In November, 1973, we successfully captured 10 of 11 white amur (*Ctenopharyngodon idella*) weighing 6 to 9 pounds in a two-acre pond. Collection time ranged from 4 hrs. 35 min. to 7 hrs. As the first amur was netted, the 3rd ppm was being added.

SUMMARY

Thanite has been used on Southlands Experiment Forest as a fish management tool since 1968. Annually, SEF personnel have successfully moved 2,000 to 4,000 largemouth bass using an 0.8 to 1 ppm (active ingredient) of an 80% Thanite - 20% Atlox 1045-A mixture. Results are best in colder water temperatures with initial reaction time in very small ponds as low as 20 minutes. Collection of centrarchids can last over a 4 to 6 hour period. Recovery in an aerated holding tank is rapid and survival exceeds 90%. The length of time to recover depends on the amount of exposure and depth of sedation.

Collected fish, primarily largemouth bass, are used to stock new ponds, to replace fish removed by heavy fishing pressure, to crop overpopulated sunfish, and as breeders.

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AQUATIC MACROINVERTEBRATE RESPONSES TO AN EXTREME DRAWDOWN[1]

by

William Wegener, Vincent Williams and Thomas D. McCall
Fisheries Division
Florida Game and Fresh Water Fish Commission
207 Carroll Street
Kissimmee, Florida

ABSTRACT

An extreme drawdown conducted on Lake Tohopekaliga, Florida, improved littoral substrate, stimulated development of aquatic macrophytes and increased invertebrate standing crop. Benthic macroinvertebrates increased from 98 to 244 organisms per square foot in limnetic areas after reflooding; littoral benthos rose from 154 to 250 organisms per square foot. Phytomacrofauna increased from a predrawdown high of 304, to 1364 organisms per sample unit after reflooding. Standing crops decreased to predrawdown estimates within two years following peak production periods. These decreases were attributed mainly to predator cropping. Fish food organisms were favored by the drawdown, and their incidence in largemouth bass stomachs increased. As a final expression of increased production, sportfish populations which utilized these organisms nearly doubled.

INTRODUCTION

Aquatic substrate and vegetation communities can be manipulated to increase abundance and production of macroinvertebrates. In turn, this increase is passed through various trophic levels, terminating (for fishery management purposes) in higher standing crops of sportfish. Studies on Lake Tohopekaliga have shown that the simplest most economical method for accomplishing this is through extreme water fluctuation during the plant growing season.

[1]This is a contribution from Dingell-Johnson Project F-29-R, Florida.

Tohopekaliga is a 22,700 acre natural lake located in western Osceola County, Florida. It is one of the larger lakes in the Kissimmee Basin, and serves as a major source of water for Lake Okeechobee and southern Florida. Its morphometry is typical of most Florida lakes, being quite shallow (maximum depth 15 ft.) with a gently sloping bottom and wide expanses of rooted emergent vegetation. As a result of fluctuating water levels in past years plant communities remain dynamic, including true aquatic, semi-aquatic, and terrestrial forms throughout the lake basin and associated floodplain.

Prior to 1964, lake elevation and surface area were determined principally by annual rainfall. For the period of record (January 1942-64), the lake fluctuated between 59.40 MSL (feet, mean sea level) and 48.93 MSL, a range of 10.47 feet (United States Geological Survey, unpublished).

The Central and South Florida Flood Control District completed construction of a concrete lock and spillway at the lake outlet in January 1964, stabilizing the lake level and reducing by approximately 55 percent the historic natural range of water fluctuation. From 1964-70, Tohopekaliga's elevation was controlled between 56.09-51.35 MSL, a difference of only 4.74 vertical feet. The present water regulation schedule is designed to permit a 3 foot maximum fluctuation, between 55.0 MSL (high pool) and 52.0 MSL (low pool). This represents a 71 percent decrease from the historic natural fluctuation.

Water level regulation eliminated a considerable portion of natural flood plain and caused a permanent reduction in lake surface area. Upland encroachment by agriculture and housing development quickly followed. Nutrient loading from urban areas has increased dramatically during the past decade, and is expressed by increased frequency of algal blooms and general habitat degradation.

Since 1970 Lake Tohopekaliga has been a study area for evaluating lake basin dewatering as a fishery and habitat management tool. An extreme drawdown, consisting of a seven foot vertical drop in water level from high pool stage, was initiated in 1971. Drawdown elevation, approximately 48'MSL, was achieved in March 1971. Water level remained low for 6 months, with 50% of the lake bottom exposed. As a result of drought, refilling to normal regulation pool was not completed until March 1972. The drawdown stimulated expansion of both submerged and emergent vegetation. The littoral zone, or area of rooted emergent aquatic vegetation, increased from 9,080 to 11,350 acres (Holcomb and Wegener, 1971).

This paper describes the response of aquatic macroinvertebrates to this drawdown and subsequent reflooding.

MATERIALS AND METHODS

Aquatic macroinvertebrates were collected on a biannual schedule before, during and after the drawdown, from July 1970 to December 1973. Thirty-two sampling stations, 18 littoral and 14 limnetic, are shown on Figure 1. The 48 MSL contour separates littoral (vegetated) and limnetic (open water) zones and defines the lakeward limit of rooted emergent vegetation subsequent to the drawdown. At each station four 6x6 inch Ekman dredge grabs were pooled, providing a sample equivalent to one square foot of bottom. These samples were immediately cleansed in a wash bucket having a bottom of standard 30 mesh screen. Aquatic vegetation at littoral stations was sampled with a sweepnet to collect phytomacrofauna (invertebrate organisms associated with aquatic vegetation). One standard sample unit consisted of ten 5 foot long sweeps. The rectangular net rim measured 8x18 inches, and webbing was standard #30 mesh. One sample unit approximates 1.8 cubic yards.

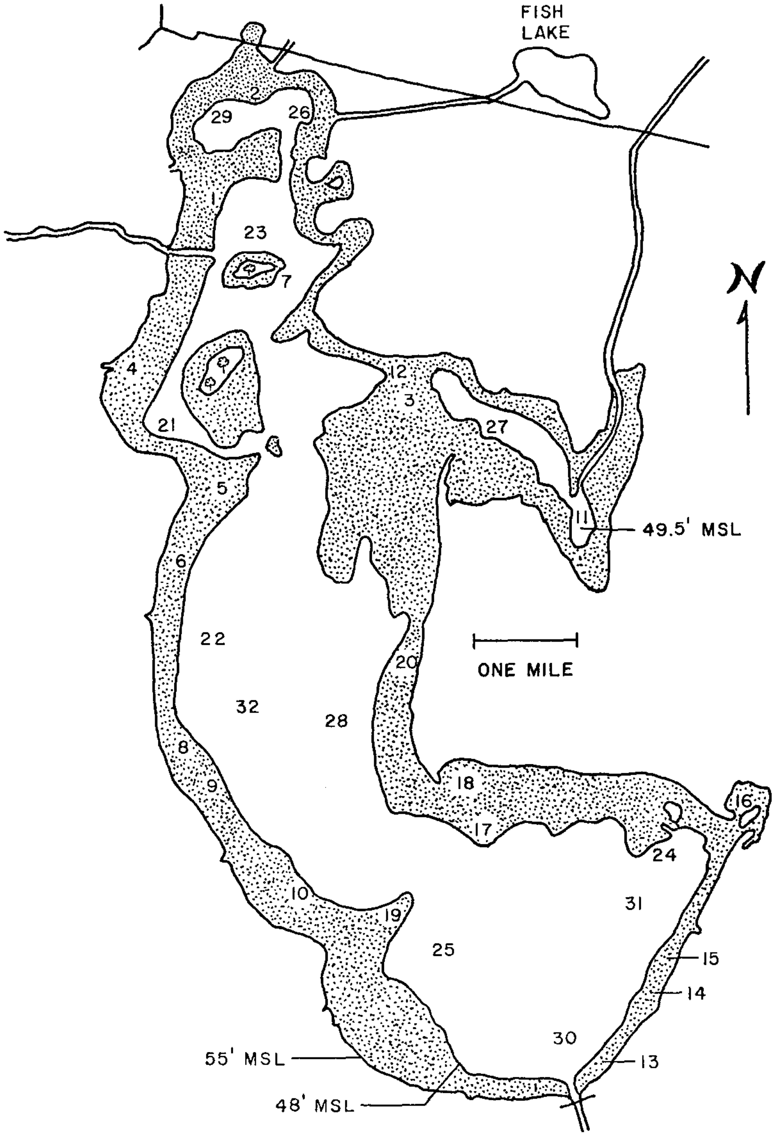

Figure 1. Outline map of Lake Tohopekaliga showing sample locations in vegetated and open water habitats. (Shaded area indicates extent of littoral vegetation and bottom area exposed during drawdown).

Most samples were refrigerated after collection, and organisms were separated while still alive. A few sweepnet samples were preserved in formalin stained with Rose-Bengal to facilitate sorting organisms from masses of filmanetous algae. All invertebrates were preserved in 70% isopropyl alcohol until counted and identified to taxonomic rank as indicated in Figure 2.

Identification was made with the aid of a binocular dissecting scope and taxonomic keys by Pennak (1953), Usinger (1956), and Ward and Whipple (1959).

Figure 2. A checklist of aquatic macroinvertebrates collected from Lake Tohopekaliga from June 1970 - December 1973.

Taxon	Common Name
Platyhelminthes (phylum)	
Turbellaria (class)	flatworms
Nematoda (phylum)	roundworms
Annelida (phylum)	
Oligochaeta (class)	aquatic earthworms
Hirudinea (class)	leeches
Anthropoda (phylum)	
Crustacea (class)	
Podocopa (order)	
Cypridae (family)	seed shrimp
Branchiura (order)	
Argulidae (family)	fish lice
Isopoda (order)	
Asellidae (family)	aquatic sow bugs
Amphipoda (order)	
Talitridae (family)	scuds
Decapoda (order)	
Astacidae (family)	crayfish
Palaemonidae (family)	freshwater shrimp
Insecta (class)	
Ephemeroptera (order)	
Ephemeridae (family)	mayflies
Baetidae (family)	mayflies
Odonata (order)	
Libellulidae (family)	dragonflies
Gomphidae (family)	dragonflies
Aeschnidae (family)	dragonflies
Coenagrionidae (family)	damselflies
Hemiptera (order)	
Hydrometridae (family)	water measures
Mesoveliidae (family)	water treaders
Gerridae (family)	water striders
Vellidae (family)	broad-shouldered water striders
Naucoridae (family)	creeping water bugs
Nepidae (family)	water scorpions
Belostomatidae (family)	giant water bugs
Corixidae (family)	water boatman
Gelastrocoridae (family)	toad bugs
Trichoptera (order)	
Hydroptilidae (family)	caddis flies
Psychomyiidae (family)	caddis flies
Leptoceridae (family)	caddis flies
Lepidoptera (order)	aquatic caterpillars
Coleoptera (order)	
Haliplidae (family)	crawling water beetles
Dytiscidae (family)	predaceous diving beetles
Gyrinidae (family)	whirligig beetles
Hydrophilidae (family)	water scavenger beetles
Elmidae (family)	riffle beetles

Helodidae (family)	
Curculionidae (family)	weevils
Noteridae (family)	burrowing water beetles
Staphylinidae (family)	rove beetles
Diptera (order)	
Tipulidae (family)	craneflies
Culicidae (family)	phantom midges
Tendipedidae (family)	midges
Ceratopogonidae (family)	biting midges
Stratiomyiidae (family)	soldier flies
Tabanidae (family)	horse flies
Syrphidae (family)	flower flies
Mollusca (phylum)	
Gastropoda (class)	
Pulmonata (order)	
Physidae (family)	pouch snails
Planorbidae (family)	orb snails
Ancylidae (family)	limpets
Ctenobranchiata (order)	
Pilidae (family)	apple snails
Viviparidae (family)	round mouthed snails
Amnicolidae (family)	pond snails
Pelecypoda (class)	
Eulamellibranchia (order)	
Unionidae (family)	freshwater mussels
Sphaeriidae (family)	fingernail clams
Corbiculidae (family)	Asiatic clams

Only limnetic sites were sampled during the drawdown (July 1971), as vegetated areas were dry. Four sweepnet stations having water depths less than 6 inches were omitted during the December 1971 sample period.

RESULTS AND DISCUSSION

Figure 2 is a checklist of invertebrate organisms collected from Lake Tohopekaliga during the period July 1970 to December 1973. Organisms other than aquatic flatworms, roundworms, earthworms, and leeches, were identified to family. Where possible common names are given.

A total of 55 taxonomic groups were recorded during the study period. Forty-seven taxons were found on littoral vegetation; littoral and limnetic benthos accounted for 40 and 29 respectively. Many taxons were collected rarely or sporadically, and are considered incidental; approximately 30 are regarded as important contributors to lake basin productivity.

Figure 3 illustrates numerical changes in standing crop related to littoral zone dewatering for three main macroinvertebrate communities (limnetic benthos, littoral benthos, and littoral phytomacrofauna). Data demonstrates that drawdown and reinundation produced a rapid and substantial increase in standing crop of invertebrates. Numbers declined to pre-drawdown levels within two years following peak standing crops. This is mainly attributed to cropping and can be correlated with substantial increases in both fish and invertebrate predator populations.

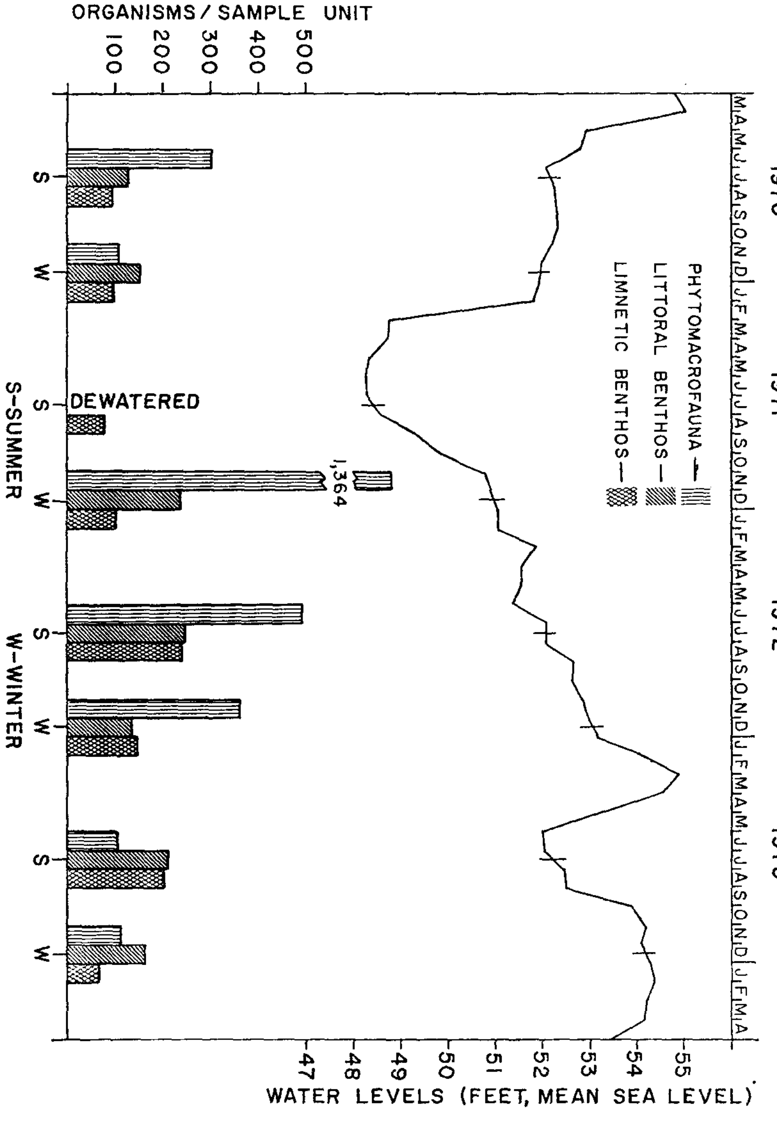

Figure 3. Average standing crop of macroinvertebrates collected in Lake Tohopekaliga from July 1970 to December 1973 from three different communities (limnetic benthos, littoral benthos, and littoral phytomacrofauna) in relation to water level hydrograph.

The most dramatic response occurred in phytomacrofauna. Seasonal pre-drawdown estimates ranged from 110 to 304 organisms per sample unit, compared to a high of 1,364 organisms per sample unit during reflooding. This represents a 350 percent increase, attributed directly to rejuvenation of aquatic substrate accompanied by dense growth of new vegetation and associated periphyton.

Prior to dewatering numbers of littoral benthic invertebrates were 33 to 57 percent higher than limnetic. Following the drawdown populations were similar with two exceptions, the winters of 1971 and 1973. In both instances littoral numbers were twice the limnetic. Post-drawdown peaks for both zones occurred during summer 1972. Compared to pre-drawdown estimates littoral numbers increased 63%, limnetic 150%.

Severe cropping of limnetic invertebrates was anticipated during the drawdown phase (March-August 1971) due to concentration of fish populations. Only a slight reduction in numbers occurred at this time, as production apparently increased to keep pace with predation and natural mortality. This is consistent with work done by Hayne and Ball (1956) which indicated a decrease in standing crop and corresponding increase in rate of production correlated with introduction of predaceous fish to experimental ponds. They determined that productivity could reach 18% per day of the total standing crop. This figure, applied to an annual growing season of 150 days for southern Michigan, indicated an annual production 27 times greater than the standing crop. Mann (1966) cites various authors as estimating annual productivity at up to 9 times the standing crop for selected invertebrate species. Organisms displaced from dewatered littoral areas would provide additional forage for predators, further mitigating the effects of cropping on existing limnetic populations (Moon 1935, Davis and Hughes 1965).

Few limnetic benthic organisms exhibited significant changes during the study period (Table 1). Dramatic increases in oligochaetes and tendipeds account for the peak standing crop which occurred during July 1972. Total numbers decreased from this period to the end of the study. Ephemerid mayflies, genus *Hexagenia*, were the only major fish food organisms exhibiting a progressive decline throughout the study. It is not known whether this was caused by increased predation or unfavorable environmental factors.

Table 1. Invertebrates collected in limnetic Ekman[1] samples from Lake Tohopekaliga before, during and after an extreme drawdown (expressed as average numbers per square foot).

TAXON	Sample Periods 7/70	12/70	7/71[2]	12/71	7/72	12/72	7/73	12/73
Turbellaria		0.2		0.3	0.4			
Nematoda	4.8	1.3	0.5	0.6	0.1	1.1	3.4	3.1
Oligochaeta	1.1	6.8	11.4	6.9	50.9	26.1	26.9	11.8
Hirudinia	5.1	3.4	2.4	8.1	14.1	2.6	14.6	3.6
Cypridae		1.0		0.8		0.2	0.1	3.1
Talitridae	4.5	5.0	4.3	8.7	4.4	1.3	4.2	0.2
Palaemonidae				0.1				
Ephemeridae	20.7	11.1	1.5	2.7	2.6	1.4	1.3	0.9
Baetidae	0.6	0.1		4.1	0.1	0.4	0.1	0.1
Libellulidae		0.1		0.1		0.1		
Gomphidae	0.1		0.2					
Corixidae				0.1				
Hydroptilidae						0.1		
Psychomyiidae	0.1	0.6	0.1					
Leptoceridae	0.1	0.1		0.5	0.1	0.1	0.1	0.2
Hydrophilidae		0.4	0.2	0.1		0.1		
Elmidae	0.1							
Staphylinidae	0.1							
Culicidae	1.8	1.2	0.3	0.3	0.4	2.8	5.5	1.3

Tendipedidae	43.8	53.3	36.4	54.1	149.9	102.7	130.7	39.6
Ceratopogonidae	1.7	1.6	1.6	3.4	4.3	4.1	8.6	1.0
Physidae		0.1	0.1	0.2				
Planorbidae			0.1	0.1				
Ancylidae						0.1		
Viviparidae	7.3	6.0	3.8	4.1	4.2	3.3	2.9	2.0
Amnicolidae					0.1			
Unionidae	1.1	1.4	1.2	1.6	0.9	0.7	0.7	0.9
Sphaeriidae	2.5	4.0	15.2	6.4	11.4	2.4	4.8	0.1
Corbiculidae								0.1
TOTALS	95.5	97.7	77.3	103.3	243.9	148.6	203.9	68.0
Taxons Present	17	19	16	21	15	18	14	15
Number of Samples	11	11	14	14	14	14	14	14

[1]Data represents actual organisms per square foot. To convert to square yards multiply by 9.
[2]During drawdown.

Table 2 depicts littoral benthos collected during the study period. As with limnetic data, oligochaetes and tendipeds account for much of the numerical increase subsequent to the drawdown. Baetid mayflies represented a substantial portion of the population during July 1972, averaging nearly 68 organisms per square foot of substrate. Scuds (*Talitridae*) show a decreasing trend throughout the study. Species diversity increased slightly following reflooding.

It is not possible to quantitatively compare sweepnet samples (littoral phytomacrofauna - Table 3) with standard Ekman dredge samples (littoral and limnetic benthos - Tables 1 and 2); however, two major trends are obvious. Subsequent to reflooding a large increase in total number of organisms occurred within a short period of time. In addition, species diversity is consistently greater on vegetation than in either littoral or open water substrate.

Table 2. Invertebrates collected in littoral Ekman[1] samples from Lake Tohopekaliga before, during and after an extreme drawdown (expressed as average numbers per square foot).

	Sample Periods							
TAXON	7/70	12/70	7/71[2]	12/71	7/72	12/72	7/73	12/73
Turbellaria	1.9	2.7		0.2	0.1	1.7	0.1	1.6
Nematoda		0.1				0.3	3.6	0.7
Oligochaeta	14.7	13.0		29.5	13.2	32.1	36.1	25.8
Hirudinia	4.4	2.6		0.2	1.6	2.6	6.1	5.5
Cypridae				0.7			0.2	0.1
Asellidae	0.3							
Talitridae	47.2	27.5		28.2	20.6	7.9	5.3	11.2
Astacidae						0.1		
Palaemonidae		0.4		0.2	1.6	0.6	0.1	0.3
Ephemeridae	4.0	3.1				0.1	0.1	0.1
Baetidae	2.2	6.7		17.8	67.7	10.9	9.6	5.5
Libellulidae	0.3	0.4		2.7	0.2	1.2	1.4	0.2
Gomphidae	0.1	0.1				0.1	0.1	0.1
Coenagrionidae	0.4	0.2		2.4	0.9	0.3	0.8	0.3
Mesoveliidae					0.2		0.3	0.1
Gerridae								0.1
Nepidae				0.1				
Corixidae				0.4				0.1
Hydroptilidae	0.7	0.6		0.2	0.7	0.7	0.4	0.4
Psychomyiidae	0.6	0.6				0.1		0.2
Leptoceridae	2.5	4.7		3.1	2.0	0.6	2.2	0.7
Lepidoptera	0.2				0.2	0.1		

Haliplidae		0.3		0.1	0.1			
Dytiscidae		0.2		0.1		0.4		
Hydrophilidae	0.3	0.2		1.9	1.7	0.1	0.8	0.4
Helodidae					0.1	0.1		
Culicidae	0.2	0.2			1.9	13.7	7.1	3.1
Tendipedidae	38.7	84.2		144.1	131.8	58.6	130.1	97.6
Ceratopogonidae	3.4	2.4		0.4	1.2	1.0	2.0	1.7
Stratiomyiidae							0.1	
Tabanidae				0.1	0.1		0.3	
Physidae	0.2	0.1		0.4	0.7	0.2	0.1	0.1
Planorbidae	0.2			4.5	2.5	1.2	0.2	0.1
Ancylidae	0.2	0.1		0.1		1.2	1.9	0.4
Viviparidae	1.4	1.8			0.2		0.9	0.6
Pilidae							0.3	
Amnicolidae					0.1			
Unionidae	0.3	0.6					0.7	0.4
Sphaeriidae	2.6	0.8			0.3		0.3	0.1
TOTALS	127.2	153.6		237.3	249.9	135.8	211.1	163.1
Taxons Present	24	25		21	26	24	27	29
Number of Samples	18	18	0	17	18	18	18	18

[1]Data represents actual organisms per square foot. To convert to square yards multiply by 9.
[2]During drawdown.

The data in Table 3 shows phenominal increases in standing crop occurred for those organisms commonly utilized by fishes. Aquatic earthworms, scuds, freshwater shrimp, baetid mayflies, dragonflies, damselflies, and midge larvae responded rapidly and were the most important organisms in this category. Most increased by a factor of 10 to 15 times their numbers prior to dewatering. Water boatman "bloomed" in vegetated areas after reinundation, as did pouch and orb snails. Populations of other organisms also increased, but their total numbers remained comparatively low. Species diversity decreased slightly during the study period.

Predaceous macroinvertebrates such as dragonflies, damselflies, and certain hemipterans show definite increases subsequent to the drawdown; these may well account for much of the invertebrate cropping which occurred. Their numbers remained high through the July 1973 sample period, while prey organisms demonstrated significant decreases.

Table 3. Invertebrates (phytomacrofauna) collected in littoral sweepnet[1] samples from Lake Tohopekaliga before, during and after an extreme drawdown (expressed as average numbers per sample unit).

TAXON	7/70	12/70	7/71	12/71[2]	7/72	12/72	7/73	12/73
Turbellaria	9.7	3.6		1.3	2.5	11.3		4.3
Oligochaeta	2.7	6.5		175.4	127.1	6.5	0.4	1.8
Hirudinia	0.6	0.2		0.2	0.1	6.1		0.4
Cypridae				14.6				
Argulidae	0.1							
Asellidae	0.1							
Talitridae	177.9	37.2		365.0	80.7	99.5	10.2	5.8
Astacidae					0.2	0.1		
Palaemonidae	2.4	2.6		51.1	41.4	65.8	1.5	7.1
Baetidae	2.7	6.0		122.3	55.7	11.0	9.7	6.9
Libellulidae	2.2	0.1		21.6	0.1	1.6	5.9	0.1
Aeschnidae				0.1				0.1
Coenagrionidae	5.4	4.1		74.5	17.9	13.6	20.7	4.3
Hydrometridae	0.1			0.1			0.1	
Mesoveliidae	2.3			6.8	5.6	0.3	19.1	0.2
Gerridae				0.1	0.1			
Vellidae	0.1			0.1	0.1			
Naucoridae	1.2				1.1	0.7	0.4	
Nepidae	1.6	0.1		0.4	7.7	0.5	6.0	0.1
Belostomatidae	0.3			0.3	1.2		0.4	
Corixidae				61.1	0.1	8.4		10.4
Gelastocoridae	0.3							
Hydroptilidae	5.1	5.3		4.1	2.9	1.3	0.3	
Psychomyiidae	5.0	0.6			0.2	0.7	0.1	1.8
Leptoceridae	1.2	1.1		2.0	0.5	0.1	1.0	0.2
Lepidoptera	0.2	0.4		4.3	1.8	2.0	1.0	0.5
Dytiscidae	0.5			0.4	0.2	0.1	0.1	0.1
Gyrinidae		0.1		0.5				
Hydrophilidae	0.4	0.3		29.6	0.3	0.6	0.3	0.1
Elmidae	0.1							

Circulionidae		0.2						
Noteridae	0.1							
Tipulidae				0.2				
Culicidae	0.1			0.1			0.1	0.1
Tendipedidae	66.8	31.1		255.1	119.8	121.1	25.3	63.2
Ceratopogonidae	0.8	0.3		13.7	1.3	0.1	0.8	
Stratiomyiidae	0.1			0.3		0.7	0.6	
Tabanidae		0.1		2.6	0.2	0.3		
Tetanoceridae				0.2				
Syrphidae						0.1		
Physidae	5.9	3.7		20.4	12.3	3.3	0.5	1.6
Planorbidae	0.8	0.1		33.1	8.4	2.7	0.3	1.0
Ancylidae	1.9	0.1		2.0	0.6	4.2	0.3	0.8
Viviparidae	6.6	6.6						0.2
Pilidae						0.1	1.7	0.1
Unionidae							0.2	
Sphaeriidae	0.2	0.1				0.1	0.1	
TOTALS	303.7	110.5		1363.7	493.1	362.9	107.1	111.1
Taxons Present	34	24		34	29	29	27	25
Number of Samples	18	18	0	14	18	18	18	18

[1]One standard unit approximately 1.8 cubic yards. Do not equate with Ekman data.
[2]During drawdown.

Investigations concerning food and feeding habits of largemouth bass were conducted concurrently with this study. Freshwater shrimp, water boatmen, larval midges, dragonflies, and damselflies increased dramatically in dietary importance following the drawdown as reflooding occurred. Numbers ingested remained high, and in some cases have steadily increased since reflooding (Chew, 1971 and 1972; Barwick, 1973; unpublished, D-J Federal Aid Annual and Completion Reports, Project F-24, Florida Game and Fresh Water Fish Commission, Tallahassee, Florida). The increased incidence of these organisms in bass stomachs corresponded with increases documented by sweepnet data.

CONCLUSIONS

There is no doubt that aquatic vegetation plays a major role in invertebrate production. Crowell and Hudson (1967), in studying Lake Francis Case, found that invertebrate production in smartweed/periphyton communities was 7 to 30 times greater than on unvegetated reservoir bottoms. In Lake Tohopekaliga benthic standing crops from littoral and limnetic substrate are similar; however, submerged and emergent vegetation adds a significant dimension to lake productivity. Phytomacrofauna account for a much larger standing crop and greater species diversity than either littoral or limnetic benthos. Vegetation also provides habitat for many groups of invertebrate organisms utilized by fishes which would not otherwise occur, or would do so infrequently.

Improvements in littoral substrate and increases in vegetation density and diversity subsequent to drawdown significantly increased standing crop of macroinvertebrate organisms. Declining trends are evident following peak standing crops which occurred during and shortly after reflooding. These are attributed to cropping by vertebrate and invertebrate predators. Within two years standing crops decreased to near predrawdown levels.

Phytomacrofauna commonly utilized as fish food exhibited the most dramatic increase following reflooding. Species occurrence in largemouth bass stomachs corresponded to numerical increases in respective populations. Aquatic earthworms, scuds, freshwater shrimp, and larval baetid mayflies, dragonflies, damselflies and midges were the most important groups in this category. As a final expression of increased production, standing crop of sportfish increased during the study period from 151 to 236 pounds per acre in the littoral zone, and from 34 to 54 pounds per acre in the limnetic (Wegener and Williams, in press).

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FISH POPULATION RESPONSES TO IMPROVED LAKE HABITAT UTILIZING AN EXTREME DRAWDOWN[1]

Co-Authors
William Wegener and Vincent Williams
Fisheries Division
Florida Game and Fresh Water Fish Commission
207 West Carroll Street
Kissimmee, Florida 32741

ABSTRACT

An extreme drawdown conducted on Lake Tohopekaliga rejuvenated littoral substrate, stimulated development of desirable aquatic plants and increased macroinvertebrate production. As a result of these beneficial changes standing crops of fish in littoral areas increased from a high of 191 pounds per acre before the drawdown to 455 pounds per acre within two years after reflooding. Limnetic standing crops increased from 59 pounds per acre to 127 pounds per acre during the same period. Biomass of sportfish nearly doubled, although forage fish accounted for a higher percentage of the population following reflooding. Individual species response to the drawdown varied. Numbers of harvestable size sportfish increased following reflooding. The monetary value of the Lake Tohopekaliga fishery increased by 37 percent, or $6,222,186.

INTRODUCTION

Fish management efforts for large lakes in the southeast are generally oriented towards increasing or improving sport fisheries. Avenues for accomplishing these aims are quite diverse, but can be categorized into two basic approaches: directly managing one or more species of a population or indirectly managing the fishery by altering aquatic habitat.

The use of water fluctuation as a fish management tool was proposed by many early workers, although incorporating adequate and timely fluctuations into large reservoirs specifically for sportfish management purposes is a relatively new technique. Hulsey (1958) recommended drawdowns to induce predator cropping, control noxious vegetation, aid in rough fish removal, and improve bottom substrate. In recent studies, Herman, Campbell and Redmond (1969) attributed increased growth rates for largemouth bass and a decline in forage bluegill populations to a short summer drawdown on Little Dixie Lake in Missouri. Lantz (1974) documented a correlation between increased fishery production and extreme annual water fluctuation for several Louisiana lakes.

Studies concerning lake drawdowns have generally dealt either with predator cropping for species management of a fish population or with reduction of "nuisance"

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