

**Movements and Habitat Preferences of Adult
Post Spawn Pallid Sturgeon**

2002 Progress Report

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This report submitted to:

Cooperators

Bureau of Reclamation

Garrison Dam National Fish Hatchery

Montana Fish, Wildlife and Parks
Fort Peck Field Office

North Dakota Game and Fish Department

Upper Pallid Sturgeon Workgroup

US Army Corps of Engineers

US Geological Survey
Fort Peck Field Office

Western Area Power Administration

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Introduction

This report summarizes the research and field activities conducted in April through October of the 2002 field season. The main goals of this study are to monitor post spawn migrational movements to help identify pallid sturgeon spawning areas, determine pallid sturgeon response to "Spring Test Flows" out of Fort Peck Dam to see if mimicking natural flows will expand pallid use and habitat into the Missouri River above the confluence of the Yellowstone River, and to evaluate reproductive stages of known post spawn females. We also hope telemetered pallid sturgeon will serve as an important tool for future broodstock capture by utilizing and netting possible aggregations in relation to telemetered fish. Netting additional fish and marking them with Passive Integrated Transponder (PIT) tags will also serve to help strengthen current population estimates.

Study Area

The pallid sturgeon study area (See Figure 1, for study area), for the most part, is a semi-confined stretch of approximately 290 river miles encompassing the Missouri River from Fort Peck Dam to the headwaters of Lake Sakakawea and from the Yellowstone River confluence (~RM 1582.0) up the Yellowstone River to the Intake Diversion Dam, Intake, Montana.

As suggested in the Post Spawn Telemetry Study Plan, datalogging station locations had to be adjusted due to a variety of factors, but eventually all stations were placed in well-suited areas that met the criteria needed to work effectively. Our first station initially was placed up the mouth of the Yellowstone River, a few hundred yards adjacent to or above the confluence on the west riverbank below the high water line. Later in the summer, it was moved to the east bank on private property, due to low water conditions. The second station, which is identified as the Fort Union Station, is approximately 5 river miles up the Missouri River above the confluence, and as its name suggests, lies due east of Fort Union State Park on the north shore of the Missouri River on State-owned land. The third station was located approximately 11 miles down the Missouri River on the Erickson Island State Game Production Area and is located on the north shore of the river.

Two additional logging stations were funded for the 2002 field season by the Bureau of Reclamation (BOR) and the North Dakota Game and Fish Department (NDGFD), which brings the total of stations to five. The BOR station was positioned on Montana Dakota Utilities property outside of Sidney, Montana, (RM 30.1) on the Yellowstone River. The NDGFD funded station was placed downstream of the Ducks Unlimited Pumphouse (RM 1557) on the lower Missouri River. The addition of the two new stations benefited the project, helping to expand the study area into more manageable reaches and providing more movement data.

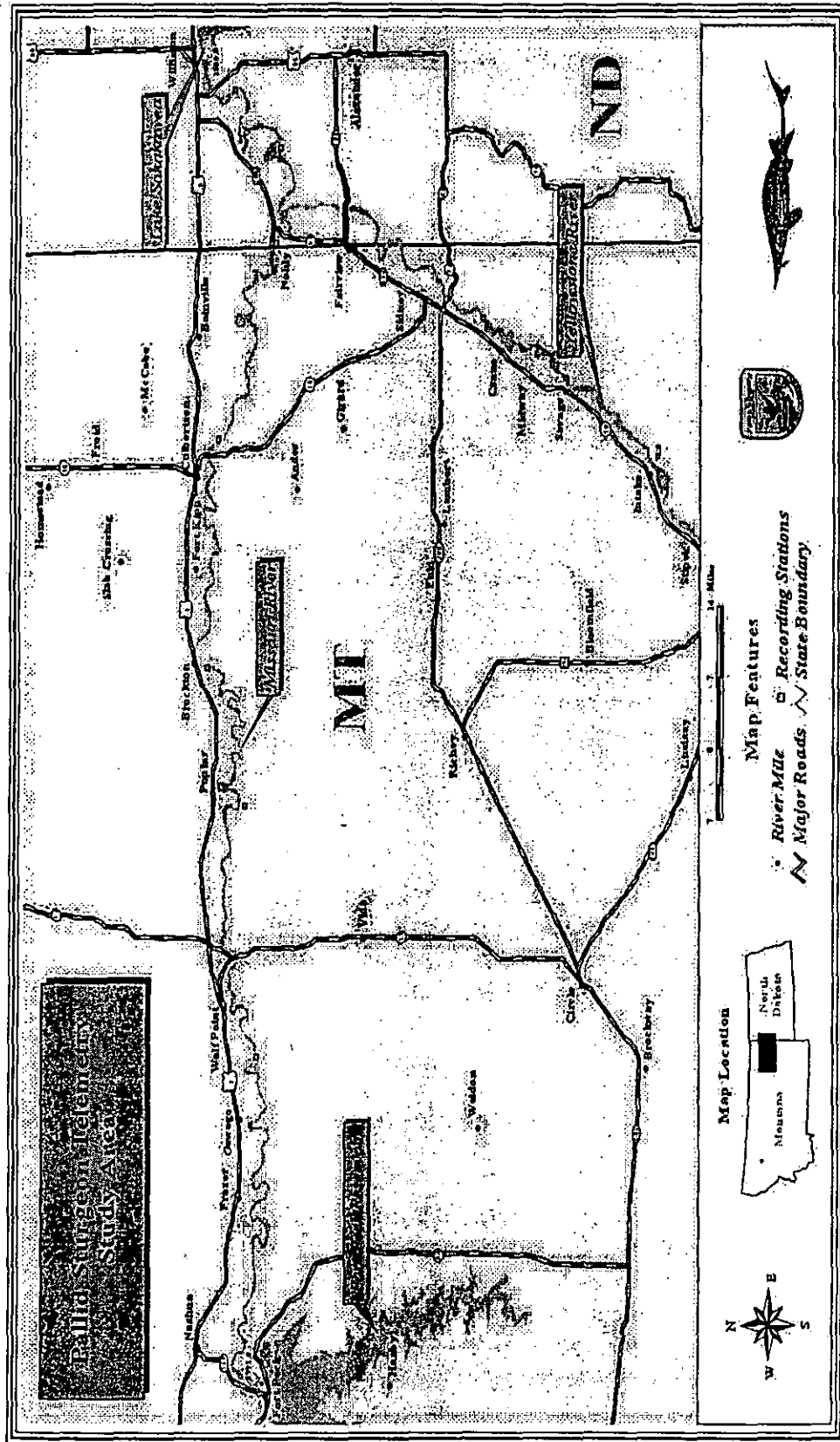


Figure 1: Map of study area

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Methods

Pallid sturgeon telemetry tracking started in the second week of May 2002, and manual tracking resumed throughout the month and continued until the end of June. During the month of July, we started a less stringent tracking regime, only tracking every third week, which was continued through October, when fixed datalogging stations were taken out of the river.

Tracking methodology, as well as other methods, has been described in last year's progress report and the USFWS's draft proposal plan, so rather than describe them here, one can refer to the previous year's literature.

One addition utilized in this past field season's tracking, was the implementation of using a cell phone link to the Sidney fixed datalogging station. This system allowed us to download the station data from a hotel or office, with the aid of a computer. The remote system also allowed us to check settings and change them, call the station to see if it is still operating properly, and most importantly, check the data to determine if one of our study fish has moved into another study reach.

Due to the number of paddlefish on the 149.760 pallid frequency, the addition of two more cell phone links and three more W31 receivers will be utilized to ensure data can be downloaded before memory banks fill up and data is lost. This became a problem on a few different occasions in the 2002 tracking season and should be resolved with the upgraded receivers and technology.

No pallid sturgeon were tagged after the spring 2002 spawn, due to a number of mortalities of the broodstock adults in the hatchery. Although only one mortality (which possibly was the result of cumulative stress from spawning, as well as tagging,) has been associated with the telemetry project; surgically implanting telemetry tags was suspended for a year until the mortality issue in the hatchery could be addressed.

For further clarification of tables and figures listed in this report, fish spawned in the spring of 2000 were named starting with the letter "A," and fish spawned in the spring of 2001 were given names with the letter "B." Because no fish were tagged in the spring of 2002, C will be skipped and fish spawned and tagged in 2003 will all be designated with names starting with "D."

Results and Discussion

During the 2002 spring broodstock capture, a male pallid sturgeon with rather suspicious scar tissue was netted. After referencing the pallid sturgeon database for passive integrated transponder (PIT) tag matches, it was conclusive this fish was a previous telemetry study fish. Aaron, fish # 38, had been tracked in the fall of 2000 when he was released back to the river and beginning in the spring of the 2001 field season, was unable to be located till present. His tag incision had healed perfectly and no signs of stress or infection were observed.

Consequently, we saw this happen at least two more times in the 2002 field season. Amber, fish # 62, lost her tag approximately at river mile (RM) 1558 above the Ducks Unlimited Pumphouse. In mid-April, she was observed crossing the Erickson Island Station and staging downstream below the Confluence Station for a brief period of time. She then was located by boat at RM 1567 in May. Somewhere after that time period, she shed her tag in about 7 feet of water adjacent to an island. We continued to pick up here tag throughout the summer at the same location without it ever moving. Attempts were made to net the fish on different occasions, but no movements were ever monitored. Water levels never reached shallow enough depths to attempt retrieval.

Al, fish # 22, also departed from our study this field season. This tag was apparently shed in the early spring of 2002. Montana, Fish, Wildlife and Parks crews' picked up his signal at Big Sky Bend (~RM 17), where it remained for the rest of the year. In late August, attempts to retrieve the tag were conducted. The tag was located in approximately 2 to 3 feet of water and maximum signal output was picked up on our receivers helping us isolate the tag within a couple foot radius, unfortunately after digging for a couple of hours, the tag could not be retrieved.

Bridget, fish # 10, has also been unable to be located since she was returned back to the river. The loss of this fish, as well as Amber, has definitely hurt one of the objectives of the study and has left us with only one female study fish.

Table 1: List of the class of 2000 remaining in the study, as of October 2002.

Name	Code	Sex	Pit tag #	Weight In Pounds	Weight in Kilograms	Fork Length In Inches	Fork Length in Millimeters
Art	18	M	1F4849755B	33	14982	51	1295
Annie	25	F	1F47715752	55	24970	62	1580
Andre	26	M	7F7B081579	32	14528	56	1444
Alex	34	M	115525534A	36	16344	55	1404
Arnie	44	M	2202236E31	61	27694	60	1542
Archie	46	M	1F4A33194B	45	20340	57	1468
Andrew	50	M	115713555A	28	12712	53	1352

Table: 2. List of the class of 2001 remaining in the study, as of October 2002.

Name	Code	Sex	Pit tag #	Weight in Pounds	Weight in Kilograms	Fork Length In Inches	Fork Length in Millimeters
Butch	2	M	1F4A27214F	50	22857	61	1541
Bart	14	M	115631222A	29	13257	52	1340
Bob	116	M	7F7D3C5708	30	13714	55	1405
Ben	144	M	1F4A111C6A	43	19657	55	1394

A primary objective of this study was to establish the time between spawns for adult pallid sturgeon and to learn more about the reproductive physiology of these native river fish. Past spawning records from a female sturgeon suggests they may spawn between 2 and 7 years, as well as physical evidence displayed by two, small pallid/pallid hybrid females at GDNFH. Once a female was identified with gravid eggs, it was hoped that tracking her would lead to pallid sturgeon spawning grounds and give us an idea on the stage periods between spawns.

Fish # 25 was located in the lower Missouri River on April 24th, and subsequent netting drifts were made to capture this female on two different days. Unfortunately, she was located in a deep trough along the shore and was unable to be captured. On two separate occasions (June 19-21 and June 30 to July 8th), she proceeded to migrate up the Missouri River to the USGS's Culbertson datalogging station (RM 1619). Unfortunately, we were unaware of her location and she eluded us until mid-August, when she was found in the lower Missouri River around RM 1556.5.

Upon relocation of the Annie on August 22 at RM 1664.7, Garrison Dam National Fish Hatchery Manager, Rob Holm, was contacted immediately and met us at the highway 85 boatramp 3 hours later. We then drift-netted for the female and captured her on the third drift, at which time we went to shore and prepared to tube her. Rob used a ¼-inch diameter, 30-inch section of clear, plastic tubing to perform the procedure.

Upon tubing the female, no small white eggs or black shriveled, larger eggs were found. Two subsequent attempts were made to extract eggs off the ovary, but no eggs were present. Annie was released and remained present in the lower Missouri throughout the rest of the summer and into the end of the tracking season. Although we can't be positive, due to the lack of any eggs present, two possible scenarios could exist. One, she spawned her eggs in the spring of 2002 and is in the process of regeneration; and, if this theory is true, she should have small, white eggs present on her ovaries in the spring of 2003. Two, if no sign of eggs are found on the ovary in the spring of 2003, it will be safe to assume that it will take a longer duration for her to attempt another spawn.

Diel movements were also recorded and compared for the 2002 fish by using data from individual fish passing fixed datalogging stations. The stations list the time the fish enters and leaves the range of station hydrophones. Times from boat relocations were not considered.

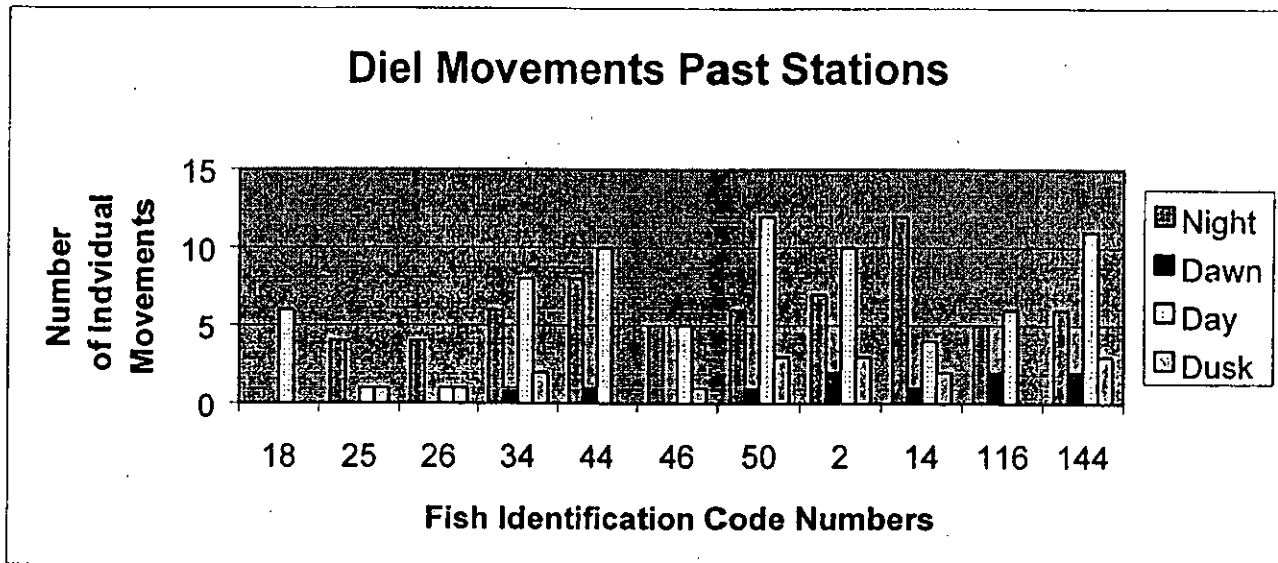


Table 3: Diel movements of the 11 fish remaining in study for the 2002 field season.
 Night = 1 hour after sundown to 1 hour before sunrise.
 Dawn = 1 hour before sunrise to 1 hour after sunrise.
 Day = 1 hour after sunrise to 1 hour before sunset.
 Dusk = 1 hour before sundown to 1 hour after sundown.

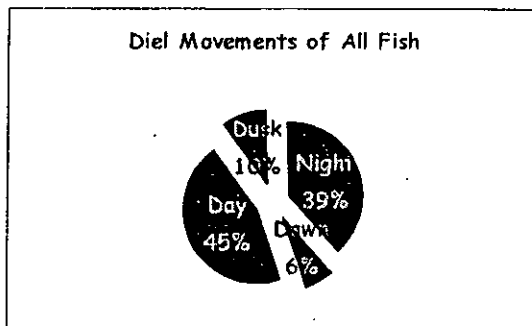


Figure 2: Diel movements for all fish in 2002.

Although diel movements differed significantly between some fish, there seems to be only a marginal difference between the higher percentages of daytime movements from the nighttime movements recorded.

A total of 331 observations were recorded in the 2002 field season, with 139 of them coming from boat relocations. A portion of the boat relocations came from Montana Fish, Wildlife and Park's fishery crews tracking paddlefish in the same confines of the river. This added information helped fill the gaps in data when fish sometimes slipped past stations and were not recorded.

With the addition of the USFWS's two stations and the deployment of the Montana based USGS stations on the upper Missouri River to Fort Peck Dam, fish movement was recorded both higher in terms of RM's traveled up in the upper Missouri and Yellowstone Rivers. Fish # 144 traveled up the Missouri River to the Wolf Point, Montana, Station (RM 1717), from May 20 to June 8 and ranged as low as RM 1555.4 in the lower Missouri in mid-July to the last boat relocation on November 8, 2002. From lower to upper river reaches, he spanned over 161 river miles in the Missouri and also made a couple of appearances 4 to 5 miles up the Yellowstone. In the Yellowstone River, a male pallid sturgeon was relocated 50 miles above the confluence, marking it as the highest a fish has been observed in that reach.

Although we saw greater distances traveled from a few individual pallids, overall fish movement seemed to decrease in 2002 compared to 2001. In 2001, only three fixed datalogging stations were active in the study and they recorded a total of 165 observations of fish passing them. For the 2002 field season, the USFWS deployed five stations and the USGS deployed at least five additional stations from Culbertson, MT, to Fort Peck Dam, Montana. In all, there were over three times the stations deployed and activated, and they accounted for 192 station observations, only 27 more than last year.

A large proportion of movement mimicked behavior from last year's observations. In April, May, and June, fish reacted to the rising and falling hydrographs daily; later in the summer to early fall, response was usually limited.

The study pallids are definitely exhibiting some unique behavior that has carried over from 2001 to 2002. Two males, Art (18) and Andre (26), have consecutively passed the Yellowstone Station and have spent almost the entire summer around or above Sidney, Montana. Andre passed the Yellowstone Station on May 19 in 2001 and on May 17 in 2002 to spend most of the summer above Sidney, and then returned in August and September. Art basically followed the same behavior and traveled up the Yellowstone on May 25 and also spent his summer ranging above the Highway 200, Fairview Bridge to about 10 miles above Sidney, MT.

For 2 consecutive years, Annie, the sole female left in the telemetry study has selected to stay in the Missouri River, this past year ranging from RM 1557 in the lower Missouri to RM 1619, at Culbertson, MT, on the upper Missouri. Although on both years she was recorded staging around the Yellowstone Station, she has never been relocated by boat up the Yellowstone River.

This was also the case for Butch, a male from the class of the 2001 spawners. He was captured four times in one week during the broodstock capture in mid-April at the confluence, and finally dropped down into the lower Missouri, where he stayed for the rest of the summer. This fish didn't seem to exhibit any urge to follow the hydrograph and spent most of the season between the Erickson Island and the Williston Stations. In fact, he never did migrate up to the confluence

or show up on the Yellowstone Station. Although, I suspect some of his behavior may have stemmed from the stress induced with being caught four times in April, it's possible his home range may be that small considering all the movement he displayed within the small area.

As mentioned above, many of the telemetry study fish were either captured or monitored in the confluence area during the April broodstock capture. Besides Butch, Arnie was captured three times and three other fish were at least captured once. Radio-transmitted fish aided in the capture of non-tagged sturgeon on a couple different occasions, including a large female caught up the Yellowstone River adjacent to where Archie, fish # 46, was netted previously.

On three occasions during the field season, we relocated pallid sturgeon using slow, shallow side channels, which was interesting, considering we did not see this happen in 2001. In two of the cases, the side channel was shallow, with about 3 feet of water and we saw the pallids moving around continually, possibly feeding.

Plans for the 2003 field season include the same tracking schedule and protocol, hopefully with the addition of more study fish in the spring. Baseline data will continue to be taken to compare against fish movement associated with USACE proposed test flows slated for the future.

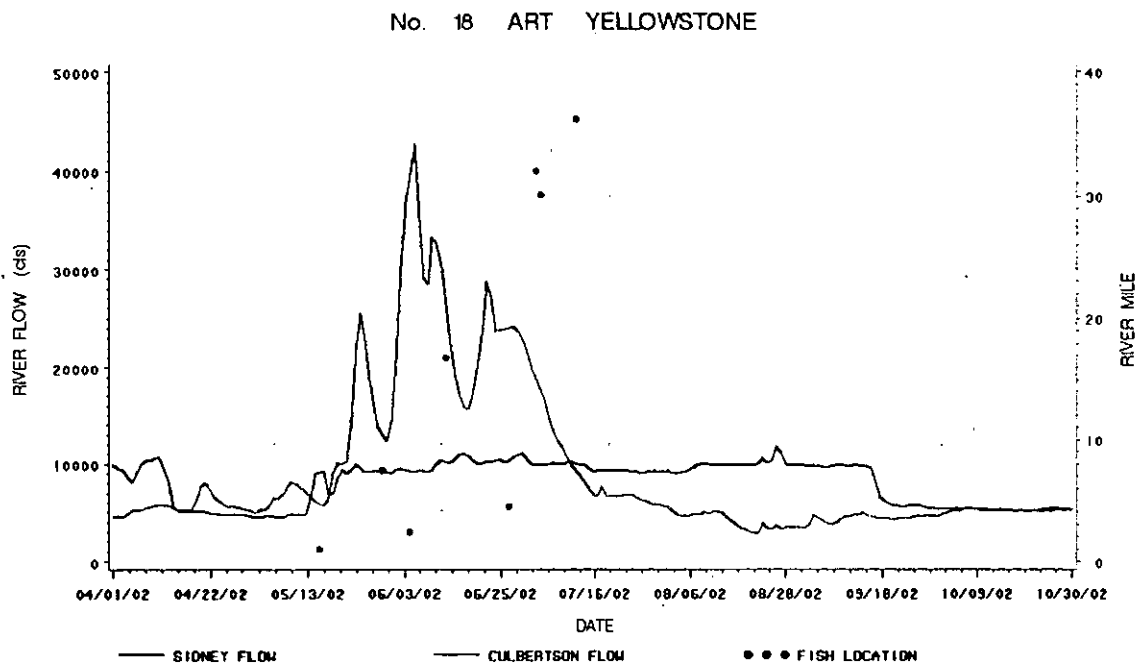


Figure 3: Relocations for Art, fish # 18, by river mile in the Yellowstone River plotted against flows from the Sidney and Culbertson gauging stations.

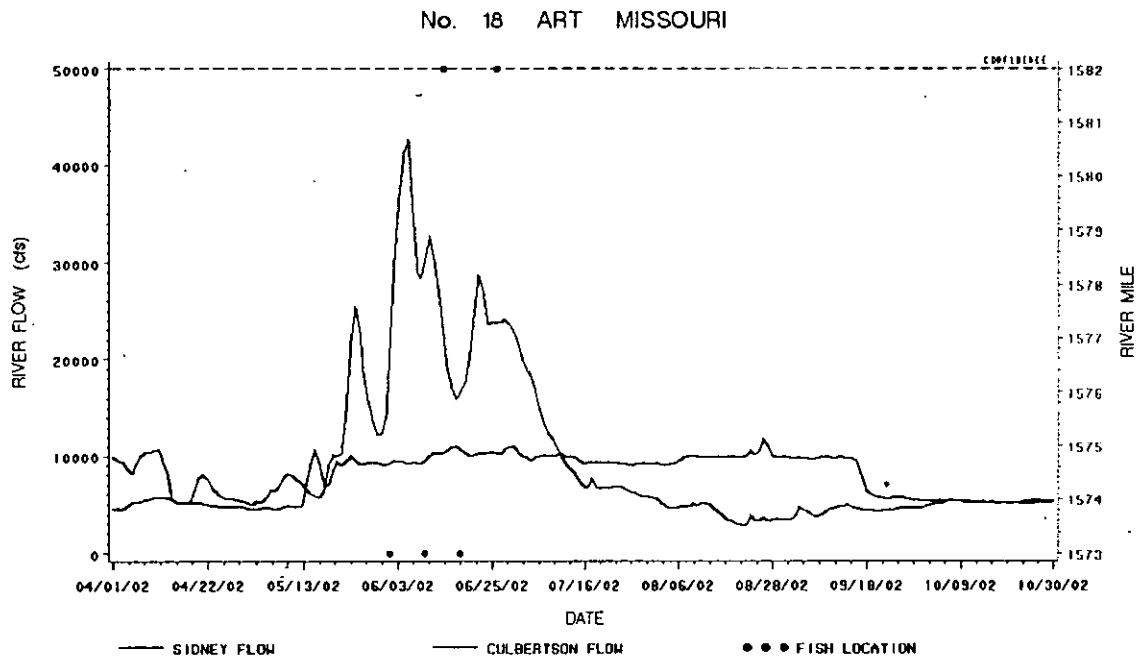


Figure 4: Relocations for Art, fish # 18, by river mile in the Missouri River plotted against flows from the Sidney and Culbertson gauging stations.

No. 25 ANNIE MISSOURI

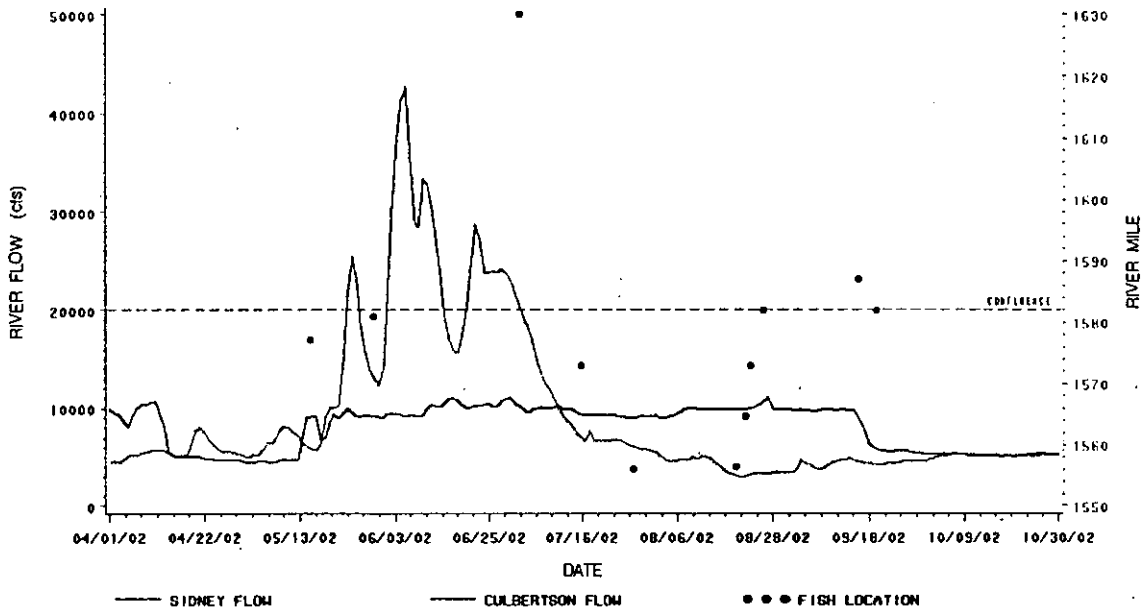


Figure 5: Relocations for Annie, fish # 25, by river mile in the Missouri River plotted against flows from the Sidney and Culbertson gauging stations.

No. 26 ANDRE YELLOWSTONE

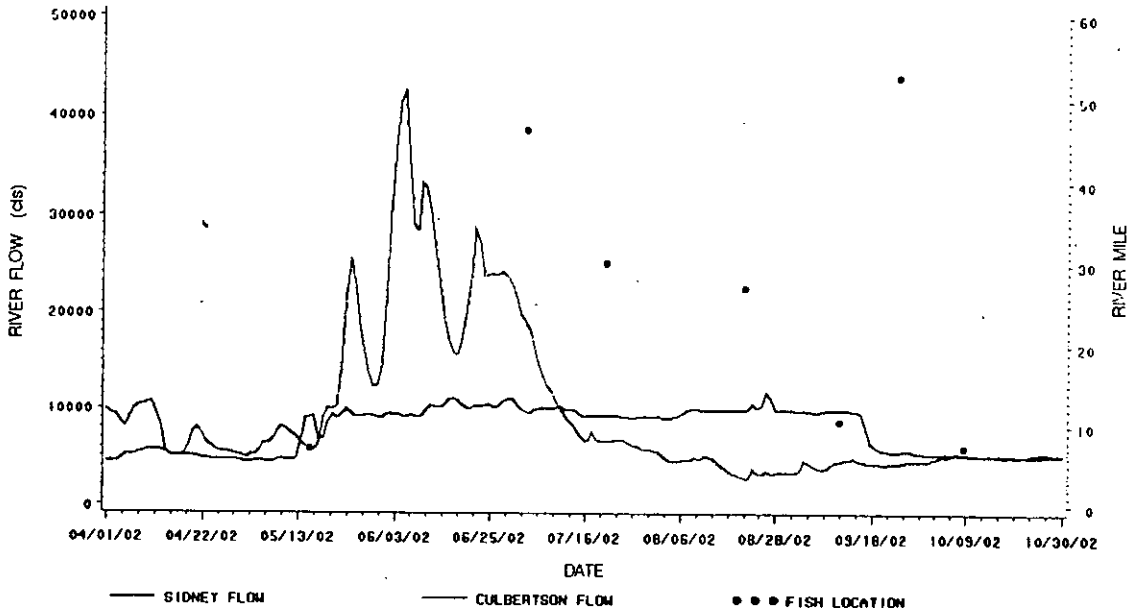


Figure 6: Relocations for Andre, fish # 26, by river mile in the Yellowstone River plotted against flows from the Sidney and Culbertson gauging stations.

No. 26 ANDRE MISSOURI

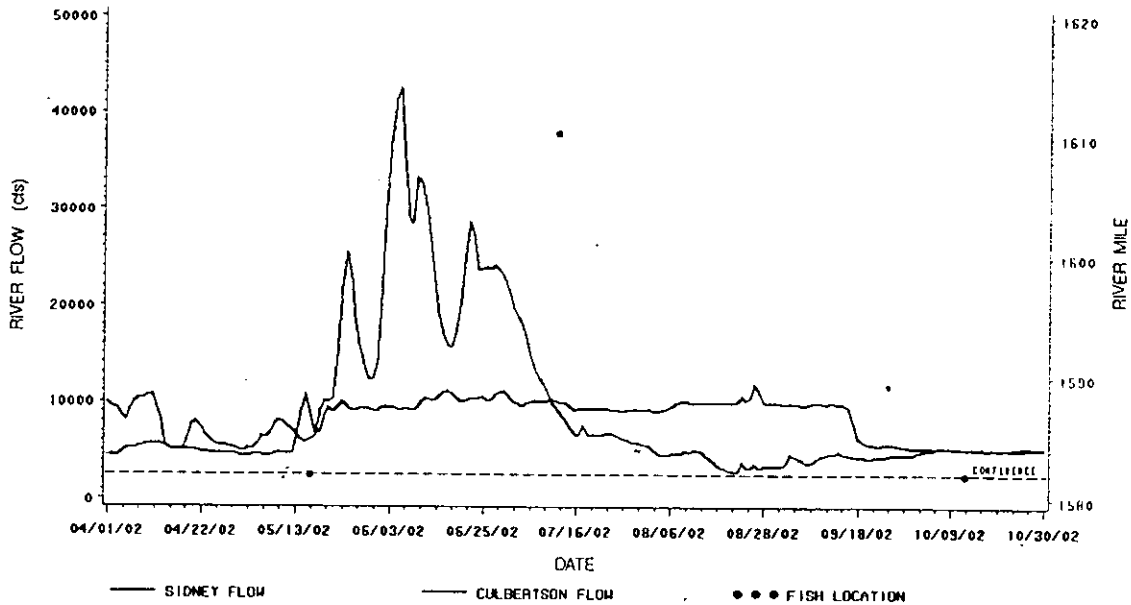


Figure 7: Relocations for Andre, fish # 26, by river mile in the Missouri River plotted against flows from the Sidney and Culbertson gauging stations.

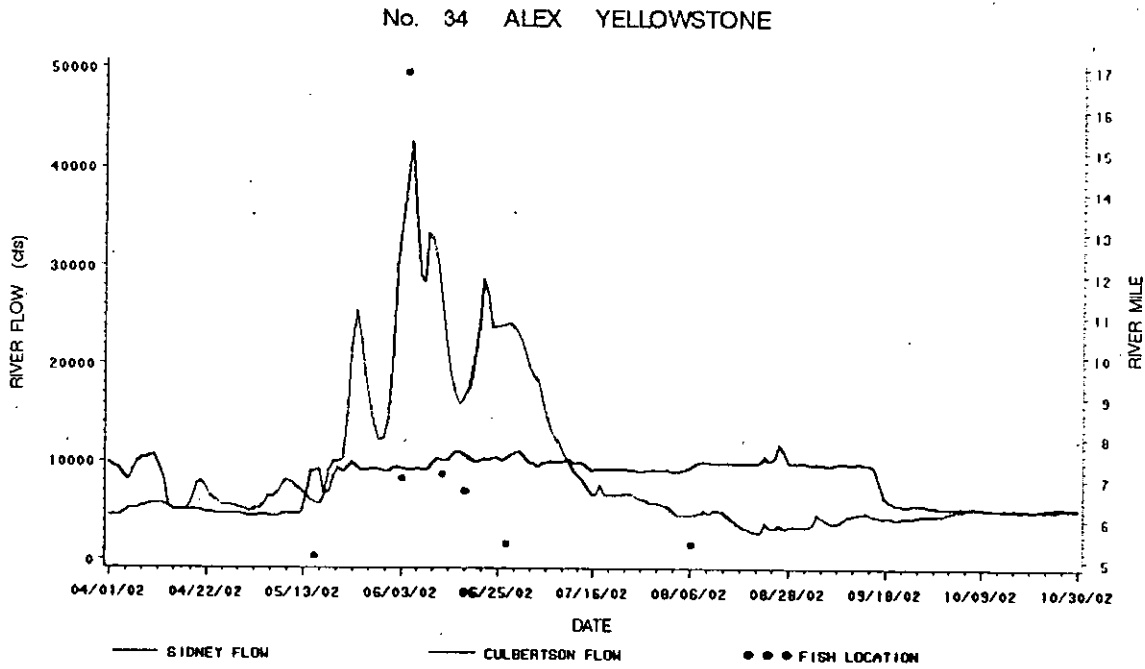


Figure 8: Relocations for Alex, fish # 34, by river mile in the Yellowstone River plotted against flows from the Sidney and Culbertson gauging stations.

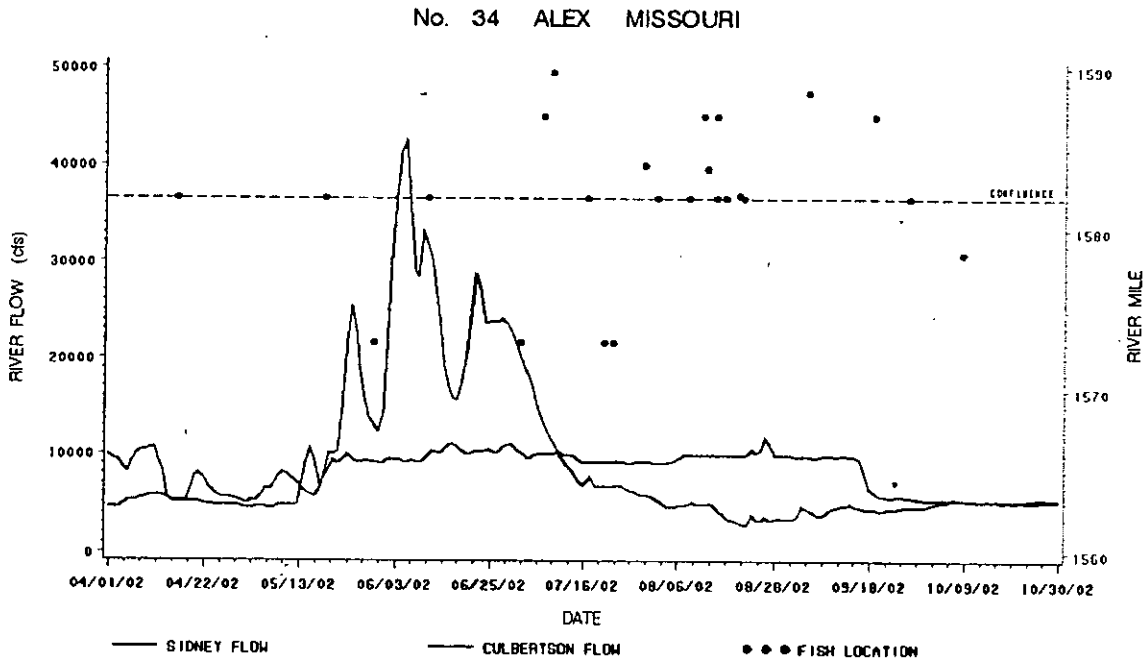


Figure 9: Relocations for Alex, fish # 34, by river mile in the Missouri River plotted against flows from the Sidney and Culbertson gauging stations.

No. 44 ARNIE YELLOWSTONE

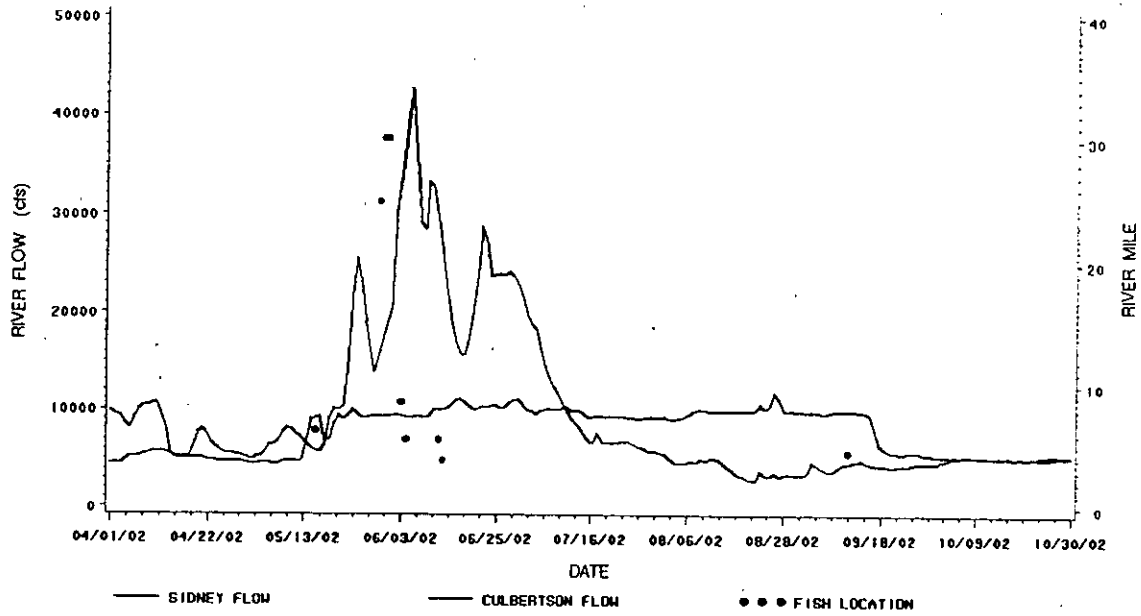


Figure 10: Relocations for Arnie, fish # 44, by river mile in the Yellowstone River plotted against flows from the Sidney and Culbertson gauging stations.

No. 44 ARNIE MISSOURI

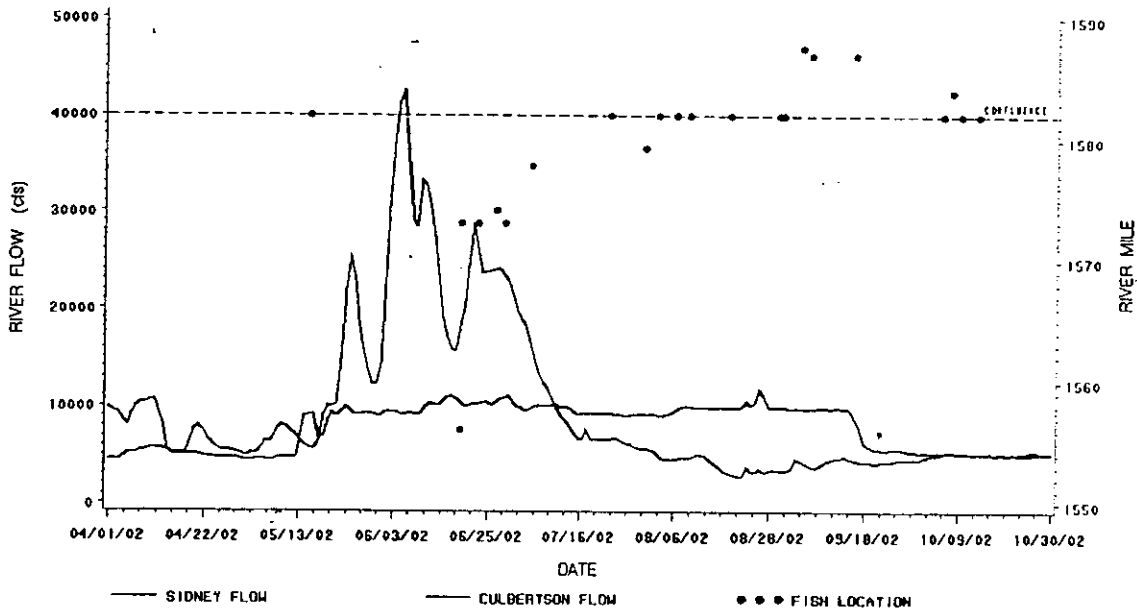


Figure 11: Relocations for Arnie, fish # 44, by river mile in the Missouri River plotted against flows from the Sidney and Culbertson gauging stations.

No. 46 ARCHIE YELLOWSTONE

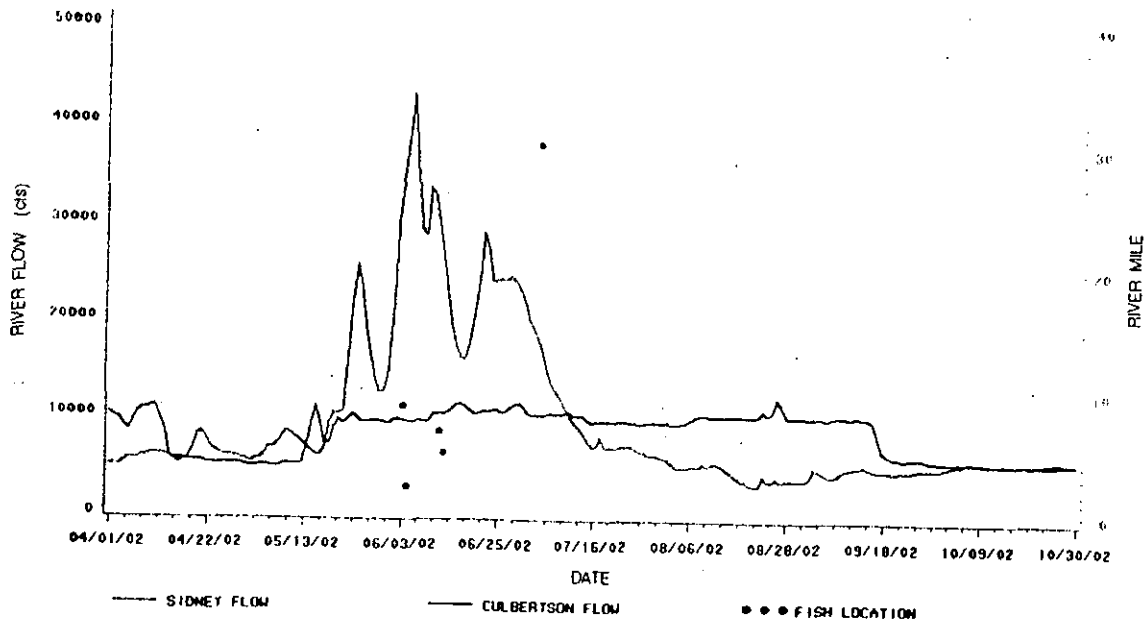


Figure 12: Relocations for Archie, fish # 46, by river mile in the Yellowstone River plotted against flows from the Sidney and Culbertson gauging stations.

No. 46 ARCHIE MISSOURI

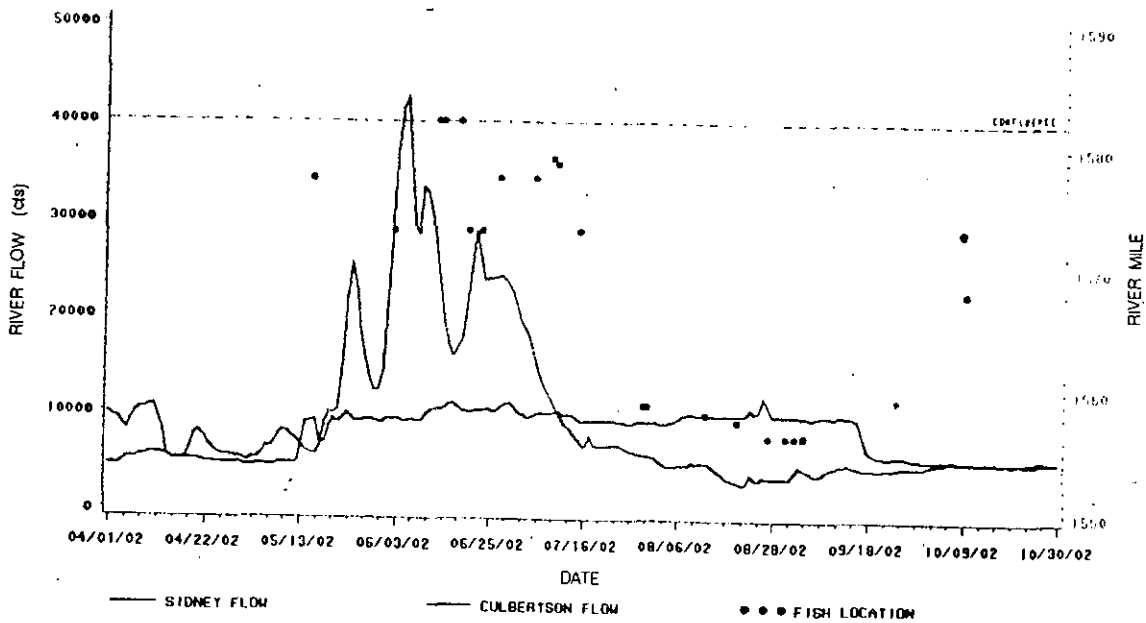


Figure 13: Relocations for Archie, fish # 46, by river mile in the Missouri River plotted against flows from the Sidney and Culbertson gauging stations.

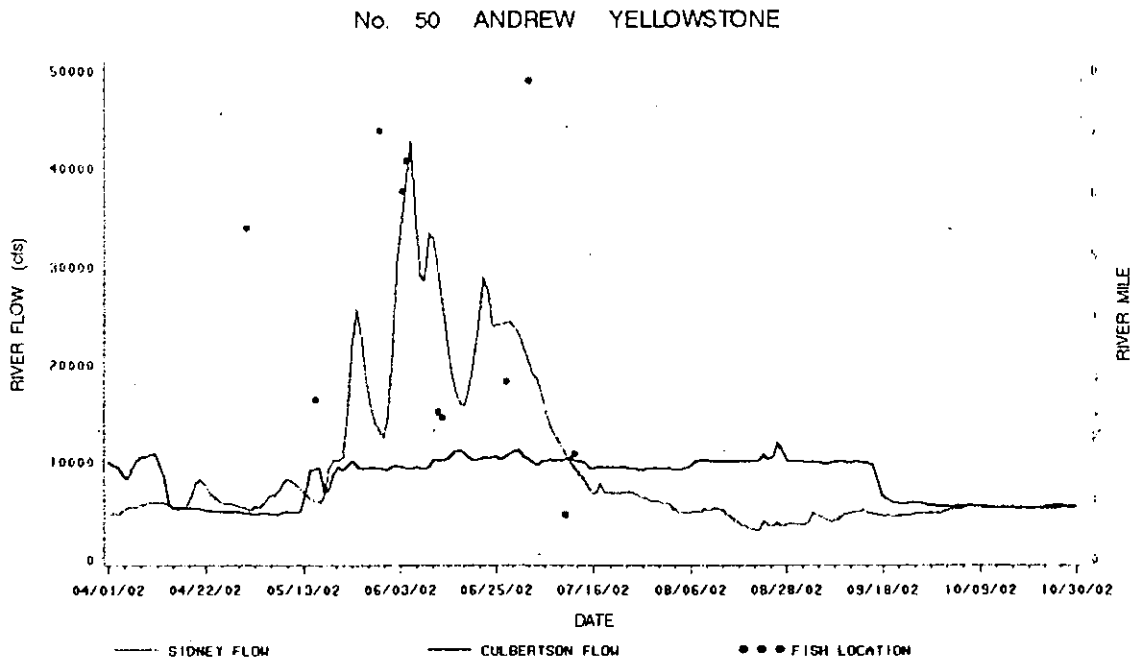


Figure 14: Relocations for Andrew, fish # 50, by river mile in the Yellowstone River plotted against flows from the Sidney and Culbertson gauging stations.

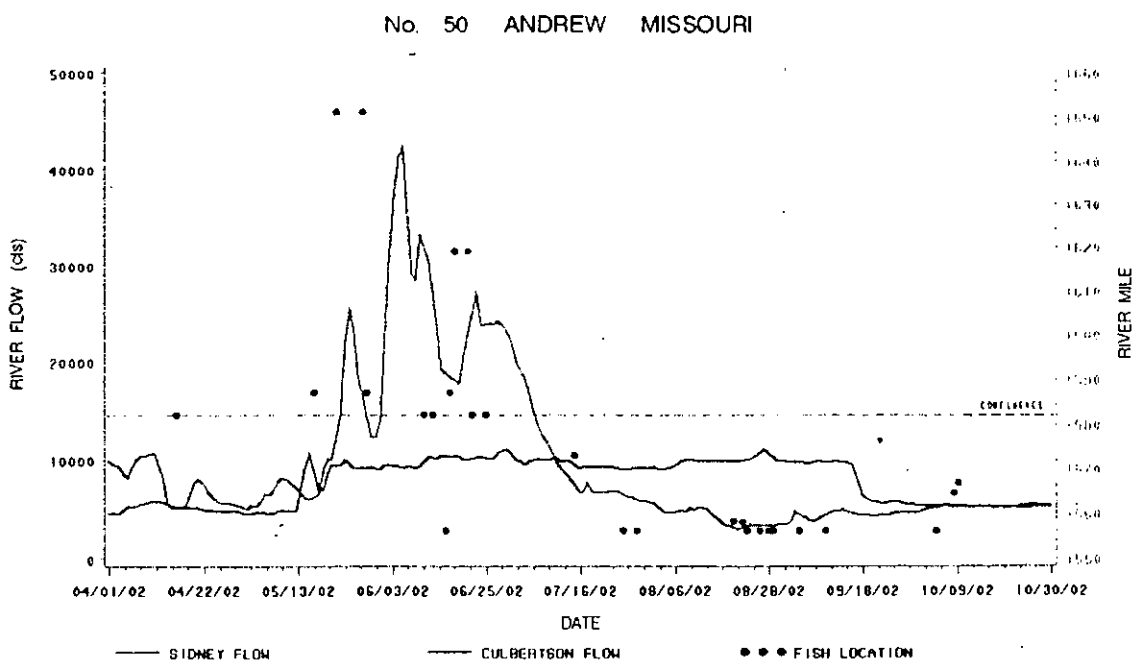


Figure 15: Relocations for Andrew, fish # 50, by river mile in the Missouri River plotted against flows from the Sidney and Culbertson gauging stations.

No. 2 BUTCH MISSOURI

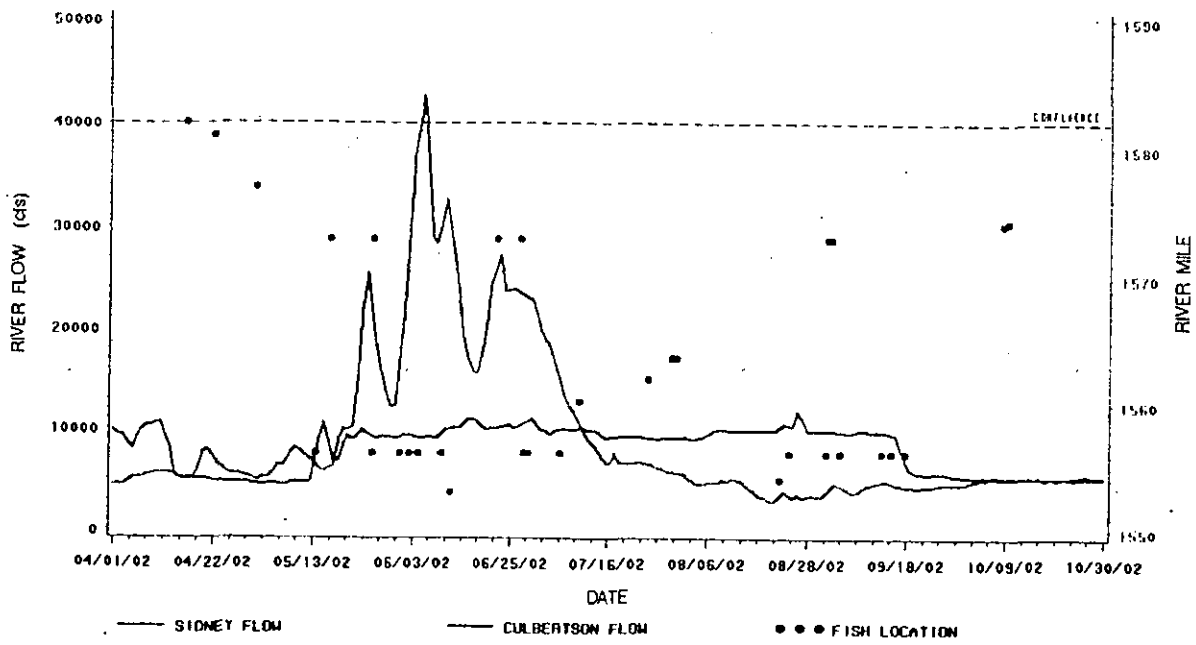


Figure 16: Relocations for Butch, fish # 2, by river mile in the Missouri River plotted against flows from the Sidney and Culbertson gauging stations.

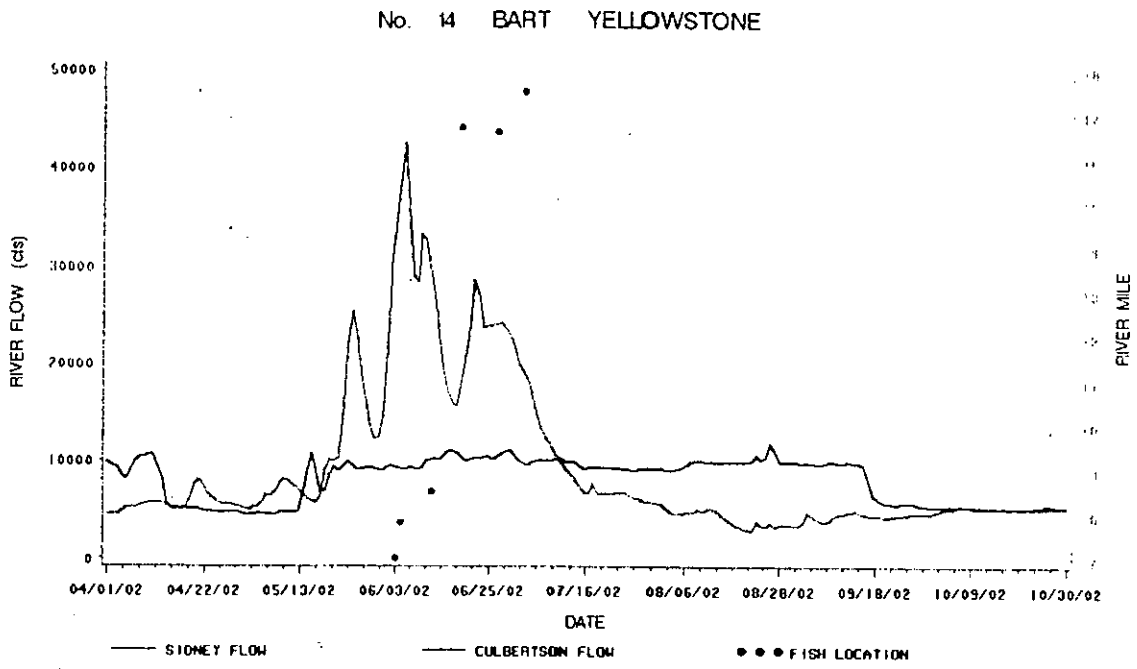


Figure 17: Relocations for Bart, fish # 14, by river mile in the Yellowstone River plotted against flows from the Sidney and Culbertson gauging stations.

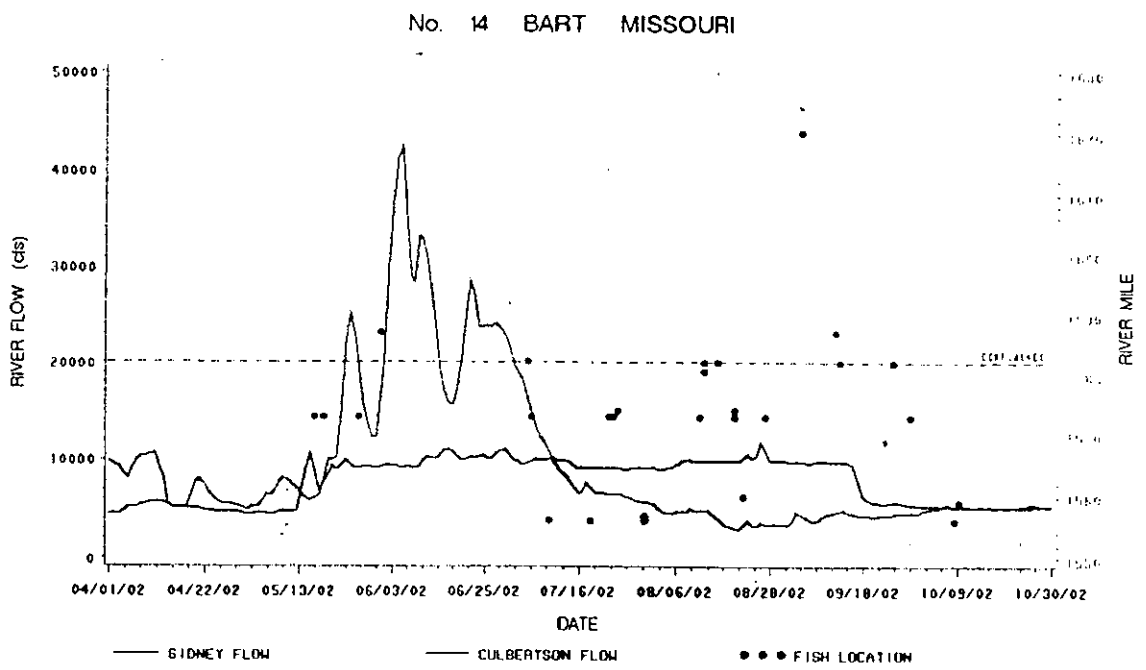


Figure 18: Relocations for Bart, fish # 14, by river mile in the Missouri River plotted against flows from the Sidney and Culbertson gauging stations.

No. 116 BOB YELLOWSTONE

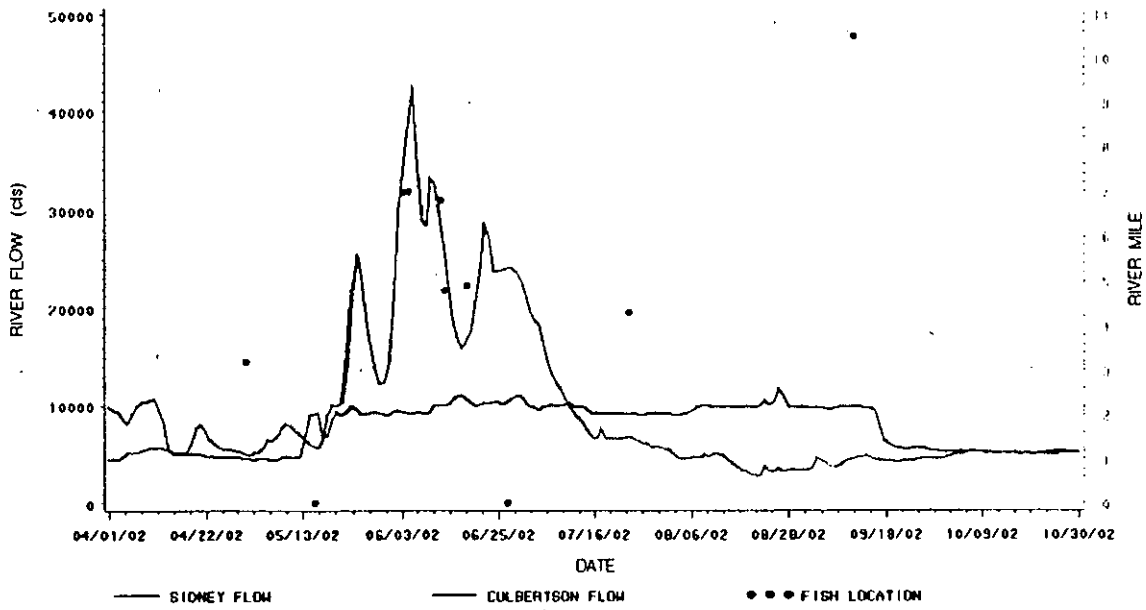


Figure 19: Relocations for Bob, fish # 116, by river mile in the Yellowstone River plotted against flows from the Sidney and Culbertson gauging stations.

No. 116 BOB MISSOURI

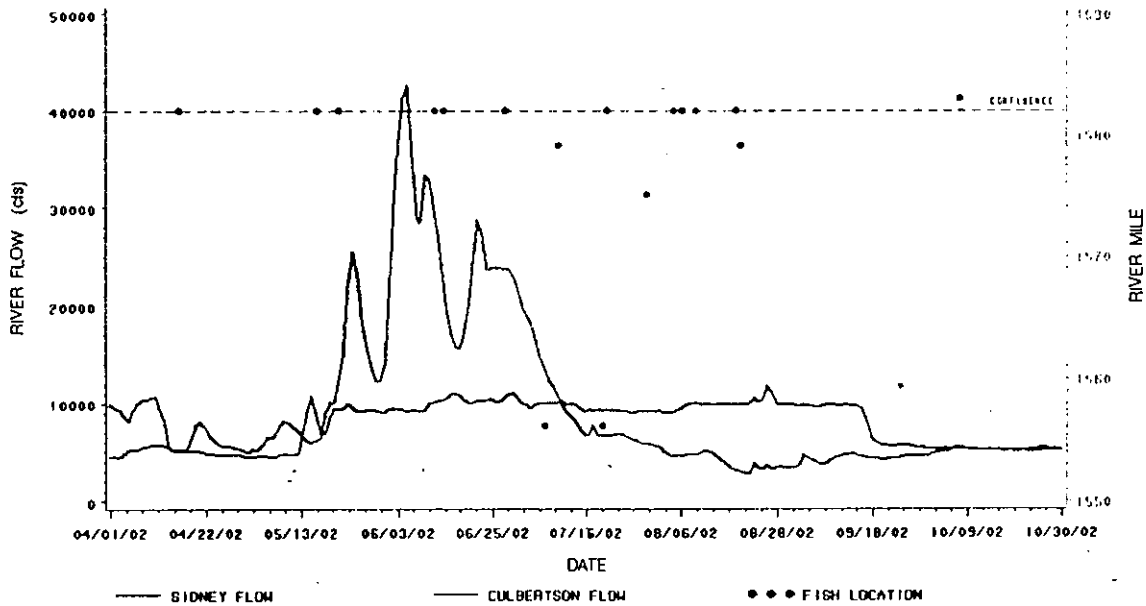


Figure 20: Relocations for Bob, fish # 116, by river mile in the Missouri River plotted against flows from the Sidney and Culbertson gauging stations.

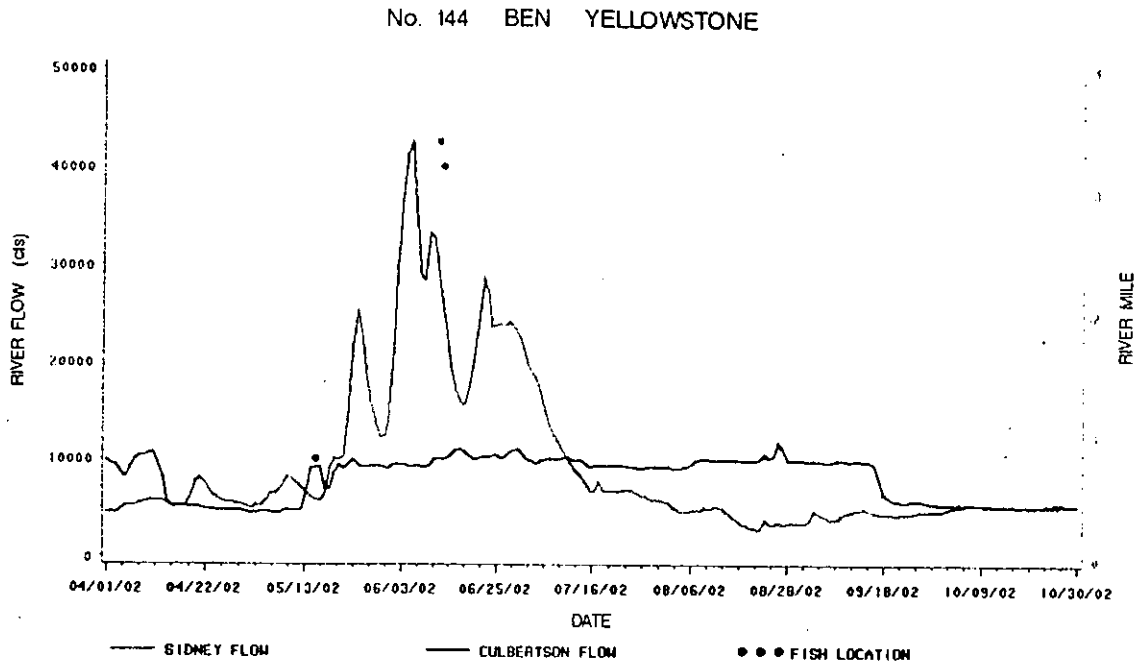


Figure 21: Relocations for Ben, fish # 144, by river mile in the Yellowstone River plotted against flows from the Sidney and Culbertson gauging stations.

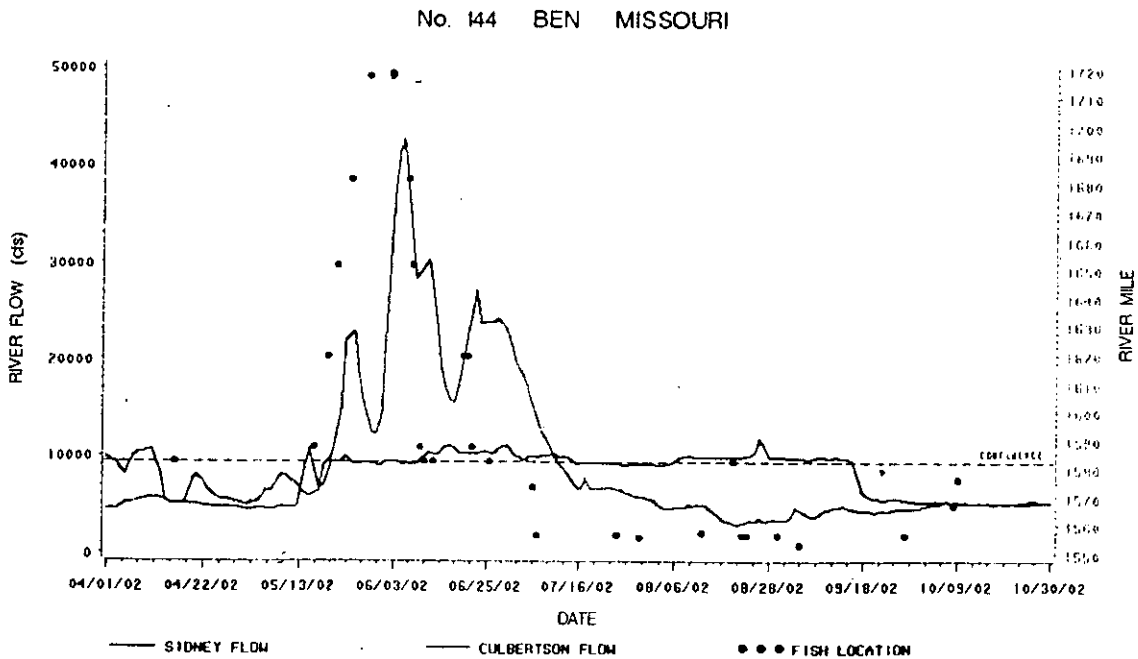


Figure 22: Relocations for Ben, fish # 144, by river mile in the Missouri River plotted against flows from the Sidney and Culbertson gauging stations.

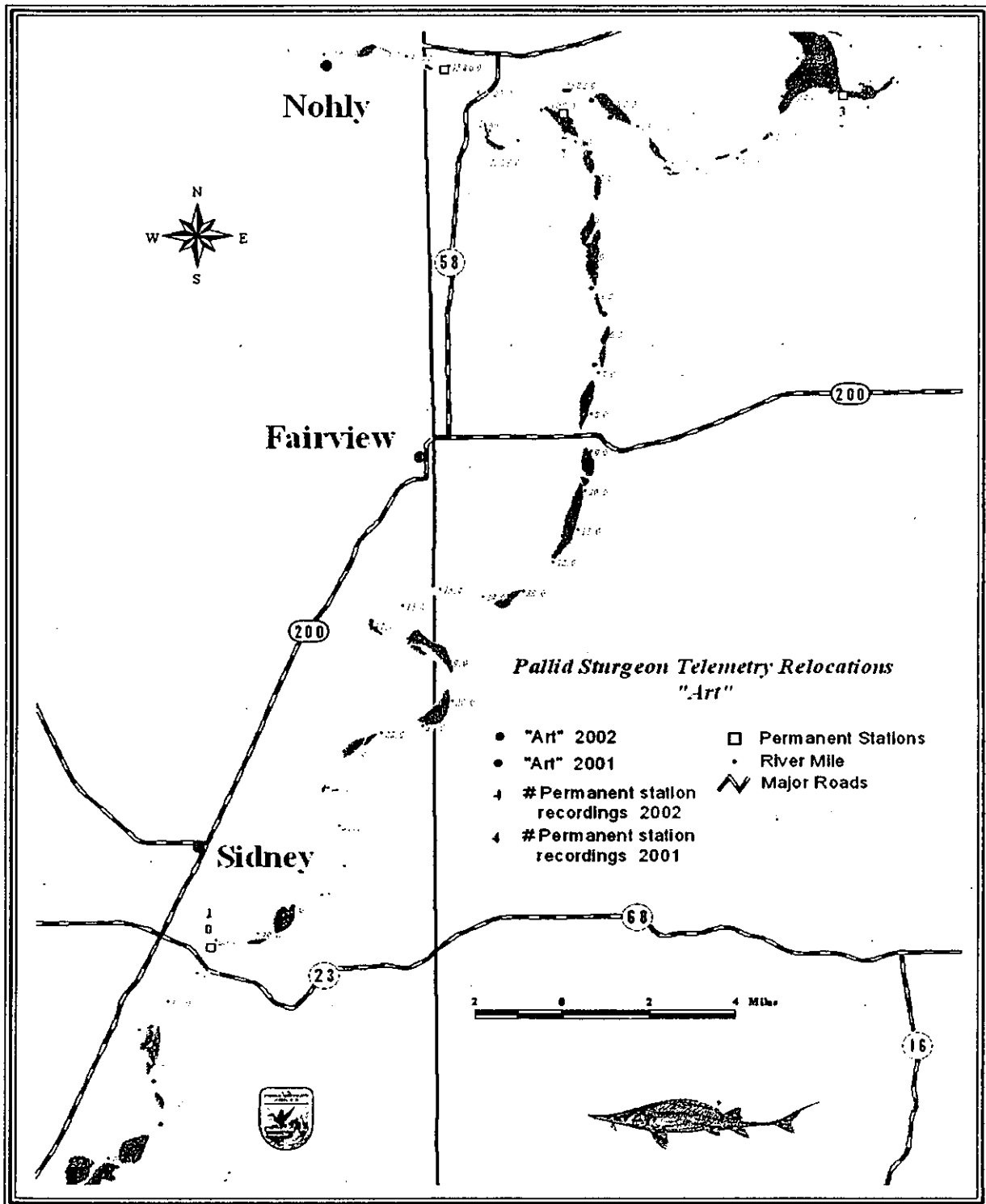


Figure 23: Map of boat relocations and movement frequencies registered for Art passing various fixed datalogging stations for 2001 and 2002.

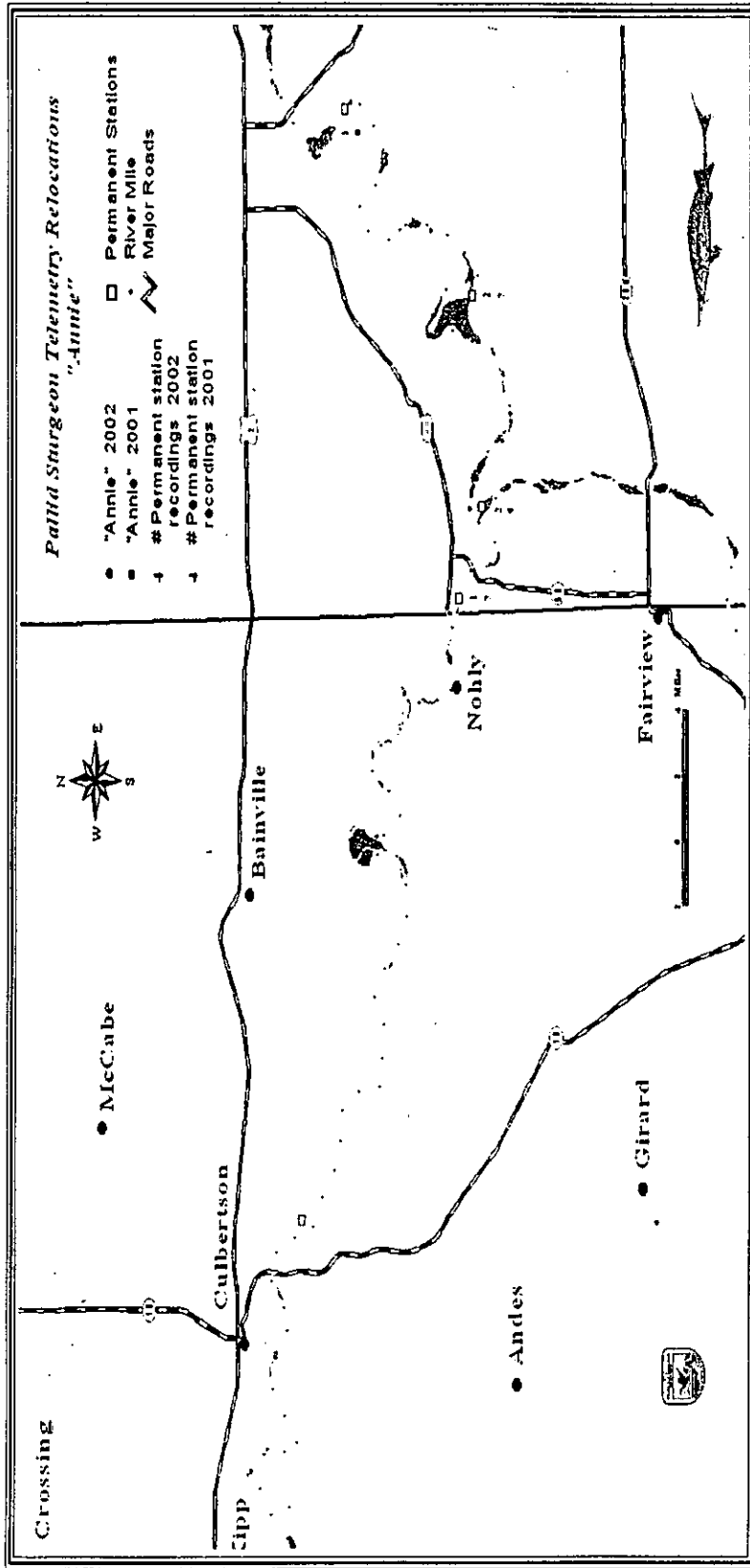


Figure 24: Map of boat relocations and movement frequencies registered for Annie passing various fixed datalogging stations for 2001 and 2002

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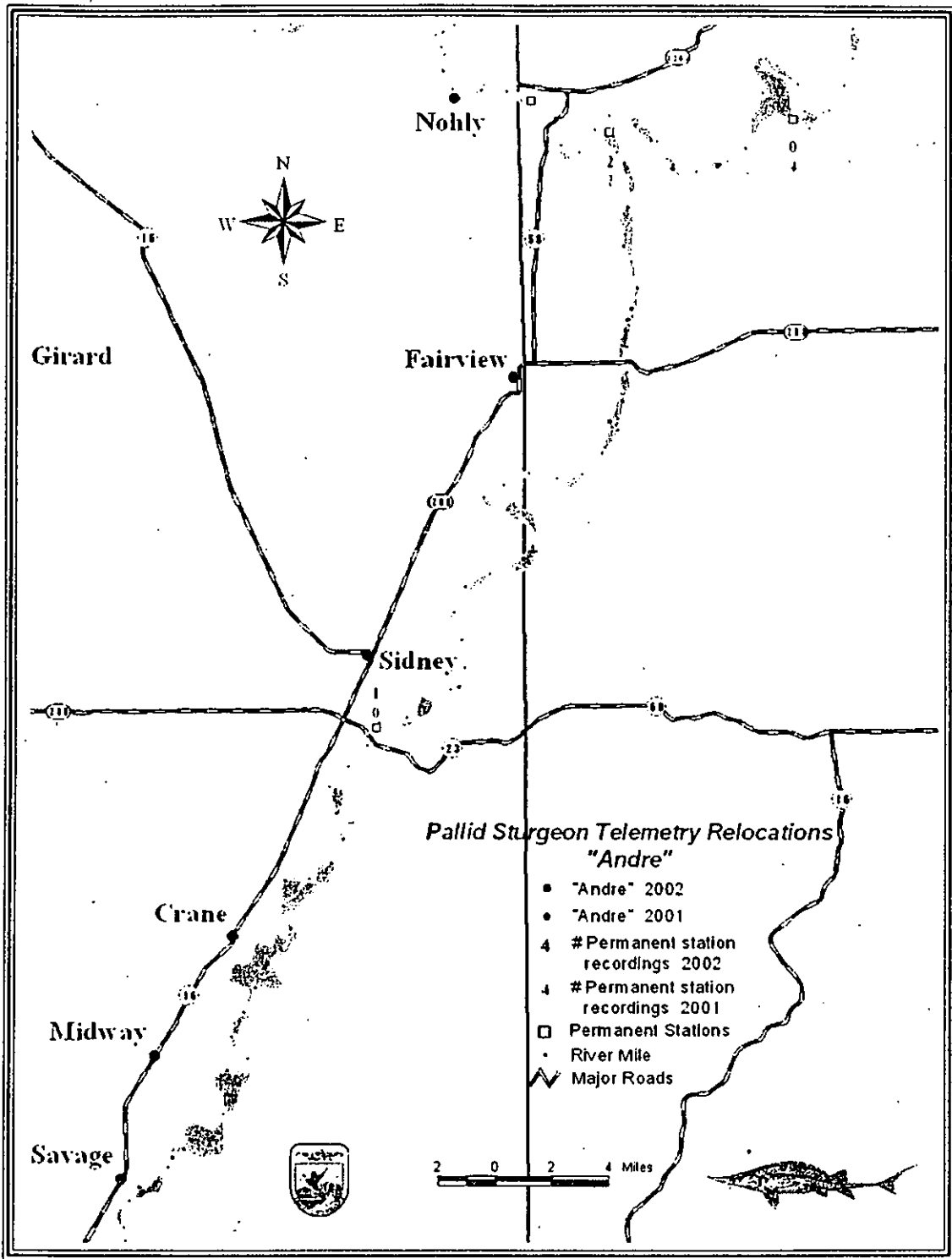


Figure 25: Map of boat relocations and movement frequencies registered for Andre passing various fixed datalogging stations for 2001 and 2002.

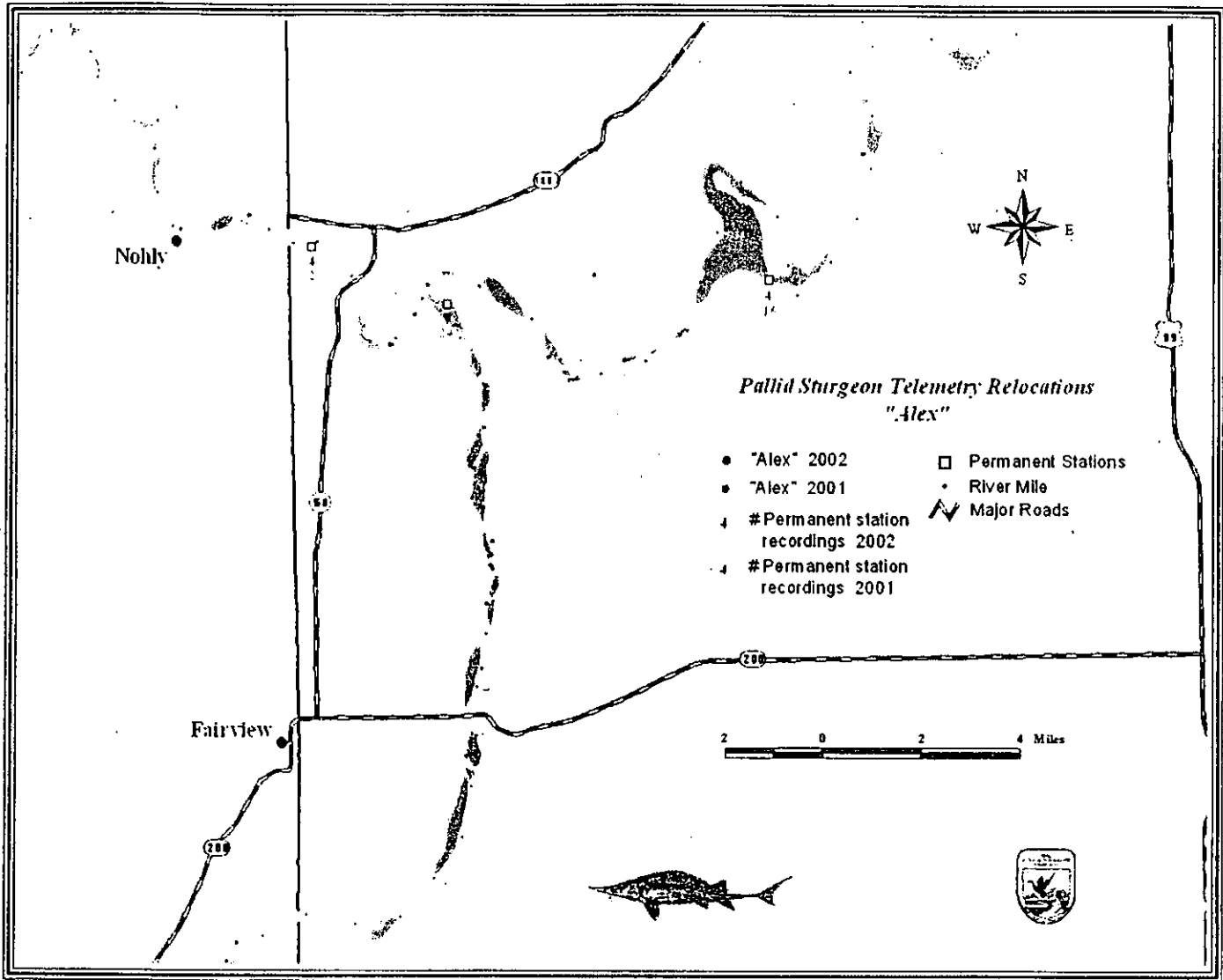


Figure 26: Map of boat relocations and movement frequencies registered for Alex passing various fixed datalogging stations for 2001 and 2002.

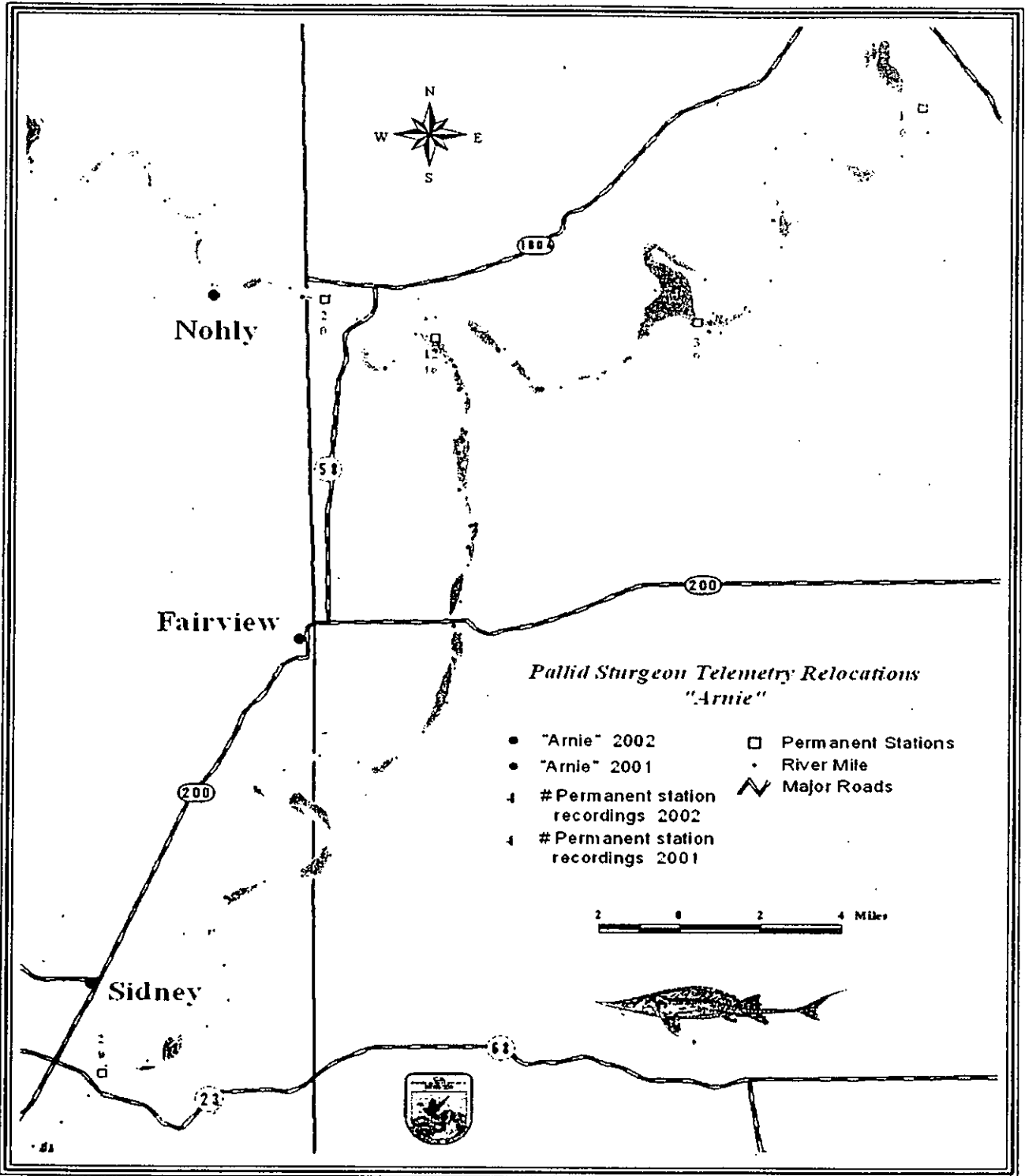


Figure 27: Map of boat relocations and movement frequencies registered for Arnie passing various fixed datalogging stations for 2001 and 2002.

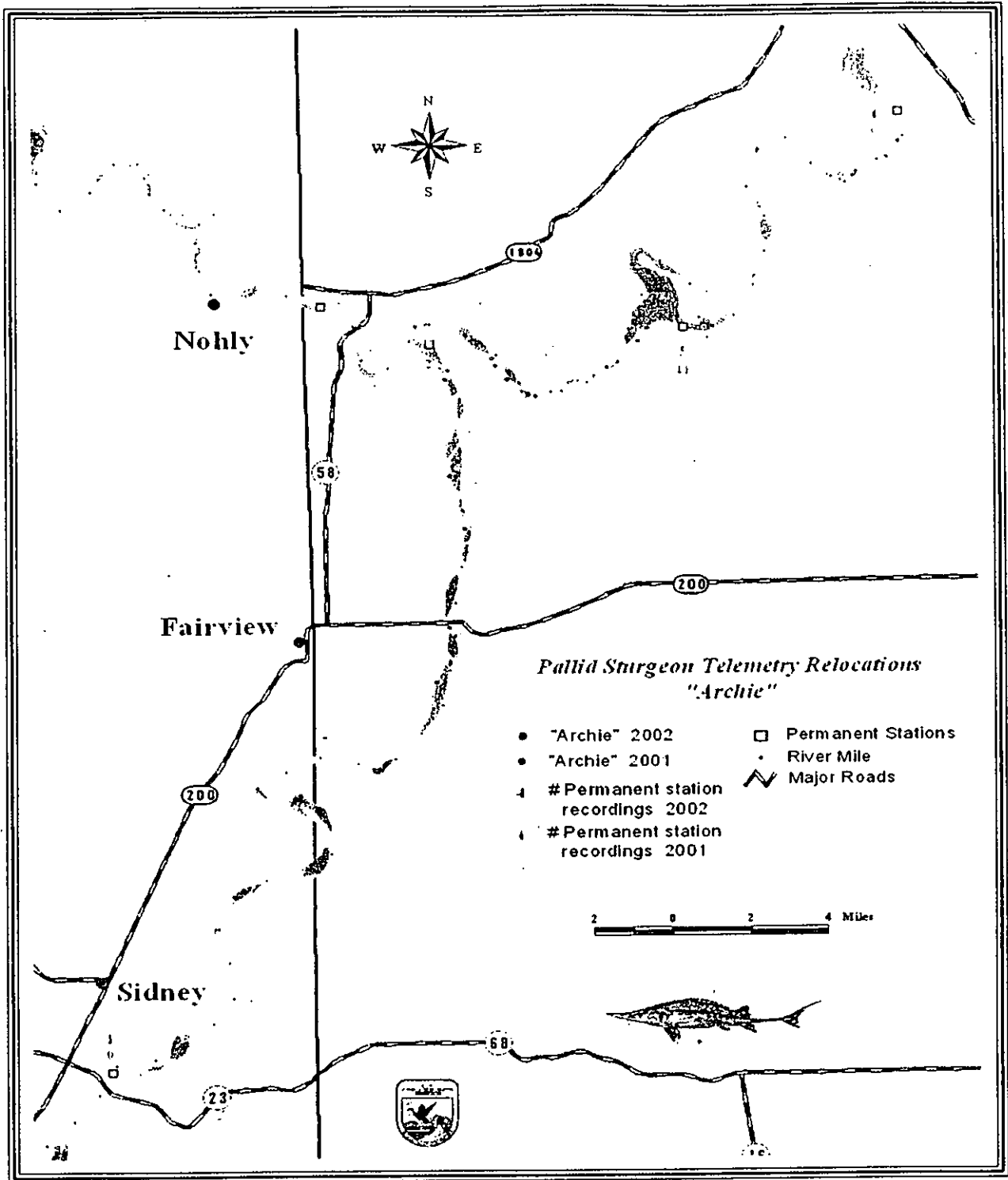


Figure 28: Map of boat relocations and movement frequencies registered for Archie passing various fixed datalogging stations for 2001 and 2002.

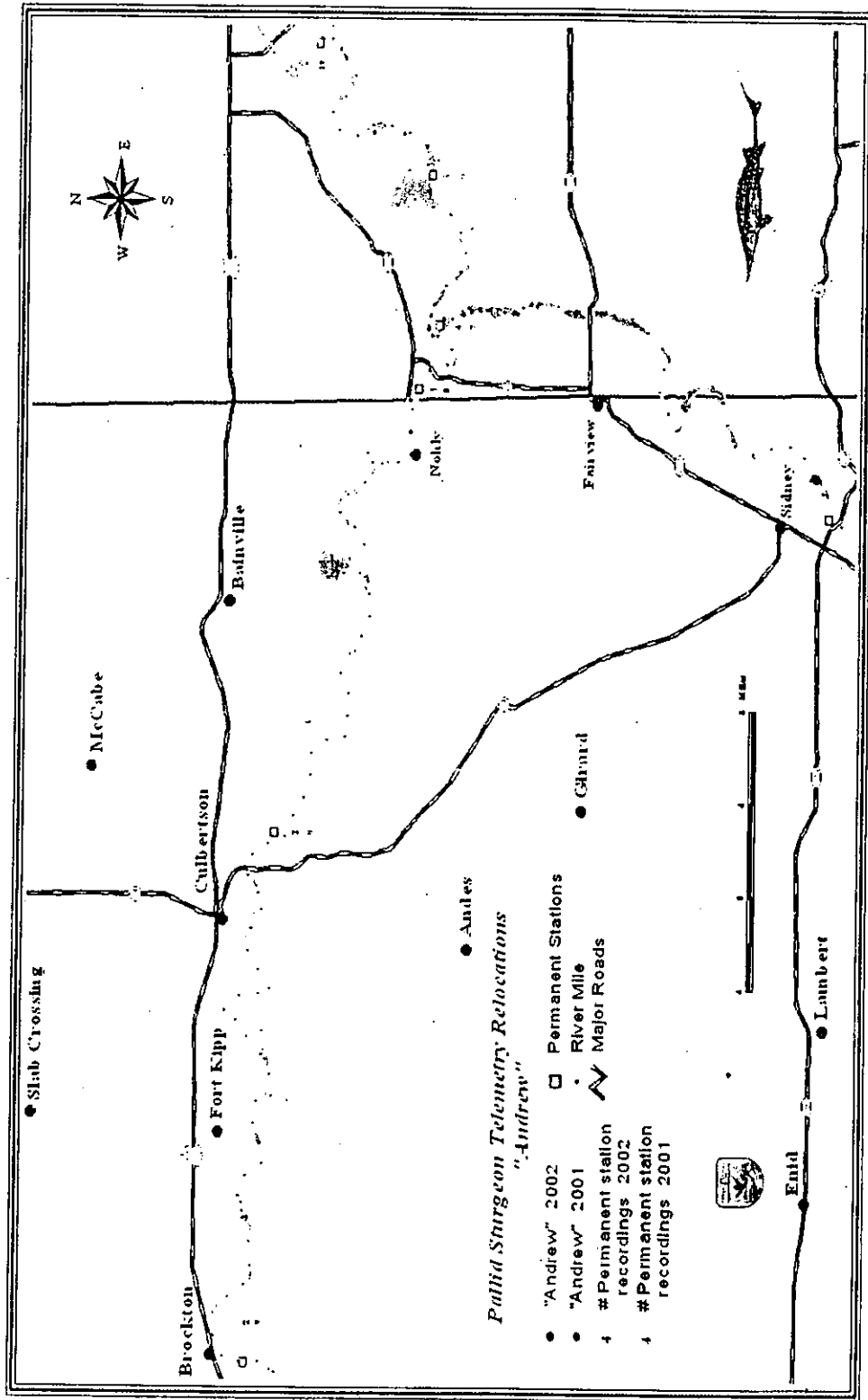


Figure 29: Map of boat relocations and movement frequencies registered for Andrew passing various fixed datalogging stations for 2001 and 2002.

030513

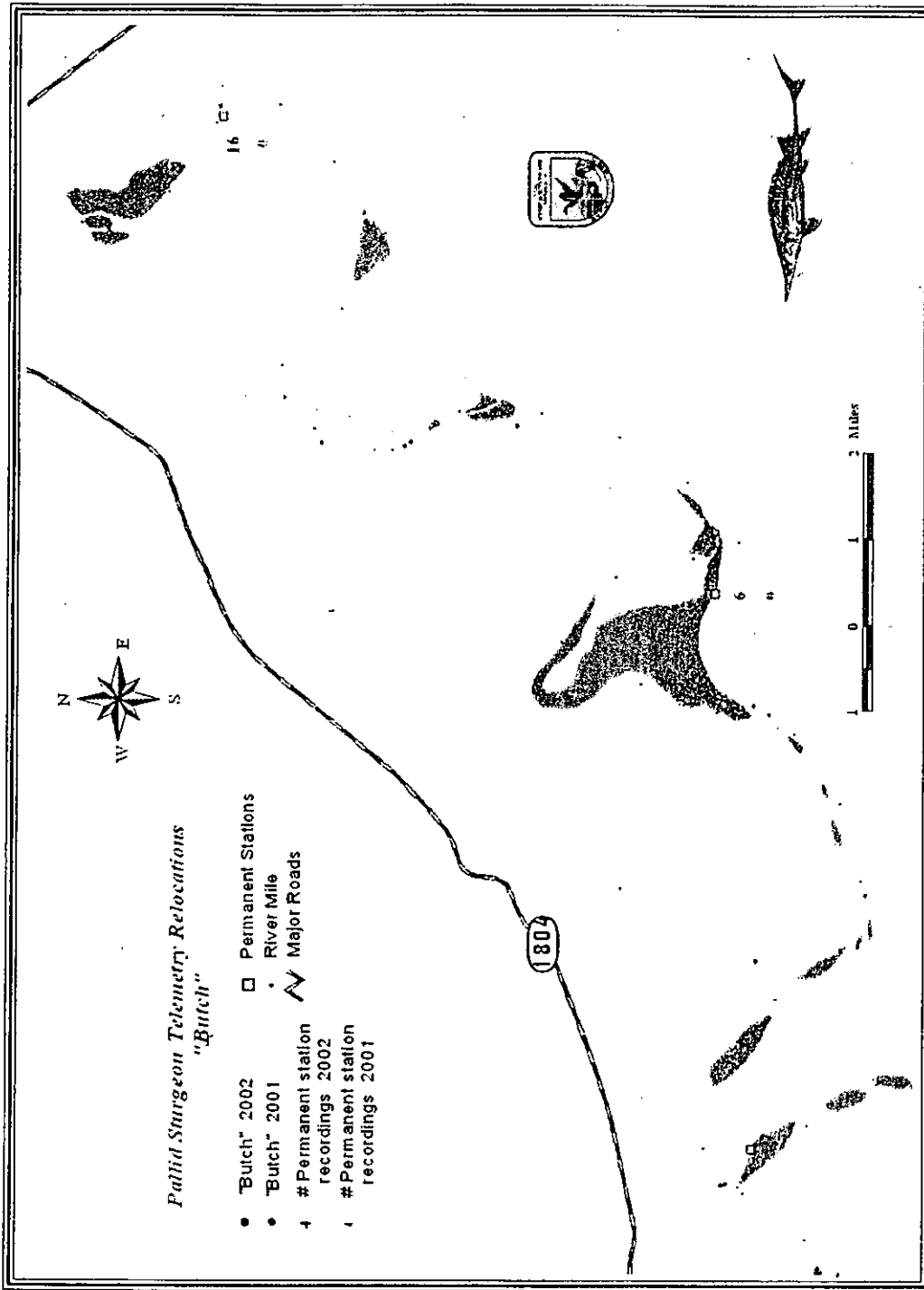


Figure 30: Map of boat relocations and movement frequencies registered for Butch passing various fixed datalogging stations for 2001 and 2002.

035574

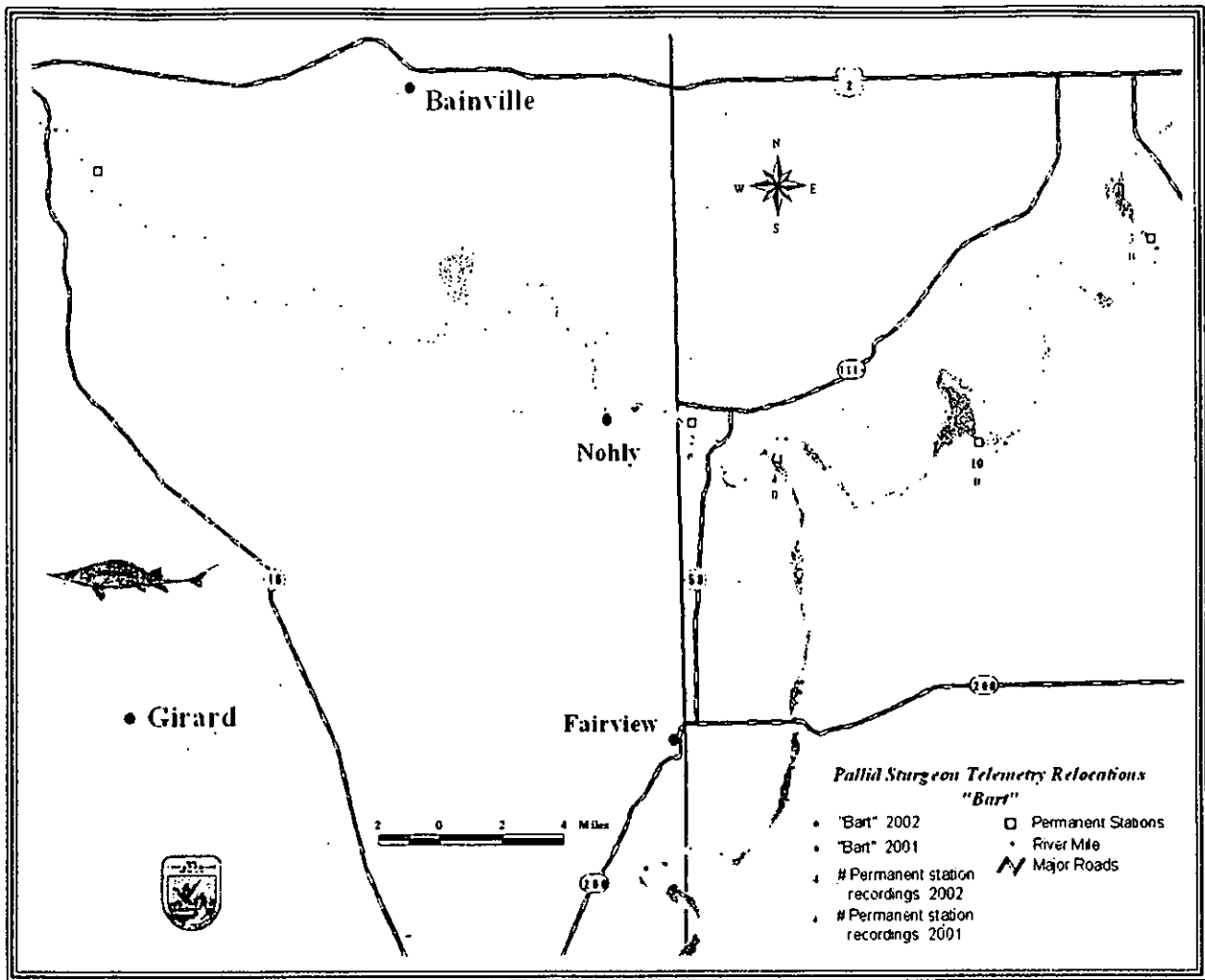


Figure 31: Map of boat relocations and movement frequencies registered for Bart passing various fixed datalogging stations for 2001 and 2002.

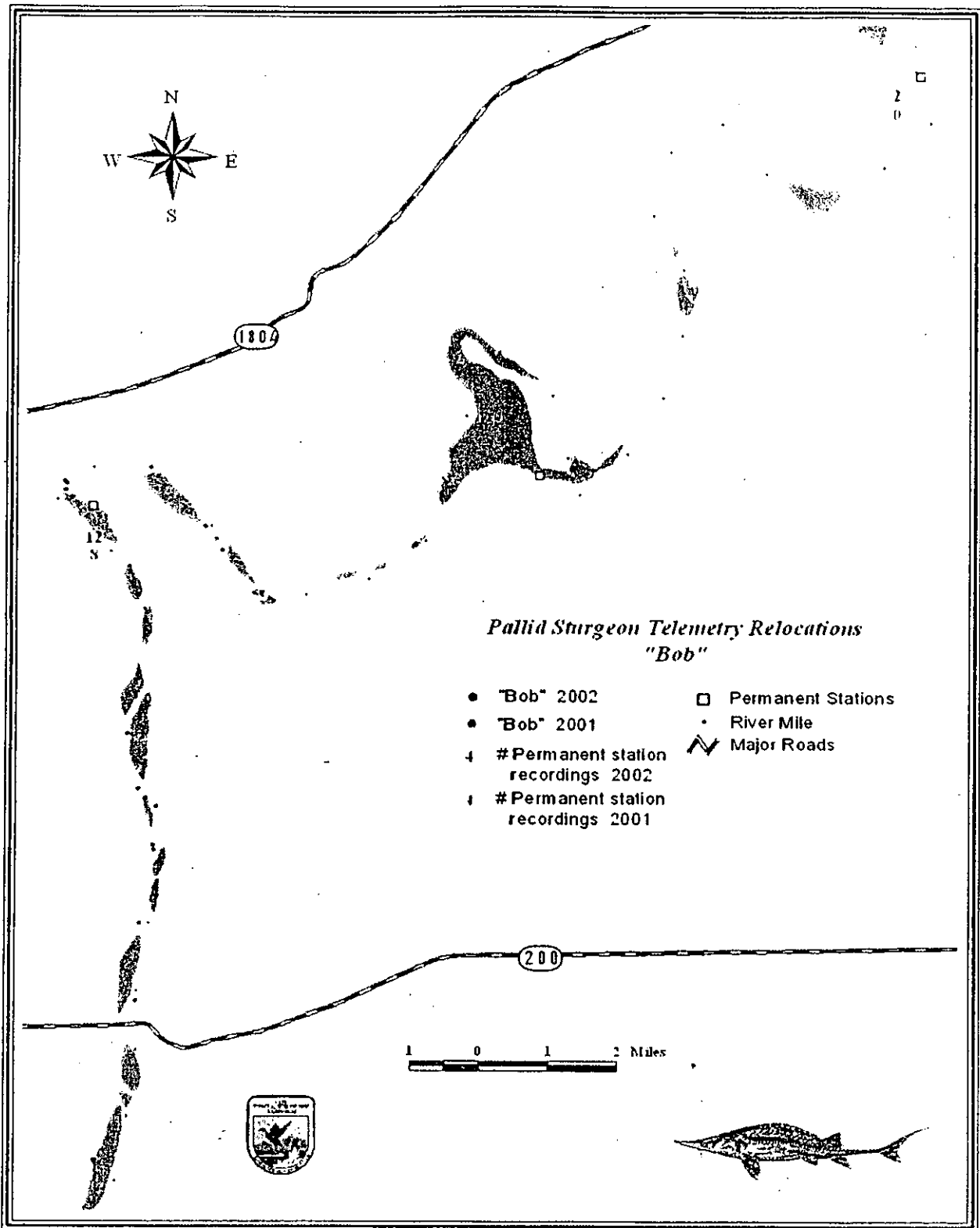


Figure 32: Map of boat relocations and movement frequencies registered for Bob passing various fixed datalogging stations for 2001 and 2002.

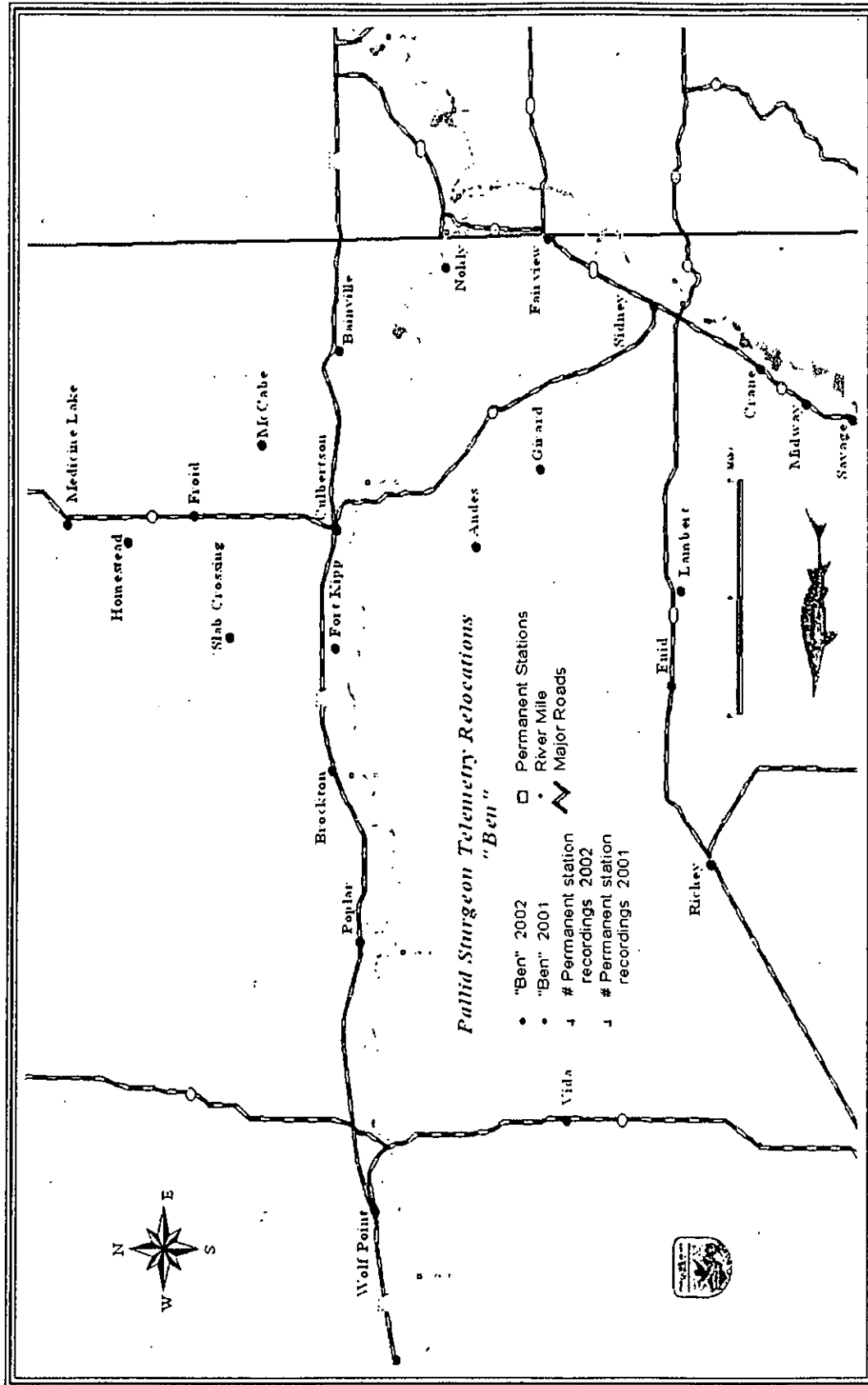


Figure 33: Map of boat relocations and movement frequencies registered for Ben passing various fixed datalogging stations for 2001 and 2002.

035547

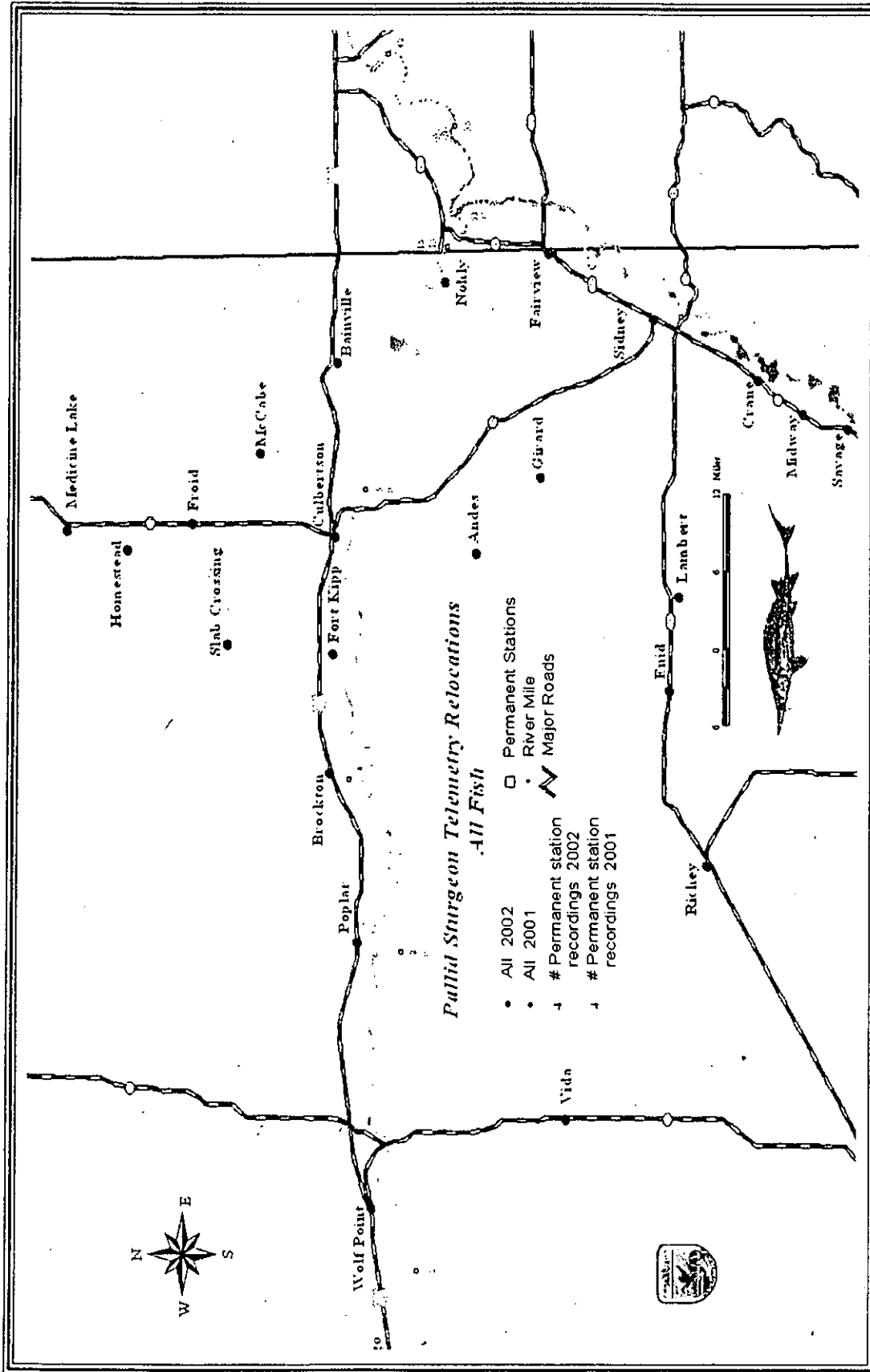


Figure 34: Map of boat relocations and movement frequencies registered for all fish passing various fixed datalogging stations for 2001 and 2002.

035578