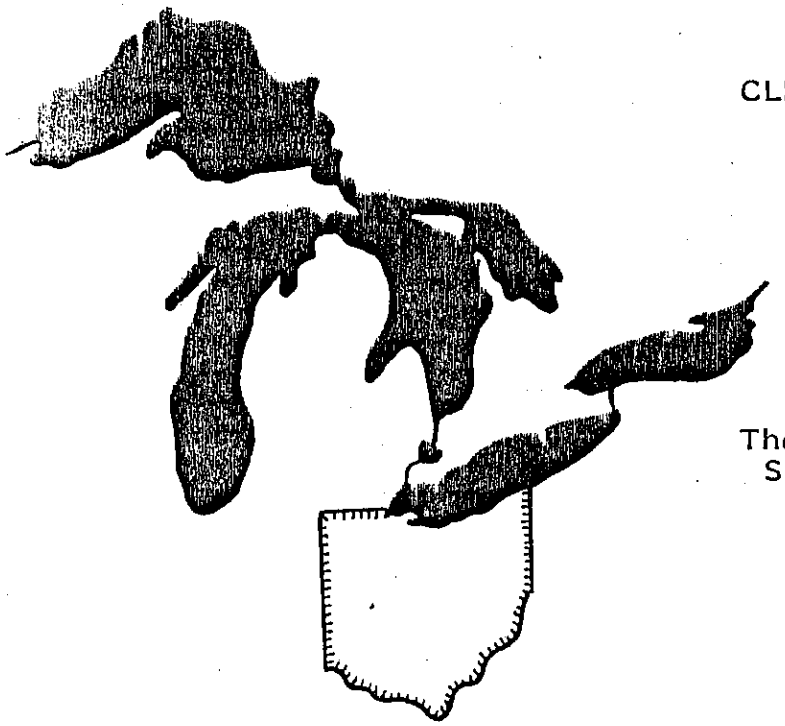

CLEAR TECHNICAL REPORT NO. 318

The Experimental Winter Seining of Gizzard Shad (Dorosoma cepedianum) from the Warmwater Discharge Area of Lorain Harbor

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THE EXPERIMENTAL WINTER SEINING OF GIZZARD SHAD (Dorosoma cepedianum) FROM THE WARMWATER DISCHARGE AREA OF LORAIN HARBOR

INTRODUCTION

The gizzard shad (Dorosoma cepedianum) is the most abundant fish species in Lake Erie. This is not unexpected as it is able to utilize phytoplankton as a food source (Bodola, 1955). The gizzard shad is predominantly a southern, warm-water species which did not appear in Lake Erie until about 1850 (White et al., 1986), and, while the gizzard shad has proliferated in the nutrient-rich waters of Lake Erie, it has remained relatively rare in the colder waters of the upper Great Lakes. Even in Lake Erie it has been subject to massive die-offs induced by the cold in the late fall and winter. These die-offs are most frequently observed in harbors and river mouths near warmwater discharges where the shad congregate (Reutter and Herdendorf, 1976). Because the gizzard shad is a schooling species, huge numbers may die in a short period of time, causing significant clean-up problems for communities and clogging problems at water intakes in the vicinity.

The Ohio Sea Grant College Program, since its inception in 1977, has had as one of it major goals the development of markets for underutilized species, and the gizzard shad has been a prime candidate for market development. Initial marketing efforts for fertilizers were unsuccessful, and efforts with meat meal and oil rendering companies were only marginally successful.

In the early 1980's, efforts shifted to the bait industry beginning with crayfish bait in Louisiana. This was followed by

test marketing with Florida Sea Grant and the charter fishing industry in the Florida Keys. This market requires a finely ground product which is frozen into 5-8 lb "chum blocks." These frozen chum blocks are placed in mesh bags and suspended from the fishing boat. As the block thaws, the fine pieces of shad fall from the bag and attract game fish. Because of its high oil content, the gizzard shad was felt to be a prime candidate for the chum block market. Preliminary tests in 1985 and 1986 indicated further testing was warranted.

Lorain Harbor was selected as a test collection site because: 1) it contained a warm water discharge where shad were known to congregate, 2) physically, it had a large, shallow, protected area which was very seinable, and 3) dead or dying shad were creating clean-up problems for the City of Lorain and an Ohio Edison power plant.

In 1986, Ohio Edison agreed to support a collection and marketing study in Lorain to be conducted by the Ohio Sea Grant College Program. With the approval of the Ohio Division of Wildlife, the project was initiated in 1987.

OBJECTIVES

This study had three primary objectives:

1. to determine if gizzard shad could be harvested in commercial quantities from Lorain Harbor;
2. to determine if significant numbers of non-target game fish were harvested and adversely impacted by the shad-harvesting procedure; and
3. to produce chum blocks in Lorain, ship them to Florida, and test market/evaluate them in Florida.

PROCEDURES

Whites Landing Fisheries, Inc., was hired to construct a shore seine and harvest the gizzard shad in a commercial fashion. Ohio Edison requested and was granted permission by the U.S. Army Corps of Engineers to construct a small beach adjacent to their property from which to seine. The Ohio Division of Wildlife issued a collector's permit for this experimental work.

Seining was completed on 10 occasions between 8 December 1987 and 25 February 1988. The seine was a 200-ft. bag seine of 1-inch square mesh.

With the exception of gizzard shad, all fish collected were identified, enumerated, weighed and measured. One hundred gizzard shad were randomly selected from each collection and weighed and measured. The total weight of all gizzard shad was also determined, and, based on the mean weight obtained from the 100 shad, an estimate of the total number was obtained.

The shad were hauled by truck to the Lagana Fish Company, Inc., where they were ground, frozen, packaged and labeled. For the marketing study, the product was called "Lake Erie Power Chum." Approximately 40,000 lbs. of these blocks were shipped to Florida in March 1988. With the assistance of the Florida Sea Grant College Program, six distributors were identified as cooperators in Florida--Aylesworth Fish Co. of Tampa; City Fish Inc. of Marathon; Harry H. Bell and Sons Inc. of Tampa; Islamorada Fish Co. of Islamorada; Key Largo Fisheries Inc. of Key Largo; and Summerland Seafood Inc. of Summerland Key. When the research team arrived in Florida, they discovered that the

level of public awareness and interest in their effort was quite high. On Summerland Key the team was visited by representatives of the E. Fish Company and, at their request, agreed to add them to the group of cooperators, making a total of 7 companies. Each cooperator agreed to distribute the experimental blocks to reliable customers, at no charge, with a questionnaire to be completed and returned to the Ohio Sea Grant College Program.

RESULTS

On the ten sampling dates between 8 December 1987 and 25 February 1988, a total of 309,255 fish, representing nine species, were harvested (Table 1). Of this total, 309,143, or 99.96% were gizzard shad. No salmonids, yellow perch (Perca flavescens), or walleye (Stizostedion v. vitreum) were harvested, and only three white bass (Morone chrysops) were harvested.

Attachment A is the summary of the evaluations of the users. A total of 99 evaluations were returned. Results of respondents indicate that 63% felt the packaging was better than most blocks; 56% said the appearance was better than most; 55% said the performance was better than most; and 90% said they would like to purchase more. Additional written comments were very constructive in suggesting packaging modifications and indicated the potential existence of sub-markets depending on the size of the ground pieces of shad.

CONCLUSIONS

Tests to determine whether gizzard shad can be harvested commercially near a thermal discharge in Lorain Harbor were very successful. Furthermore, results indicated that the harvest of

non-target species was extremely low and certainly did not represent a significant adverse environmental impact.

Results also indicated that local processing into chum blocks was possible in Lorain, those blocks which were produced were more than satisfactory for the Florida chum block industry, and a market for the blocks exists in Florida.

Based on mortality rates in excess of 90% predicted by White et al. (1986), it appears that utilization of the gizzard shad in chum blocks represents a sound management strategy to avoid wasting a portion of the resource. This process also eliminates extensive clean-up costs for communities by creating a salable product from what had previously been considered trash.

LITERATURE CITED

Bodola, A. 1955. Life history of the gizzard shad, Dorosoma cepedianum (LeSeuer), in Western Lake Erie. Ph.D. Dissertation, The Ohio State Univ. Columbus, Ohio.

Reutter, J.M. and C.E. Herdendorf. 1976. Thermal discharge from a nuclear power plant: predicted effects on Lake Erie fish. Ohio J. Sci. 76:39-45.

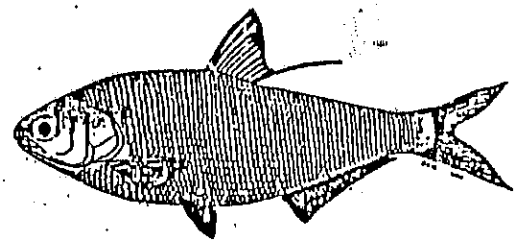
White, A.W., F.D. Moore, N.A. Alldridge, and D.M. Loucks. 1986. The effects of natural winter stresses on the mortality of the eastern gizzard shad, Dorosoma cepedianum, in Lake Erie. Rept. No. 78. John Carroll Univ. and Environmental Resource Associates, Inc. Cleveland, Ohio. 209 p.

TABLE 1
Summary of Seining Efforts at Lorain Harbor
from 12/8/87 - 2/25/88

DATE	SPECIES	NUMBER* MEASURED	Mean Length (mm)	Mean Weight (g)	Total Weight (Kg)	Shad Total Number Est.
12/8/87	Gizzard Shad	4	119	-		4
12/23/87	Gizzard Shad	9	150	19 g	.17 kg	9
1/12/88	Gizzard Shad	100	175	68 g	2059 kg	30,279
	Goldfish	1	291	476 g	.5 kg	
	GoldfishXCarp	1	464	2,000 g	2.0 kg	
	White Sucker	1	247	146 g	.1 kg	
1/19/88	Gizzard Shad	100	187	87 g	362 kg	4,161
	Carp	1	309	2,268 g	2.3 kg	
	Gold Fish	4	286	433 g	1.7 kg	
	Freshwater Drum	1	306	255 g	.3 kg	
1/29/88	Gizzard Shad	5	127	14 g	0.07 kg	5
	Carp	1	602	4,400 g	4.4 kg	
	Emerald Shiner	1	97	4 g	.004 kg	
2/9/88	Gizzard Shad	100	201	137 g	4,233 kg	30,898
	Brn Bullhead	1	286	335 g	.3 kg	
	Carp	21	494	1,870 g	39.3 kg	
	Goldfish	7	274	513 g	3.6 kg	
	Freshwater Drum	1	406	476 g	.5 kg	
	White Bass	1	370	548 g	.5 kg	
2/11/88	Gizzard Shad	100	206	106 g	2,540 kg	23,962
	Bluegill	1	131	67 g	.07 kg	
	Carp	12	528	2,497 g	30 kg	
	Freshwater Drum	3	335	297 g	.9 kg	
	Goldfish	5	319	761 g	3.8 kg	
2/16/88	Gizzard Shad	100	154	31 g	2,595 kg	83,710
	Carp	7	528	2,429 g	17 kg	
	Goldfish	2	304	591 g	1.2 kg	
	White Bass	2	155	44 g	.09 kg	
2/23/88	Gizzard Shad	100	174	48 g	4,424 kg	92,167
	Carp	16	455	1,782 g	28.5 kg	
	Goldfish	11	292	627 g	7.0 kg	
	GoldfishXCarp	1	409	1,200 g	1.2 kg	
2/25/88	Gizzard Shad	100	181	58 g	2,549 kg	43,948
	Brn Bullhead	1	325	410 g	.4 kg	
	Carp	2	352	997 g	2 kg	
	Goldfish	7	292	567 g	4 kg	

* Total number harvested for species other than Gizzard Shad

ATTACHMENT A



GIZZARD SHAD.

SUMMARY

LAKE ERIE POWER CHUM

EVALUATION FORM

N = 99

1. How many Lake Erie Power Chum blocks did you get? 7.7 average

2. On how many fishing trips did you use these blocks? 3.0 average

3. The packaging of these chum blocks was: (check one)

20% a. The best I have seen.
43% b. Better than most.
31% c. About the same as most others.
5% d. A little below average.
1% e. Greatly inferior

If (d) or (e), please explain: _____

_____

4. The visual appearance of these blocks was: (check one)

20% a. The best I have seen.
36% b. Better than most.
42% c. About the same as most others.
2% d. A little below average.
0% e. Greatly inferior

If (d) or (e), please explain: _____

_____

5. How would you rate the performance of your Lake Erie Power Chum blocks?

12% a. Best I have used.
43% b. Better than most I have used.
39% c. About the same as most others I have used.
6% d. Below average.
0% e. The worst I have used.

If (d) or (e) selected, what was the problem? _____

_____

6. What fish did you catch when you used Lake Erie Power Chum blocks?

50% a. Grouper
89% b. Yellowtail snapper
54% c. Other snappers
59% d. Grunts/Porgies
43% e. Mackerels
11% f. Shark
1% g. Dolphin
0% h. Tuna
14% i. Bonita
42% j. Jacks
29% k. Bait fish
12% l. Other, specify - Ballyho, Squid, Bluefish, Cobia, Ladyfish, Kings, Sea Trout

7. Was the particle size and rate of flow from the chumbag of Lake Erie Power Chum acceptable?

87% a. Yes
13% b. No (If no, what was the problem?) _____

8. I would like to purchase more Lake Erie Power Chum.

90% a. Yes 10% b. No

9. Where did you get your Lake Erie Power Chum? See attached sheet.

10. How much did you pay? 93% Free 7% - Various amounts

11. I am a:

44% a. Private fisherman.
14% b. Charter captain.
42% c. Commercial fisherman

12. How many chum blocks do you use per year? 304.11 average

13. Approximately how many days do you fish per year? 114.5 average

14. Has this been your first contact with:

Any Cooperative Extension Service Program? 88% Yes 12% No

Any Sea Grant Program? 80% Yes 20% No

15. Please complete the following:

Name: _____

Street Address: _____

City, State, Zip: _____

Telephone: ( ) _____

Please return this form to:
David O. Kelch
District Specialist
Ohio Sea Grant Extension Program
1575 Lowell Street
Elyria OH 44035
(216) 322-0127

Answers to question 9: Where did you get your Lake Erie Power Chum?

City Fish Market, Marathon	42%
Summerland Sea Food, Inc.	23%
"E" Fish, Summerland Key	13%
Key Largo Fisheries	13%
Hall's Bait and Tackle	2%
Aylesworth Seafood	2%
Islamorada Fish Co.	1%
Harry H. Bell & Sons	1%
East Coast Fishery	1%
Gasprilla Fisher - Miller's Marina	1%
Pete's Corner Store Bait	1%