 1982 and has a \bar{S} of 2.8% and an AI value of 773. It is surrounded by cropland.

Total estimated fish standing stock in Rock Creek Lake was 785 lbs/ac of which 40 lbs/ac was acceptable to anglers (Table 13). Six hundred forty nine lbs/ac or 83% of the total fish biomass was comprised of common carp. White crappie was the most dominant sport fish and had an estimated biomass of 67 lbs/ac. Bluegill biomass was 23 lbs/ac, while channel catfish and black bullhead each contributed 12 lbs/ac, respectively. Green sunfish, golden shiner, and tiger musky collectively contributed 9 lbs/ac. Rock Creek Lake was scheduled for renovation in September, 1982, and was completely drained immediately after this biomass estimate was made.

Table 13. Estimated standing stock (lbs/ac) by length group and total standing stock of fish in Rock Creek Lake during 1982.

Length Group(in)	Species									
	Lm Bass	Bluegill	White Crappie	White Bass	Green Sunfish	Channel Catfish	Black Bullhead	Carp	Golden Shiner	Tiger Musky
0-3		1	6		1					
3-6	1	13	10	1	5		2	1	1	
6-8	1	9	47	1			2	5	1	
8-10	1		4	4			3			
10-12	2						5			
12-14	3									
14-16						3				
16-18						9				
18-20										1
20-24								527		
24-28								116		
Total	8	23	67	6	6	12	12	649	2	1

Total: 785

Angler Acceptable: 40

Area: 602 acres

Group I, II, and III lakes all had the highest standing stock of fish acceptable to anglers (Figure 1). Group I lakes had 246 lbs/ac and 385 lbs/ac of "keepers" and averaged 316 lbs/ac. Biomass of group II lakes ready for harvest ranged from 462 lbs/ac to 155 lbs/ac and averaged 308 lbs/ac. Group III biomass of harvestable fish ranged from 541 lbs/ac to 139 lbs/ac but averaged 291 lbs/ac. The two lakes sampled in group IV had angler acceptable fish biomass of 234 and 369 lbs/ac. The average for these two lakes was 301 lbs/ac. "Keeper" biomass in the group V lake was 40 lbs/ac, or about 13% of the average for group I, II, and IV.

DISCUSSION OF FINDINGS

Group I lakes sampled in 1982 had between 52% and 60% of their total fish standing stock acceptable to anglers, while the lakes in this group sampled in 1981 had 62% of its fish biomass large enough for harvest. Mormon Trail Lake had 385 lbs/ac of "keepers" while Viking Lake sampled in 1981 had 306 lbs/ac of harvestable fish, because the total fish biomass was nearly 256 lbs/ac higher in Mormon Trail Lake. This wide variability exists because only three lakes were sampled in each lake group with the exception of lake group III, where four lakes were sampled. Larger sample sizes should reduce the variability.

Data in 1981 revealed lower total standing stocks for group I and II lakes and higher standing stocks for group IV and V lakes with the opposite relationship with angler acceptable biomass. This trend isn't apparent in the 1982 data, which shows highest total fish standing stocks in group II with group I and III lakes having the lower fish biomass (Figure 2). Group I lakes should provide the highest quality fishery because of the steep lake basin slope (above 13%) and low siltation index 50-250. Group V lakes in contrast have shallow lake basin slopes and/or very high AI values.

Group II lakes were expected to provide quality fishing with minor fish management problems. These lakes have lower mean slopes, 7 to 12%, with the same AI as group I lakes. Lake Miami had an estimated standing stock of 715 lbs/ac and 50% of this was angler acceptable. This lake has fewer small bluegills relative to large ones and a high standing stock of bass over 85 lbs/ac. Twenty five percent of the bluegill biomass is angler acceptable in Lake Miami while this portion of the bluegill biomass is 39% in Mormon Trail Lake. Largemouth bass acceptable to anglers is 69 lbs/ac (66% of total) in Mormon Trail Lake but 66 lbs/ac (78% of total) in Lake Miami. Both lakes have a good crappie fishery but few redear sunfish. The channel catfish standing stock in both lakes is over 200 lbs/ac.

The group IV lakes were expected to have fish standing stocks more desirable for angling than group V and group III lakes. The group IV lakes have higher nutrient loading (AI of 250-600) but steep lake basin slopes above 7. Lakes in this group will have a shorter life than those in groups I, II, and III because of the increased silt load, but when younger may support quality fisheries because of their shape and nutrient loading. Thayer Lake had 256 lbs/ac of bluegill of which 53% were "keepers". Nearly half of the bass were angler acceptable and 45% of the channel catfish could be creel. Nearly half of the estimated total standing stock was comprised of sport fish acceptable to anglers.

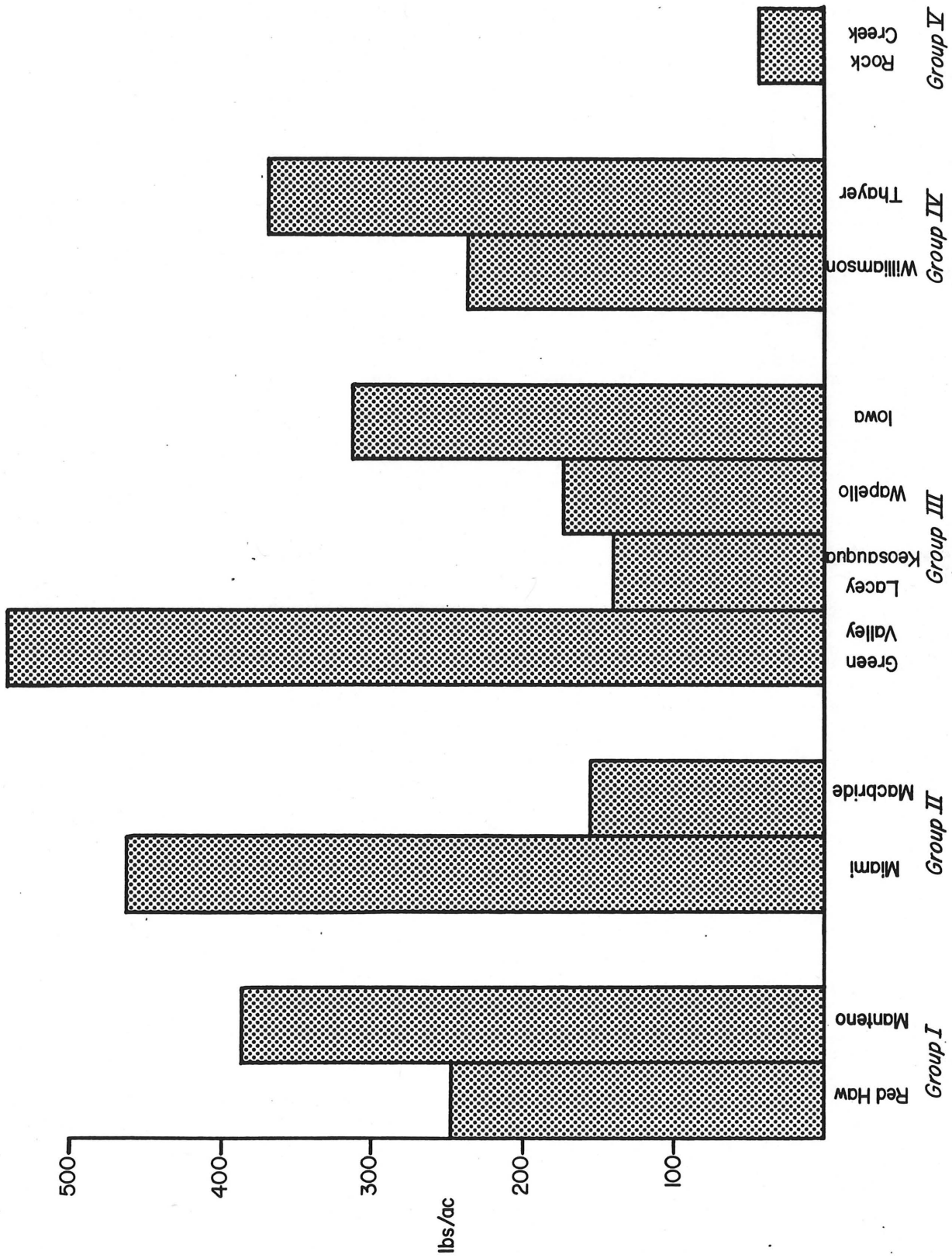


Figure 1. Estimated angler acceptable standing stock of fish in eleven study lakes in 1982.

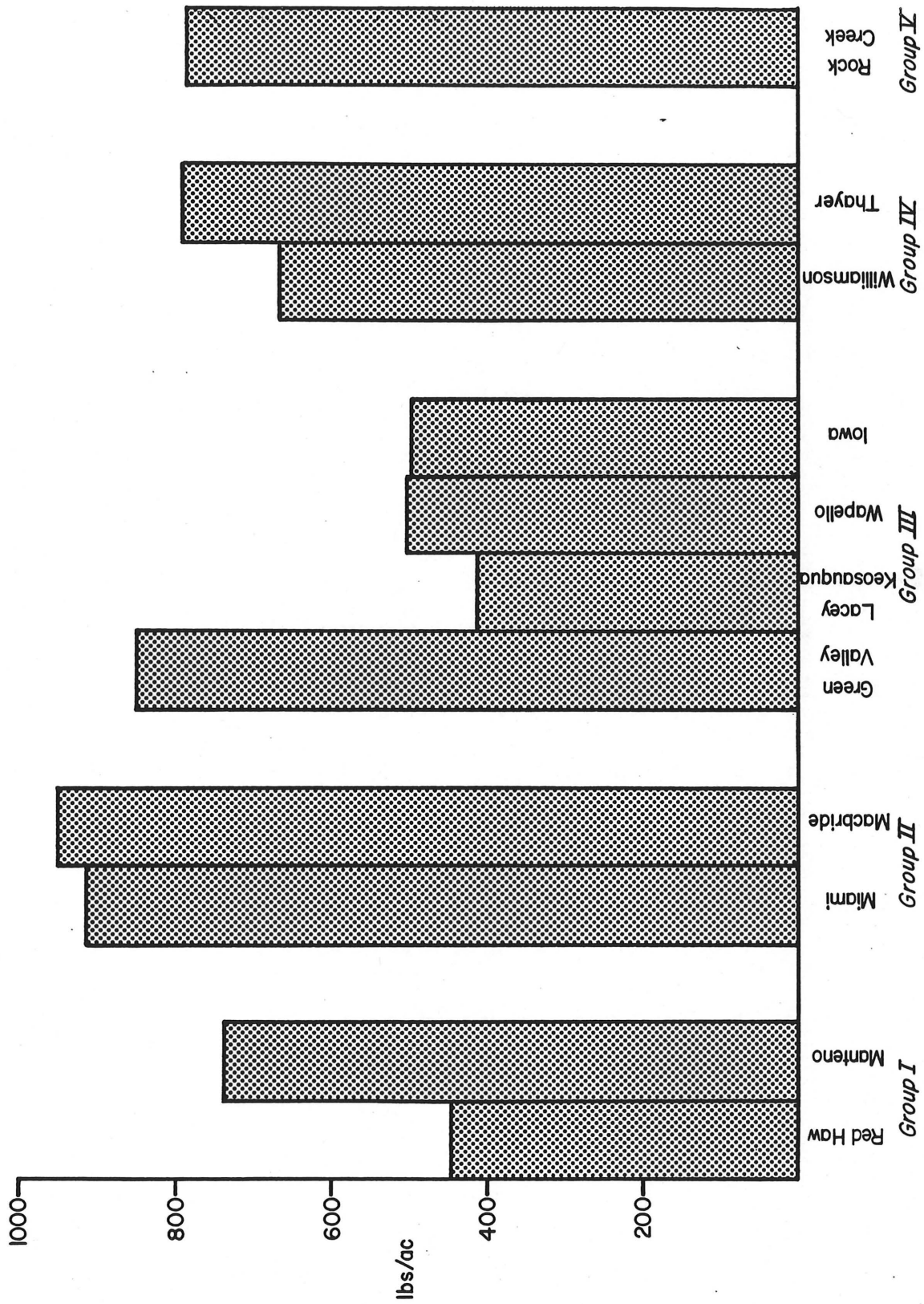


Figure 2. Total estimated standing stock of fish in eleven study lakes during 1982.

Group V lakes represented by Rock Creek Lake had shallow slopes with large shallow expanses ideal for cyprinid and centrarchid reproduction and/or very high nutrient loading (high AI indexes). Rock Creek had one of the highest estimated total fish standing stocks. 700-800 lbs/ac, and was comprised mostly of carp. Total standing stock was 785 lbs/ac but 650 lbs/ac was carp. Five percent of the total standing in Rock Creek was acceptable to anglers, but this will improve after the lake is restocked and the fishery develops. A good fishery will probably be short-lived because this lake type would require intensive management to maintain a quality fishery; in many instances this might be unattainable.

RECOMMENDATIONS

The investigation should continue for an additional year so fish standing stocks in nine other sample lakes can be determined to increase sample size and reduce variability of data between lakes within the same lake groups.

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