

1980 MORMON ISLAND CRANE MEADOWS
FISH INVENTORY

prepared for The Nature Conservancy

by

John Cochnar

David Jenson

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ABSTRACT

From June through October of 1980, a fishery inventory was conducted for the Nature Conservancy on the newly acquired Mormon Island Crane Meadows, (MICM). Three major areas were sampled including 1) 3 channels of the Platte River, 2) a sandpit isolated from the river, and 3) a sandpit adjacent to and frequently connected to the river during periods of high water. The river channels were sampled at various sites and sub-habitats using hand seines. The 2 sandpits were sampled using hoop nets, gill nets and jug fishing. Voucher specimens of each fish species collected were preserved. Data recorded while sampling included fish length, and weight, plus the number of hours each net was set. Temperature and dissolved oxygen readings were also taken in both sandpits.

The results of this sampling produced a total of 33 different species from the river and sandpits. Twenty-six species were collected in the river, 10 species in pit 1, and 13 in pit 2. Distribution maps were compiled for the species found in the river. Fifteen-hundred and thirty-six net hours captured a total of 117 individual fish in pit 1, while 370 net hours collected 122 fish in pit 2. A total of 107.1 pounds of fish were caught in pit 1 with carpsuckers (Quillback and River) comprising 72.8 total pounds or 68% of the total weight of all fish captured. Fifty-eight pounds of fish were caught in pit 2, with carpsuckers comprising 56% of this total.

Pit 1 was sounded and a bottom contour map was prepared.

Management proposals for the 3 major water areas are set forth in this report. It was determined that obtaining a minimal stream flow in each of the 3 river channels would greatly enhance the diversity and survival of the fish species found. During July of the study, the North and Middle channels had no surface water flow. During the no flow period, isolated potholes contained only those fish tolerant to poor water quality conditions. The presence of minimal flows would provide better conditions for other migratory and resident wildlife species that use the river for a water and food source.

Sandpit 2 would be best managed by diking the southeast corner to stop the invasion of the river during high water. This would eliminate fish passage as well as slow down the sedimentation process. Sandpit renovation would then be in order.

Pit 1 should also be renovated. The renovation would improve waterfowl habitat for nesting and migration. Planting various natural waterfowl food stuffs (i.e. smartweed, bulrush, etc.) would also speed this process and very likely would increase the usage of the area by waterfowl.

It was also concluded that future research should be conducted to determine the effects of the management plans used.

INTRODUCTION

Mormon Island Crane Meadows has two main aquatic habitat types. The first habitat type is the Platte River. This consists of three main channels: North, Middle and South channels (Figure 1). The South and Middle channels carry the largest percentage of periodic flowing water. The North channel divides from the Middle Channel and is the shortest of the three channels. Along with the three main channels, there are numerous small channels which wind throughout the island. These channels contain water during wet years and during periods of seasonal flooding.

The second aquatic habitat type is sandpits. Sandpit #1 is totally isolated from the river and is about 2.2 acres in size, while Sandpit #2 is .7 acres in size, and is located directly adjacent to the river (Fig. 1). During periods of the year when the river is high, river water flows into it.

This study was conducted to compile a species inventory list of fish present in river habitat adjacent to MICM.

Another purpose of the study was to inventory fish populations of sandpits #1 and #2, determine relative abundance of fish species present in sandpits #1 and #2, and determine the population condition of the fish population of pit #1. The population condition was not analyzed for pit #2 because of water inflow and fish migration problems due to its connection with the river.

Furthermore, a management plan was formulated and future research needs were identified for the Nature Conservancy which contracted this study. The information in this study should now and in the future benefit the flora and fauna that utilize the area.

Fish species found in the river were keyed out and a relative distribution list was developed.

A voucher specimen collection was made of fish found on and around

Mormon Island, excluding threatened and endangered species. The voucher specimen collection required at least one but no more than five of each species collected.

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S-South Channel Seining Sites

N-North Channel Seining Sites

M-Middle Channel Seining Sites

FM-Flooded Meadows

SP-Sandpits

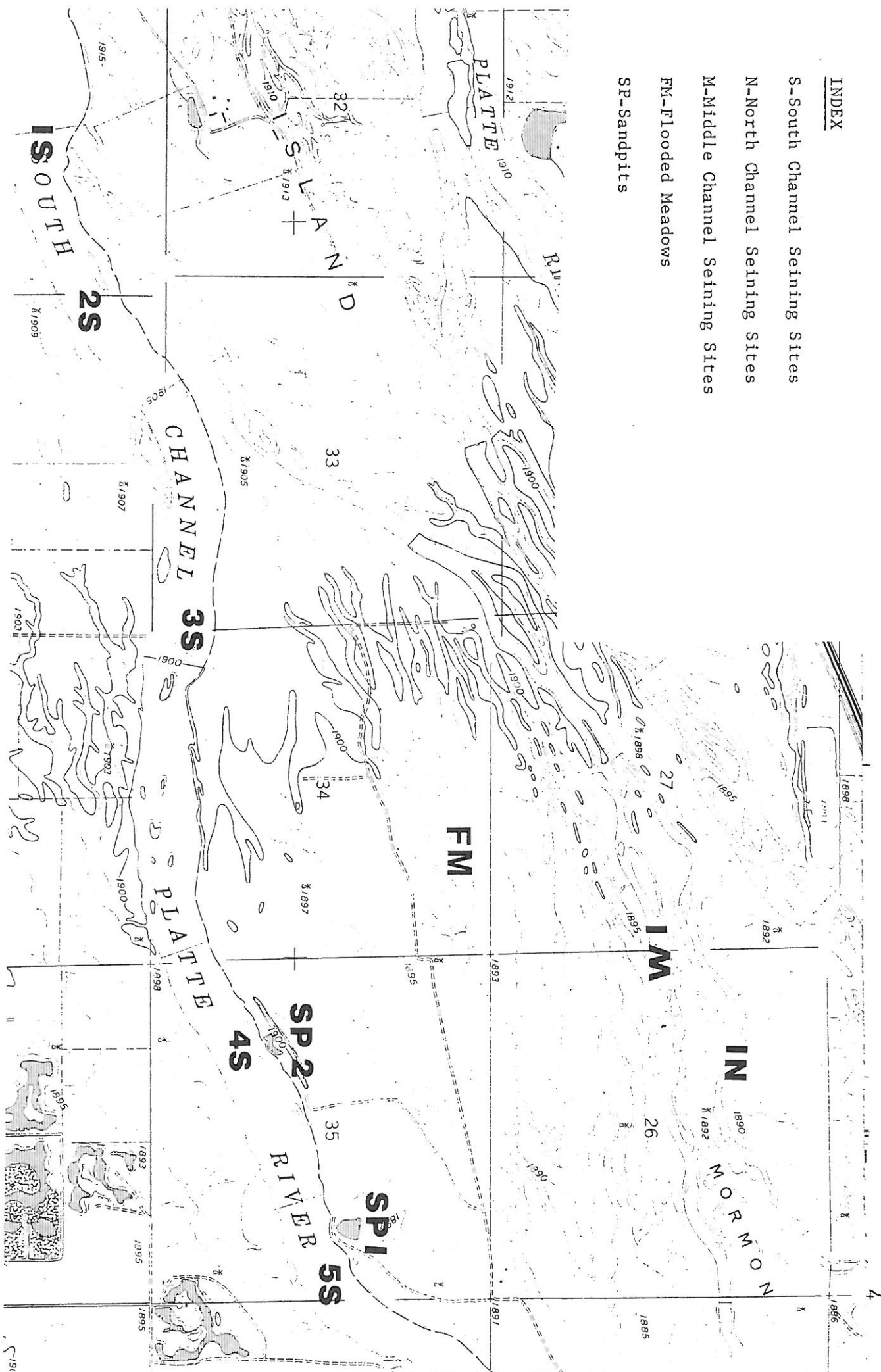


Figure 1. Fish Sampling Sites of the Mormon Island Crane Meadows

METHODS AND MATERIALS

1. Aerial photographic maps in 1 to 24000 scale of the Mormon Island Crane Meadows were obtained from the Nature Conservancy. These maps gave accurate details of the location and sizes of the river channels, flooded meadows, and sandpits that were to be sampled for fish. These maps were also important for plotting the various seining sites on each of the river channels (See Figure 1) and also facilitated the plotting of distribution maps for each fish species (Appendix A).

2. A Model 54 BR, Dissolved Oxygen Temperature Meter, manufactured by the Yellow Springs Instrument Company, located in Yellow Springs, Ohio, was used to measure dissolved oxygen and temperatures. The instrument was equipped with a drop probe and 25 feet of cable. The meter was borrowed from the Biology Department of Kearney State College, Kearney, Nebraska.

Sandpits #1 and #2 were checked for D.O. levels. Before readings were taken, the meter was properly calibrated. Sites were randomly selected in each pit. Pit #1 had 4 sampling sites, while Pit #2 had 5 sites. At the sampling sites, readings for temperature and dissolved oxygen were taken at one foot intervals from one foot below the water's surface to just above the bottom of the pits. A rigidly anchored boat was used to take these readings to insure minimal error at each site. Results were recorded in a ledger. Along with the D.O. and temperature readings, notes concerning the time of day, and the weather (cloud conditions, air temperature, barometric pressure, and wind velocity) were also recorded.

3. Seining was an important means of collecting mainly small fish in the river channels and flooded meadows. The seines used were 1/8 inch nylon mesh by 20 feet by 4 feet. They were provided by Kearney State College.

Flooded meadows, created by high river levels, were seine sampled

in May 1980. These areas were sampled 3 different times during May. By the end of May the water levels had receded. See Figure 1 for the location of these particular sampling areas.

Mainstem river channels were seined between June 29, 1980 and July 13, 1980. Prior to this period, most of the Platte River was too high to allow effective seining. The study team seined one sample site in the North Channel, one in the Middle Channel, and five in the longer South Channel. See Figure 1 for the location of these various sites.

Each sample site encompassed varying habitat conditions. Therefore an attempt was made to collect specimens from the various habitat sub-types. The main differences between these sub-types were in water velocity and depth. These differences were determined visually by the study personnel. The following is a list of the six different habitat sub-types and a description of each.

1. Fast - shallow: an area that had a noticeably rapid current, and was less than 12 inches deep.
2. Fast - deep: an area with noticeably rapid current and a water depth greater than 12 inches.
3. Still - shallow: an area of no apparent flow and less than 12 inches deep. These areas were isolated pools or standing waters backed up from a flowing channel.
4. Still - deep: this sub-habitat type had the same physical characteristics as the Still - shallow sub-habitat type, except the water depth was greater than 12 inches.
5. Slow - deep: an area with very little flow, and greater than 12 inches in water depth.
6. Slow - shallow: an area with very little water velocity, but less than 12 inches long.

Some sample sites did not have all these habitat sub-types, but the ones

that existed were sampled. These were identified and sampled to show the various locations of different fish species, and also to obtain the greatest species diversity for the inventory. The sub-type, Fast - deep, was unseizable.

Seining was usually done in an upstream fashion in areas of slow current. Two seines were usually used in sampling fast current. One seine was anchored in place across a small channel, and the other was used to drive fish downstream into the first. Still areas also were sampled with two seines if they were not isolated. Isolated still pockets were sampled in one direction using one seine.

Small fish were placed in labeled quart jars of 10% formalin for preservation. Larger fish captured were identified, recorded on data sheets, and then released. Some of the larger fish however, were also saved as voucher specimens. Some of the large fish released died due to the shock of capture and intensive heat. These fish were buried.

4. Two major sandpits are located on the preserve. Pit #1 is located north of the South Channel and is isolated from the river except during extremely high flood stages. Normally, there is no flow into the pit except for rainfall, underground water seepage, etc..

Pit #2 is located immediately adjacent to the north side of the South Channel of the Platte River, and high river water levels can easily flow into it. Water inflow into pit #2 did occur this spring, and can be expected to occur on a fairly regular basis in the future.

Sampling of these pits involved the use of two 2 foot hoop nets, one 100'x 5'x 1" mesh gill net, two 150'x 5'x variable mesh experimental gill nets, set lines and jug fishing. The pits were sampled from July 19 - October 5, 1980, after scientific collecting permits were obtained from the Nebraska Game and Parks Commission. Nets were set at various locations to obtain random capture.

Hoop nets were set out and checked approximately every 24-48 hours. Gill nets were checked every 24 hours to minimize net mortality.

The hoop nets and 100' gill net were obtained from Kearney State College. The 150' gill nets were obtained from the Nebraska Game and Parks Commission and were available only for a short period of the study. A 13 foot vee-bottom boat and a nine horsepower motor, owned by Eugene Miller, U.S. Fish and Wildlife Service of Grand Island, Nebraska, was used as a work boat.

Set lines and jugs were set using various baits and checked at periodic intervals.

Fish captured were measured for length and weight, and results were recorded on data sheets. These data sheets were also used to record the details concerning the method of capture and weather conditions. All fish captured in this study were identified either at the spot of capture, and released, or preserved and later keyed. Scales from scaled species and pectoral spines from Channel Catfish were also taken.

5. The mapping of bottom contours of Sandpit #1 consisted of first applying general surveying techniques. A benchmark was placed to establish an elevation. A Cottonwood tree located west of the sandpit was used as a benchmark. A large nail was placed in the tree about a foot from the ground and given an arbitrary elevation of 100.0. This benchmark was used as a starting point to establish other elevations around the sandpit so that in the future the study could be duplicated if needed.

An automatic level B4, telescope length 220mm, and tripod, borrowed from the U.S. Fish and Wildlife Service of Grand Island, Nebraska (both instruments manufactured by the Brunson Instrument Company of Kansas City, Missouri) along with a 25 foot fiberglass rod (model #2125 manufactured by the Hastings, Fiberglass Products Inc. Hastings, Michigan) were used to determine elevations at each headstake. One-foot wooden surveyor's stakes were used as headstakes.

Headstakes were placed 20 feet apart on a line 80° east of north. A Silvi Type 3 compass was used to obtain the bearing of true North. Then a level loop was run and closed to establish the elevation at each headstake. Next, the south headstakes were placed and elevations determined. The location of the South headstakes were determined by setting the level over each of the 21 north headstakes and lining the level up with one of the other north headstakes. Then the level was turned 90° south and a stake was set.

For a more detailed description of the surveying technique refer to the Hydraulic Simulation in Instream Flow Studies: Theory and Techniques, FWS/OBS-78/33 August, 1978, prepared by the Cooperative Instream Flow Service Group of the Fish and Wildlife Service.

The second part of the mapping involved the sounding of the sandpit. A Lorance Fish-Lo-K-Tor, LFP-150, was used to determine the depths of the sandpit. A 300 foot steel tagline was stretched from corresponding north and south headstakes. Soundings were then taken every 10 feet from a boat, at the north shore of the pit. On transects where the length of the pit exceeded 300 feet. A second tagline was used. The data was recorded in a ledger and used in mapping the contours.

After the soundings were completed, three 6 foot steel T fence posts were placed at the water's edge so as to be evenly distributed around the sandpit. Three feet of the post remain above ground, and can be used in determining future water level fluctuations of the sandpit.

RESULTS AND DISCUSSION

The following are results and discussion of the work completed for the final report. The results are categorized in the same order as presented in the Methods and Materials section.

Dissolved Oxygen - Temperature Readings

In 1976, the Environmental Protection Agency set certain standards on water quality. Dissolved oxygen was the only water quality standard tested in the 1980 Mormon Island Fishery Study.

The amount of dissolved oxygen necessary to support a good fish population is 5 mg/l or parts per million (EPA, 1976). However, dissolved oxygen concentrations of 4 ppm seems to be the lowest that will support a varied fish population, even in the winter.

Tables 1 and 2 show the dissolved oxygen and temperatures for sandpits 1 and 2 respectively. The tables indicate that dissolved oxygen levels in both pits were all above the 5 ppm criteria set for dissolved oxygen by EPA at the time of the sampling. Sampling should be conducted in the winter to determine the threat of winterkill to fish. Also shown on tables 1 and 2 are the environmental conditions and the time of day the sampling was done.

TABLE 1

Dissolved Oxygen-Temperature Readings for Sandpit #1

Date: September 28, 1980
 Water Temperature: 15°C
 Air Temperature: 14°C
 Time: 1000
 Calibration Reading: 9.6 ppm

Pit Sampling Site Locations
 Site #1 - North Central
 Site #2 - Northwest Corner
 Site #3 - South Central
 Site #4 - Southeast Corner

Depth in ft.	Site #1		Site #2		Site #3		Site #4	
	Temp.	D.O.	Temp.	D.O.	Temp.	D.O.	Temp.	D.O.
1	15	8.9	15	9.2	15	8.9	15	9.1
2	15	8.9	15	9.0	15	8.8	15	8.8
3	15	8.8	15	8.9	15	8.8	15	8.6
4	15	8.8	15	8.9	15	8.7	14	8.6
5	14	8.7	15	8.8	14	8.7	14	8.4
6	14	8.6	14	8.7	14	8.7	14	8.3
6½	14	8.3	14	8.5				
7	BOTTOM		BOTTOM		14	8.6	14	8.3
8					14	8.6	14	8.1
9					14	8.4	14	7.9
10					14	8.1	14	7.7
11					14	7.9	14	7.1
11½					BOTTOM		BOTTOM	

NOTE - Temperatures in °C

Dissolved Oxygen readings taken in parts per million or mg/l.

TABLE 2

Dissolved Oxygen-Temperature Readings for Sandpit #2

Date: September 28, 1980
 Water Temperature: 15°C
 Air Temperature: 14°C
 Time: 1050
 Calibration Reading: 9.6 ppm

Pit Sampling Site Locations
 Site #1 - South Central
 Site #2 - Northeast Corner
 Site #3 - Northwest Corner
 Site #4 - Southwest Corner
 Site #5 - North Central

Depth in ft.	Site #1		Site #2		Site #3		Site #4		Site #5	
	Temp.	D.O.	Temp.	D.O.	Temp.	D.O.	Temp.	D.O.	Temp.	D.O.
1	15	8.8	15	8.9	15	8.6	15	8.8	15	8.8
2	15	8.8	15	8.9	15	8.5	15	8.7	15	8.7
3	15	8.7	15	8.8	15	8.3	15	8.5	15	8.6
4	15	8.7	15	8.7	15	8.2	15	8.4	15	8.6
5	15	8.8	15	8.8	15	8.2	15	8.1	15	8.4
5½					15	7.9	15	7.8		
6	15	8.5	15	8.7	BOTTOM		BOTTOM		15	8.2
7	15	8.2	15	8.7					15	8.0
7½	15	7.9								
8	BOTTOM		15	8.4					15	7.8
8½			15						15	7.4
9			15	7.6					BOTTOM	
9½			15	7.4						
10			BOTTOM							

NOTE - Temperatures in °C

Dissolved Oxygen readings taken in parts per million or mg/l.

River Seining

As previously described in the 'Methods' and Material section, six sub-habitat types were found in the three main channels of the Platte River. Of these six sub-types, fast-deep was the only one that we were unable to seine because fish escaped around the sides and over the top of the seine.

Table 3 shows a list of the fish seined by station, the sub-habitat types in which they were found and the relative abundance of each species of fish found in the three channels.

A total of 26 species of fish were caught. Of these 26, seven were classified as abundant. Six of the 26 were found to be common, and 13 of the 26 fish species seined were found to be uncommon in the river.

The criteria for relative abundance of fish in the river is as follows:

Abundant - those species of fish which were fairly numerous in about all of the river channels and sub-habitat types.

Common - those species of fish which were fairly numerous in some of the river channels and sub-habitat types.

Uncommon - those fish species that were found in few of the sub-habitat types.

Another habitat type that is related to the rivers is flooded meadows. This type is created when the river is at high water levels causing water to encroach onto the island. The only species of fish seined in this habitat type were carp.

Occurrence and Location of Fish Species Sampled in the Platte River by Mormon Island Crane Meadows

Species	North		Middle		South #1					South #2			South #3		South #4		South #5	Relative Abundance
	SS	St.S	St.S	St.D	SD	St.S	FS	SS	FS	SD	SS	FS	SS	SD	SS	FS		
Shortnose Gar	x			x														C
Goldeye																		U
Carp	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	A
Mirror Carp	x			x														U
Creek Chub				x														U
Plains Minnow	x				x	x		x	x	x	x	x	x	x	x	x	x	A
Fathead Minnow	x		x	x	x	x		x	x	x	x	x	x	x	x	x	x	A
Brassy Minnow																		U
Silvery Minnow					x													U
Suckermouth																		U
Minnow																		U
Red Shiner	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	A
Sand Shiner	x			x	x	x		x	x	x	x	x	x	x	x	x	x	A
Emerald Shiner					x	x		x	x									A
River Shiner								x										C
Bigmouth Shiner				x														U
Speckled Chub																		U
River																		U
Carp sucker																		U
Quillback																		U
Carp sucker	x			x				x										C
White Sucker		x	x	x		x												C
Channel																		C
Gatfish	x			x														C
Plains																		C
Killifish	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	A
Bluegill																		U
Green																		U
Sunfish																		U
Largemouth																		U
Bass	x			x														C
Smallmouth																		U
Bass		x																U
Yellow Perch																		U

Sub-habitat Types- SS-Slow Shallow, St.S.-Still Shallow, St.D.-Still Deep, SD.-Slow Deep, FS.-Fast Shallow
 Relative Abundance- A-Abundant, C-Common, U-Uncommon.

COMPARITIVE STUDIES

In 1960, Larry A. Morris conducted a study on the distributions of fish in the Platte River. (Morris, 1960). One of his sampling stations along the Platte River was about 8 miles South and $\frac{1}{2}$ mile West of Grand Island, Nebraska. This is near or on the Mormon Island Preserve. In his study, Morris collected 19 species of fish.

During the summer of 1972, a stream survey was also conducted by the Nebraska Game and Parks Commission, as part of the Platte River Basin Level B Study, under the Dingell - Johnson Project F-9-R. Water quality studies and fish sampling of the river made up the majority of the study objectives. Twenty-one fish species were collected by the Nebraska Game and Parks Commission in this 1972 study.

In this study, numerous sample sites were selected along the Middle Platte River. Of these sampling sites, three of them were located in close proximity to the Mormon Island Preserve. One sample station was located about 8 miles upstream, another site about 12 miles north of the Preserve.

As part of our study, we compared the fish species found during the 1980 study with those found in 1960 and 1972. Comparisons are shown in Table 4.

In 1980, there were 26⁵ species of fish found during the 1980 study with 19 species in 1960, and 21 species in 1972.

Four species of fish were found in 1980 that were not found in 1960 or 1972. These species are; Shortnose Gar, Mirror Carp, Speckled Chub, and Yellow Perch.

Species found during the 1972 study that were not found in the 1980 study were; Gizzard Shad, White Perch, and Black Crappie. The Gizzard Shad and Black Crappie were not found in the river in 1980, but were found

in the sandpits. Orangespotted Sunfish were found in the river in 1960, but not in 1980. There was however, one specimen collected in Sandpit #2 in 1980. The remaining species of fish contained in Table 4, were found in either two or three of the study years.

TABLE 4

Comparison of Fish Species found in the Platte River near Mormon Island during 1960, 1972, and 1980 Fish Studies.

Species	1960	1972	1980
1. Shortnose Gar			x
2. Gizzard Shad		x	
3. Goldeye		x	x
4. Carp	x	x	x
5. Mirrow-Carp			x
6. Plains Minnow		x	x
7. Fathead Minnow	x	x	x
8. Brassy Minnow	x	x	x
9. Silvery Minnow	x	x	x
10. Suckermouth Minnow	x		x
11. Red Shiner	x	x	x
12. Sand Shiner		x	x
13. Emerald Shiner		x	x
14. River Shiner	x		x
15. Bigmouth Shiner	x	x	x
16. Creek Chub	x		x
17. Speckled Chub			x
18. River Carpsucker	x	x	x
19. Quillback Carpsucker		x	x
20. White Sucker	x		x
21. Shorthead Redhorse		x	
22. Channel Catfish	x	x	x
23. Black Bullhead	x	x	
24. Plains Killifish	x	x	x
25. Plains Topminnow	x		
26. White Perch		x	
27. Bluegill	x		x
28. Green Sunfish	x		x
29. Orangespotted Sunfish	x		
30. Largemouth Bass	x	x	x
31. Smallmouth Bass		x	x
32. Black Crappie		x	
33. Yellow Perch			x

Sandpits

As noted in the Methods and Materials section, there is one major difference between the two pits on the preserve. Sandpit #1 is quite isolated from river flows (except under extreme flooding conditions). Sandpit #2, is directly adjacent to the river and often receives water from the rivers as seen in the spring of 1980. As a result of this condition, fish can move in and out of the pit.

Sandpit #1

During the sample period from July 19th to August 24th, a total of approximately 1,536 net hours were spent. The resulting capture included 117 fish which comprised of 10 different species (Table 5).

The capture rate of 1 fish per 13.2 net hours plus the small total capture of 117 fish, shows that this sandpit does not support a large fish population. Carpsuckers are the dominant species in Pit #1. Table 5 also shows that although River Carpsucker and Quillback Carpsucker comprised only 30% of the total number, they made up 68% of the total weight of fish. The other species only ranged individually from .3% to 17% of the total weight. The abundance of carpsuckers in comparison to the other fish species, shows they are competing for food and space with the more desirable species (Pflieger, 1975)

As noted in the Methods and Materials section, scales and pictoral species, (Ictalurids), were taken from individual fish. However, since the resulting capture was so poor, the authors felt that the length - weight relationships of the more numerous fish would show more valuable information about growth. The resulting length - weight relationships are shown in Figures 2 through 7. The River Carpsucker and Quillback Carpsucker (Fig. 2 and 3) have very similar length - weight relationships, with little variance of these lengths and weights. Figure 4 shows that there were most likely two separate age classifications of Black Crappies sampled, due to the resulting distribution

of length and weight. The varied distribution of lengths of the Channel Catfish (Fig. 5) would indicate at least 3 consecutive age groups according to Pflieger, (1975). Figures 6 and 7, show the weight and length distributions of White Crappies, Largemouth Bass, and Bluegill. Do to the small sample size, accurate conclusions cannot be made from that date.

Sandpit #2

Table 6 shows that a total of 122 fish comprising of 13 species were captured in Sandpit #2. During the period from June 23rd to October 5th, a total of 370 net hours were spent to capture these 122 fish; a capture rate of 1 fish per 3.1 hours. Table 6 also indicated that the carpsuckers were the dominant species. They comprised 56% of the total weight of the allspecies captured. One unique capture here, was a large White Crappie that was 13.75 inches long and weighed 16.75 oz. The rest of the fish captured besides the Carpsuckers, a Carp and the above White Crappie, were quite small.

A length - weight relationship distribution for each species was not determined for sandpit #2 due to the influx of water and fish from the river during high flows. These relationships would therefore be of little value.

As stated earlier, carpsuckers usually compete with other fish for food and space, and is probably the case here, since the results show their dominance in total weight and length.

TABLE 5

Vital Statistics of the Fish found in Sandpitt #1

#	Species	x length (in.)	x weight (oz)	Total # of each species	% of the total fish captured	Total weight of each species	% of total weight of sp.
1.	River Carpsucker	16.3	33.3	21	18	699.3 oz.	41
2.	Quillback Carpsucker	16.6	32.7	14	12	457.8 oz.	27
3.	Channel Catfish	13.8	13.8	21	18	289.8 oz.	17
4.	Black Crappie	8.5	6.8	16	14	108.8 oz.	6
5.	Bluegill	4.5	1.5	21	18	31.5 oz.	2
6.	Green Sunfish	6.0	2.5	2	2	5.0 oz.	.3
7.	White Crappie	6.2	2.5	11	9	27.5 oz.	2
8.	Largemouth Bass	7.4	8.5	9	8	76.5 oz.	4
9.	Freshwater Drum	40.0	17.5	1	.9	17.5 oz.	1
*10.	White Bass	No Data	No Data	1	.9	No Data	No Data
TOTALS				117		1713.7 oz. or 107.1 pounds	

* White Bass was found dead and partially eaten in the net.

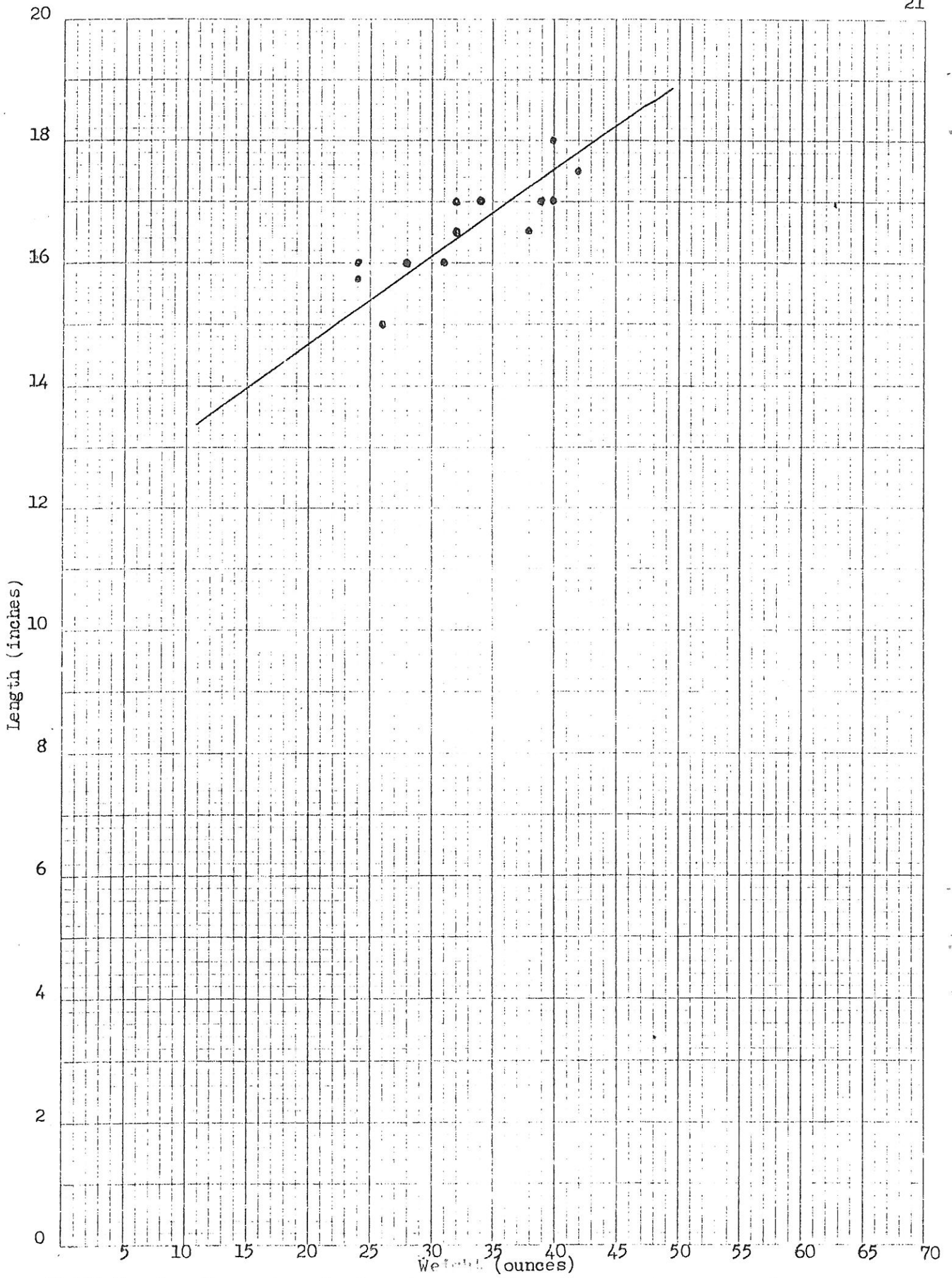


Figure 2 Length vs. Weight Relationship of Fishes in the ...

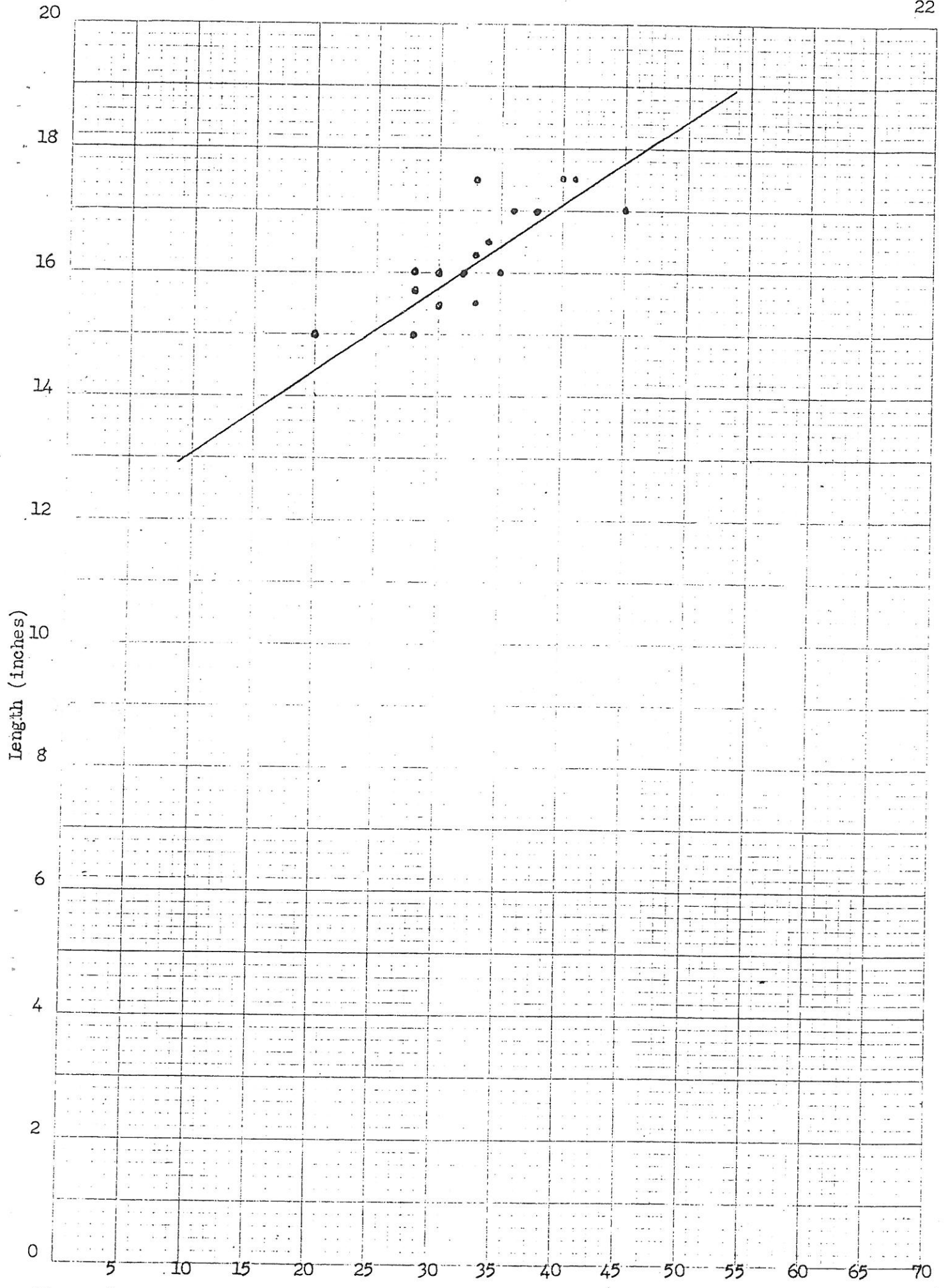


Figure 3. Length-weight Relationships of River Carpsuckers in Pit #1 Weight (ounces)

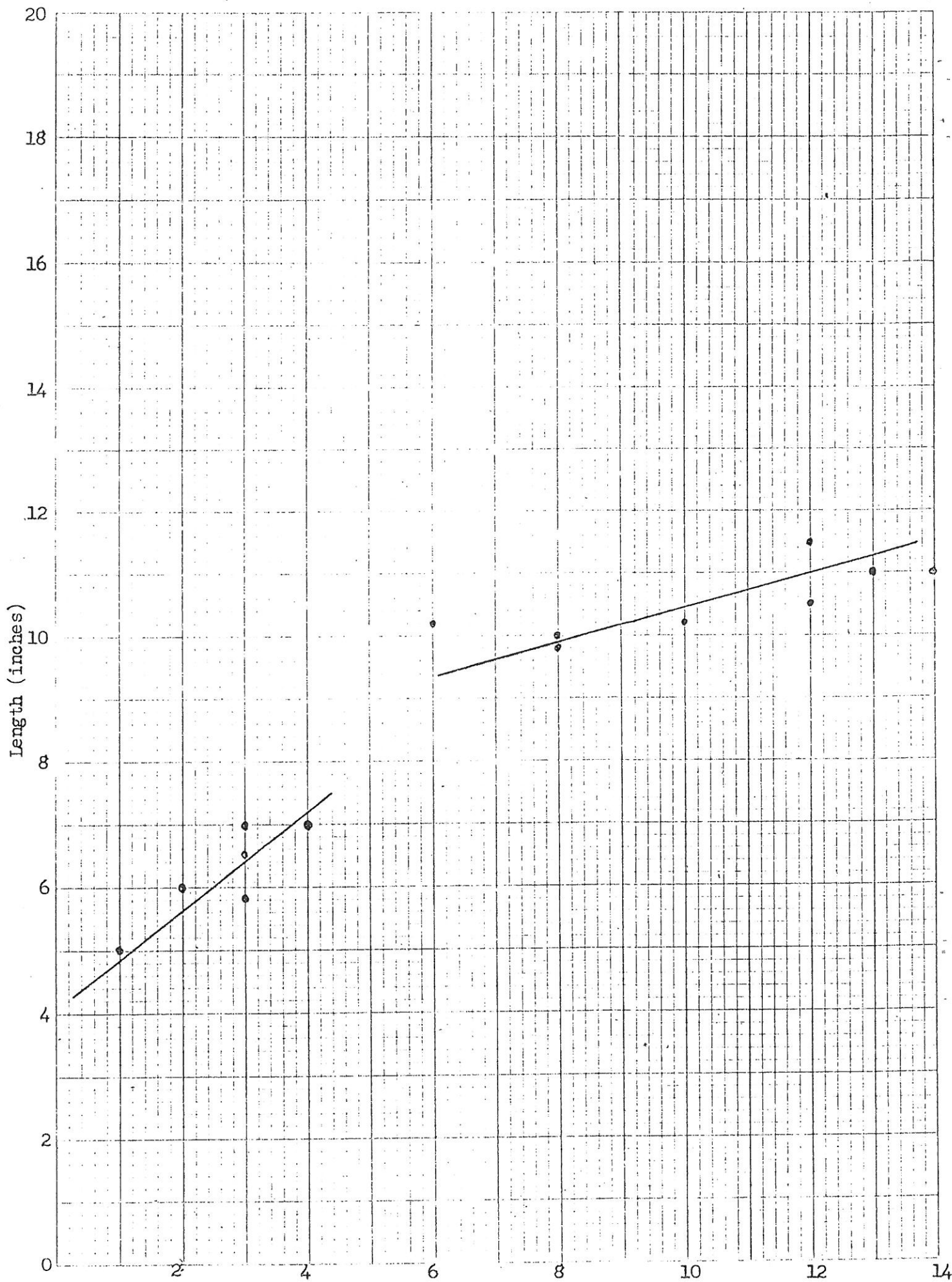


Figure 1 - Length-weight Relationship of Black Grouse in Pit #1

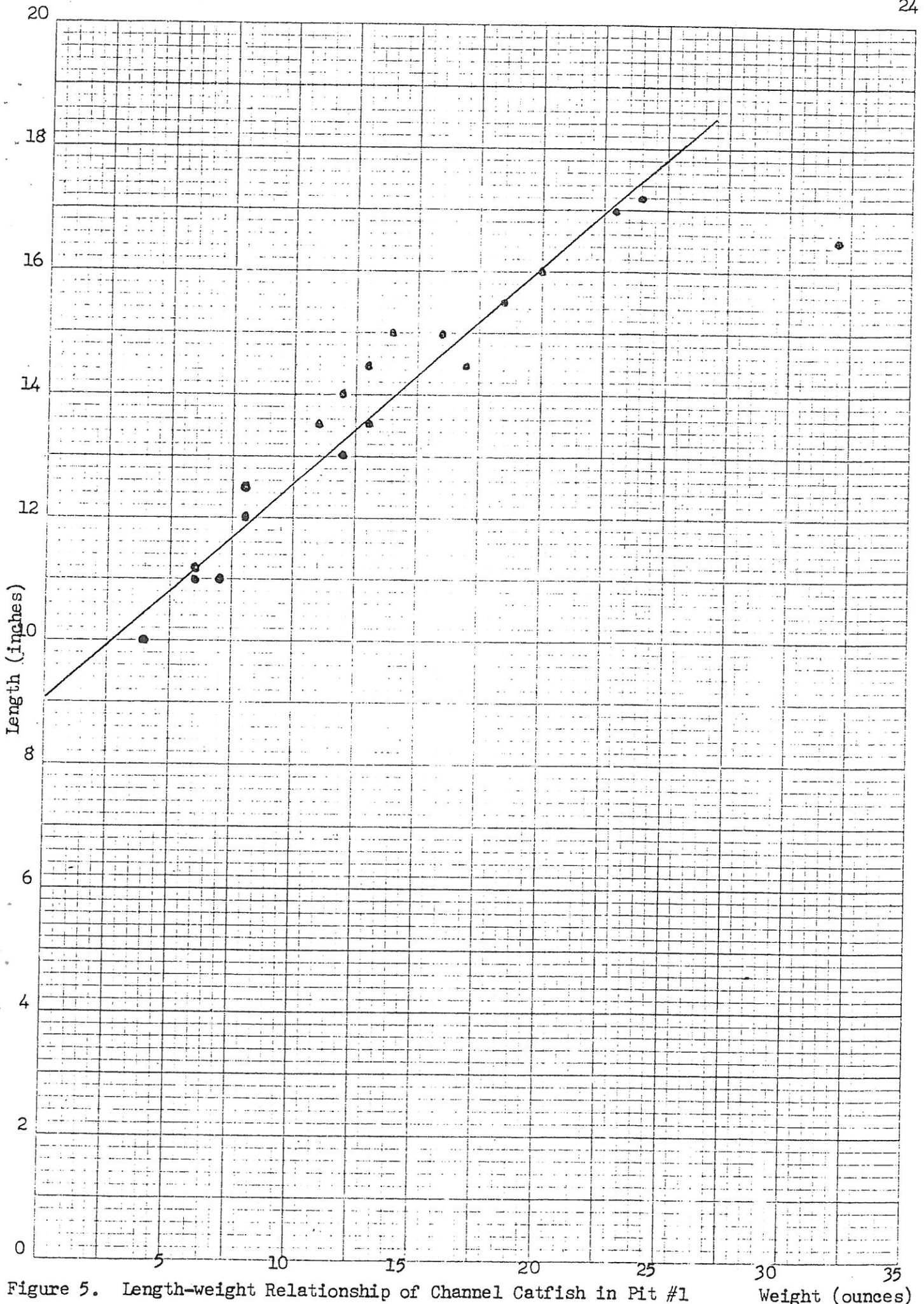


Figure 5. Length-weight Relationship of Channel Catfish in Pit #1

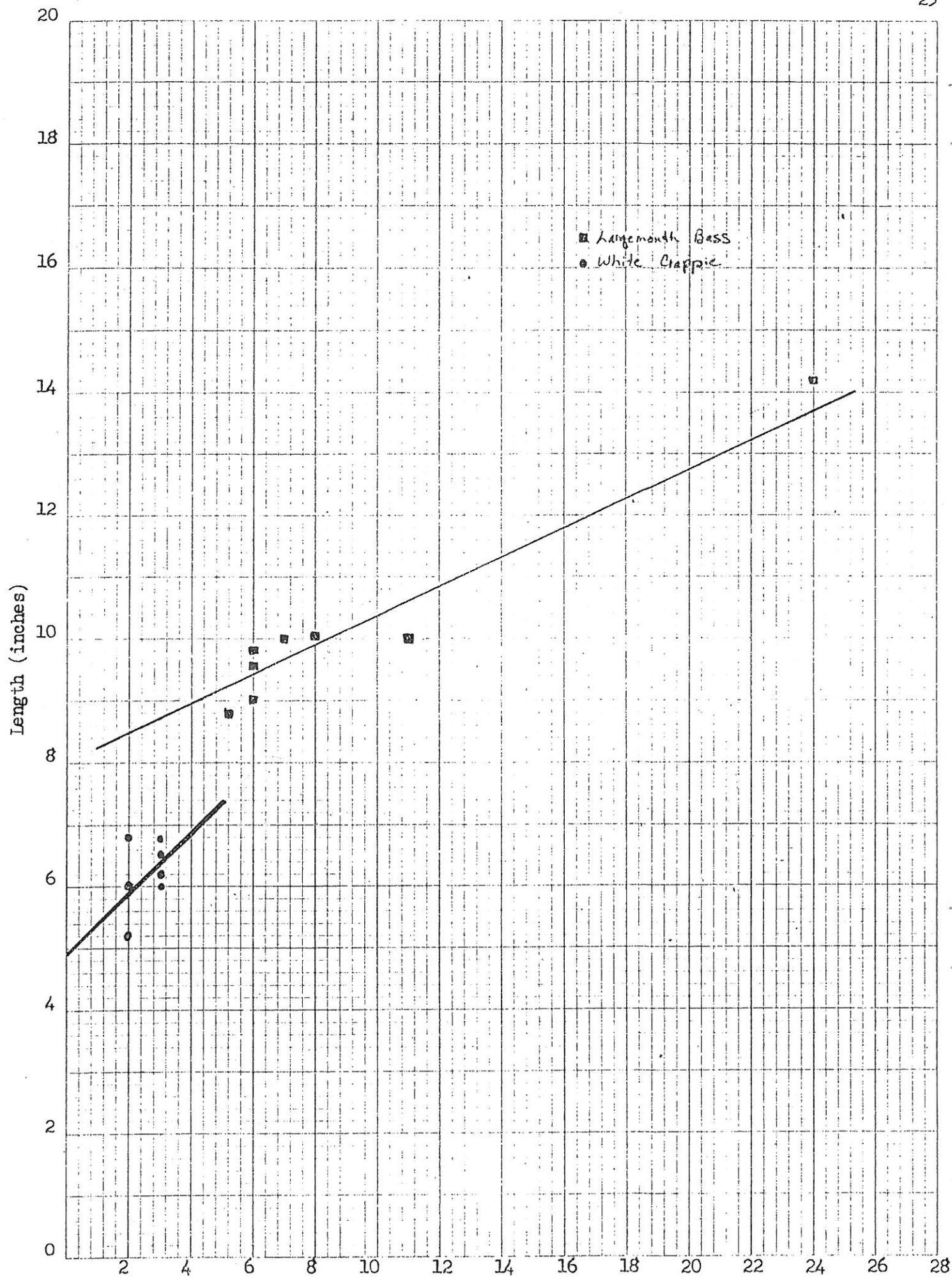


Figure 6. Length-weight Relationships of White Crappie and L.M. Bass in Pit # 1 Weight(oz)

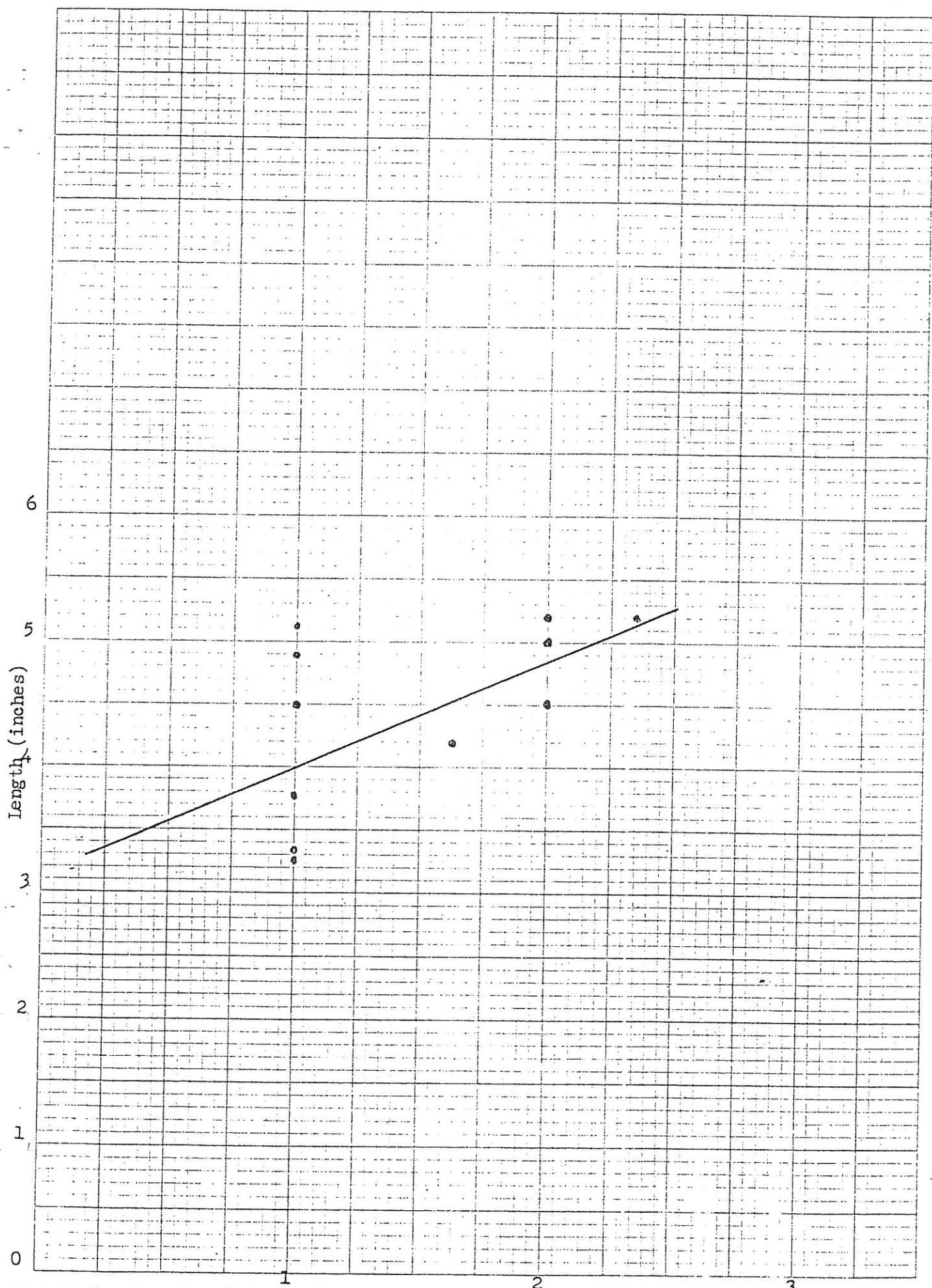


Figure 7. Length-weight Relationships of Bluegill in Pit #1. Weight (ounces)

TABLE 6

Vital Statistics of the Fish found in Sandpitt #2

#	Species	x length (in.)	x weight (oz)	Total # of each species	% of the total fish captured	Total weight of each species	% of total weight of sp.
1.	Gizzard Shad	8.0	4.0	11	9	39.5 oz.	4
2.	Carp	19.8	52.0	1	.8	52.0 oz.	6
3.	River Carpsucker	15.5	27.2	5	4	136.0 oz.	15
4.	Quillback Carpsucker	12.2	16.8	23	19	386.0 oz.	41
5.	White Sucker	14.0	18.0	1	.8	18.0 oz.	2
6.	Black Bullhead	8.3	6.6	12	10	59.0 oz.	6
7.	Green Sunfish	5.8	2.9	16	14	49.0 oz.	5
8.	Bluegill	5.7	2.0	20	16	39.9 oz.	4
9.	Orangespotted Sunfish	No Data	No Data	1	.8	No Data	No Data
10.	Largemouth Bass	9.3	7.3	6	5	43.5 oz.	5
11.	White Crappie	8.3	5.0	17	14	85.8 oz.	9
12.	Black Crappie	6.4	2.6	8	7	20.5 oz.	2
13.	Yellow Perch	6.8	2.0	1	.8	2.0 oz.	.2
TOTALS				122		931.2 oz. or 58.2 pounds	

Mapping of Sandpit #1

As previously mentioned in the Method and Material section, the mapping of the sandpit consisted of two parts: surveying and sounding. The technique can be found in FWS/OBS - 78/33, August 1978. Surveying was done between May 31, 1981 and June 13, 1981. The soundings were done on June 14, 1981. At that time, water surface elevations were also taken. This section will be discussed as two separate parts. The first being the surveying, and the latter being the soundings.

Surveying

This technique required establishing a benchmark for a starting point. As stated before, a cottonwood tree west of the sandpit was used as benchmark and given an arbitrary elevation of 100.00 ft. From there elevations were taken at each headstake, which were 20 ft. apart.

The sandpit consists of four basic changes in elevation. First the high bank which has an average elevation of 100.2 ft. in relationship to the benchmark. The second topographical break has an average elevation of 98.4 ft. in relationship to the benchmark. The third change in topography has an average elevation on relationship to the benchmark of 95.8 ft. Finally, the last major topographical change is the water surface elevation. The water surface elevation on June 14, 1981 was 89.9 ft. in relationship to benchmark. Any future fluctuations in water levels, could be estimated from elevations. These elevations also showed that the water level in the sandpit could rise ten feet before flooding surrounding lands.

The dike separating the pit from the river would probably wash out before this would occur however, since water levels in the sandpit are influenced by the river.

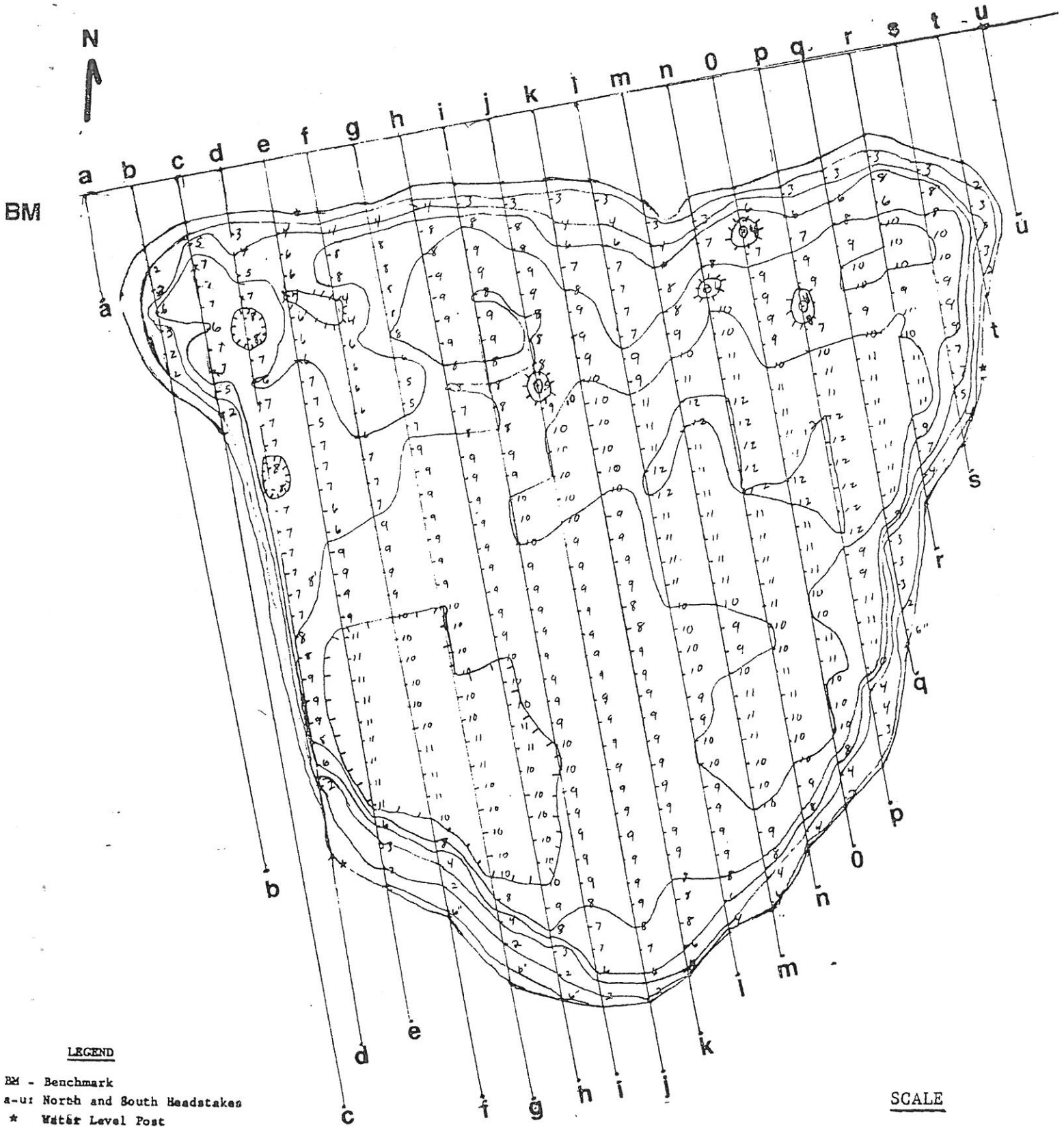
Sounding

Secondly, the sounding was done at 10 foot intervals along the 21 transects. This distance was used in order to find any major changes in

depth in the pit.

Figure 8 shows the contour map of the first sandpit. The scale of the map is 1 inch = 40 feet. The bearing of the north headstake is 80° east of north. The benchmark, (cottonwood tree) is 60 feet from the north headstake. The contour lines shown in Figure 8 are at 2 feet intervals. The average depth of the sandpit is between 7 and 8 deep. The deepest part of the sandpit is in the northeast corner and consists of an area of 12 feet deep.

As mentioned earlier, there were three 6 feet steel fence post driven into the bank at water's edge, thus leaving 3 feet exposed. These fence posts combined with the known volume established for the sandpit on June 14, 1981 and elevation measurements would allow estimation of volume at future water levels. On June 14, 1981 the volume of this sandpit was about 17.6 acre-feet. The surface area of the sandpit is approximately 2.2 acres.



LEGEND

- BM - Benchmark
- a-u: North and South Headstakes
- * Water Level Post

SCALE

1 inch = 60 feet

Figure 8. Contour map of Sandpit #1.

MANAGEMENT PROPOSALS AND FUTURE RESEARCH NEEDS

One of the purposes of the 1980 Mormon Island Preserve fish inventory was to propose a management plan and future research needs. The plan will be comprised of three sections; the river, Sandpit #2 and Sandpit #1.

1. River Proposals

After June 12, 1980, the North and Middle Channels of the Platte River contained little water for the rest of the summer. Most of this water was found in small still shallow pools. Low water conditions generally occur every summer. Species found in these pools were Carp, Fathead Minnows, Red Shiners, Sand Shiners, Emerald Shiners, and Plains Killifish.

The Fathead Minnow has tolerance for high temperature, extreme turbidity and low oxygen, and so is suitable for survival in stagnant pools that provide the refuge for fish in many small prairie streams during extended dry periods. In such situations, the Fathead Minnow, along with a few other hardy species, often comprise the entire fish population (Pflieger, 1975). The Plains Killifish is found in such standing waters, and capable of survival particularly those adjacent to the river. (True, 1974)

Carp can also tolerate low dissolved oxygen, extreme variations in temperature, pollution and high turbidity such as would be encountered in low water conditions (True, 1974).

These are three of the more widely distributed species of fish found in the small still shallow pools of water that normally occur in the Platte River in the summer. As mentioned above, these species are normally the only fish found under these conditions, indicating low water levels.

Other species of fish normally found in the Platte River either migrate downstream with the decreasing water levels, find refuge in deep pockets, or are trapped in small shallow pools and normally die when the water disappears.

The fish found in the Platte River not only comprise the river fishery,

but more importantly are part of the food chain. These species comprise the diets of numerous shorebirds and wading birds such as; the Great Blue Heron, Green Heron, and Belted Kingfisher, to name a few, which are found on the preserve.

Another species of birds that feed upon some of the fish found in the river is the Interior Least Tern. This species is currently listed by the Nebraska Game and Parks Commission as a threatened species.

The Least Tern population in Nebraska has experienced declines due to destruction and disturbance of large, open sandbar habitat that serves as nesting sites. Existing nesting habitat is threatened with destruction because of man's many activities that cause reductions in water flows. These reductions in water flows have caused a corresponding reduction in the "scouring effect" of the river. This has resulted in vegetational encroachment, narrowing of the channels, and a decline of open sandbar habitat. The future will probably bring continued decline of this habitat and the least tern, unless the demand for water from the river can be curtailed and controlled. If water demands are not controlled, the least tern might well become endangered as a nesting bird, or at best be restricted to such small nesting sites that the species would no longer be a viable part of Nebraska's fauna (Locke, 1977).

Some type of minimal flows for the Platte River need to be established to help maintain the habitat and food chain for these and other important species.

2. Proposals for Sandpit #2

Sandpit #2 is located north of the South Channel of the Platte River, as described in the Methods and Materials section.

This sandpit is directly influenced by high water levels in the river. During periods of the year when the river is high, water flows into the pit on the southeast corner. When this occurs, fish migrate in and out of the

sandpit. Then when the water levels in the river recedes, the fish in the pit are trapped until the water rises again. This occurs regularly in the spring.

The first management proposals for this sandpit is to dike up the southeast corner, so that the river does not flow into it. This would allow for proper management of the sandpit. After diking, chemical renovation of the sandpit should be done to eliminate the rough fish population. The management of this sandpit could then be similar to that of Sandpit #1, (further discussion will follow).

If diking is not done, then the fish migration in and out of the sandpit would continue, and thus its faunal use would remain unchanged. The sandpit however, would eventually silt in due to the sediment carried in by the river.

3. Proposals for Sandpit #1

Sandpit #1 is located north of the South Channel, and is totally isolated from the river as previously stated. After completion of the study on this sandpit, it was evident that rough fish such as River and Quillback Carpsuckers dominate the fishery. Carpsuckers are of no importance to the fishery except that they occupy space which could be occupied by game fish (Nebr. Game and Parks Comm.).

Furthermore, Carpsuckers browse extensively on the attached filamentous algae, consuming large quantities of single-celled algae, protozoans, and small crustaceans associated with attached algae. Other items in its diet include immature aquatic insects, aquatic worms, mollusks, and miscellaneous parts of higher plants (Pflieger, 1975).

Carpsuckers feed on material gleaned from the bottom ooze, including plant material, insects and their larvae, diatoms, desmids, small crustaceans and rotifers (True, 1974).

From the evidence above, the Carpsucker is undesirable as a sport fish since it feeds and destroys the vegetation in which it inhabits, and it competes with other wildlife species for invertebrates. Therefore, chemical renovation to eliminate the rough fish is necessary to establish Sandpit #1 as an area that can be more beneficial to the wildlife on Crane Meadows.

It is the belief of the project investigators that the restocking of fish in Sandpit #1 would not be "in the best interest" of the Mormon Island Preserve, whose basic goal is management of the area for migratory waterbirds. Therefore, the proposal is to renovate the pit, and not restock it with fish. Then by natural succession or man-made implantments of aquatic vegetation, such as smartweed, cattail, bulrush, and spikerush, let develop within the sandpit.

On June 16, 1981, John Cochnar, one of the project investigators, made personal contacts with Fred Zeillemaker, refuge manager of Crescent Lake National Wildlife Refuge, and Leonard McDaniel, assistant refuge manager of Valentine National Wildlife Refuge, both in Nebraska. From these discussions it was determined that renovation of lakes on the refuge shows that it significantly increases waterfowl use.

On Crescent Lake Refuge, Island Lake was renovated in 1978, and in the fall of 1979 duck use had increased 116%, from less than 8000 duck use days in 1978 to over 927,200 use days in 1979. On the Valentine National Wildlife Refuge, a lake was renovated in 1975. The number of duck use days prior to renovation was 5,000. After renovation of the following year, the duck use days had increased to over 1,000,000 duck use days. An increase of 200%.

These are but two examples of increased waterfowl use on renovated lakes. Personal contacts with other qualified wildlife biologist, point to similar increases of waterfowl use on renovated aquatic areas.

If the sandpit is not renovated, the existing rough fish would continue their population dominance and curtailment of aquatic vegetation. This would mean the pit would continue in its limited value as a fishery and waterfowl use area. If the pit were renovated and not restocked with any fish, it would provide the greatest benefits for migratory waterfowl, and best meet the goals of the preserve. Stocking the pit with game fish, would not allow it to reach its greatest potential waterfowl use, because of the competition between the birds and the fish for invertebrates. It is the beliefs of these researchers that the increased waterfowl benefits would outweigh any fishery benefits.

It is also the belief of the researchers that if Sandpit #2 is diked, then the same management plan could be applied as described for Sandpit #1, with similar benefits.

Furthermore, once there are minimal flows established in the river, then consistent water levels will be maintained in both sandpits, because the river water levels effect those in the sandpits.

CONCLUSION

In conclusion, an inventory of 33 species of fish were found to exist in the riverine and sandpit aquatic habitats of the Mormon Island Crane Meadows. Rough fish dominate the fishery. Some type of minimal flows are necessary to maintain the river fishery, the habitat and its food chain benefits to other wildlife species.

Diking of Sandpit #2 is required to exclude high river flows to control its management. If this is accomplished, then both sandpits should be renovated to eliminate rough fish populations and not restocked with any fish. This would allow both pits to develop to their greatest potential for waterfowl use benefits which is more in line with the goals of the Mormon Island Crane Meadows Preserve. Stocking of game fish in these pits after renovation would only serve to detract from waterfowl benefits with limited fishery benefits in return.

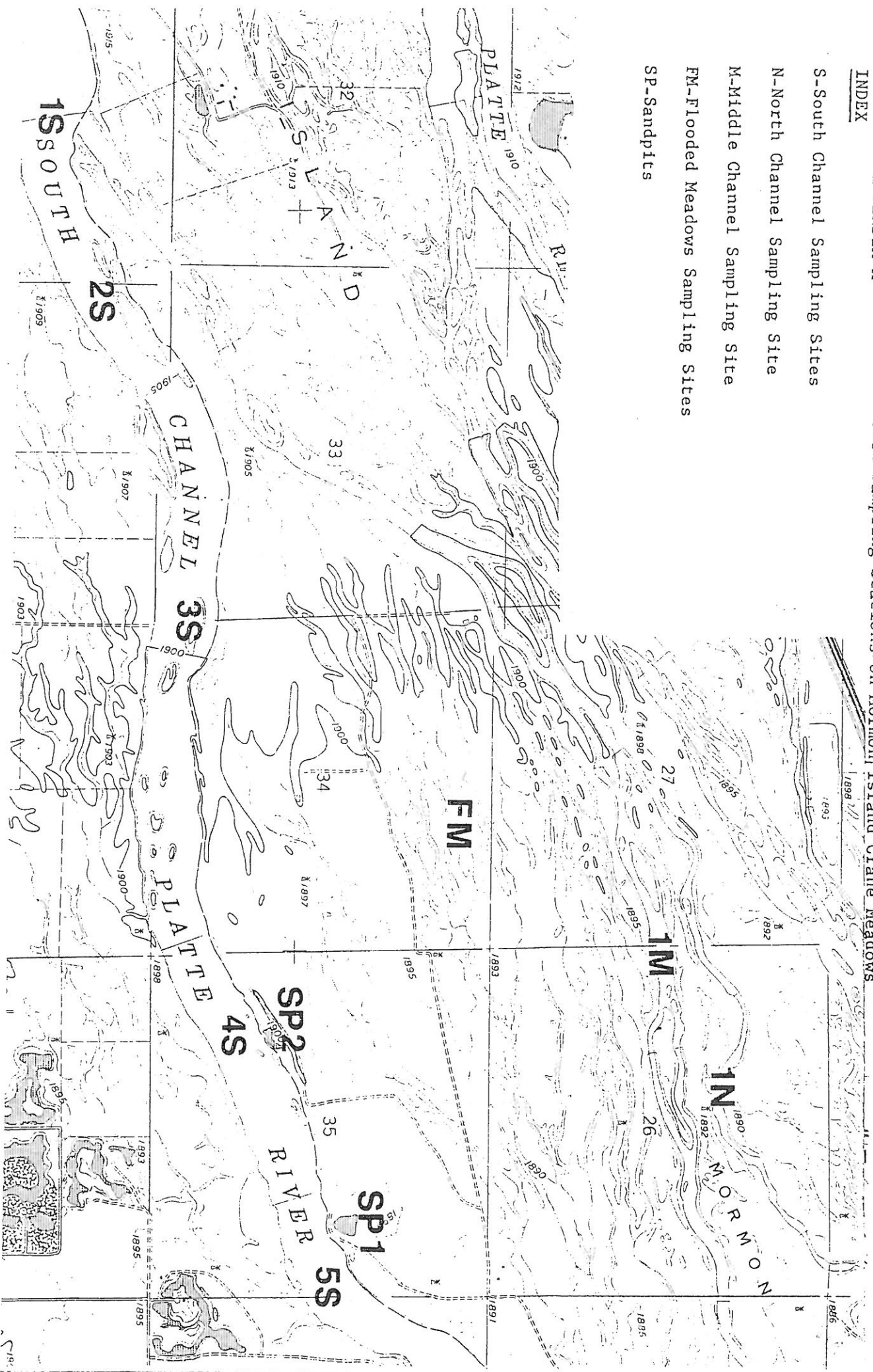
APPENDICES

APPENDIX A

Fish Sampling Stations on Mormon Island Crane Meadows

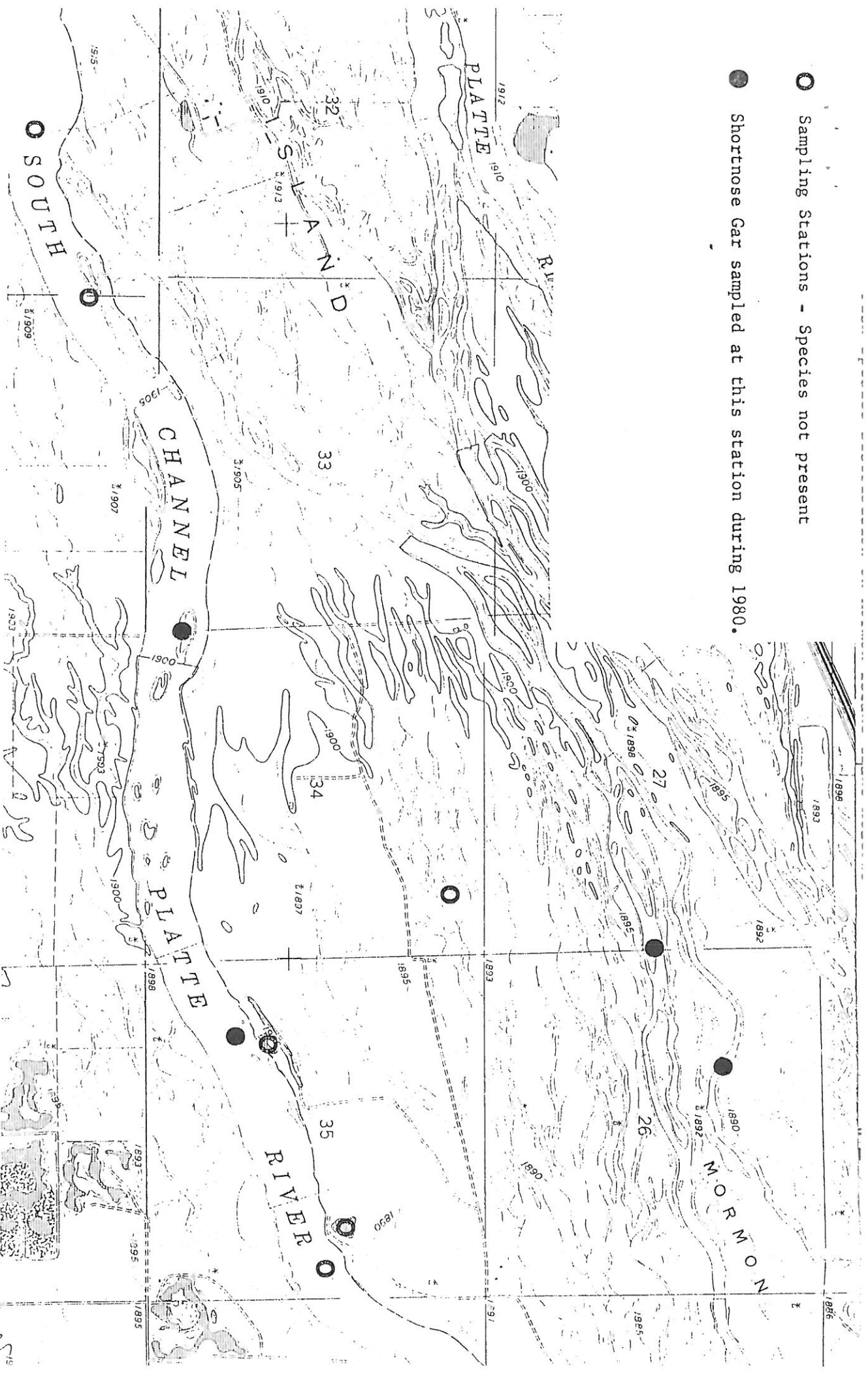
INDEX

- S-South Channel Sampling Sites
- N-North Channel Sampling Site
- M-Middle Channel Sampling Site
- FM-Flooded Meadows Sampling Sites
- SP-Sandpits



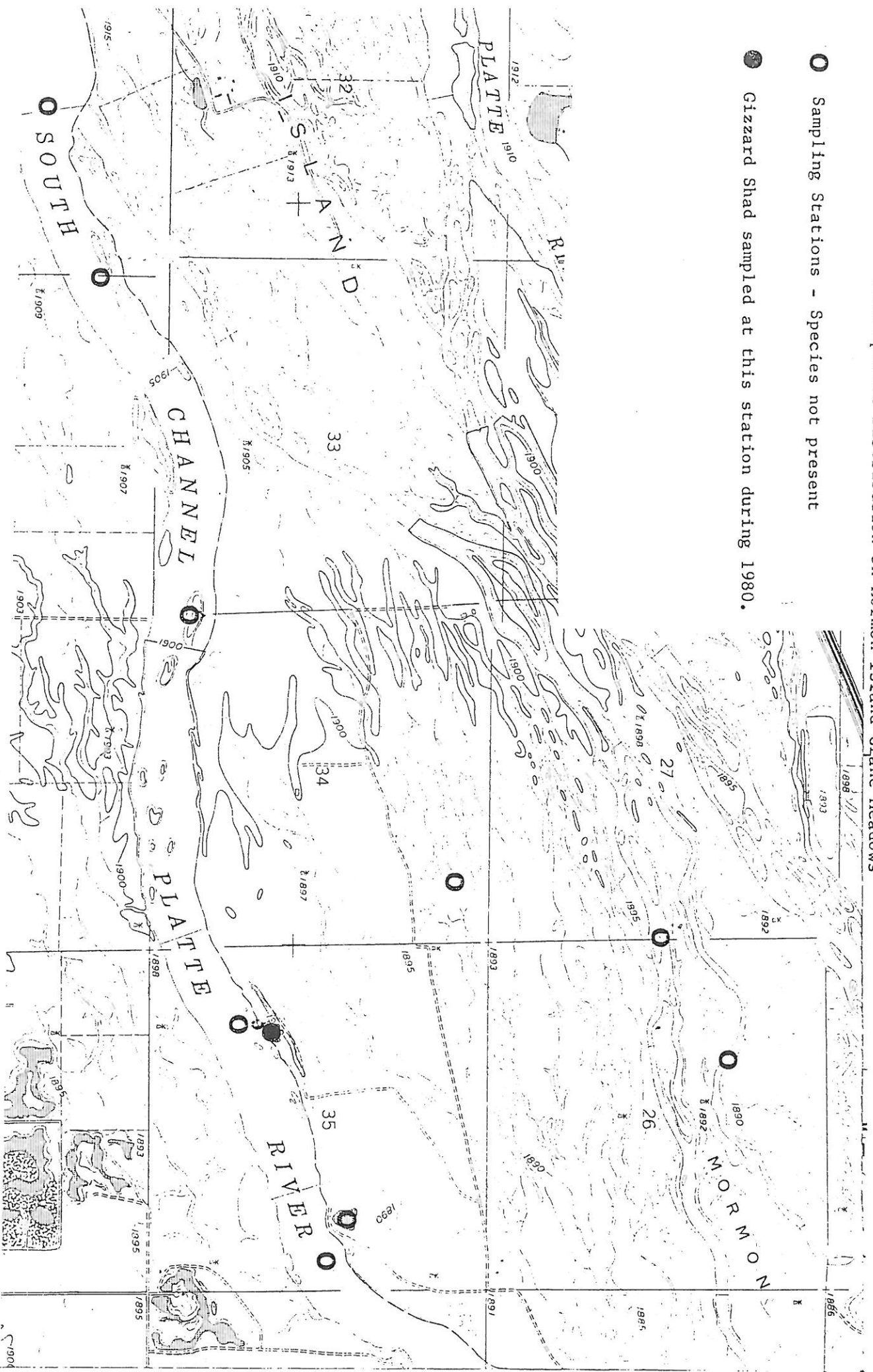
○ Sampling Stations - Species not present

● Shortnose Gar sampled at this station during 1980.



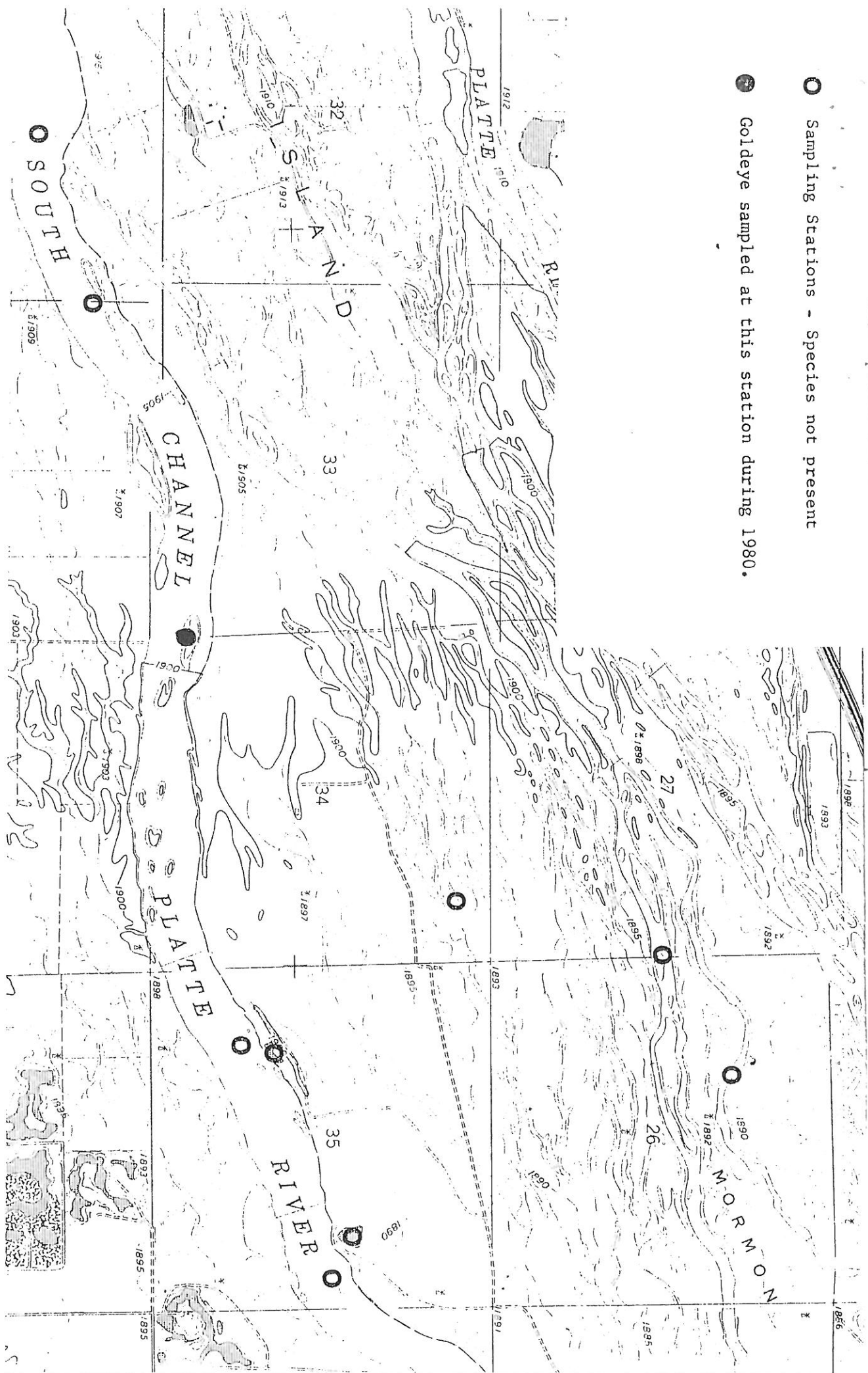
Fish Species Distribution on Mormon Island Crane Meadows

- Sampling Stations - Species not present
- Gizzard Shad sampled at this station during 1980.



○ Sampling Stations - Species not present

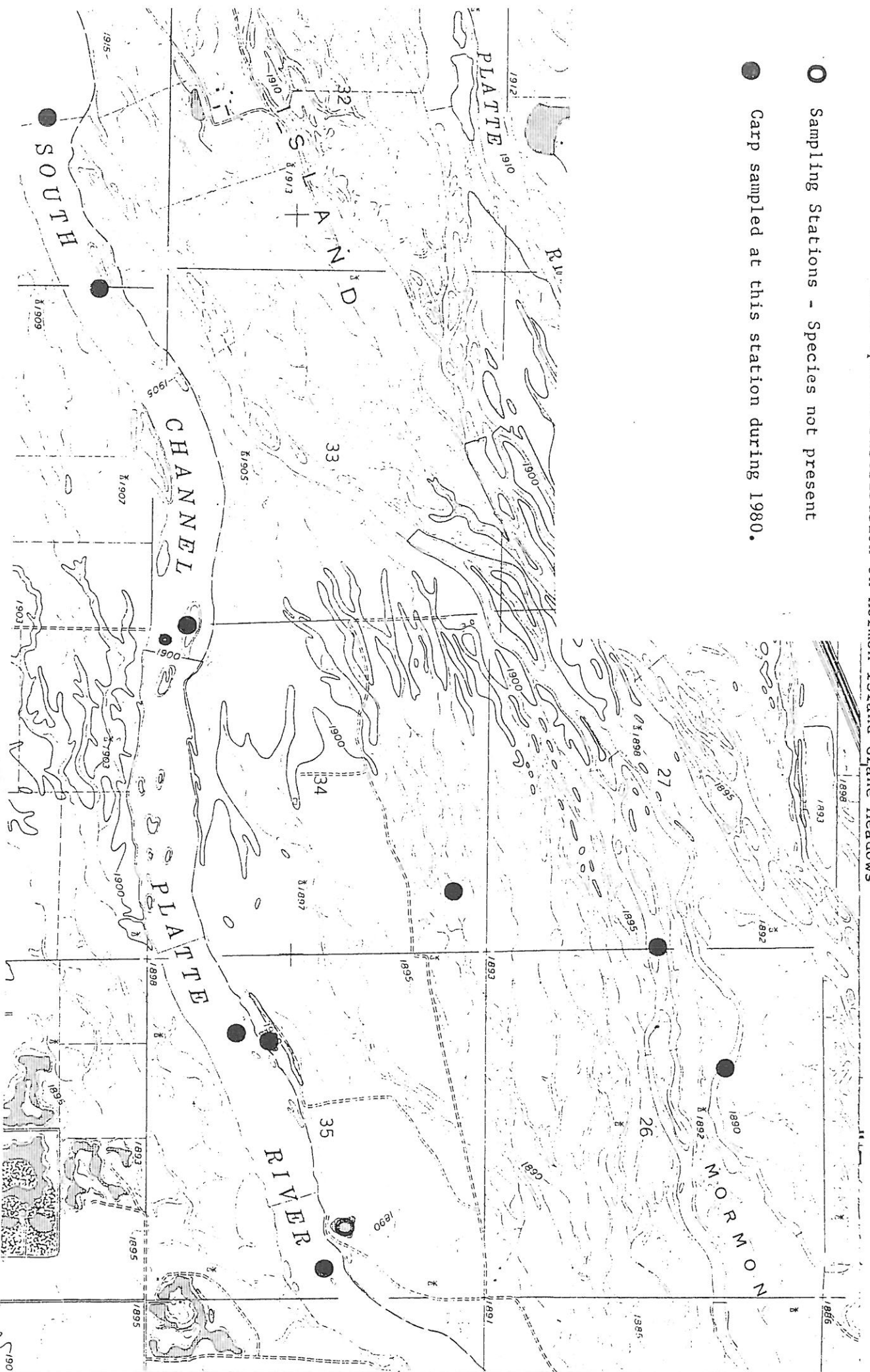
● Goldeye sampled at this station during 1980.



Fish Species Distribution on Mormon Island Crane Meadows

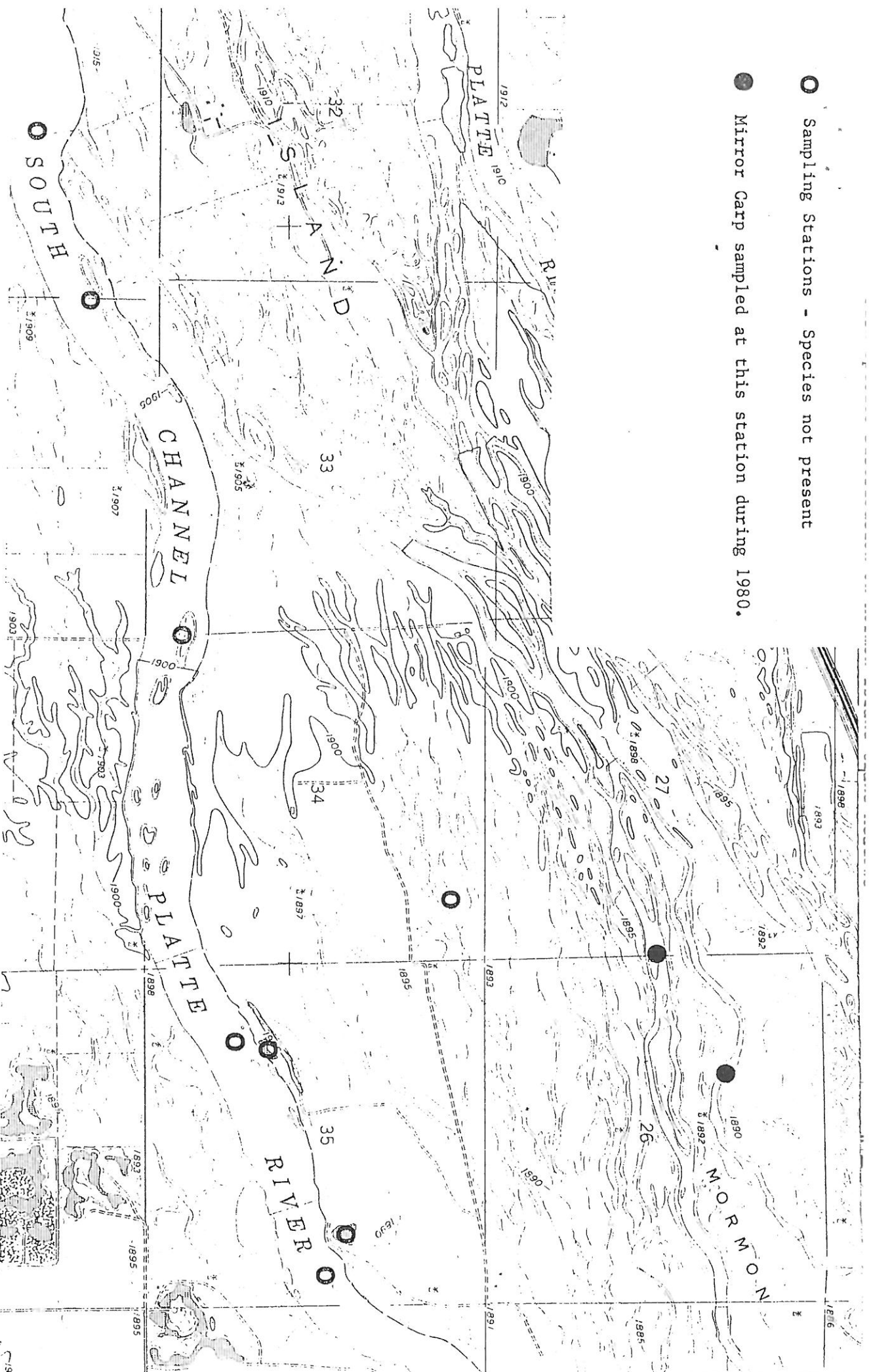
○ Sampling Stations - Species not present

● Carp sampled at this station during 1980.



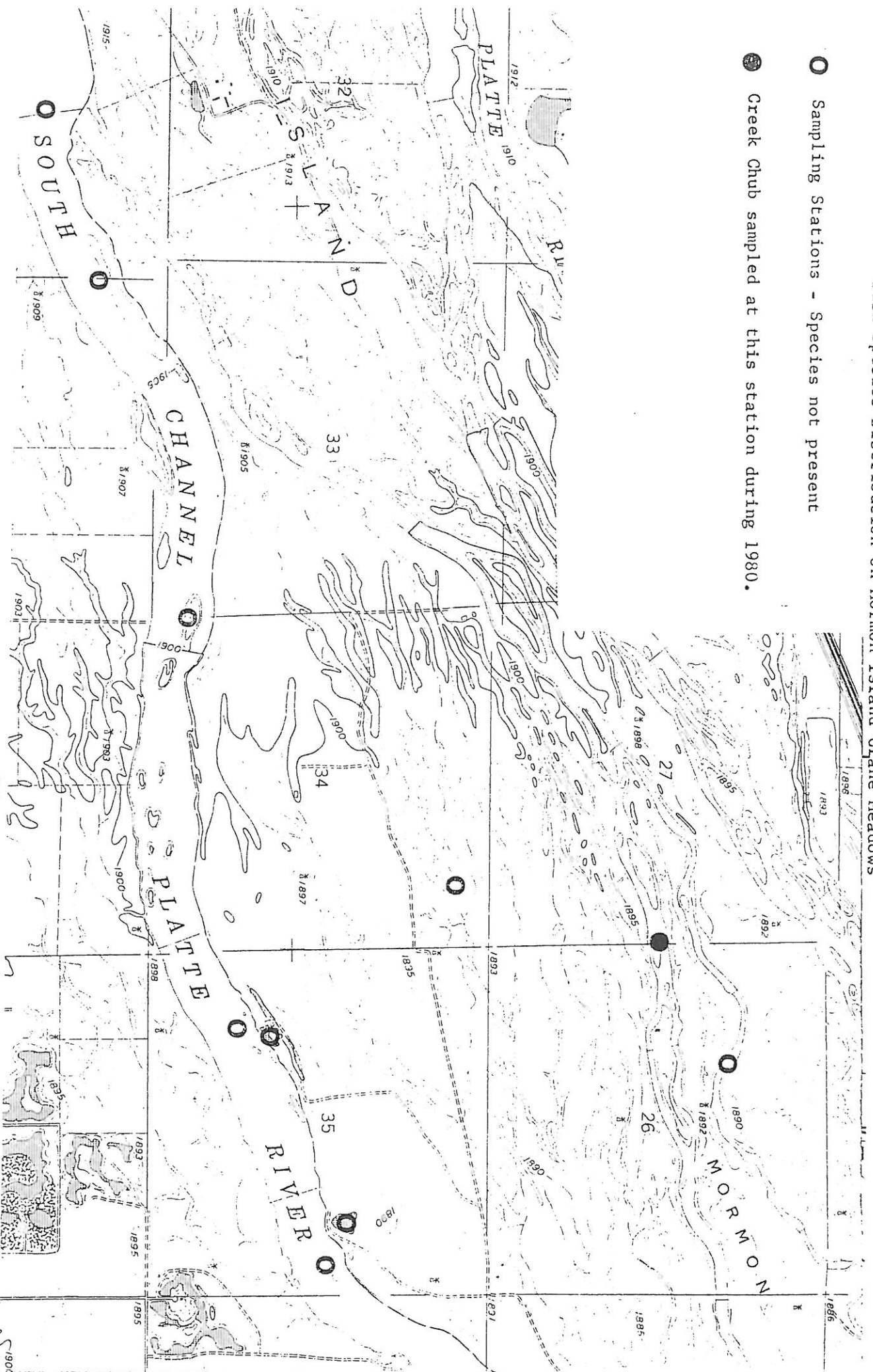
○ Sampling Stations - Species not present

● Mirror Carp sampled at this station during 1980.



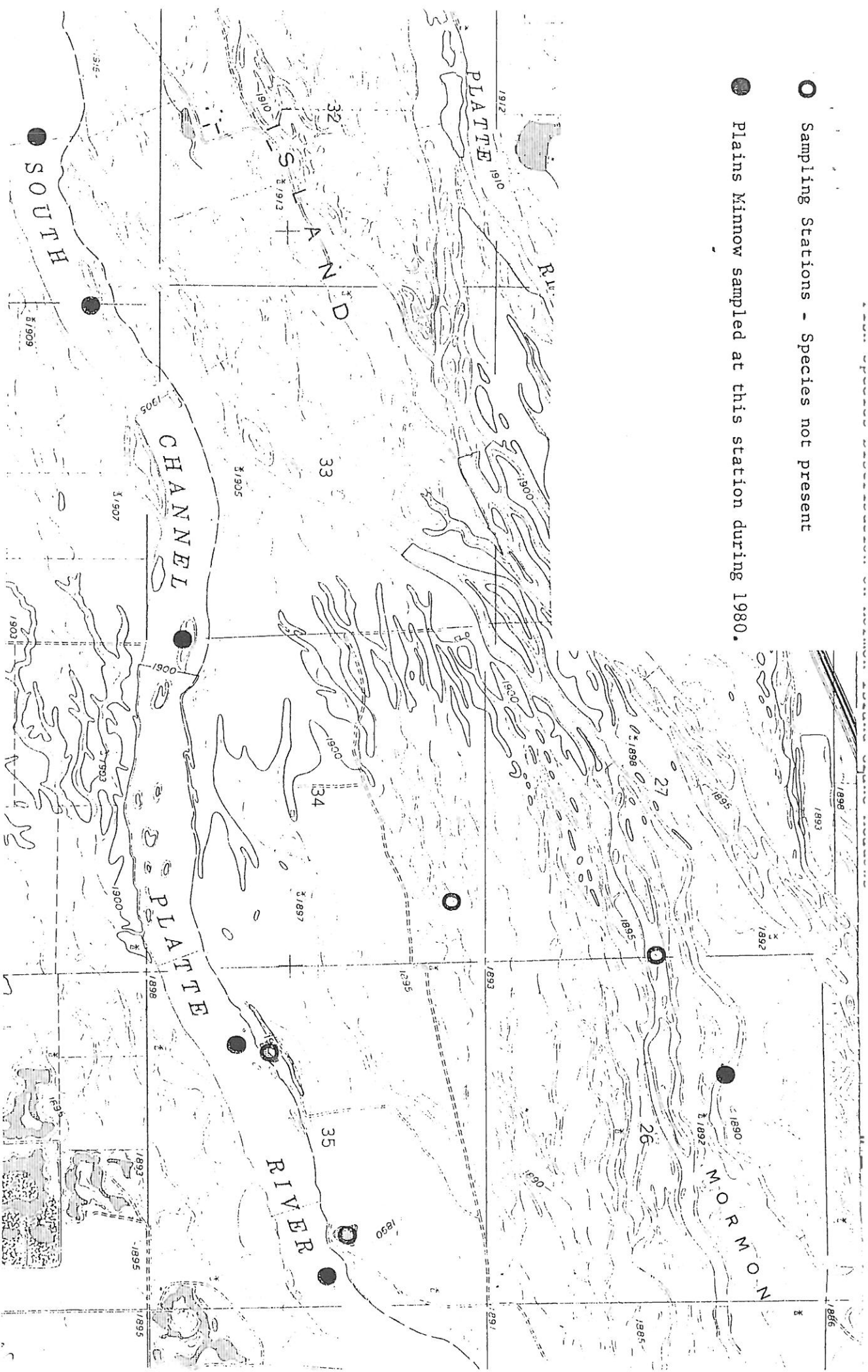
Fish Species Distribution on Mormon Island Crane Meadows

- Sampling Stations - Species not present
- Creek Chub sampled at this station during 1980.



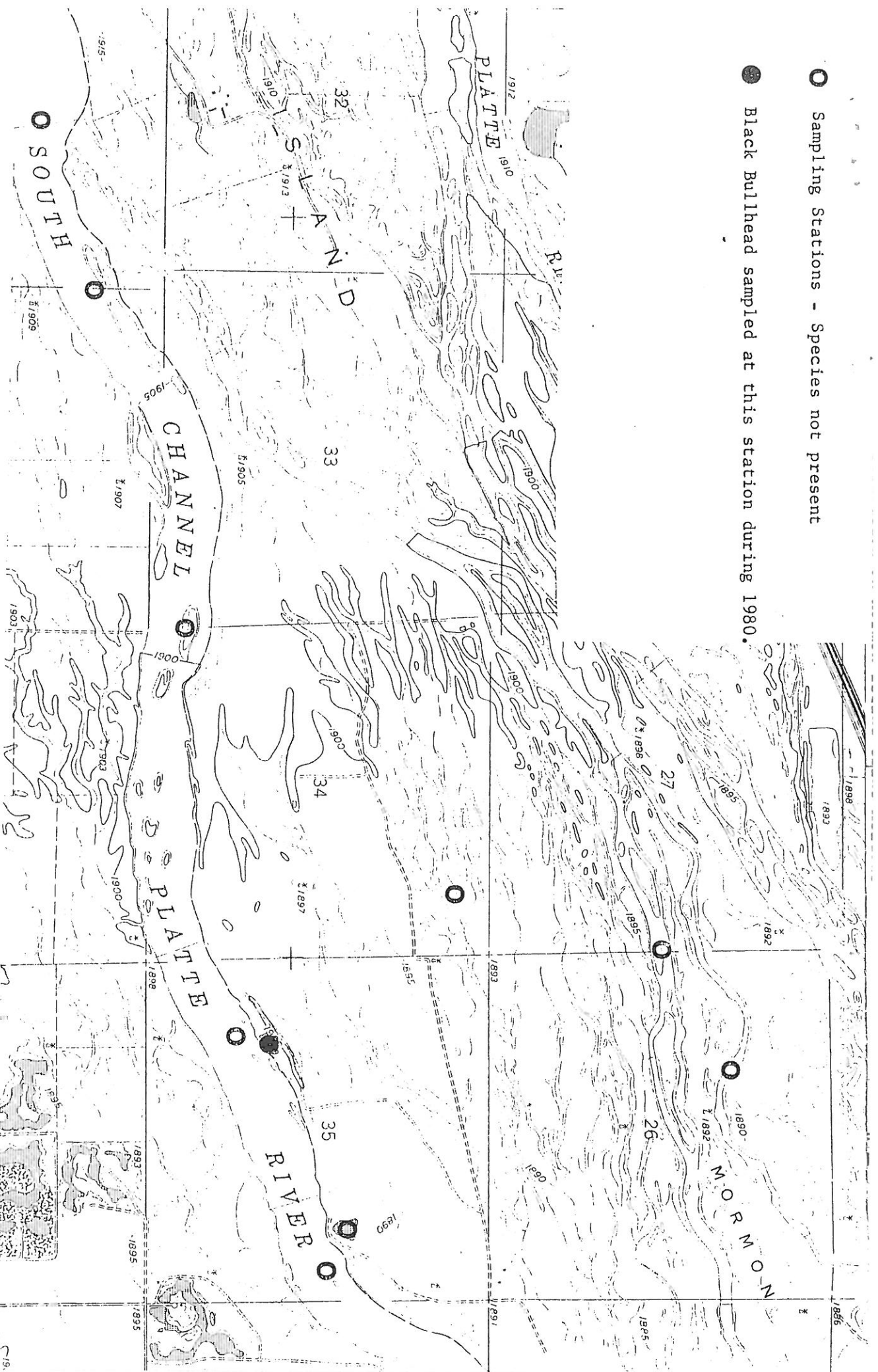
○ Sampling Stations - Species not present

● Plains Minnow sampled at this station during 1980.



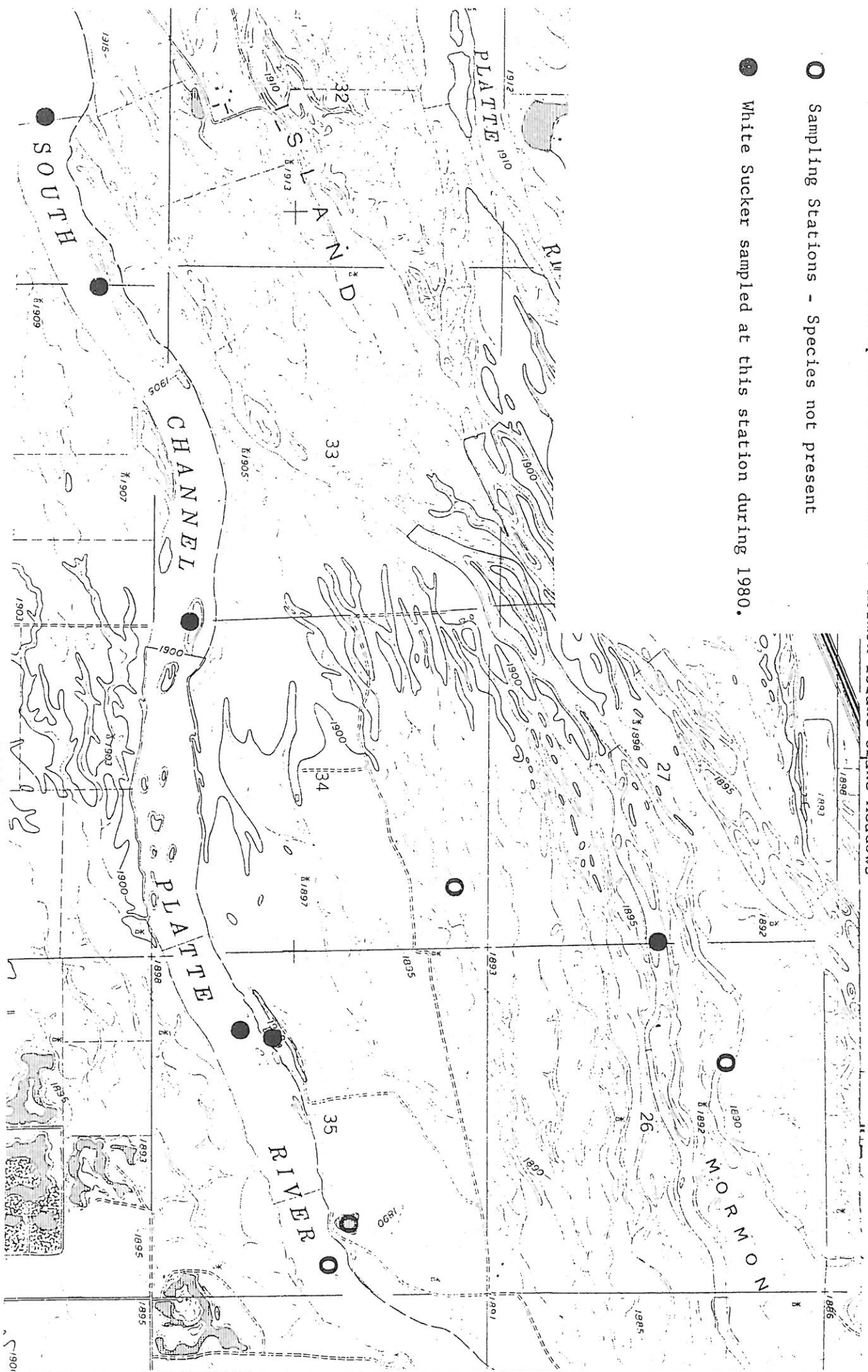
○ Sampling Stations - Species not present

● Black Bullhead sampled at this station during 1980.



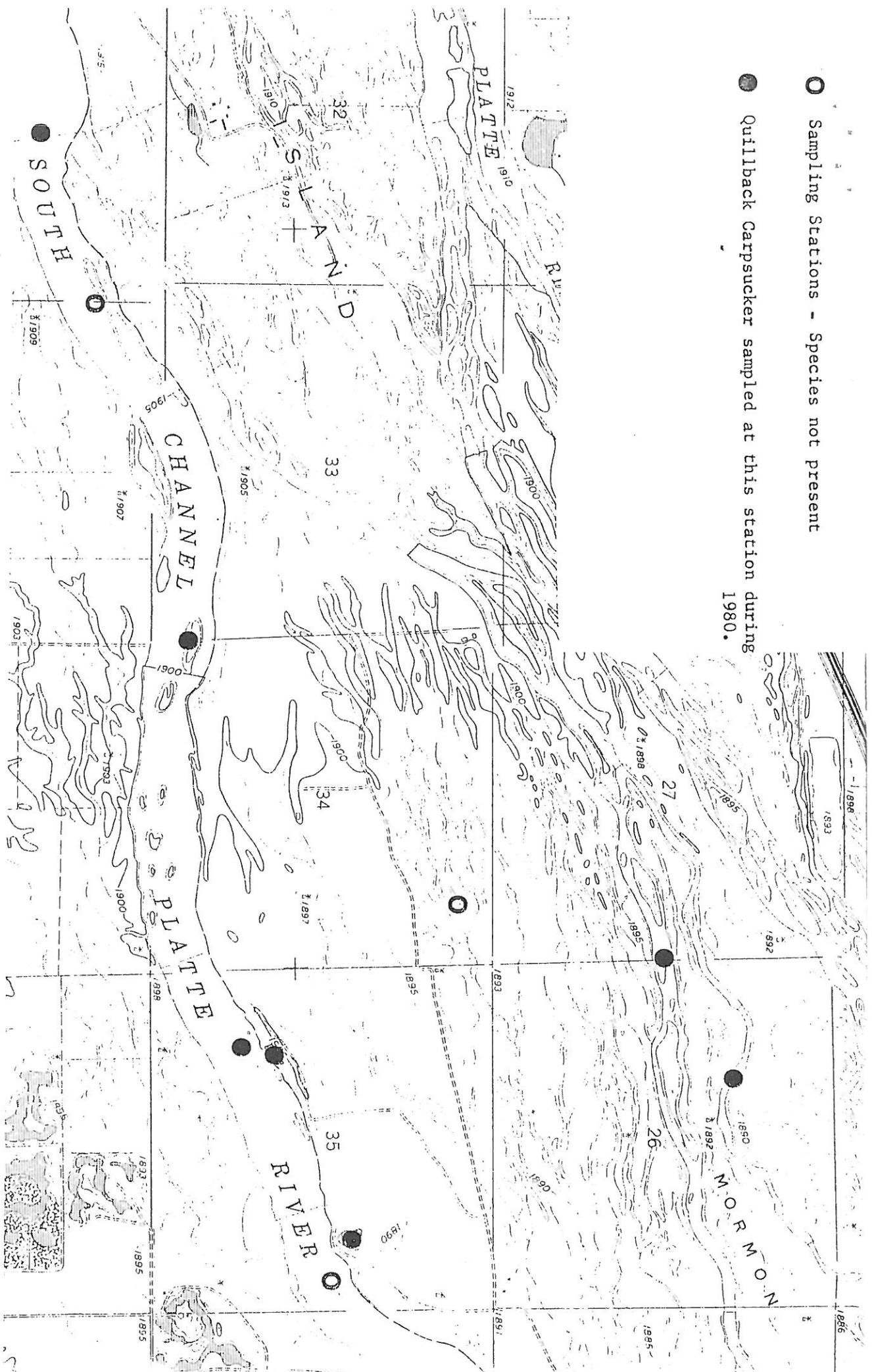
Fish Species Distribution on Mormon Island Crane Meadows

- Sampling Stations - Species not present
- White Sucker sampled at this station during 1980.



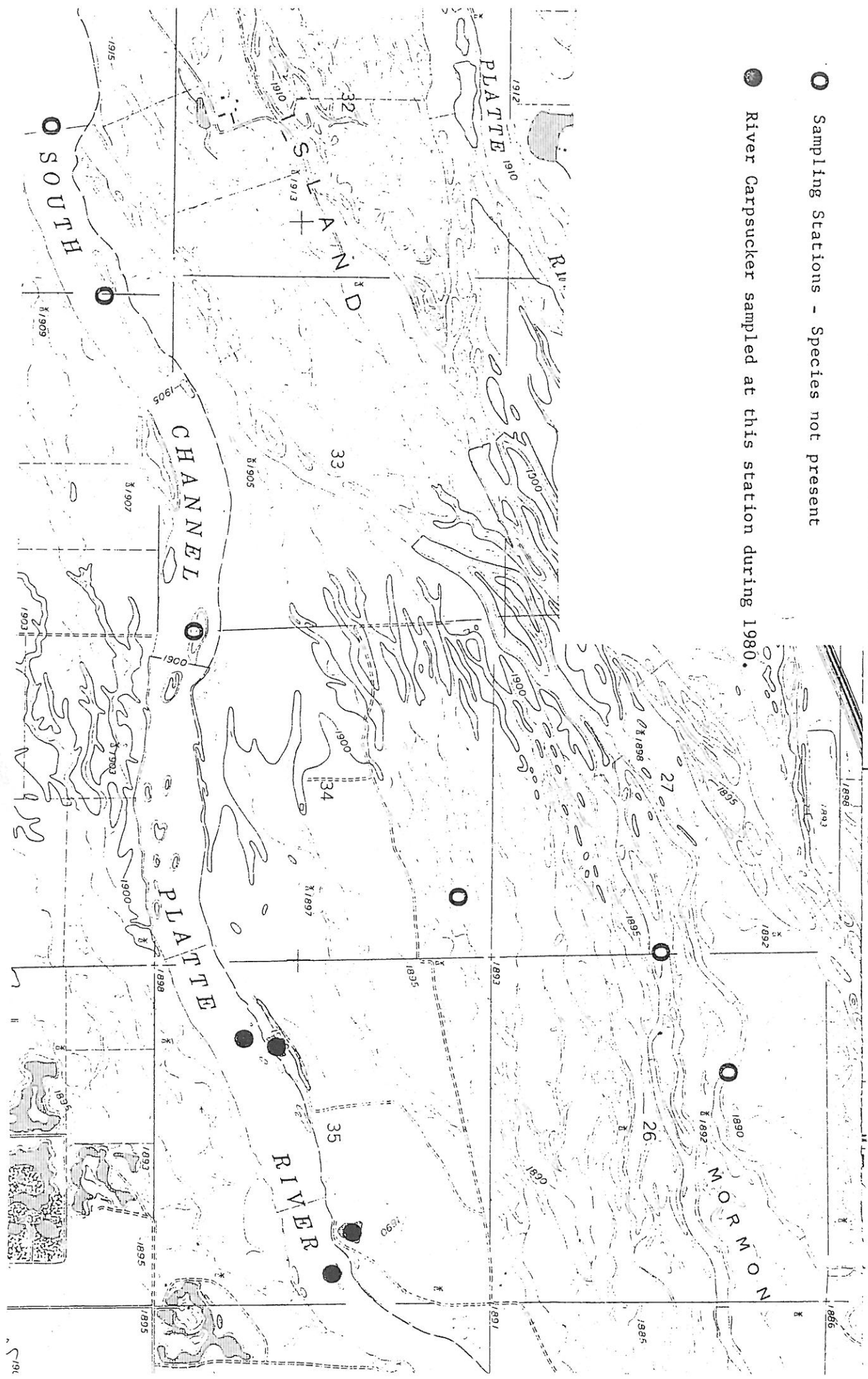
○ Sampling Stations - Species not present

● Quillback Carpsucker sampled at this station during 1980.



Fish Species Distribution on Mormon Island Crane Meadows

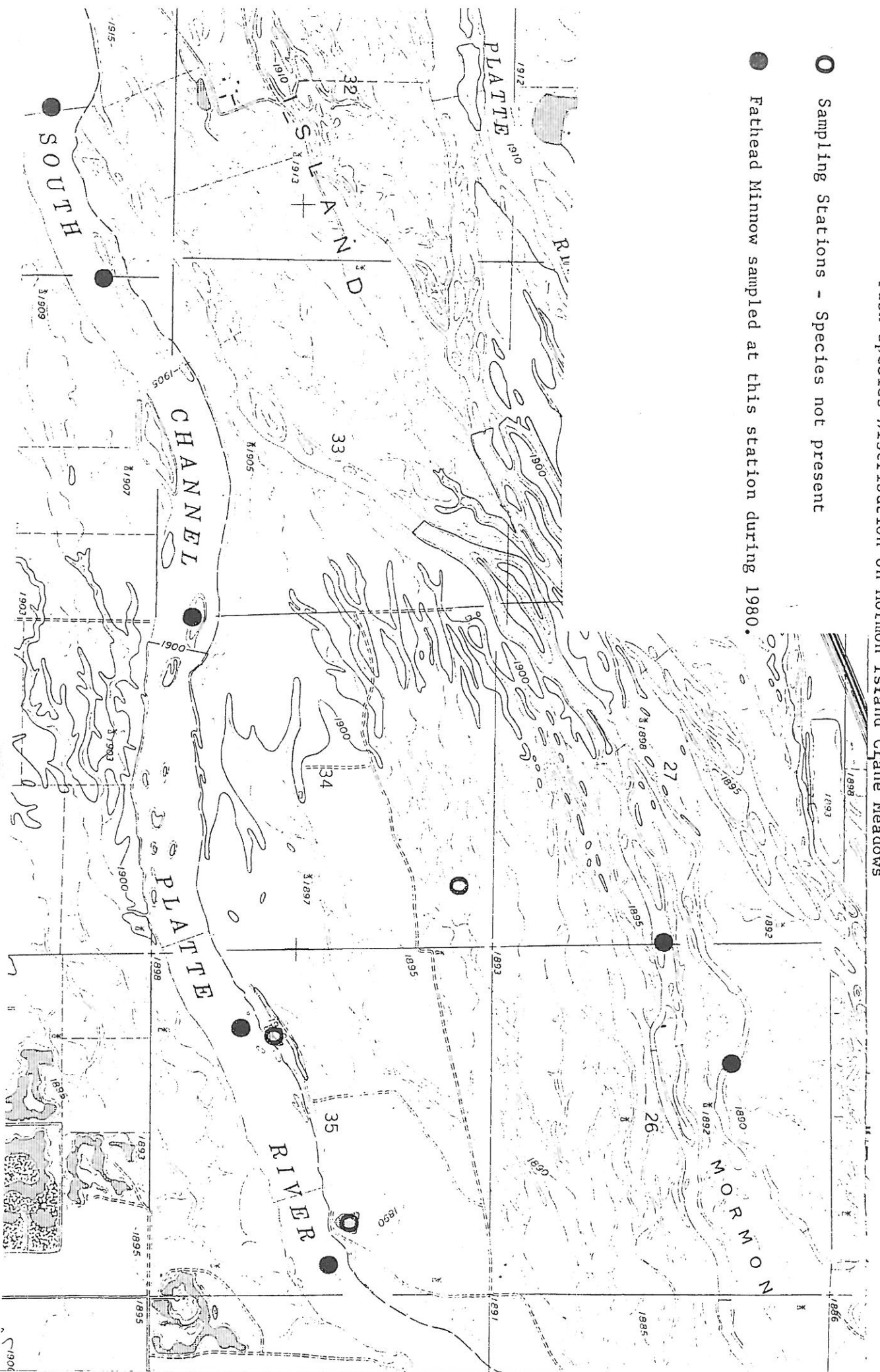
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- River Carpsucker sampled at this station during 1980.



Fish Species Distribution on Mormon Island Crane Meadows

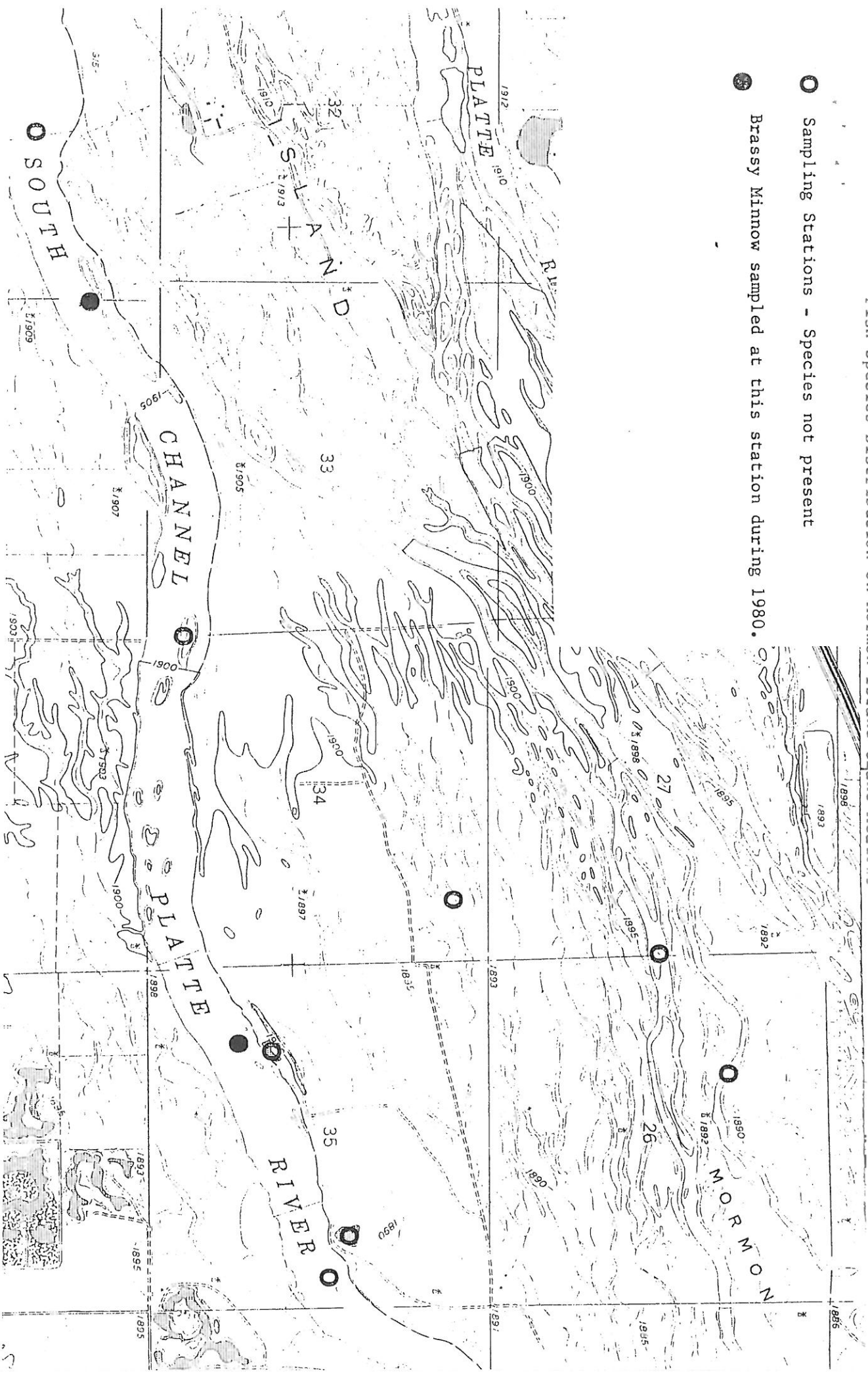
○ Sampling Stations - Species not present

● Fathead Minnow sampled at this station during 1980.



○ Sampling Stations - Species not present

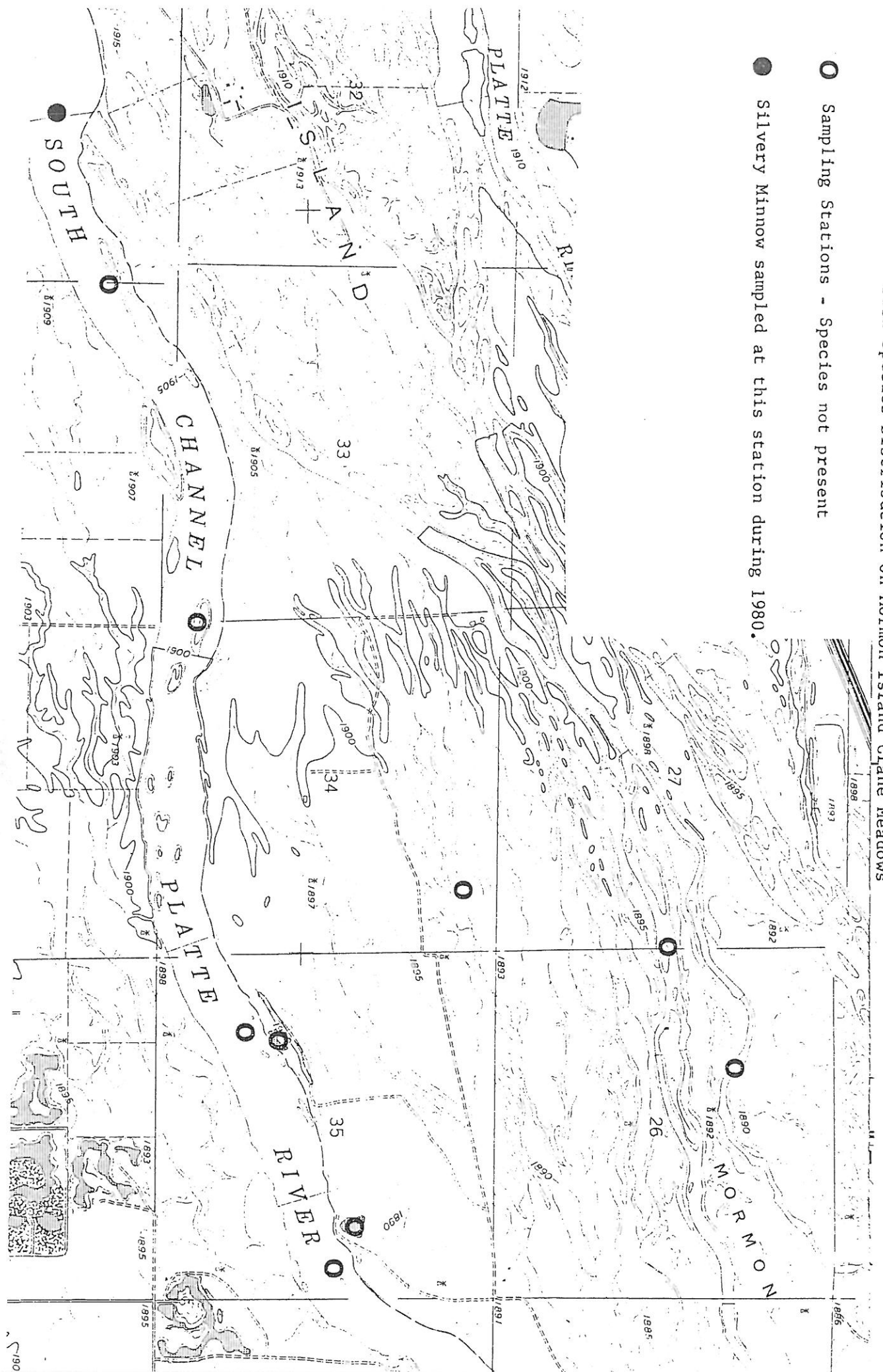
● Brassy Minnow sampled at this station during 1980.



Fish Species Distribution on Mormon Island Crane Meadows

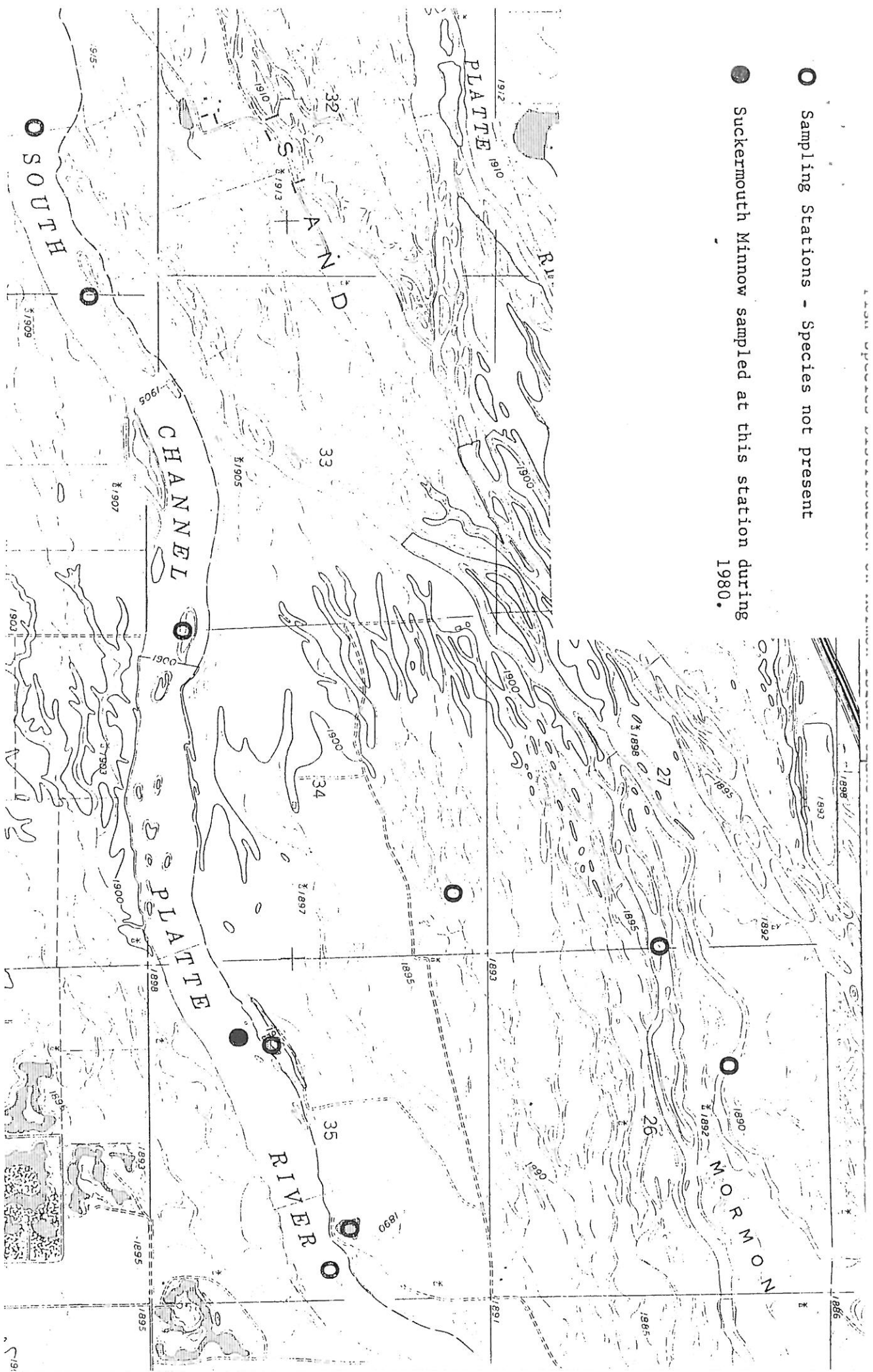
○ Sampling Stations - Species not present

● Silvery Minnow sampled at this station during 1980.



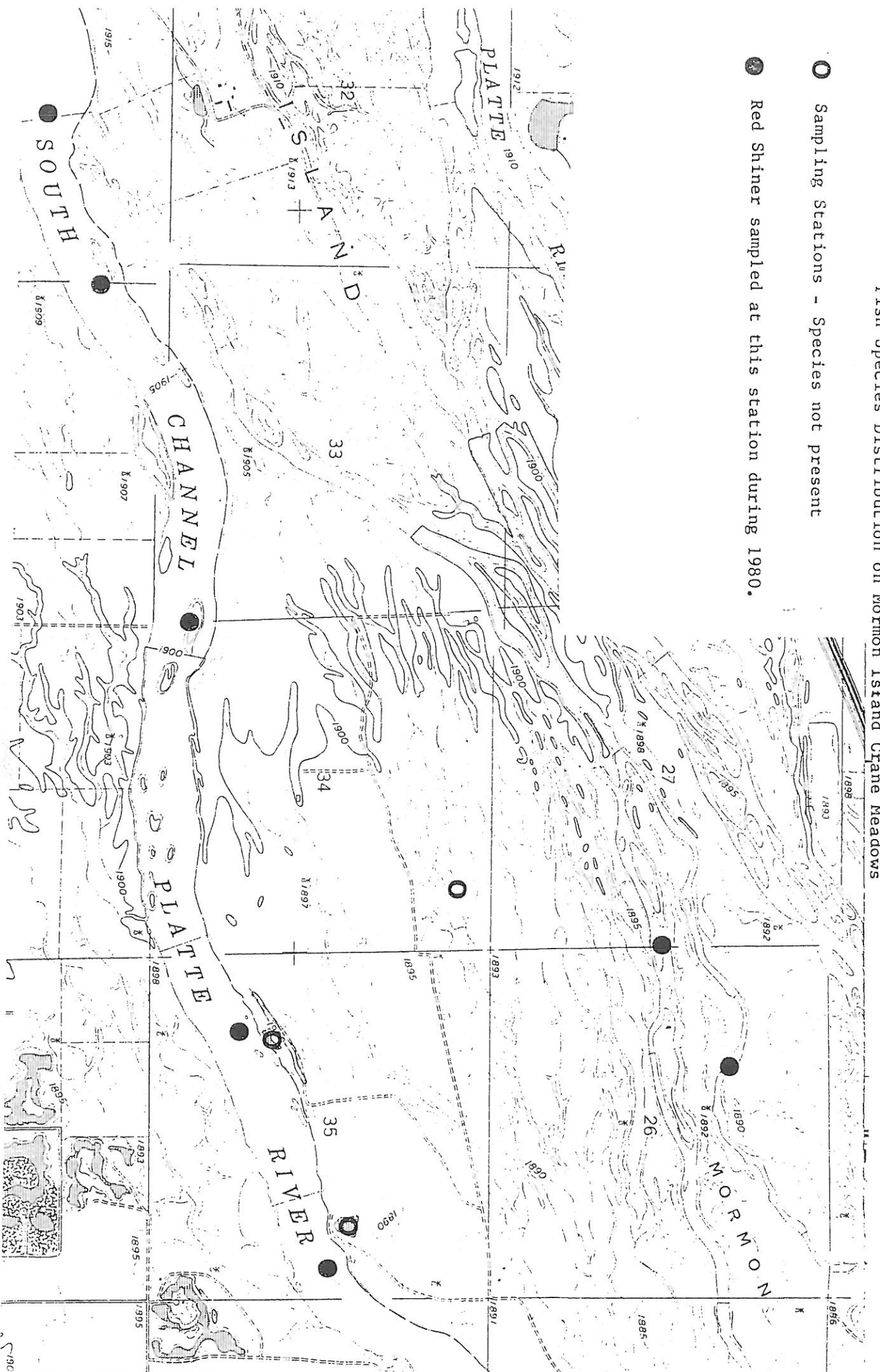
○ Sampling Stations - Species not present

● Suckermouth Minnow sampled at this station during 1980.



Fish Species Distribution on Mormon Island Crane Meadows

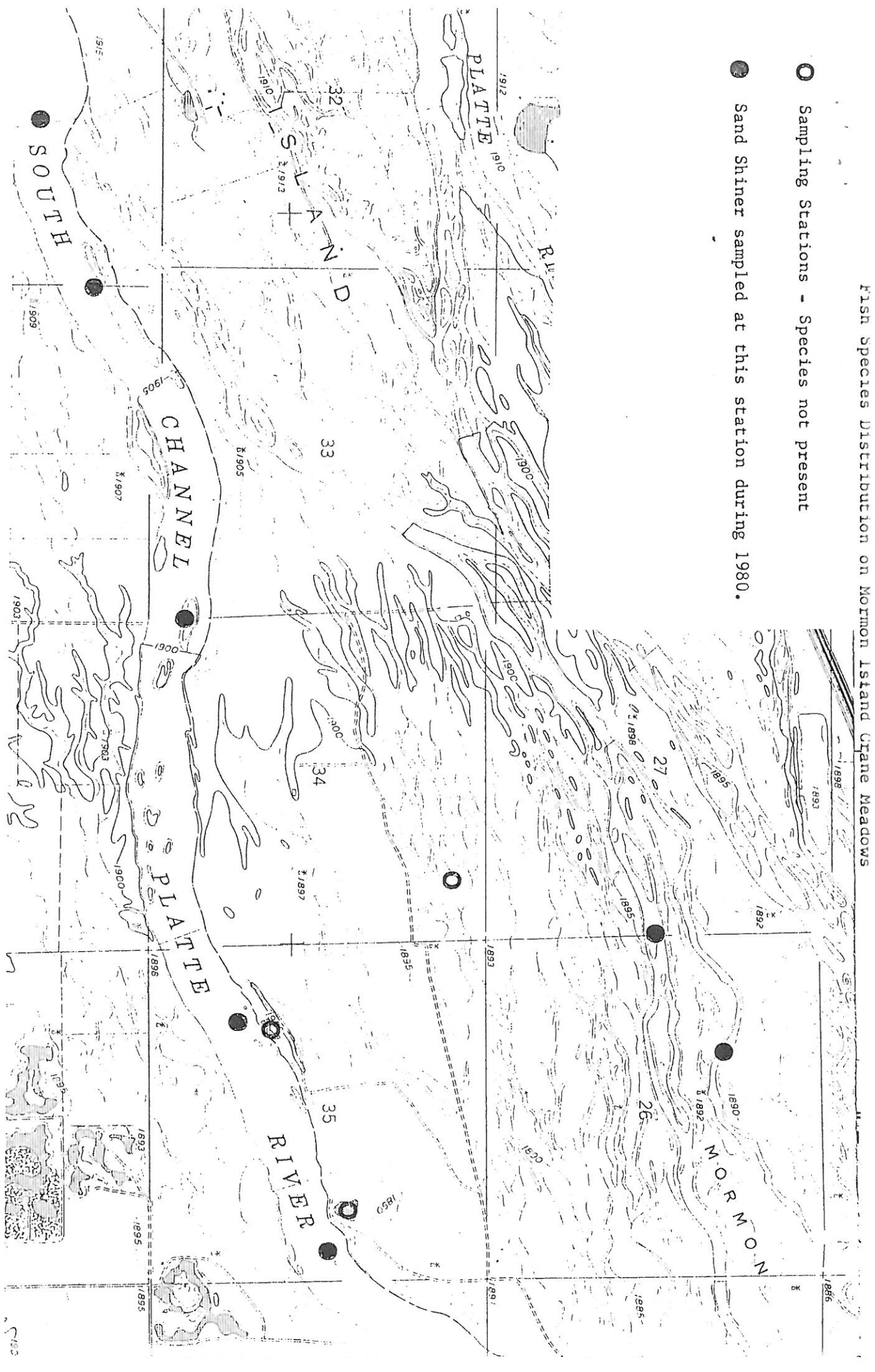
- Sampling Stations - Species not present
- Red Shiner sampled at this station during 1980.



Fish species Distribution on Mormon Island Crane Meadows

○ Sampling Stations - Species not present

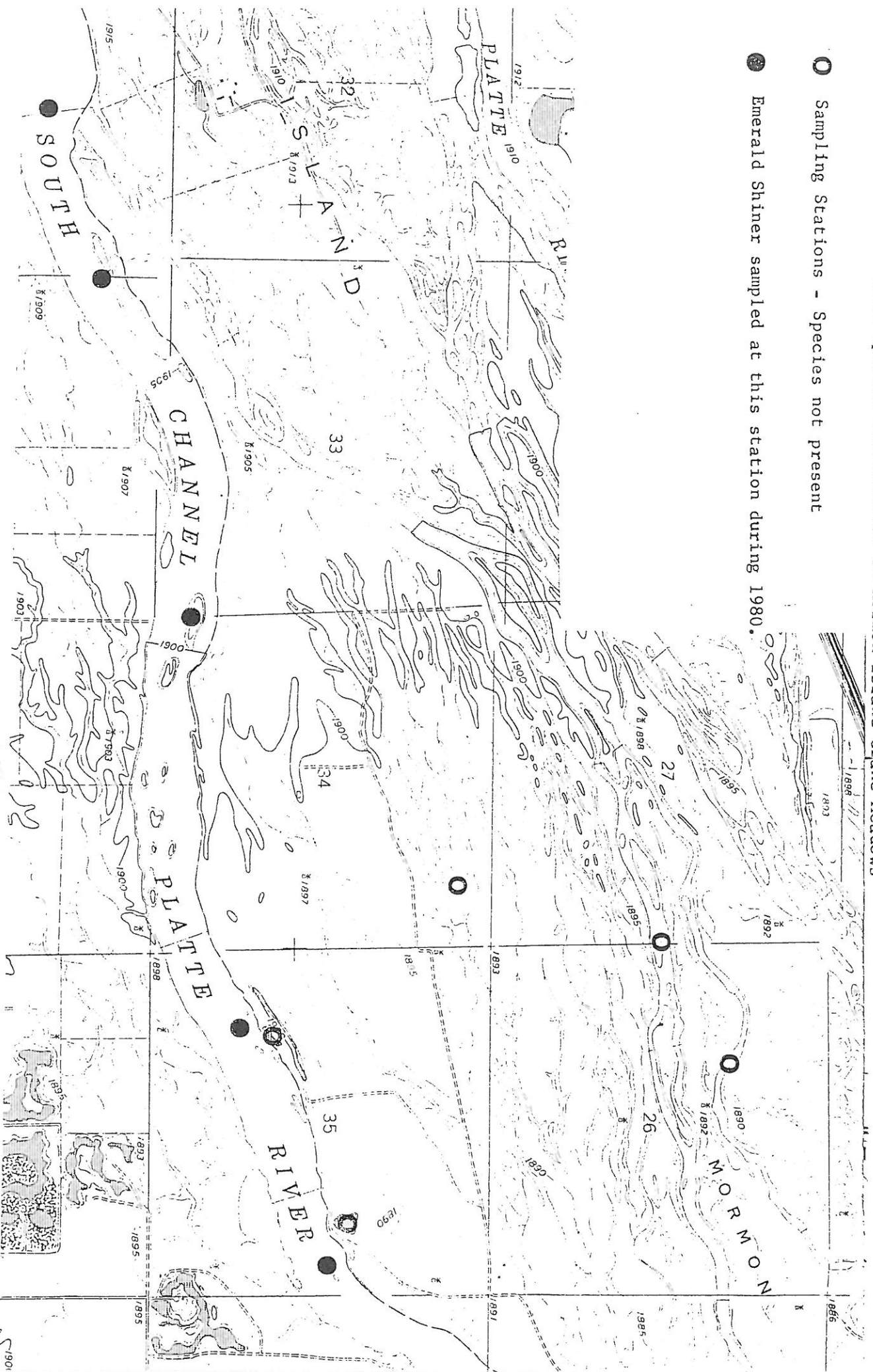
● Sand Shiner sampled at this station during 1980.



Fish Species Distribution on Mormon Island Crane Meadows

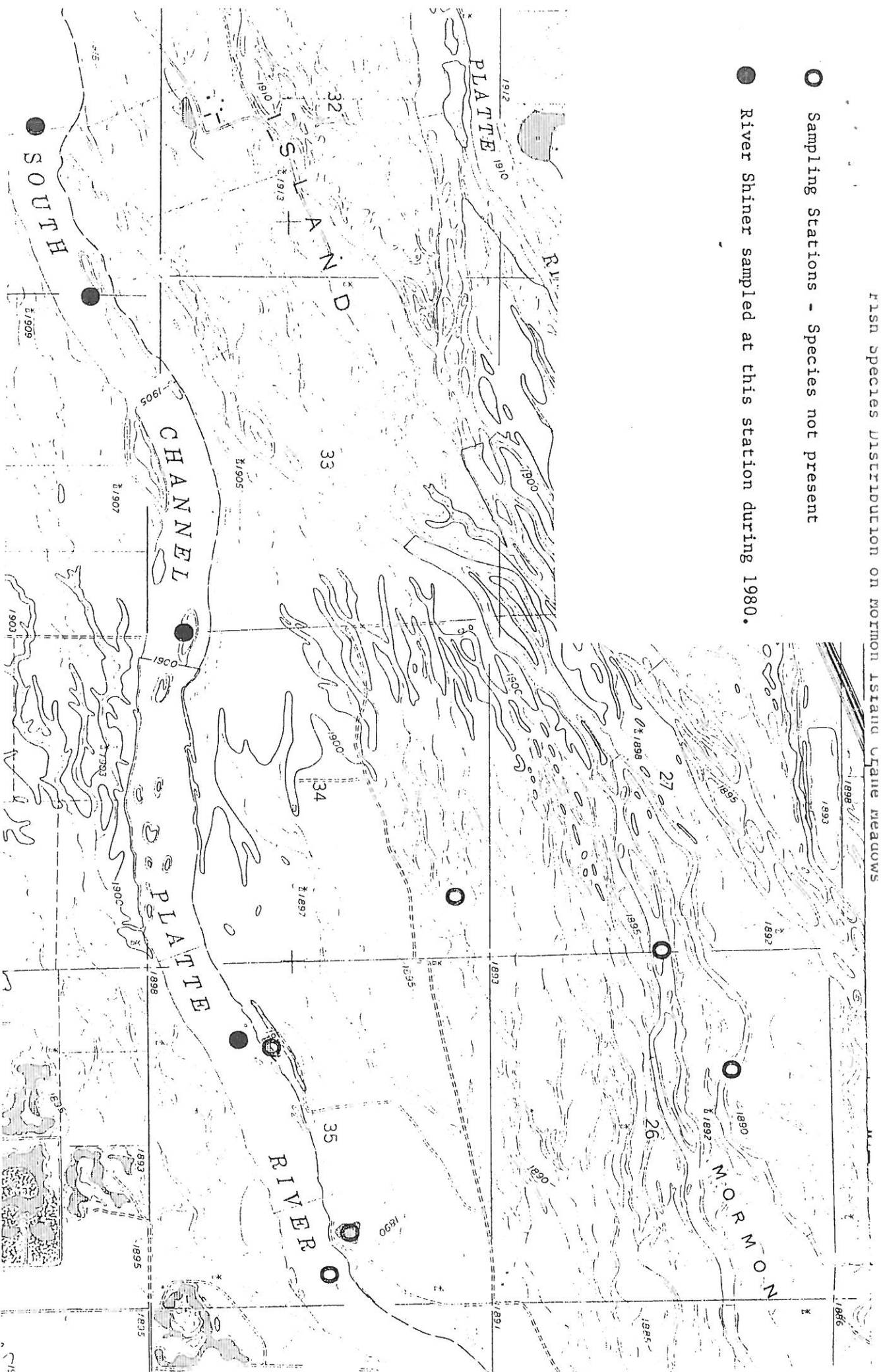
○ Sampling Stations - Species not present

● Emerald Shiner sampled at this station during 1980.



○ Sampling Stations - Species not present

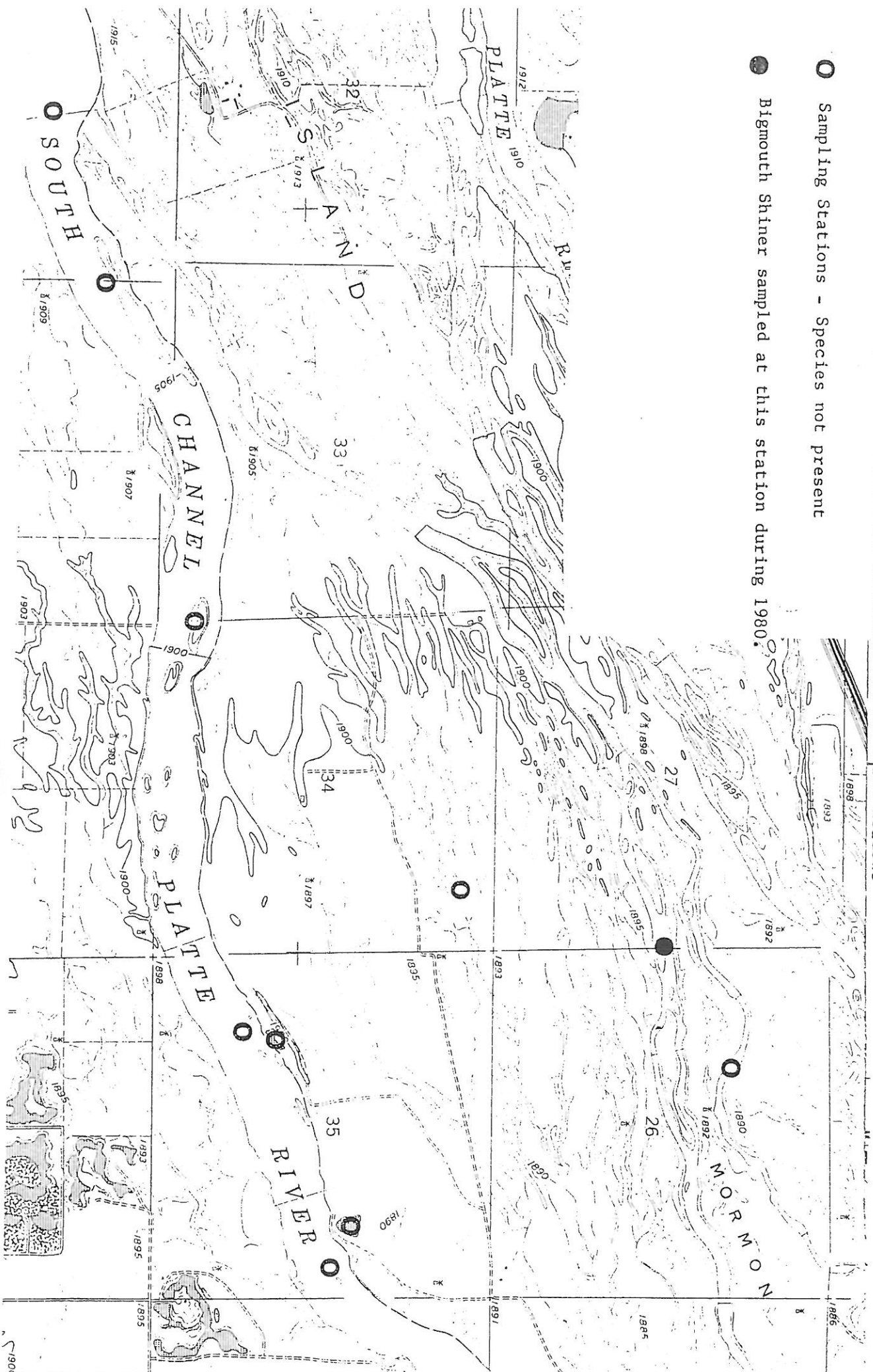
● River Shiner sampled at this station during 1980.



Fish Species Distribution on Mormon Island Crane Meadows

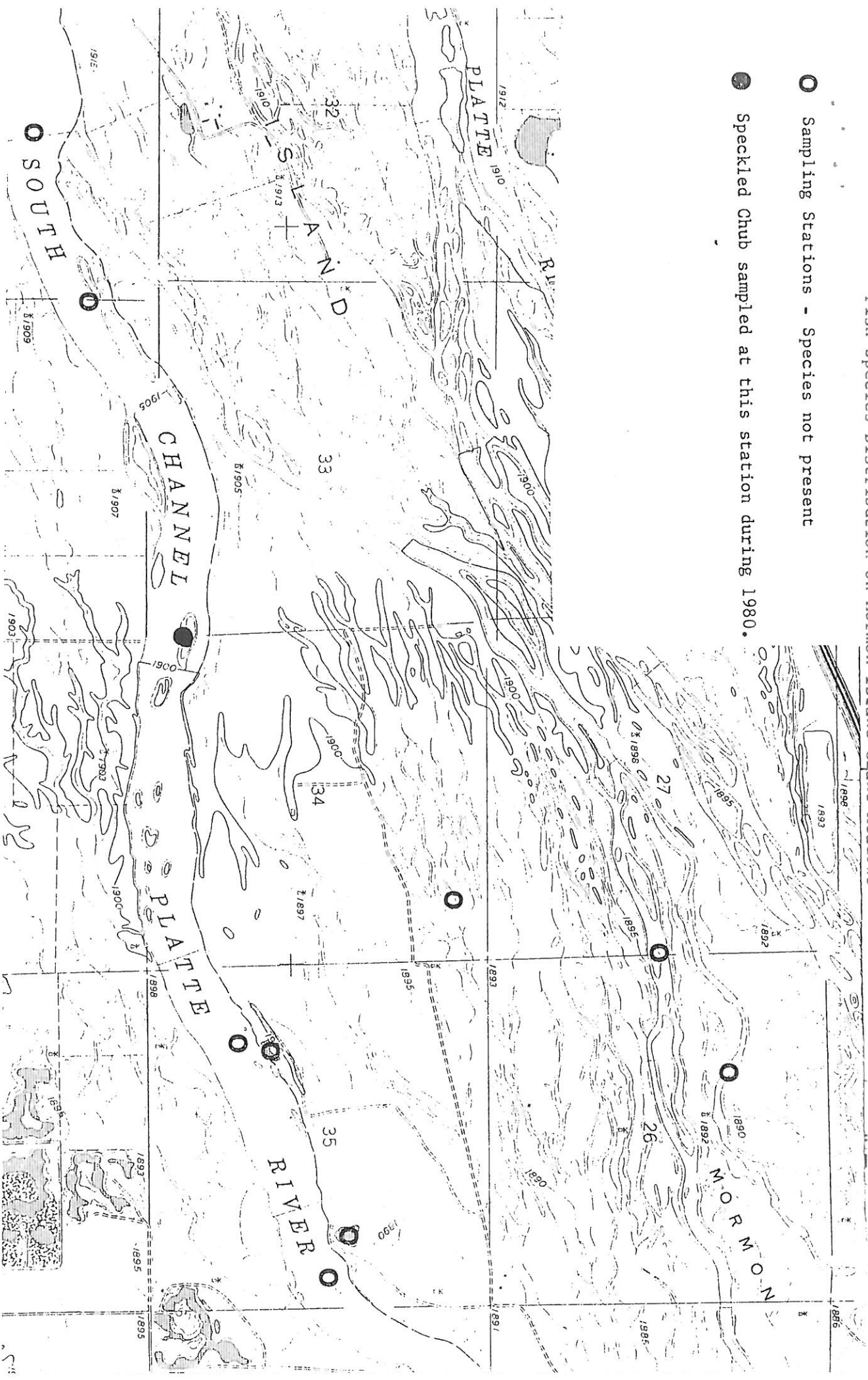
○ Sampling Stations - Species not present

● Bigmouth Shiner sampled at this station during 1980.



○ Sampling Stations - Species not present

● Speckled Chub sampled at this station during 1980.



U.S. FISH AND WILDLIFE SERVICE. 1979. Crescent Lake National Wildlife Refuge and North Platte National Wildlife Refuge, annual narrative report. Ellsworth, Nebraska.

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APPENDIX D

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Fish Inventory List cont.

#	COMMON NAME	SCIENTIFIC NAME
*20.	White Sucker Shorthead Redhorse	<u>Catostomus commersoni</u> <u>Moxostoma macrolepidotum</u>
	ICTALURIDAE	
*21.	Black Bullhead	<u>Ictalurus melas</u>
*22.	Channel Catfish	<u>Ictalurus punctatus</u>
	CYPRINODONTIDAE	
*23.	Plains Killifish	<u>Fundulus kansae</u>
	PERCICHTHYIDAE	
24.	White Bass	<u>Morone chrysops</u>
	CENTRARCHIDAE	
*25.	Bluegill	<u>Lepomis macrochirus</u>
*26.	Green Sunfish	<u>Lepomis cyanellus</u>
27.	Orangespotted Sunfish	<u>Lepomis humilis</u>
*28.	Largemouth Bass	<u>Micropterus salmoides</u>
*29.	^{Spotted} Smallmouth Bass	<u>Micropterus dolomieu</u> <u>premeleoides</u>
*30.	White Crappie	<u>Pomoxis annularis</u>
*31.	Black Crappie	<u>Pomoxis nigromaculatus</u>
	PERCIDAE	
*32.	Yellow Perch	<u>Perca flavescens</u>
	SCIAENIDAE	
*33.	Freshwater Drum	<u>Aplodinotus grunniens</u>

28 species collected.

* - Species can be found in voucher collection.

APPENDIX C

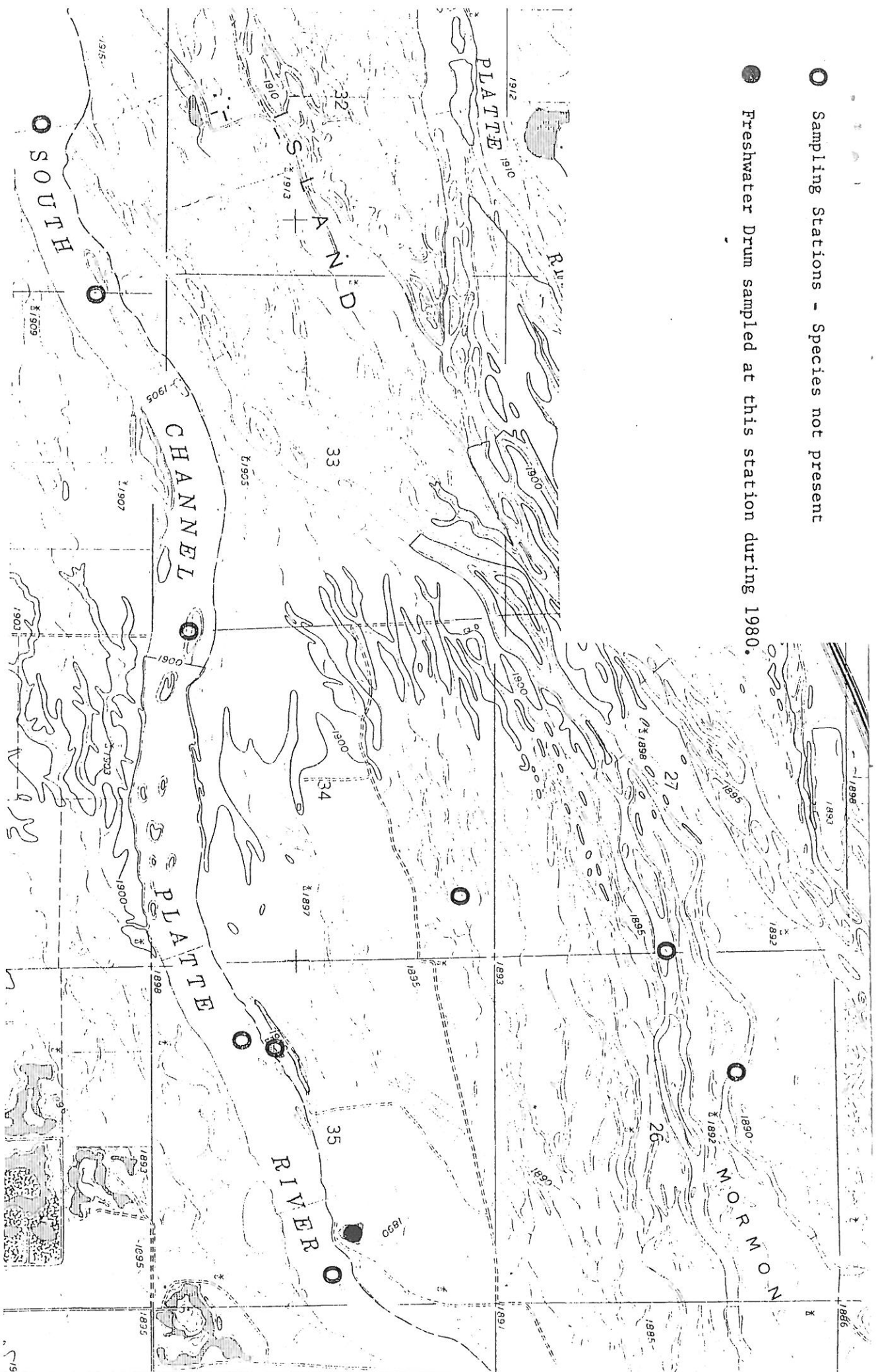
FISHERY INVENTORY LIST FOR MORMON ISLAND CRANE MEADOWS

#	COMMON NAME	SCIENTIFIC NAME
LEPISOSTEIDAE		
* 1.	Shortnose Gar	<u>Lepisosteus platostomus</u>
CLUPEIDAE		
* 2.	Gizzard Shad	<u>Dorosoma cepedianum</u>
HIODONTIDAE		
* 3.	GoIdeye	<u>Hiodon alosoides</u>
CYPRINIDAE		
* 4.	Carp	<u>Cyprinus carpio</u>
* 5.	Mirror Carp	<u>Cyprinus carpio</u>
* 6.	Creek Chub	<u>Semotilus stromaculatus</u>
* 7.	Plains Minnow	<u>Hybognathus placitus</u>
* 8.	Fathead Minnow	<u>Pimephales promelas</u>
* 9.	Brassy Minnow	<u>Hybognathus hankinsoni</u>
* 10.	Silvery Minnow	<u>Hybognathus nuchalis</u>
* 11.	Suckermouth Minnow	<u>Phenacobius mirabilis</u>
* 12.	Red Shiner	<u>Notropis lutrensis</u>
* 13.	Sand Shiner	<u>Notropis stramineus</u>
* 14.	Emerald Shiner	<u>Notropis atherinoides</u>
* 15.	River Shiner	<u>Notropis blennius</u>
* 16.	Bigmouth Shiner o.k.	<u>Notropis dorsalis</u> o.k.
* 17.	Speckled Chub	<u>Hybopsis aestivalis</u>
CATOSTOMIDAE		
* 18.	River Carpsucker	<u>Carpodes carpio</u>
* 19.	Quillback Carpsucker	<u>Carpodes cyprinus</u>

Specimens verified 3 February 1984 by Bob Hrabik

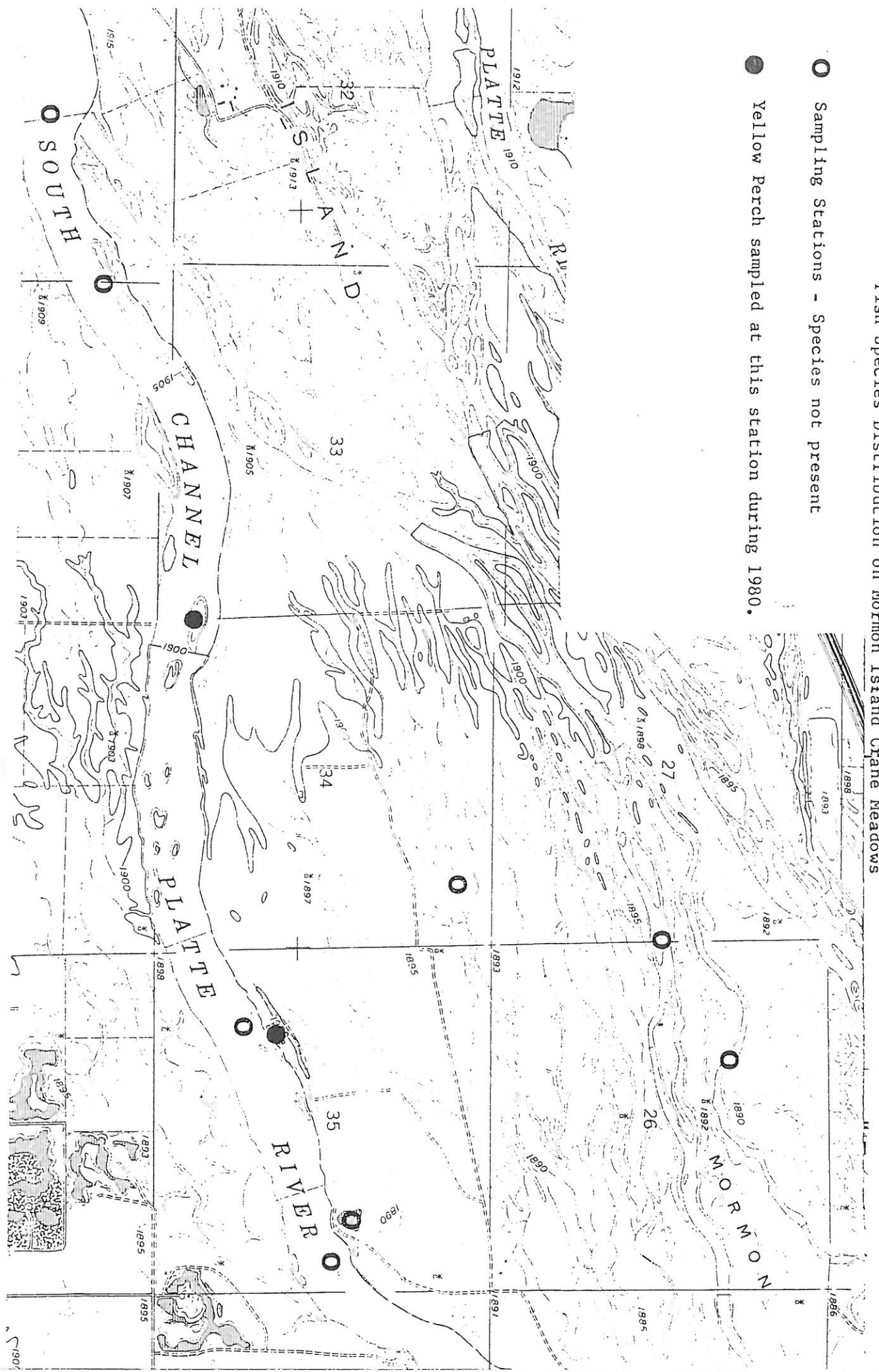
○ Sampling Stations - Species not present

● Freshwater Drum sampled at this station during 1980.



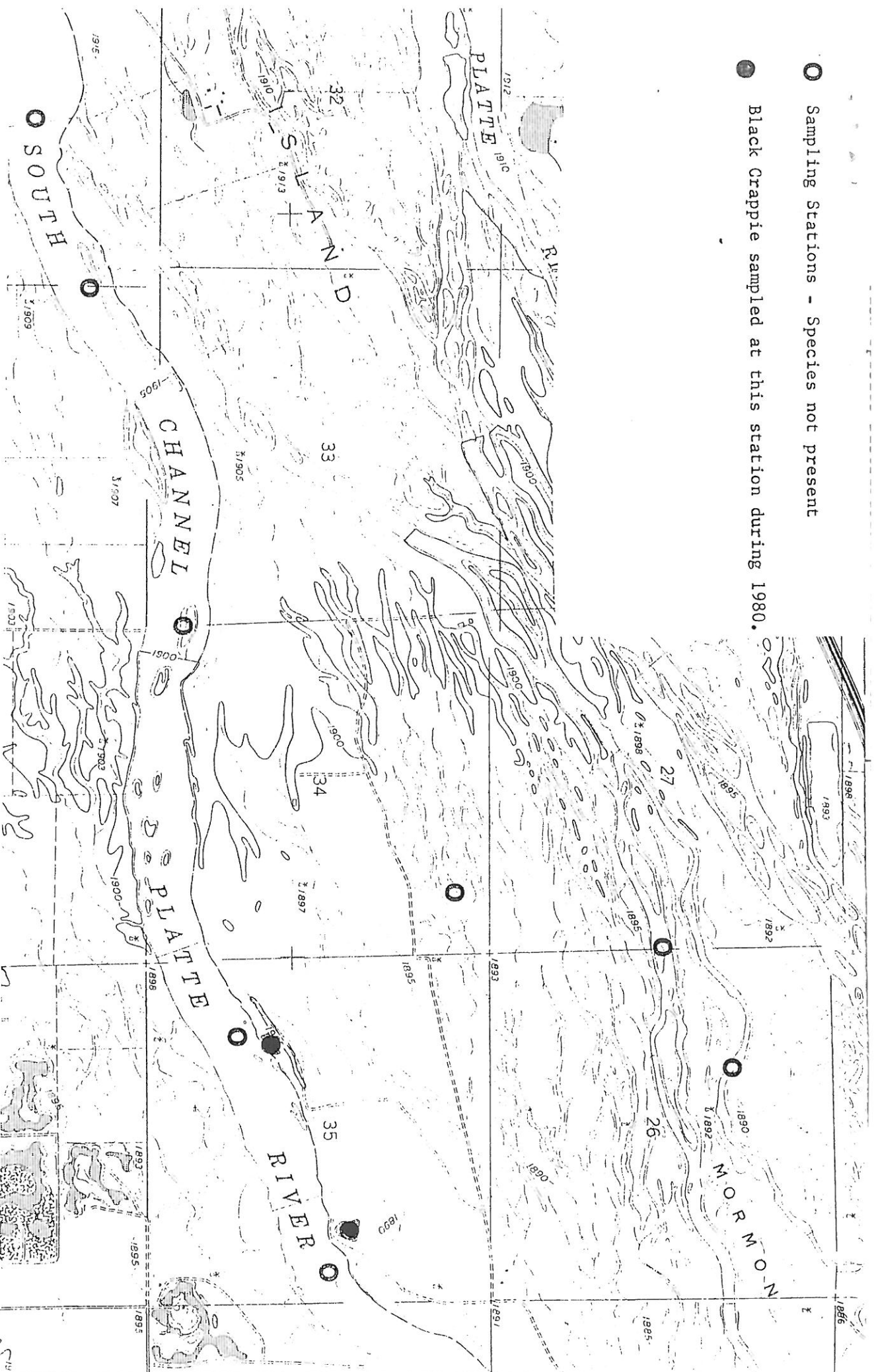
Fish Species Distribution on Mormon Island Crane Meadows

- Sampling Stations - Species not present
- Yellow Perch sampled at this station during 1980.



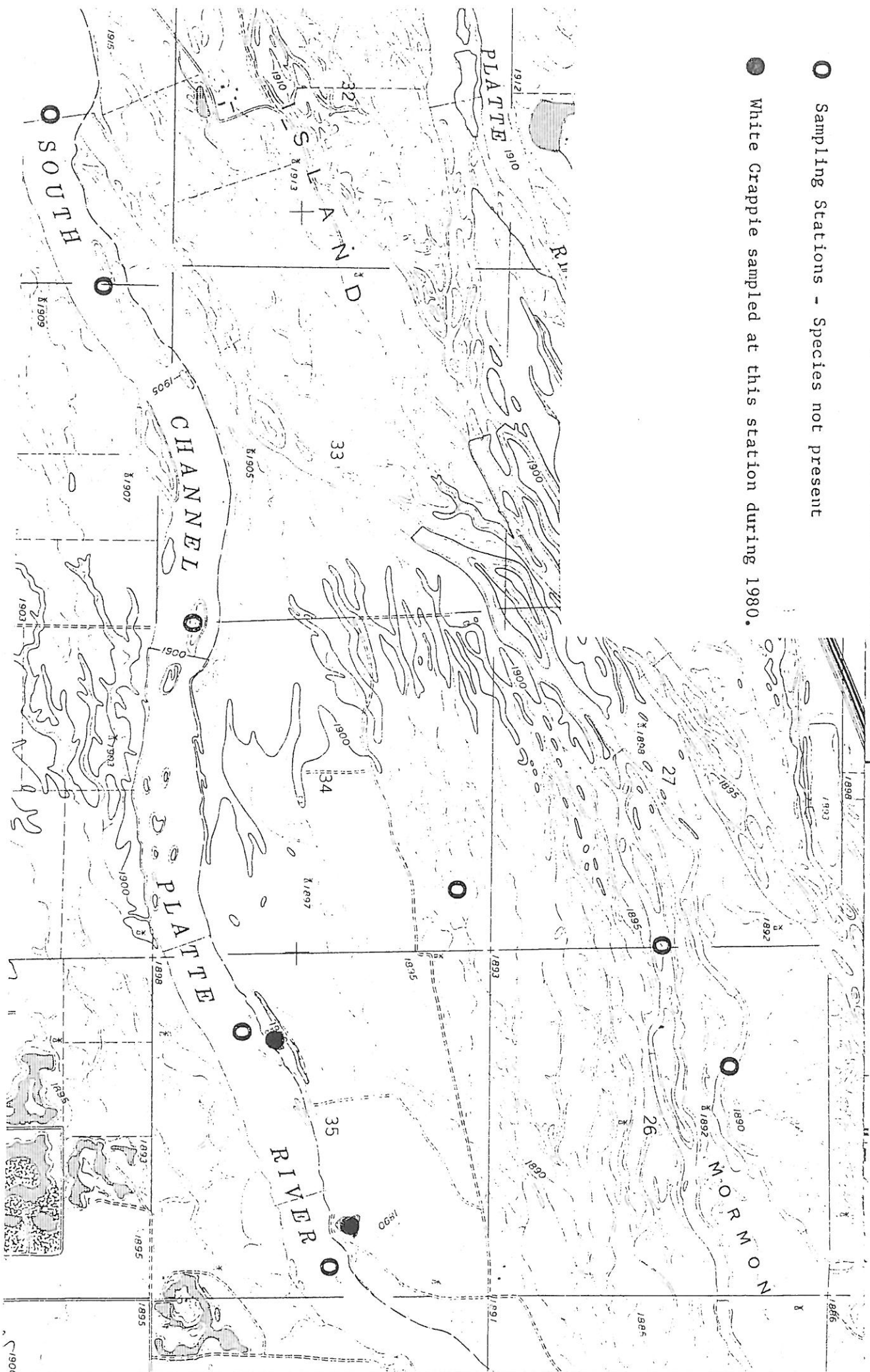
○ Sampling Stations - Species not present

● Black Crappie sampled at this station during 1980.



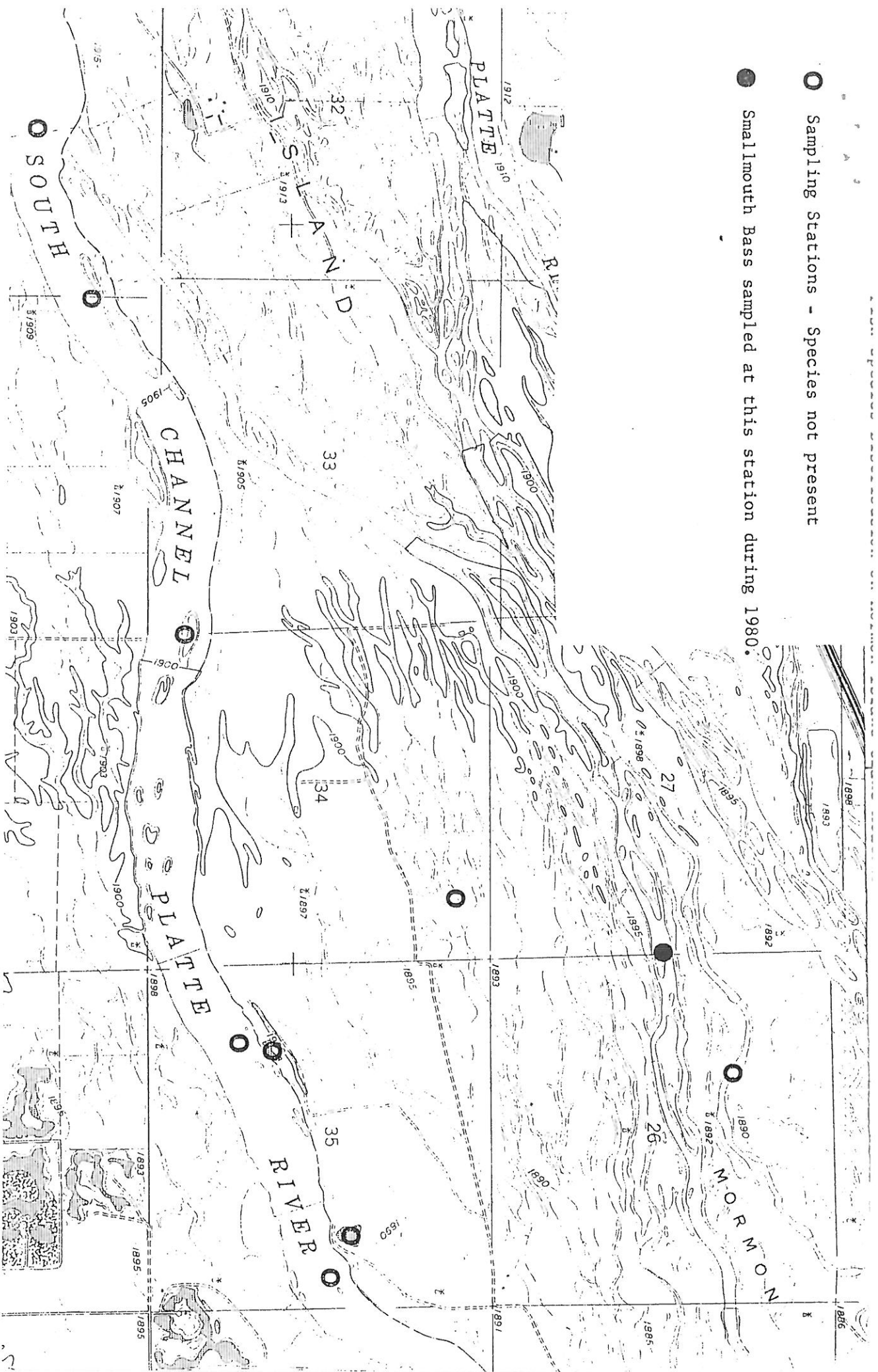
Fish Species Distribution on Mormon Island Crane Meadows

- Sampling Stations - Species not present
- White Crappie sampled at this station during 1980.



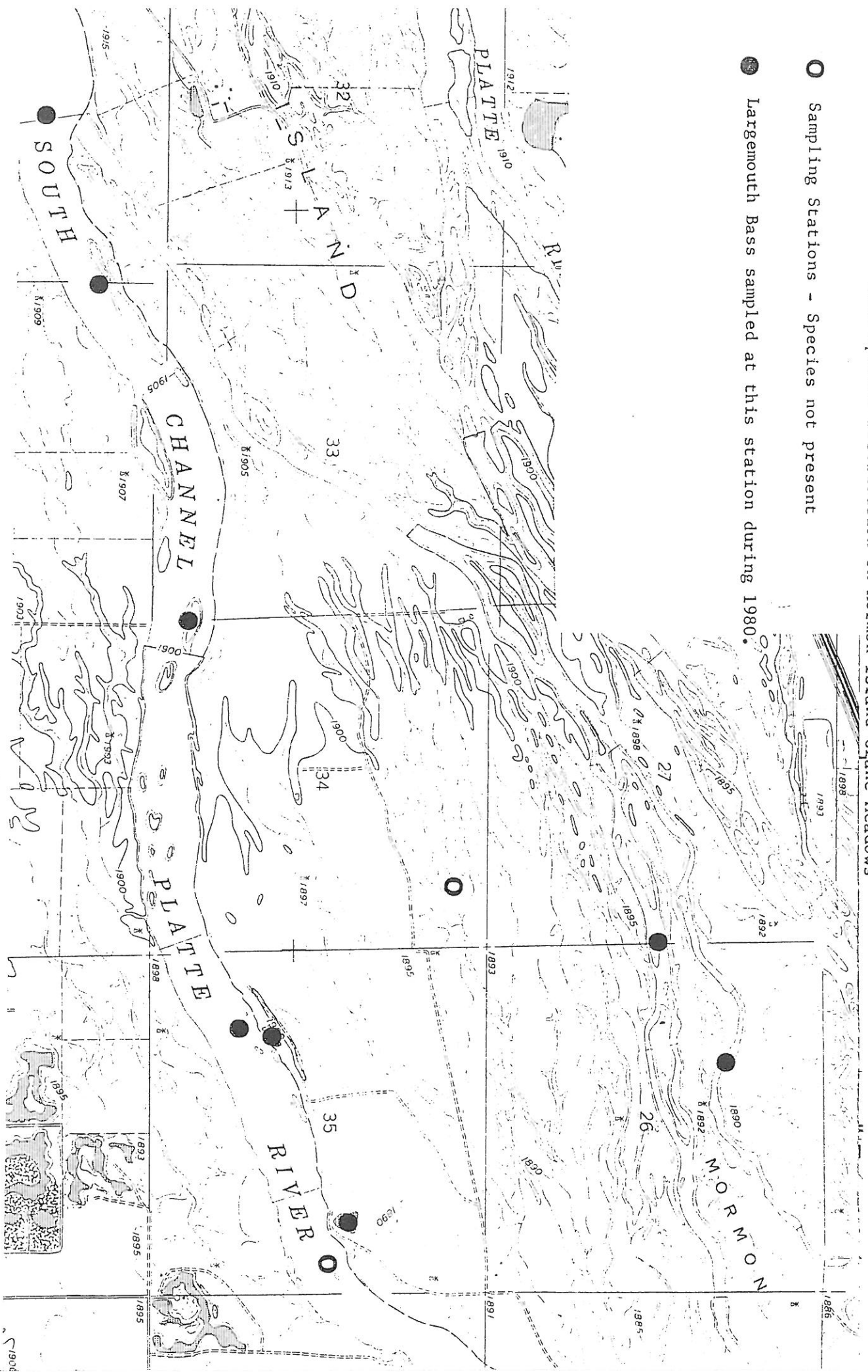
○ Sampling Stations - Species not present

● Smallmouth Bass sampled at this station during 1980.



Fish Species Distribution on Mormon Island Crane Meadows

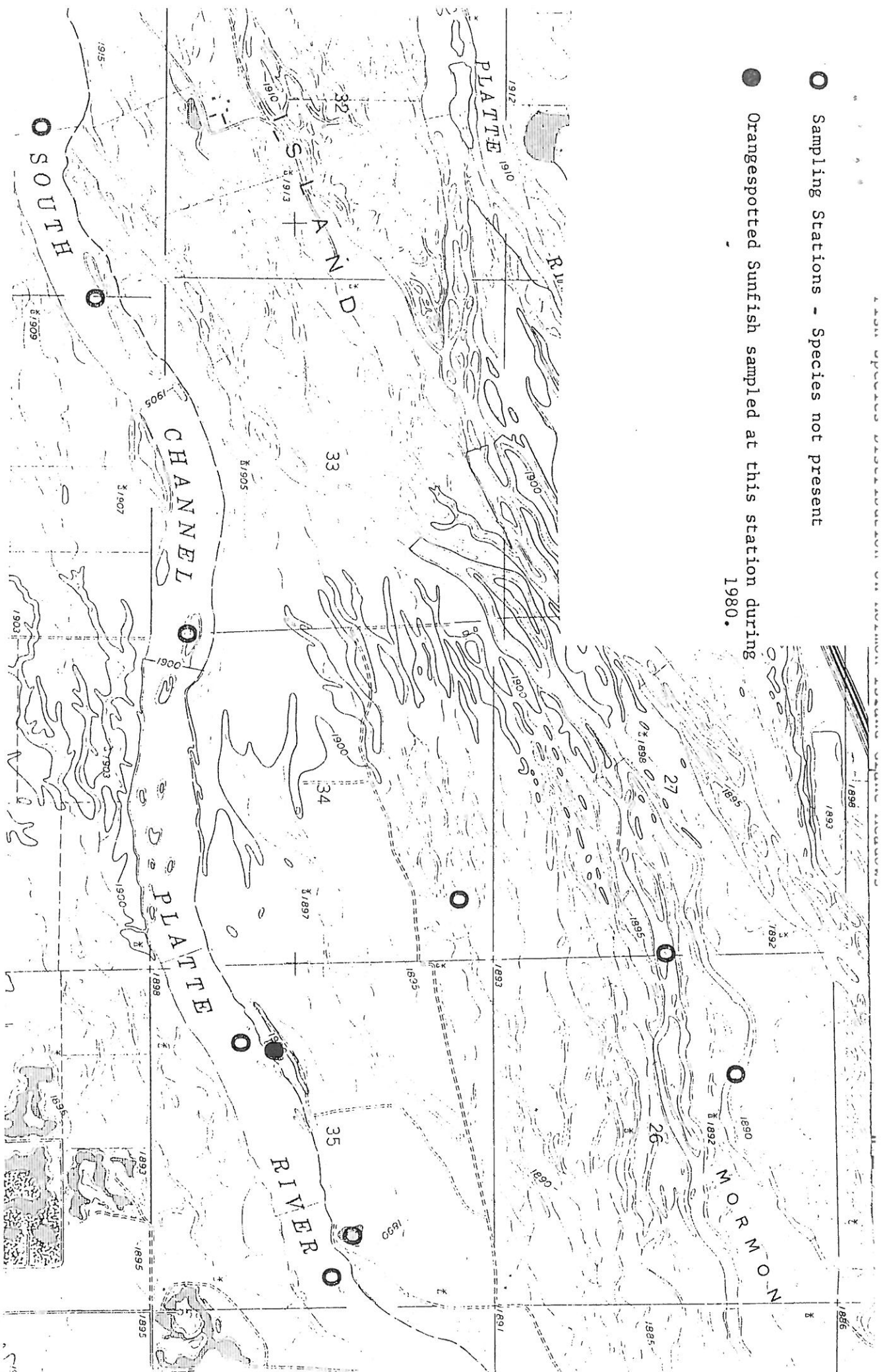
- Sampling Stations - Species not present
- Largemouth Bass sampled at this station during 1980.



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○ Sampling Stations - Species not present

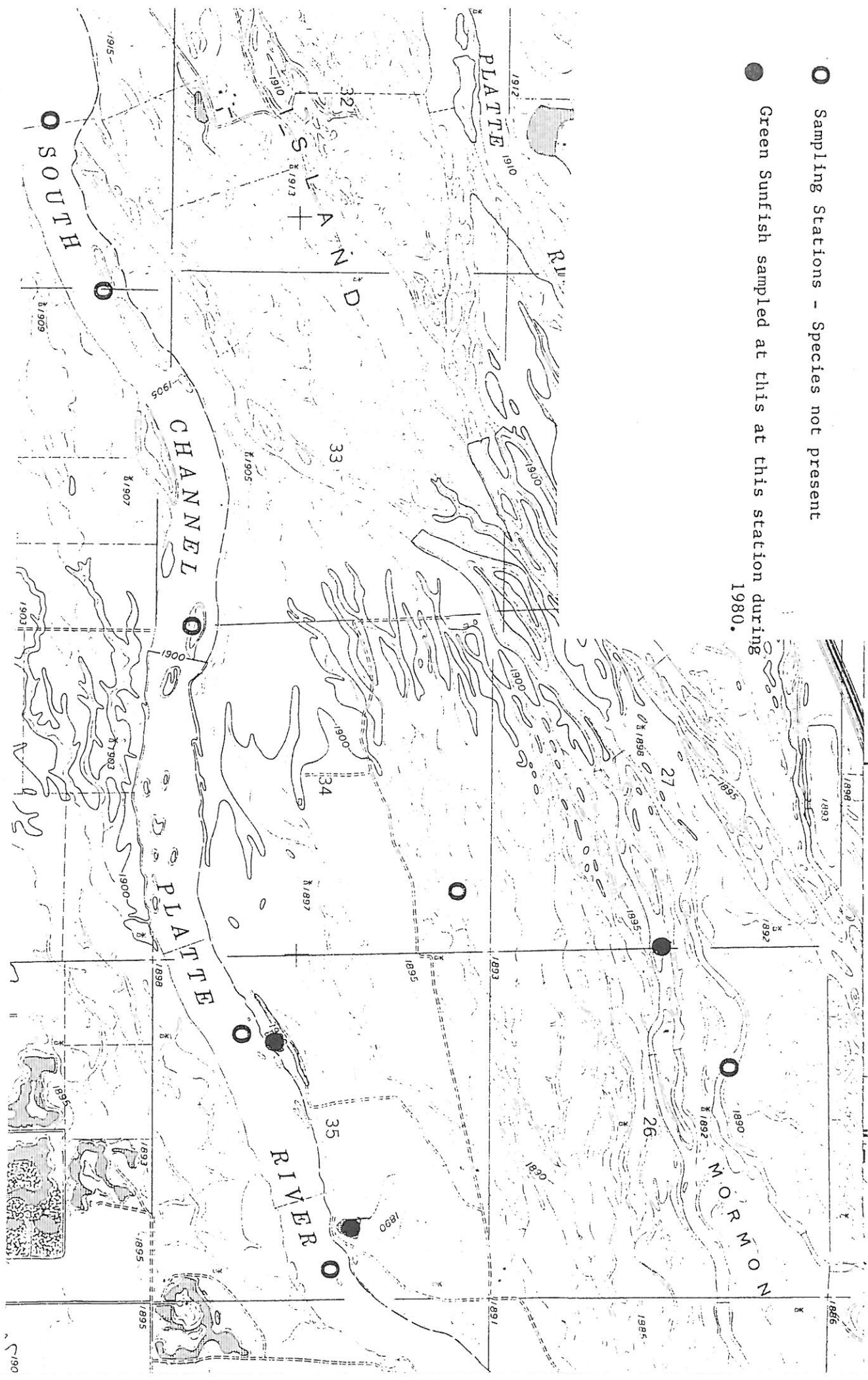
● Orangespotted Sunfish sampled at this station during 1980.



Fish Species Distribution on Mormon Island Crane Meadows

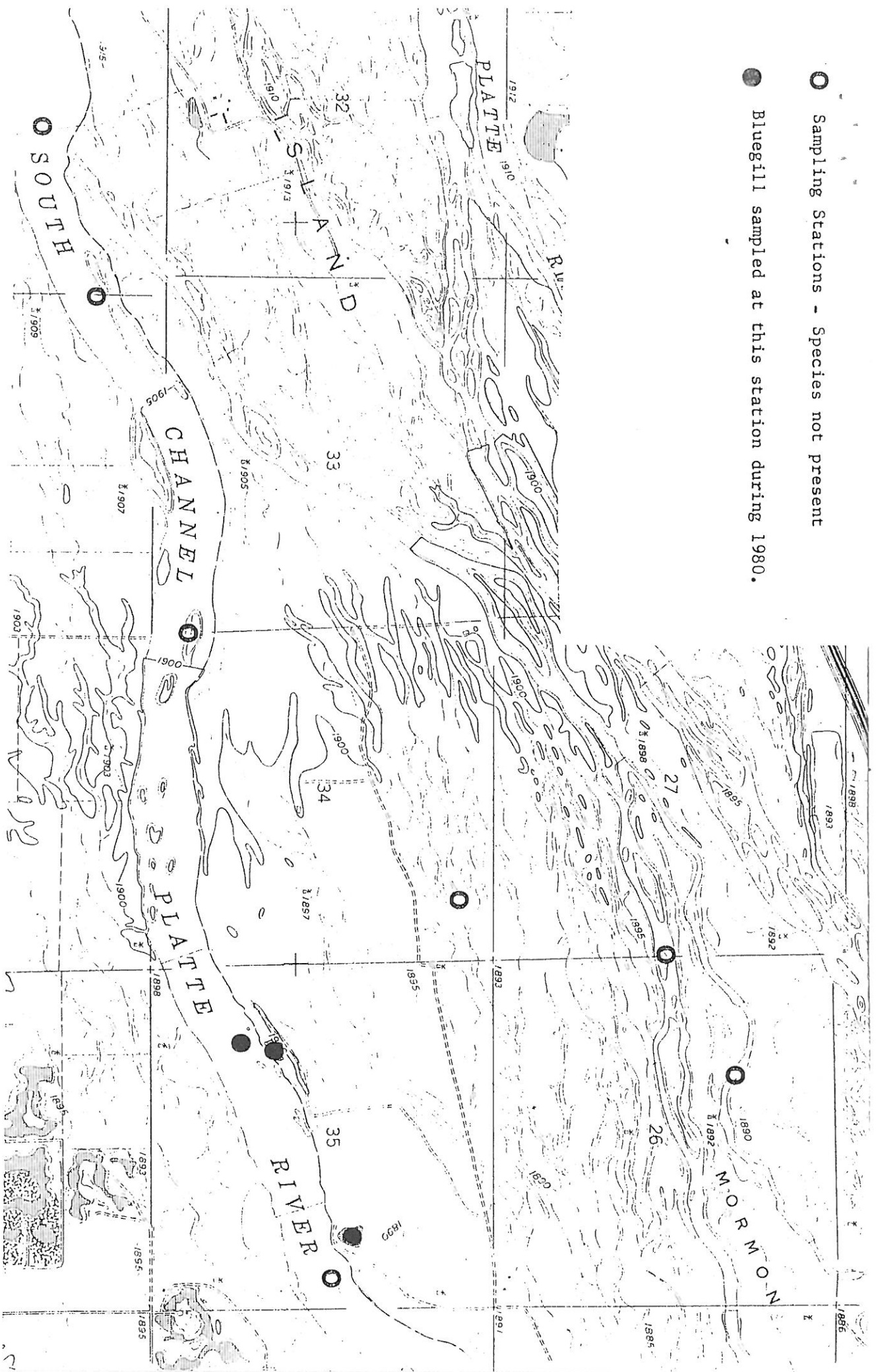
○ Sampling Stations - Species not present

● Green Sunfish sampled at this at this station during 1980.



○ Sampling Stations - Species not present

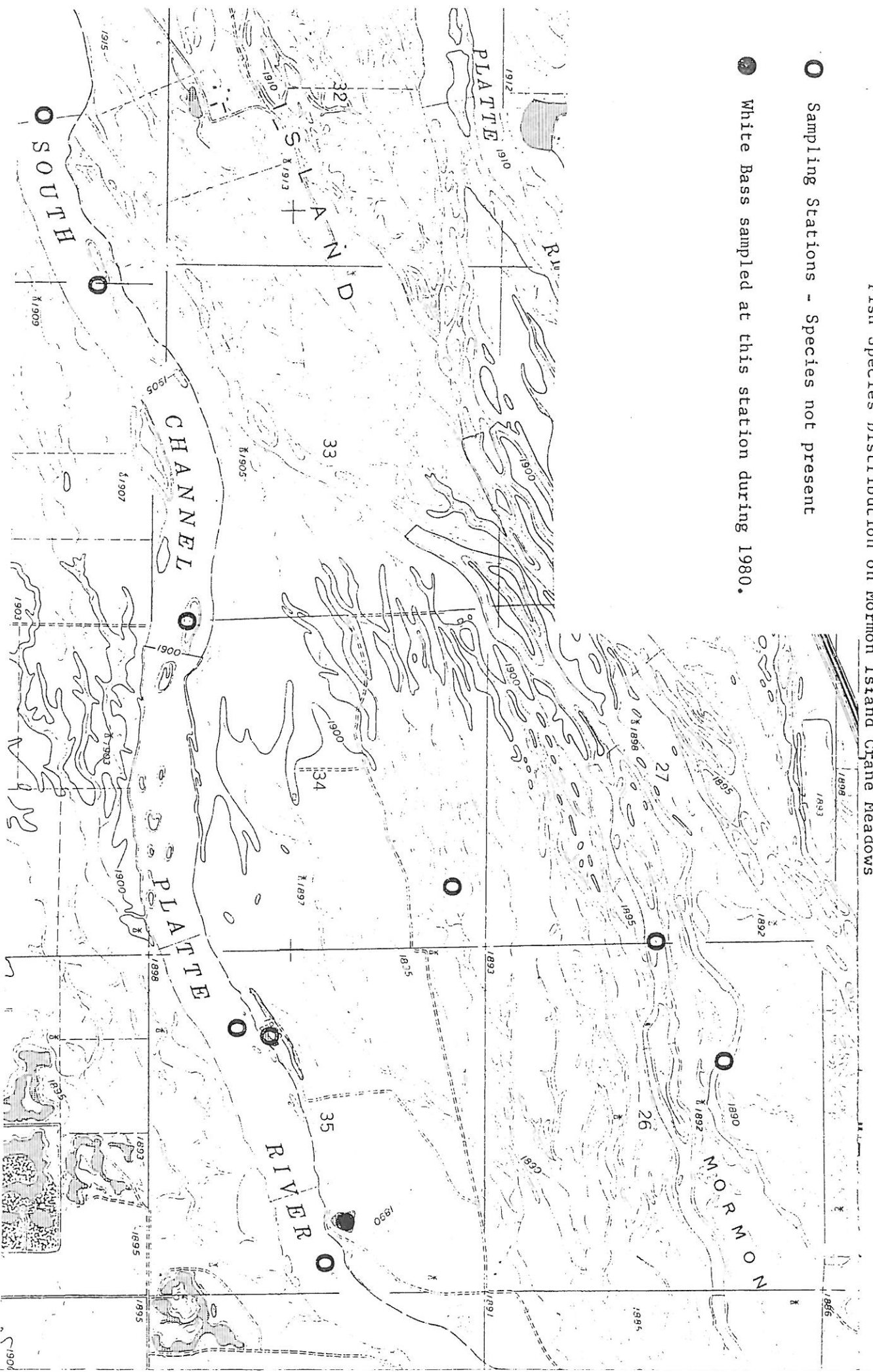
● Bluegill sampled at this station during 1980.



Fish Species Distribution on Mormon Island Crane Meadows

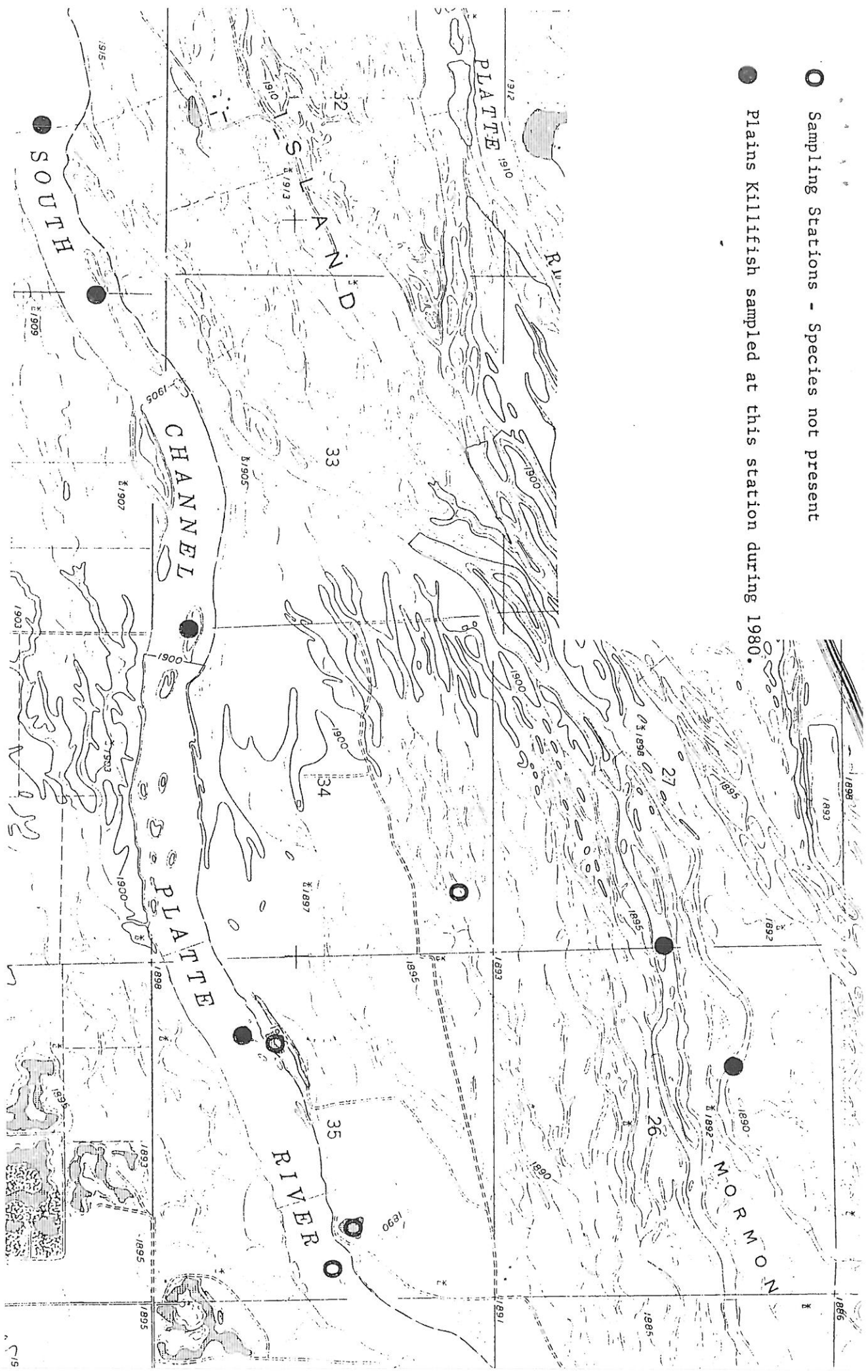
○ Sampling Stations - Species not present

● White Bass sampled at this station during 1980.



○ Sampling Stations - Species not present

● Plains Killifish sampled at this station during 1980.



Fish Species Distribution on Mormon Island Crane Meadows

- Sampling Stations - Species not present
- Channel Catfish sampled at this station during 1980.

