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FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-9-R-17

FISHERIES INVESTIGATIONS - REGION 5-A

Job No. IV Life History Study of the Flathead Catfish (*Pylodictus olivaris*)

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SUMMARY

Field work was continued on the Medina and Rio Grande watersheds. The most efficient collection tools were found to be the telephone generator and large mesh gill nets. After a period of three months, one of every three fish caught in a four-inch bar mesh gill net was a tagged fish, thereby illustrating how effective gill nets would be in drastically reducing the flathead population.

Stomach analyses were completed on over 800 young-of-the-year and juvenile flatheads, and 600 adult fish were tagged and released in the two watersheds.

The growth rate of young fish is approximately 9 mm per month over a 12-month period.

There has not been sufficient data gathered to make any valid assumptions pertaining to movement patterns of reproduction.

The distribution of Pylodictus olivaris on the North American continent is included in the text and shown by map.

A bibliography of published and unpublished reports is also included herewith.

JOB PROGRESS REPORT

State Texas

Project No.: F-9-R-17 Project Title: Fisheries Investigations - Region 5-A

Job No.: IV Job Title: Life History Study of the Flathead Catfish (Pylodictus olivaris)

Period Covered: December 1, 1968 to November 30, 1969

Background:

The need for an efficient predator to control forage and overproductive game fishes in streams and lakes has long been recognized as one of the most pressing problems in fisheries management. Numerous fisheries investigators have conducted limited research with the flathead catfish, stocked alone and in combination with other fish species. However, this research has been restricted by the fact that adequate numbers of stocking-sized catfish of known age have not been available.

Because fisheries personnel have recognized this need for large numbers of various sized flathead catfish of known ages, many attempts have been made to propagate this species.

Disease, cannibalism, failure of fry to accept food, and other yet unknown factors have greatly hindered the success of these endeavors.

Because of its possible value as a tool in fisheries management, and its value as a food and sports fish, and the difficulties encountered in the propagation of this species, it seemed necessary to conduct a life history study of the flathead catfish. This study was designed to investigate and research this fish in its native habitat.

Two radically different watersheds were chosen as sites for the initial phases of this study, the Rio Grande River with its highly turbid waters, and the much smaller Medina River with its clear spring-fed waters. Both rivers are known to support substantial flathead populations. This contrast will provide an excellent opportunity to observe any differences in feeding habits, spawning, growth rates, and other pertinent data.

Objectives:

During this segment, research objectives included the following:

1. To research literature on the use of sonic and radio tracking equipment.

2. To compile a bibliography on flathead catfish in general.

3. To determine size range and growth rates of 0-1 age class in both river and lake habitats.

4. To determine food and habitat requirements for pre-adult flatheads.

5. To determine whether flatheads in connecting rivers and lakes maintain separate and distinct populations.

6. To determine spawning locations and seasons.

7. To determine individual movement and migration patterns.

8. To determine methods of spawning and rearing flatheads in hatchery ponds.

Procedures:

Correspondence was continued with various agencies and individuals connected with research on the flathead catfish. A bibliography is included in this report with the annotated bibliography to be included in the final report.

During this segment, 803 young flatheads were collected for stomach analyses, and 709 larger fish (200 mm+) were tagged with plastic spaghetti tags and monel strap tags to determine movement and rate of growth (see Table 4).

The telephone generator was used for collecting young-of-the-year and juvenile flatheads in both the Medina and Rio Grande watersheds.

Can traps were again used in varied arrangements with negative results.

A fine mesh nylon bag (1/8" mesh) was sewn into a thirty-foot bag seine and used in conjunction with a telephone generator on the Medina and Rio Grande Rivers to collect post-larval flathead fry. This method also proved inefficient. The seine was used in small, isolated areas of the Rio Grande during rotenone collections. Again, juvenile fish were collected, but no fry appeared.

For larger fish, the telephone generator was utilized during the warmer months and gill nets during winter months.

Table 1
Monthly Variation in Foods of Flathead Catfish 9-79 mm S. L.
1968-1969

Per Cent of Total Occurrence

Time and Watershed	RG 8-68	M 8-68	RG 9-68	M 9-68	RG 10-68	M 10-68	RG 11-68	M 11-68	RG 3-69	M 3-69	RG 4-69	M 4-69
Stomachs examined w/food	0	77	0	0	0	44	35	0	13		24	12
Plant Material									2.2			
Crustacea						**15.8						
Decapoda						15.8						
Mollusca												
Insecta*		97.9				77.5	99.4		93.3		99.2	87.5
Ephemeroptera		55.2				65.8	62.3		6.7		54.6	50.0
Baetidae												
Odonata		3.6				2.5	8.9		13.3		4.2	
Aeschnidae						.8					.8	
Libellulidae		.5									1.7	
Coenagrionidae							4.9		2.2			
Trichoptera		10.9				2.5	15.7		57.8		21.0	
Hydropsychidae		10.9				2.5	15.7		57.8		21.0	
Coleoptera							.3					
Lepidoptera		14.6					.3					
Pyralidae		14.6					.3					
Diptera		.5				.8	11.1		15.6			
Chironomidae									4.4			
Simuliidae							80.0					
Neuroptera		6.8				1.7					6.2	
Corydalidae		6.8				1.7					6.2	
Corydalus sp.		6.8				1.7					6.2	
Plecoptera											6.2	
Unidentifiable insect remains		6.2				4.2	.6					
Miscellaneous insects									.8			
Osteichthyes		.5				1.7						
Percidae		.5										
Fish remains						1.7						
Unidentifiable animal tissue		1.0				4.2	.6		4.4		.8	12.5
Miscellaneous		.5				.8						

Table 1 (Con.)
Monthly Variation in Foods of Flathead Catfish 9-79 mm S.L.
1968-1969

Per Cent of Total Occurrence

Time and Watershed	RG 5-69	M 5-69	RG 6-69	M 6-69	RG 7-69	M 7-69	RG 8-69	M 8-69	RG Total	M Total	Overall Total
Stomachs examined w/food	4		31	1	38	25	29	27	174	186	360
Plant Material						1.0			.1	.2	.1
Crustacea										3.8	1.2
Decapoda										3.8	1.2
Mollusca							.8	1.5	.1	.2	.1
Insecta*	100.0		100.0		99.3	98.0	98.4	95.6	99.0	92.1	96.9
Ephemeroptera	31.2		55.0		5.7	43.4	10.1	47.1	36.0	54.0	41.6
Baëtidae								2.9		.4	.1
Odonata					4.0	1.0	28.7	1.5	8.1	2.4	6.3
Aeschnidae									.1	.2	.1
Libellulidae									.2	.2	.2
Coenagrionidae					2.7		27.1		5.4		3.7
Trichoptera	75.0		8.3		30.8	9.1	31.0	7.4	23.5	7.7	18.6
Hydropsychidae	75.0		8.3		30.8	9.1	31.0	7.4	23.5	7.7	18.6
Coleoptera						1.0		2.9	.1	.6	.2
Lepidoptera						1.0		2.9	.1	6.2	2.0
Pyralidae						1.0		2.9	.1	6.2	2.0
Diptera	6.2		34.9		58.9	34.3	27.9	27.9	30.2	11.1	24.3
Chironomidae			18.9		34.1	1.0	27.9	1.5	15.6	.2	10.9
Simuliidae			2.4		12.0	33.3		25.0	6.3	10.1	7.5
Neuroptera										3.2	1.2
Corydalidae										3.2	1.2
Corydalus sp.										3.2	1.2
Plecoptera										.2	.1
Unidentifiable insect remains			1.8		.3	2.0	.8	5.9	.6	5.4	2.1
Miscellaneous insects									.1		.1
Osteichthyes						1.0				.8	.2
Percidae										.2	.1
Fish remains						1.0				.4	.1
Unidentifiable animal tissue				100**			.8	2.9	.5	2.4	1.1
Miscellaneous					.7				.2	.5	.2

* All insects immature except Coleoptera
** Only one stomach examined

RG - Rio Grande River
M - Medina River

Table 2

Monthly Variation in Foods of Flathead Catfish 80-199 mm S.L.
1968-1969

Per Cent of Total Occurrence

Time and Watershed	RG	M 8-68	RG	M 9-68	RG	M 10-68	RG	M 11-68	RG	M 3-69	RG	M 4-69
Stomachs examined w/food	2	14				47		57		38		74	12
Plant Material						.8		.1		1.4		.9	
Crustacea						5.4							5.6
Decapoda						5.4							5.6
Mollusca													
Miscellaneous													
Insecta*	50	22.5				83.7		99.2		92.5		92.5	83.3
Ephemeroptera	25	2.5				64.3		68.4		23.8		57.1	61.1
Baetidae								6.6					
Odonata		2.5						8.1		9.5		15	2.8
Aeschnidae								.1				1.3	
Agrionidae										.7			
Libellulidae												1.3	
Coenagrionidae								4.3		4.1		.9	
Trichoptera		5				5.4		5		29.9		10.2	
Hydropsychidae		5				5.4		5		29.9		10.2	
Coleoptera						.8						.4	11.1
Diptera	25					2.3		17.2		12.9		13.7	2.8
Chironomidae										10.9			
Simuliidae						1.5		15.6				4.0	
Neuroptera						4.7		.3		15		3.1	5.5
Corydalidae						4.7		.3		15		3.1	5.5
Corydalus sp.						4.7		.3		15		3.1	5.5
Plecoptera													
Lepidoptera		12.5											
Pyralidae		12.5											
Insect Remains						6.2		.5		1.4		2.7	
Osteichthyes	50	77.5				7		.7		2.7		2.2	5.5
Cyprinidae		2.5				.8							
Notropis sp.		2.5											
Ictaluridae	25	2.5				.8		.3		2		.4	
Ictalurus punctatus	25	2.5						.1		2		.4	
Pylodictus olivaris						.8		.1					
Centrarchidae		37.5				.8							
Lepomis sp.		37.5											
Percidae													2.8
Fish Remains	25	27.5				3.9		.3		.7		1.8	2.8
Unidentifiable animal tissue						3.1				3.4		4.4	5.5

Table 2 (Con.)
Monthly Variation in Foods of Flathead Catfish 80-199 mm S. L.
1968-1969

Per Cent of Total Occurrence

Time and Watershed	RG 5-69	M 5-69	RG 6-69	M 6-69	RG 7-69	M 7-69	RG 8-69	M 8-69	RG Total	M Total	Overall Total
Stomachs examined w/food	50	16	43	23	30	6	19	12	313	130	443
Plant Material					.5			2.3	.3	.6	.4
Crustacea				.9			1.2		-	2.1	.4
Decapoda				.9			1.2		-	2.1	.4
Mollusca	.5	3.4			.4		2.5		.2	-	.2
Miscellaneous					.9				.1	-	.1
Insecta*	98.4	89.7	99.2	94.8	95.8	100	90.1	84.1	97.1	84.1	94.7
Ephemeroptera	23.1	75.9	72	76.7	18.2	90.8	12.3	56.8	52.8	65.9	55.2
Baetidae				5.2				27.3	1.9	3.8	1.6
Odonata	2.1		1.7	1.7	19.6		34.6	2.3	8.7	1.1	7.3
Aeschnidae					.5				.2	-	.2
Agrionidae									-	-	-
Libellulidae	.5						1.2		.2	-	.2
Coenagrionidae			.7		13.6		27.2	2.3	4.3	.2	3.5
Trichoptera	67.2		15.6	2.6	37.8	3.9	28.4	6.8	20.1	3.8	17.1
Hydropsychidae	67.2		15.6	2.6	37.8	3.9	28.4	6.8	20.1	3.8	17.1
Coleoptera	.5				.9			2.3	.2	1.3	.4
Diptera	1.6	6.9	9.2	1.7	15.9		13.6	2.3	12.4	1.9	10.4
Chironomidae					14		11.1		2.6	-	2.1
Simuliidae								2.3	4.9	.6	4.1
Neuroptera	.5	6.9	.2	3.4	.5	2.6		11.4	1.6	4.4	2.1
Corydalidae	.5	6.9	.2	3.4	.5	2.6		11.4	1.6	4.4	2.1
Corydalus sp.	.5	6.9	.2	3.4	.5	2.6		11.4	1.6	4.4	2.1
Plecoptera		3.4							-	.2	-
Lepidoptera						2.6	1.2	2.3	.1	3.0	.6
Pyralidae						2.6	1.2	2.3	.1	3.0	.6
Insect Remains	3.2		.3	3.4	2.8				1.2	2.5	1.4
Osteichthyes	.5		.3	4.3	.5		6.2	11.4	1.2	11	3.0
Cyprinidae									-	.4	.1
Notropis sp.									-	.2	-
Ictaluridae				.9			1.2		.4	.6	.5
Ictalurus punctatus				.9					.3	.4	.3
Pylodictus olivaris									-	.2	.1
Centrarchidae								4.5	-	3.8	.7
Lepomis sp.									-	3.2	.6
Percidae									-	.2	-
Fish Remains	.5		.3	3.4	.5		4.9	6.8	.7	5.1	1.5
Unidentifiable animal tissue	.5	10.3	.5		1.9			2.3	1.1	1.9	1.2

* - All insects immature except Coleoptera. RG - Rio Grande River M - Medina River

Table 3

Monthly Variation in Foods of Flathead Catfish 200 mm + S.L.
1968-1969

Per Cent of Total Occurrence

Time and Watershed	RG 8-68	M 8-68	RG 9-68	M 9-68	RG 10-68	M 10-68	RG 11-68	M 11-68	RG 3-69	M 3-69	RG 4-69	M 4-69
Stomachs examined w/food	5	1					4		4		3	
Insecta*	33.3						40		20			
Ephemeroptera	8.3						20					
Trichoptera	16.6											
Hydropsychidae	16.6											
Neuroptera	8.3						20		20			
Corydalidae	8.3						20		20			
Corydalus sp.	8.3						20		20			
Osteichthyes	66.6	100					40		80		83.3	
Cyprinidae	8.3											
Notropis sp.	8.3											
Ictaluridae	50						20					
Ictalurus sp.	33.3						20					
Remains	16.6											
Centrarchidae									20		33.3	
Lepomis sp.											33.3	
Pomoxis sp.									20			
Clupeidae									60		50	
Dorosoma sp.									60		50	
Sciaenidae												
Aplodinotus sp.												
Percidae		100										
Fish Remains	8.3						20					
Unidentifiable animal tissue							20				16.7	

Table 3 (Con.)
Monthly Variation in Foods of Flathead Catfish 200 mm + S. L.
1968-1969

Per Cent of Total Occurrence

Time and Watershed	RG M 5-69	RG M 6-69	RG M 7-69	RG M 8-69	RG M Total	Overall Total
Stomachs examined w/food	2	1			19 / 1	20
Insecta*					21.9 /	21.2
Ephemeroptera					6.2 /	6.1
Trichoptera					6.2 /	6.1
Hydropsychidae					6.2 /	6.1
Neuroptera					9.4 /	9.1
Corydalidae					9.4 /	9.1
Corydalus sp.					9.4 /	9.1
Osteichthyes	100	100			71.9 /100	72.7
Cyprinidae					3.1 /	3.0
Notropis sp.					3.1 /	3.0
Ictaluridae					27.9 /	21.2
Ictalurus sp.					15.6 /	15.2
Remains					6.2 /	6.1
Centrarchidae	33.3				12.5 /	12.1
Lepomis sp.	33.3				9.4 /	9.1
Pomoxis sp.					3.1 /	3.0
Clupeidae		100			21.9 /	21.2
Dorosoma sp.		100			3.1 /	3.0
Sciaenidae	33.3				3.1 /	3.0
Aplodinotus sp.	33.3				3.1 /	3.0
Percidae					/100	3.0
Fish Remains	33.3				9.4 /	9.1
Unidentifiable animal tissue					6.2 /	6.1

* - All insects were immature forms.
RG - Rio Grande River
M - Medina Lake and River

Table 4
Tagging and Recovery Data

Medina

Months	10-68	11-68	12-68	1-69	2-69	3-69	4-69	5-69
Fish Tagged	74-R*			0-R	0-R	0-R	29-R	70-R
	3-L**	0	0	10-L	27-L	72-L	16-L	4-L
	6-R				0-R	0-R	2-R	14-R
Tags Recovered	0-L	0	0	0	2-L	25-L	7-L	0-L
Months	6-69	7-69	8-69	9-69	10-69	11-69	12-69	Total
Fish Tagged	27-R	31-R	28-R	17-R	10-R	0-R	0-R	286-R
	0-L	7-L	11-L	2-L	3-L	4-L	13-L	172-L
	5-R	9-R	22-R	15-R	14-R	1-R		88-R
Tags Recovered	0-L	4-L	4-L	1-L	0-L	0-L	0	43-L

* - Medina River
** - Medina Lake

Rio Grande River

Months	10-68	11-68	12-68	1-69	2-69	3-69	4-69	5-69
Fish Tagged	0	18	No	Work	Done	15	37	32
Tags Recovered	0	0	No	Work	Done	0	0	2
Months	6-69	7-69	8-69	9-69	10-69	11-69	12-69	Total
Fish Tagged	46	37	62		3	41	0	291
Tags Recovered	2	4	8		0	1	0	17

Findings:

Previous collection methods were improved, and flatheads of all sizes (except post-larval) were collected efficiently.

The telephone generator is ineffective in waters below 60° F.

The majority of the gill nets were 4-inch bar mesh and were extremely successful in winter months (Table 5). As noted, this bar mesh proved highly selective for flathead catfish from 10-70 pounds and larger cyprinids. This size mesh will be employed extensively in the next segment along with 5-inch mesh nets.

In an effort to collect more young adult fish (1-8 pounds), 1,000 feet of 3-inch bar mesh gill netting was employed with limited success. Many other species of fish, including many game fish, were collected in the 3-inch nets along with a few flatheads in the desired size range. Therefore, for time expended and specimens acquired, 3-inch nets were not suitable.

Two flatheads were taken from an illegal hoop net on the Rio Grande River that had been placed in a narrow channel of swift-flowing water. These fish were tagged and released at a point some distance downstream. One of the two fish had been tagged before.

Habitat:

Adult lake fish were collected in water from 10-90 feet in depth by gill nets, but with limited success in depths over 45 feet. Most fish were taken near the old river channel in 15-35 feet of water. The only areas in this depth range that did not yield fish consistently were heavily silted or were old submersed fields.

Adult lake and river fish were collected with the telephone generator in water depths of from 4-25 feet around obstructions such as boulders, large trees, and rock ledges. As determined in the previous segment, adult fish were always found where some current existed, regardless of water depth. Also, as in segment 16, young-of-the-year and 1-2 year class fish were collected in shallow, fast-moving water over a hard rock or brush littered bottom.

In the summer the old river channel in the upper part of Medina Lake was approximately 18 feet deep in the center with the banks of the channel being 7-10 feet under water. Late in the summer, heavy rains on the watershed raised the lake level by 12-14 feet and telephone generator collections a few days afterward produced numerous young-of-the-year fish along the old river channel in 18-20 feet of water where only one such fish had been observed during all previous collections.

Table 5
Medina Lake Netting Results

Month	1-69	2-69	3-69	4-69	5-69	6-69
Fish Tagged	10	27	72	16	4	-
Recaptures	0	2	25	7	1	-
Sport Fishermen Tag Returns	0	0	0	1	2	2
Nights Worked	2	5	6	4	2	-
Approximate No. of Feet of Net.	600	2,500	9,000	4,000	1,000	-
Month	7-69	8-69	9-69	10-69	11-69	12-69
Fish Tagged	-	-	-	-	4	13
Recaptures	-	-	-	-	-	-
Sport Fishermen Tag Returns	1	1	-	-	2	-
Nights Worked	-	-	-	-	1	2
Approximate No. of Feet of Net	-	-	-	-	2,400	2,700

Reproduction:

Information on flathead reproduction is still vague and inconsistent. It is apparent, in both the Rio Grande and Medina watersheds, that all females do not develop at the same time of the year. Insufficient numbers of spawning sized adults have been sacrificed to show any definite spawning activity patterns. Specimens will be sacrificed in greater numbers from the Rio Grande River during the next segment in order to gain more knowledge of sexual development patterns. The Medina River will be excluded from this phase of data collection because of its relatively small size. Its recruitment potential is far below that of the Rio Grande and continued harvest of adult fish would probably produce a noticeable change in the overall population.

In the few fish sacrificed previously, there were few mature females in any specific size group. In the course of stomach analyses, 9 fish in the 79-235 mm (1.125% of the total) range contained ovaries with developed eggs. Of these nine fish, taken from the Rio Grande River, eight were between 79 and 168 mm.

Work was initiated on the Medina Hatchery in an effort to spawn flatheads artificially. Three pairs of fish were used, and females were injected with chorionic gonadotropin at the rate of 500 I. U. per pound of body weight.

One spawn was obtained and moved to the San Marcos Hatchery catfish incubator. The resulting fry appeared to be deformed, did not absorb the yolk sac, and eventually died. Water temperature at the Medina Hatchery was 83° F. preceding and during the spawn and was probably the key factor involved in the failure of the fry to survive.

A total of eight feral fish were transferred from Medina Lake to the Medina Hatchery to be used in the 1970 spawning season. A number of fish in the .5 to 2.0 pound size range from the Rio Grande were stocked in ponds on the hatchery in 1968 for use as broodfish in the future.

Valuable information during this segment, relative to reproduction and culture of flatheads, was obtained at the U. S. Department of Interior Fish Farming Experimental Station, Stuttgart, Arkansas, from Kermit Sneed and John Guidice. Their findings indicate that the combination of healthy, hatchery-reared broodstock and the use of chorionic gonadotropin injections is the most consistent method of inducing flatheads to spawn under hatchery conditions.

Growth Rate:

To date, data does not show a definite growth rate of adult fish by weight during a specified period of time. However, tagged adult fish do exhibit an average length increase of 7.5 mm per month.

Growth of young-of-the-year during the past two years averages 10.0 mm per month for fish in the Medina River and 8.3 mm per month for Rio Grande flatheads (Table 6a and 6b). Although Medina River fish overtook the Rio Grande fish by November in 1968, the reverse occurred by November 1969. The only explanation of this reversal, that can be offered at this time, is that there is nearly six weeks difference in the fall collection times in 1969 and the Rio Grande fish had a lead of 4 mm more in July 1969. By adding an extra six weeks growth to the Medina fish (15 mm) and subtracting the 4 mm gained by July from the average length of the Rio Grande fish, the growth trend of 1969 is the same as in 1968. Considering these inconsistencies, data will be collected in 1970 as it was in 1968 to substantiate the trend.

The smallest fingerlings collected in June average 110 mm standard length and are believed to be one year old. Assuming the spawn occurred in June of the preceding year, they would, therefore, exhibit a growth rate of approximately 9 mm per month over a 12-month period. This rate appears consistent in both watersheds.

Movement Patterns:

Movement of all recaptured fish appears to be quite random both in frequency and distance (Table 7). Of the 709 fish captured and tagged, only 22 fish were recaptured. Two of these were recaptured two times and two, three times. The average number of days of freedom between recapture is 28.1 days. There is no correlation between period of freedom and distance of movement.

Movement of fish in both the Medina and Rio Grande Rivers is basically the same as that for Medina Lake. Some were recaptured two and three times exhibiting erratic movement with no relation to period of freedom.

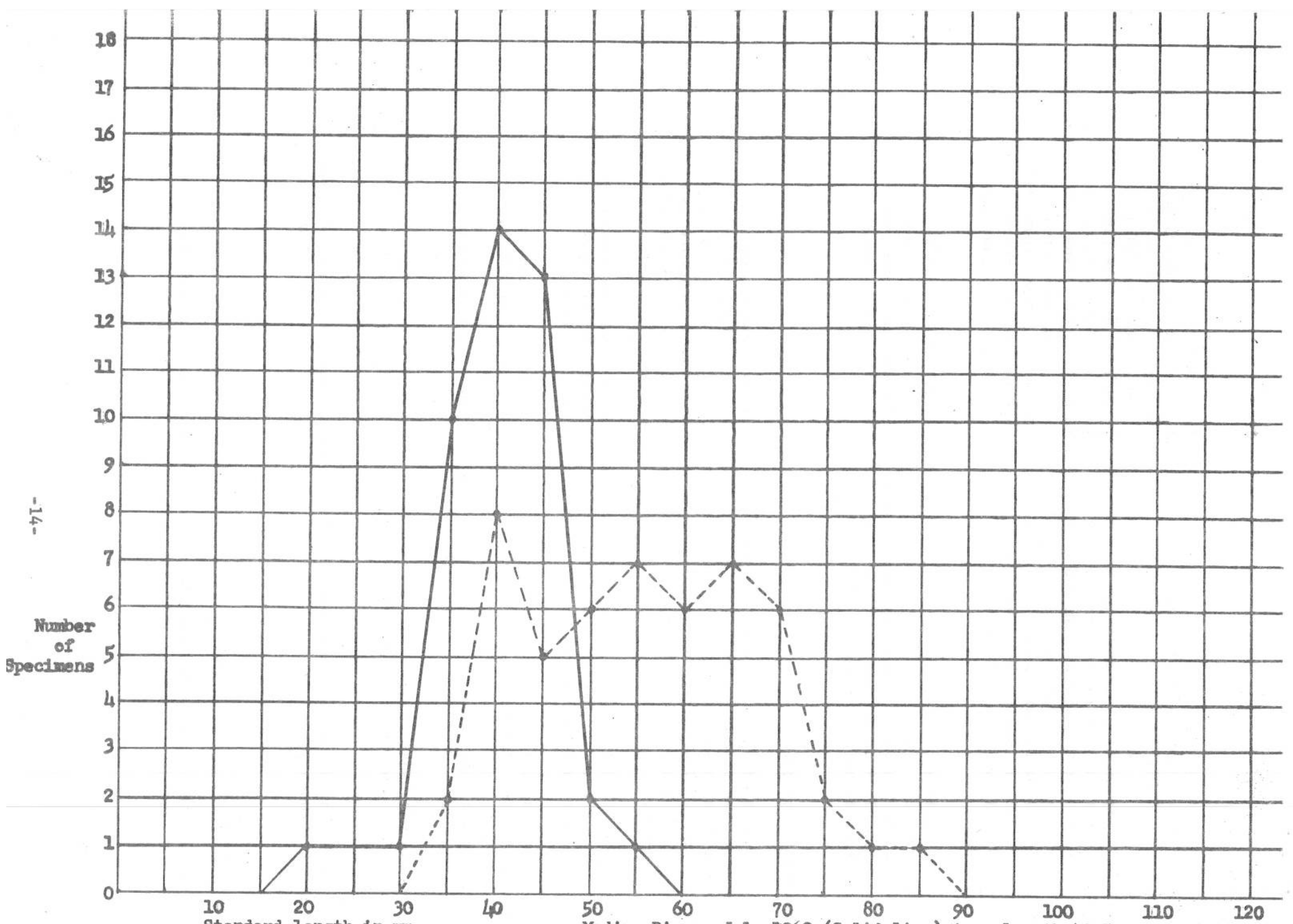
Twenty additional tags have been returned by fishermen and game management officers. The weight of these fish varied from 1 to 45 pounds and showed movements of from .25 to 4.0 miles in Medina Lake. One fish tag returned from the Rio Grande River showed the fish moved approximately 10 miles upstream.

Although biased by a number of factors, tag returns from anglers indicate that 65 per cent of these fish were caught within 60 days after release (Table 8).

It is hoped that a larger number of fish can be tagged in early 1970 and sonic instruments will be used to obtain more conclusive data on movement patterns.

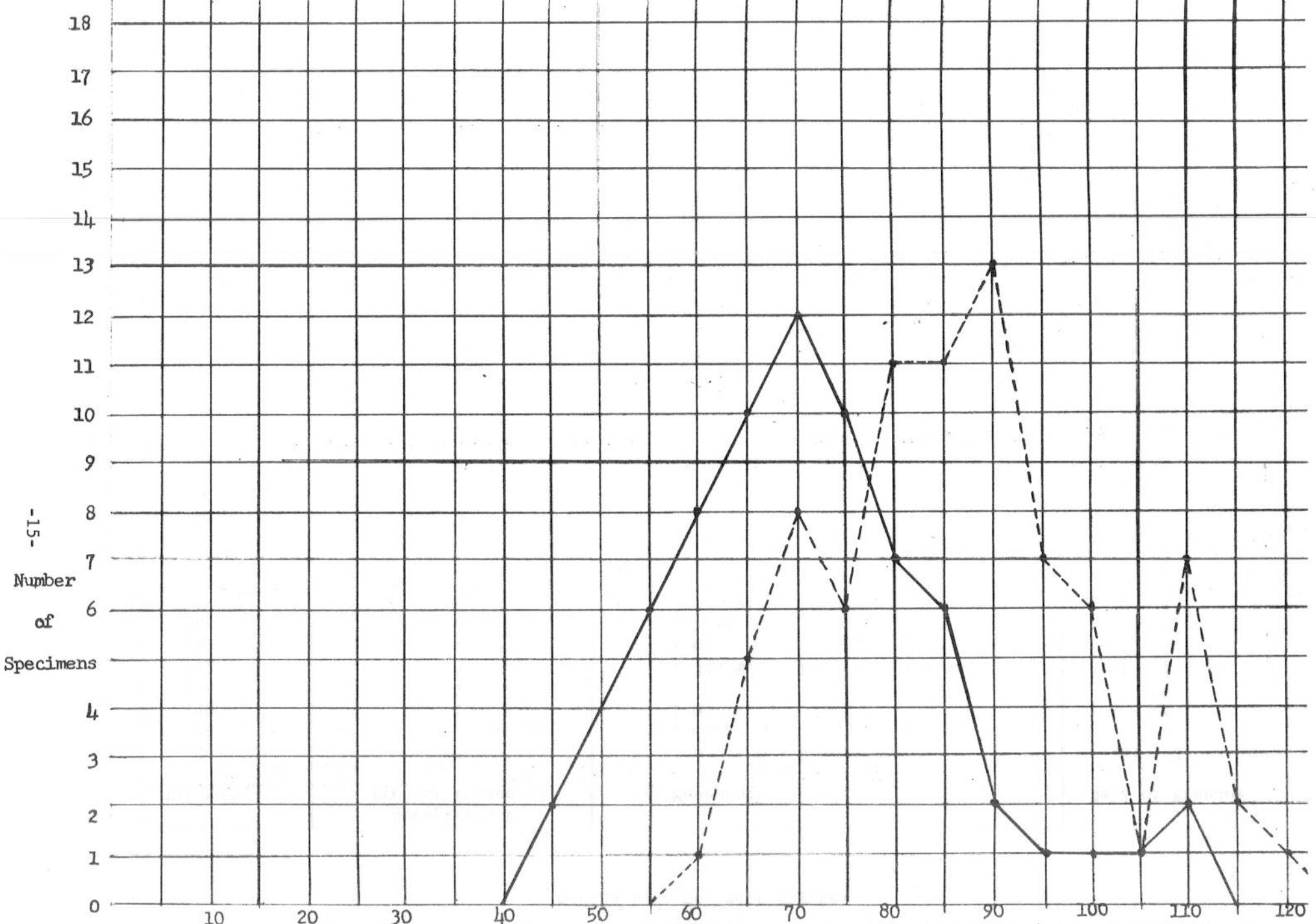
Food Studies:

A total of 823 flathead catfish stomachs were examined during this segment. These specimens were divided into three size groups:



Medina River, July 1969 (Solid line) Avg. length 40.5mm
Rio Grande River, July 1969 (Broken line) Avg. length 55.9mm

TABLE 6-a



Medina River, October 1969 (Solid line) Avg. length 72.2mm
Rio Grande River, Nov. 1969 (Broken line) Avg. length 87.0mm

TABLE 6-b

Table 7
Medina Lake Movement Figures

Tag No.	Recaptures by Project Personnel	Movements	Days of Freedom
31	3	1 mi. - 0 - 0	181 - 2 - 7
129	1	1 mi.	92
130	1	1 mi.	41
156	1	0	36
162	3	1 3/4 mi. - 1/4 mi. - 3/4 mi.	21 - 1 - 34
164	1	1 mi.	22
166	1	1/4 mi.	19
169	2	1 3/4 mi. - 1/4 mi.	20 - 1
171	1	1/2 mi.	26
172	1	1/2 mi.	26
192	1	1 3/4 mi.	19
194	1	1 mi.	39
197	1	0	1
208	1	0	2
209	1	0	7
211	1	0	2
212	1	1/4 mi.	68
222	1	0	7
235	1	1 1/2 mi.	34
236	1	1 1/2 mi.	33
244	2	1/4 mi. - 1/4 mi.	5 - 20
274	1	1/2 mi.	20

Table 8
Elapsed Time Between Tagging and Recovery - Sportfishing

Date Tagged	Tag Recovered	Days Elapsed
November 13, 1969	November 18, 1969	5
July 3, 1969	July 14, 1969	11
June 24, 1969	July 4, 1969	11
March 21, 1969	April 7, 1969	17
October 3, 1969	October 23, 1969	20
April 15, 1969	May 12, 1969	27
June 12, 1969	July 10, 1969	28
June 12, 1969	July 19, 1969	37
May 14, 1969	June 26, 1969	42
May 2, 1969	June 18, 1969	47
March 19, 1969	May 9, 1969	51
May 14, 1969	July 7, 1969	54
March 20, 1969	May 17, 1969	58
June 24, 1969	September 6, 1969	74
March 13, 1969	June 6, 1969	85
May 9, 1969	August 8, 1969	91
July 30, 1969	November 22, 1969	115
March 12, 1969	August 9, 1969	150
April 1, 1969	September 16, 1969	168
March 14, 1969	September 13, 1969	187

A. 9-79 mm standard length - Table 1

B. 80-199 mm standard length - Table 2

C. 200 mm+ standard length - Table 3

These tables substantiate the assumption drawn in the previous segment that Medina River flatheads change to a fish diet at an earlier age than do the Rio Grande fish. From Table 3 it should be noted that 71.9 per cent of the stomachs from the Rio Grande fish contained fish or fish remains while 100 per cent of the stomachs from the Medina River contained fish remains. Tables 1 and 2 show the same trends but with some variation in percentages relative to Table 3. Analysis of these tables yields the following stomach content percentages:

	Fish or Fish Remains	Insects or Insect Remains
Table 1		
Medina	0.8	92.1
Rio Grande	0.0	99.0
Table 2		
Medina	11.0	84.1
Rio Grande	1.2	97.1
Table 3		
Medina	100.0	0.0
Rio Grande	71.9	21.9

Although many insect orders were present in these analyses, Ephemeroptera was the preferred food.

The stomachs of the larger flathead catfish (10 pounds or greater) indicate these fish feed on gizzard shad, crappie, carp, and various sunfish as large as is possible to swallow. Shad removed from stomachs range up to 200 mm. Partially digested carp that had an approximate total length of 200 mm have been found in gill nets alongside large flatheads.

Stomach analyses will be conducted on those fish from the Rio Grande that are to be sacrificed for sexual development data in the next segment. These analyses should provide more basis for conclusive feeding habits of large adult flatheads.

Discussion of Tables:

Tables 1-3 were compiled from examinations of 823 flathead stomachs. Figures given are for percentage of occurrence.

Table 4 is a record of tagging activities for each watershed. Fish listed were taken by either a telephone generator or gill net.

Table 5 illustrates the effectiveness of large-mesh gill nets in collecting flatheads. Nets used were primarily 4-inch bar mesh with 3-inch bar mesh being employed 25 per cent of the time.

Table 6a compares standard lengths of young-of-the-year collected in July in the Medina and Rio Grande Rivers. This chart is used to determine the average length in July for comparison with average length in November to yield a growth rate during the prime growing period.

Table 6b is the average lengths in the fall used in conjunction with Table 6a.

Table 7 lists information gained from fish recovery by project personnel in an effort to determine movement trends and periods of freedom. Insufficient fish recoveries were made to draw sound conclusion.

Table 8 is a record of tagged fish captured by fishermen and the "tag recovered" data is occasionally an estimated time accurate to ± 5 days. As noted earlier in this report 65 per cent of these returns occurred within 60 days after release. Most tag returns were from Medina Lake. The tagging operation was concentrated in a part of the lake where the most trotline fishing is encountered. Also, most fish tagged in Medina Lake were at a time just prior to the peak trotline fishing period. Therefore, the only valid conclusion to be drawn is that handling the fish did not have an adverse effect on feeding habits or movement.

Distribution on the North American Continent:

Although it was not included in the original job description, correspondence with virtually every state agency yielded complete distribution information on Pylodictus olivaris, and is included herewith.

The flathead catfish is found (and native to) the Gulf Coast from Texas, across to the western two-thirds of Alabama, then northeastward through the northwest corner of Georgia, western fringes of North Carolina and Virginia, through most of West Virginia to the southwest corner of Pennsylvania. Its northern range extends westward through Ohio, southern Michigan, Indiana, Illinois, southern part of Wisconsin, southeast corner of Minnesota, Iowa, up through central South Dakota to its northernmost range in the Bismark area of North Dakota. It extends southward through Nebraska, Kansas, Oklahoma, and westward through most of New Mexico. It then ranges south into Mexico (but east of the Continental Divide down to the 18th Parallel). Its southernmost range is believed to be the Rio Balsas. (Personal correspondence, May 1969, Amin Zarur Menez, Biologist, El Director Del Instituto Nacional De Investigeciones Biologico Pesqueras.)

In addition to its native range, the flathead has been introduced in other areas. Those introductions are as follows:

Florida: 1965 Lake Beulah (in south Florida) - 1 specimen captured 1969.

South Carolina: 1965 Santee-Cooper Reservoirs and Hartwell Lake - results unknown.

Colorado: 1958 Adobe Creek and Bonny Dam Reservoirs - believed unsuccessful (personal correspondence 1969, R. A. Jones, Director of Game, Fish, and Parks, State of Colorado).

Idaho: Early 1940's Snake River - apparently producing.

Oregon: Snake River - apparently reproducing.

Washington: Not recorded but may have moved downstream in Snake River.

Arizona: 1962 Colorado River, also San Carlos Reservoir on Gila River. Responding well. Reproducing populations established.

California: Imperial County, All American Canal system. Recruited from Arizona introductions in Colorado River. Established population.

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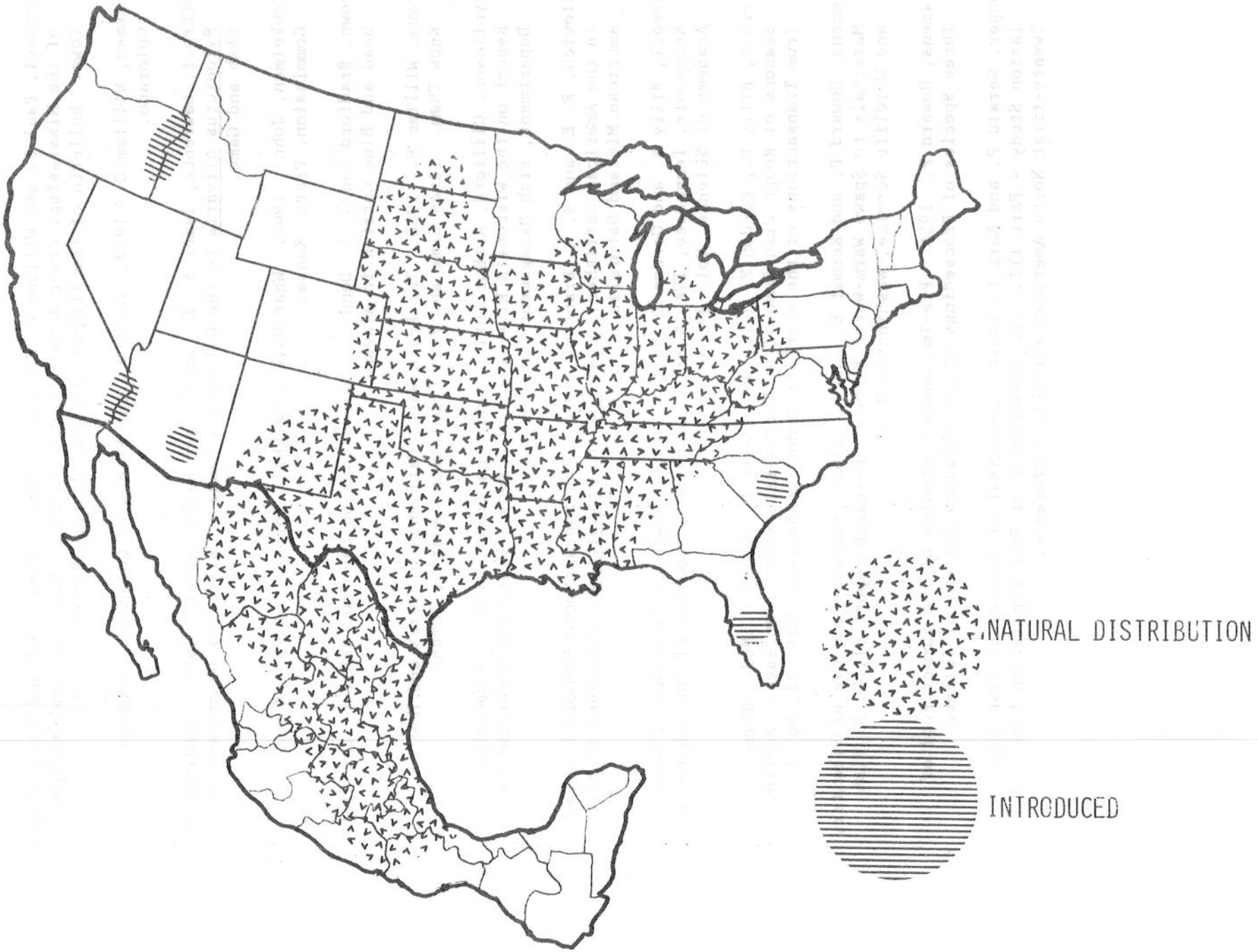
Coordinator

Date March 19, 1970

Elgin M. C. Dietz
Inland Supervisor

DISTRIBUTION OF FLATHEAD CATFISH



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