

**Habitat Selection and Movement of Native Fish
in the Colorado River, Colorado**

Prepared for

**Colorado Division of Wildlife
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INTRODUCTION

The Colorado River near Grand Junction provides habitat for several species of native and nonnative fish. Recent studies have indicated the need for additional information regarding habitat use by native species (Beyers et al. 2001). An investigation of three Colorado River fish species was conducted in order to characterize habitat requirements during periods of low summer flows. These species included the flannelmouth sucker (*Catostomus latipinnis*), bluehead sucker (*Catostomus discobolus*), and roundtail chub (*Gila robusta*). Monitoring was conducted from early August through mid September.

The specific objectives of this study include:

- monitor movements of flannelmouth sucker, bluehead sucker, and roundtail chub in the Colorado River during the low flow periods (August through September)
- determine the preferred range of habitat features occupied during the base flow periods.

Radio telemetry was used to determine the location of each fish so that specific habitat features could be measured. Specific habitat data may be useful when determining flow recommendations for this reach of the Colorado River.

METHODS

This investigation consisted of radio tracking several species of native fish to determine habitat use in a reach where physical habitat had been intensely studied. Four adult bluehead sucker, five adult flannelmouth sucker, and one adult roundtail chub were implanted with radio transmitters by personnel from the Colorado Division of Wildlife on 2 August 2001 (Table 1).

Table 1. Summary of characteristics for fish implanted with radio transmitters on 2 Aug. 2001.

Species	Total Length (mm)	Radio Frequency
Bluehead Sucker	391	40.061
Bluehead Sucker	461	40.031
Bluehead Sucker	434	40.123
Bluehead Sucker	376	40.111
Flannelmouth Sucker	461	40.050
Flannelmouth Sucker	471	40.013
Flannelmouth Sucker	494	40.023
Flannelmouth Sucker	511	40.073
Flannelmouth Sucker	536	40.043
Roundtail Chub	357	40.083

Radio tracking of fish during the 2001 season was initiated in August and continued into September. Field monitoring began on 13 August 01 and was conducted each weekday through 23 August 01. Monitoring was concluded during the period from 10 September to 12 September 01. An attempt was made to locate each fish at least one time during each week of observations. After a fish was located it was monitored until a fixed location could be determined. The time needed to locate a specific fish position was dependent on fish activity during the monitoring time. If a fish was inactive a location could usually be determined in less than 10 minutes. If a fish was active, continuous monitoring for 20 minutes or longer was required in order to determine the specific location being used. In all cases the locations were based on triangulation using a minimum of two bearings that could be taken without interference from fish movement. In most instances the location was verified by taking a third triangulation bearing. This procedure was repeated every 30 minutes during routine observations and every 60 minutes during 24-hour observations (unless it was previously determined that the transmitter had been expelled). During the observation time a variety of habitat use data were collected including; date, time of day, weather conditions, time monitored, sketch of the surrounding habitat including fish locations, and any notes on movement during the observation period. Other physical habitat data that were collected whenever possible at each fish location included total water depth, water velocity (mean column and bottom), substrate type, proximity to cover, and general description of the site.

A continuous observation of a single fish was conducted on three occasions during the study. On two of these occasions the same fish (40:023) was chosen for a 24-hour

observation. The other continuous monitoring event involved another flannelmouth sucker (40:043) that was monitored over a 12-hour period. Each fish that was monitored for an extended period was typically located and observed for movement on hour intervals. All observed activity, movement, and habitat use by fish was recorded.

Habitat/Velocity

The dominant habitat type, in this reach of the Colorado River, is run habitat. Major habitat types are often several hundred meters in length with run habitats typically separated by riffle habitat. Some areas within a large habitat have characteristics of other habitat types. For example, a large run may contain deep pockets of slow moving water that are characteristic of pool habitat. Most runs also have access to a wide range of current velocities due to the transitional zones with riffle habitat at the upper and/or lower end. The habitat description at a fish location is based on the characteristics of that specific location.

Habitat characteristics were recorded at each location used by fish. Specific habitat features were summarized for all flannelmouth sucker observations, but were not summarized for other fish due to the low number observations by single individuals representing each species. Habitat use data was also divided into day and night observations based on official sunrise and sunset records.

Movement

Description of fish movement was based on four categories (movement types) that were used to provide general information regarding the amount of activity and changes in habitat use. These categories are described as follows:

- Type 1: Stationary – No Movement
- Type 2: Some Activity – Passive Movement
- Type 3: Very Active – Active Movement
- Type 4: Movement Between Habitats

Type 4 movement generally implied that the fish was also very active. Movement types were noted during each observation.

RESULTS

The list of fish that were implanted with transmitters was not a proportional representation of the list of fish that was contacted during the monitoring portion of this study. An increase in discharge and turbidity during the days following the implanting of transmitters may be responsible for the dispersal and loss of several fish and/or transmitters from the study area. Radio frequencies that were not contacted during the monitoring portion of the study included two bluehead suckers (40.031 and 40.123), and two flannelmouth suckers (40.050 and 40.013). Several other frequencies were encountered, but were excluded from the data analysis because evidence suggested that the transmitters had been expelled. The transmitter frequency 40.061 (bluehead sucker) was consistently contacted at the same location throughout the study, but all attempts to move or scare this fish failed, and depth at this location prohibited observation or retrieval of the transmitter. It was assumed that this transmitter had been expelled shortly after implantation. Two other fish, one bluehead sucker (40.111) and one flannelmouth sucker (40.073), were found to be active at the onset of the study, but became inactive and presumably expelled their transmitters at some point during the monitoring portion of the study. Two flannelmouth suckers (40.023 and 40.043) and the roundtail chub (40.083) demonstrated activity throughout the study period. Results from each fish location that provided what could be considered “usable data” are summarized in the Appendix and will be discussed in further detail.

Roundtail Chub (40.083)

Soon after implantation the roundtail chub moved downstream of the intensive study area into a large, low velocity, run habitat bordered at both ends by shallow riffles. Specific locations for the roundtail chub were provided on 12 occasions throughout the study

period (Appendix A, Table 1). Despite the fact that this fish had moved outside of the intensive study area, GPS coordinates were obtained for several locations. A wide range of depths and velocities was observed among the 12 confirmed contacts.

Bluehead sucker (40.111)

This bluehead sucker (radio frequency 40.111) was the only active bluehead sucker that was located during the monitoring portion of this study. This fish was consistently located in a run habitat with relatively fast current velocity. Prior to 15 Aug. this fish exhibited frequent activity during contacts. Although a signal was located on several occasions after Aug. 15 it did not exhibit any movement. An attempt to move this fish during September failed, and we concluded that the transmitter had been expelled. Seven contacts were made during the early portion of the study when the fish appeared to be active. These contact locations were all in run habitat with cobble substrate and velocities that tended to be slightly higher than those used by flannelmouth suckers (Appendix A, Table 2).

Flannelmouth sucker (40.023)

This fish was contacted more than any other during the monitoring period. It was consistently located in a large run near the lower end of the intensive study reach. Contacts included numerous daily observations and two 24-hour observations (Appendix A, Table 3). These contacts revealed the use of a variety of depths and velocities within the major habitat. This fish was also found to exhibit frequent activity.

Flannelmouth sucker (40.043)

This flannelmouth sucker was also contacted on numerous occasions throughout the investigation (Appendix A, Table 4). It was always located in a large run habitat located in the middle of the intensive study area. Most of the contacts for this fish were made during the day, however two were made after sunset. This fish could not be located

during the September observation period. It is possible that the fish moved outside of the study area, but more likely that the battery in the transmitter had expired. This fish was located last on 23 Aug. 2001.

Habitat/Velocity

Flannelmouth suckers were found to use a variety of habitats and velocities throughout the investigation. Depths used during daytime hours were typically greater than 1ft, and sometimes exceeded 6ft (Figure 1). The most common depths used during daytime hours ranged between 2.0ft and 4.5ft. There were fewer observations made during the nighttime hours, but most of these depths fell within the range of depths observed during the day (Figure 2). The general trend suggested a more frequent use of shallow habitat at night.

Velocity was measured at two depths for each fish location. The mean velocity was measured at 0.6 of the total depth, and the bottom velocity was measured approximately 0.1ft above the substrate. Mean velocities for flannelmouth sucker ranged from 0.0 to 4.5 f/s during daytime hours (Figure 3), and from -0.5 to 4.5 during nighttime hours (Figure 4). Negative values are an indication of upstream flow, usually associated with “eddy” habitat. During day and night observations the preferred mean velocity seemed to range between 1.0 and 3.0 ft/s. Bottom velocities at observation points were usually lower than mean velocities and ranged between -1.0 and 2.5 ft/sec. A similar pattern was observed for day and night observations (Figures 5 and 6). Preferred bottom velocity for day and night observations ranged from 0.0 to 2.0 ft/sec.

Movement

Each species of fish that was encountered during this investigation exhibited a variety of movement types during observations. A summary of movement observed in flannelmouth suckers indicated that passive movement was most common during day observations (Figure 7). Active movement or movement between habitats was most

common during night observations. On several occasions fish moved as a result of being displaced by the boat. Any movement that was thought to be a response to the presence of the researchers was not recorded.

DISCUSSION

Habitat use and movement of native fish species in the Colorado River is likely dependent on a variety of specific environmental conditions. Some of these conditions include: temperature, discharge, and turbidity. It was beyond the scope of this study to make comparisons between habitat selection and these environmental conditions; however, data collected during this study does provide information regarding trends in habitat use during a period of late summer low flows.

Although numerous observations were reported in this study, the number of fish representing each species was low. Observations came from only one fish representing bluehead sucker and roundtail chub, and only two fish representing flannelmouth sucker. A comparison of depths used by each flannelmouth sucker suggested that there was some variability in habitat preference between individuals of the same species (Figure 8). One flannelmouth sucker (40.023) used a wide range of depths while the other (40.043) used a much narrower range of depths. This variability in habitat use among individuals indicates the need for monitoring of several individuals of the same species and similar age class.

The original design of this study was to monitor several individuals representing each species. Many of the fish and/or transmitters were lost after implantation; however, the remaining fish provided an effective means of gathering habitat use data. Numerous observations were recorded for the few fish that remained active within the study area. We recommend that this data be used with other existing data, or additional data should be collected to verify the trends observed in this investigation.

Figure 1. Summary of depths at all flannelmouth sucker locations during daytime observations.

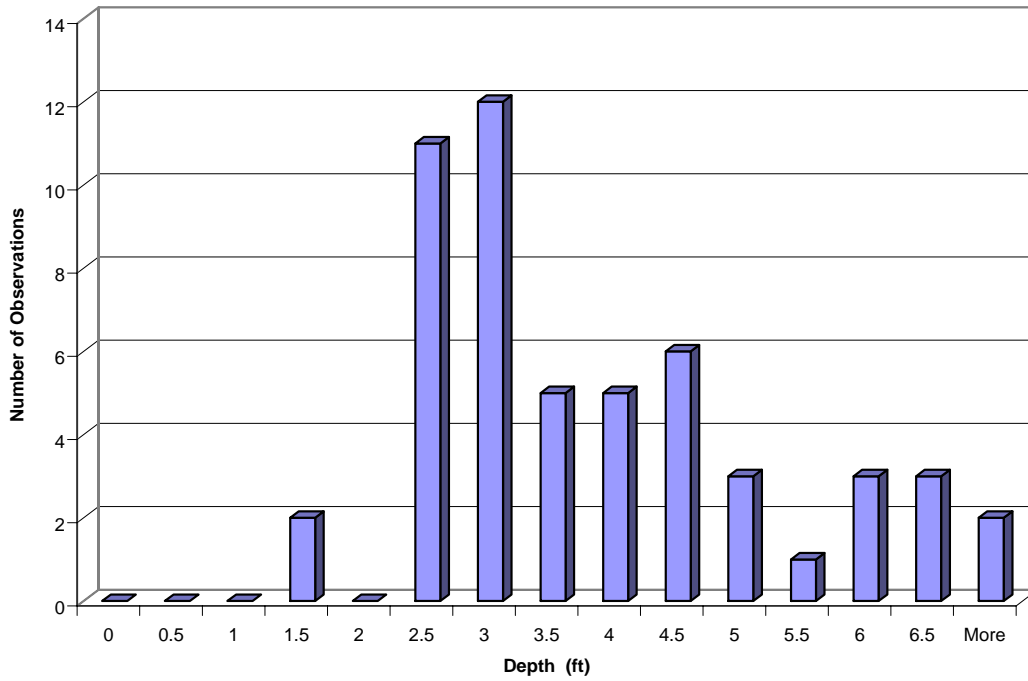


Figure 2. Summary of depths at all flannelmouth sucker locations during night observations.

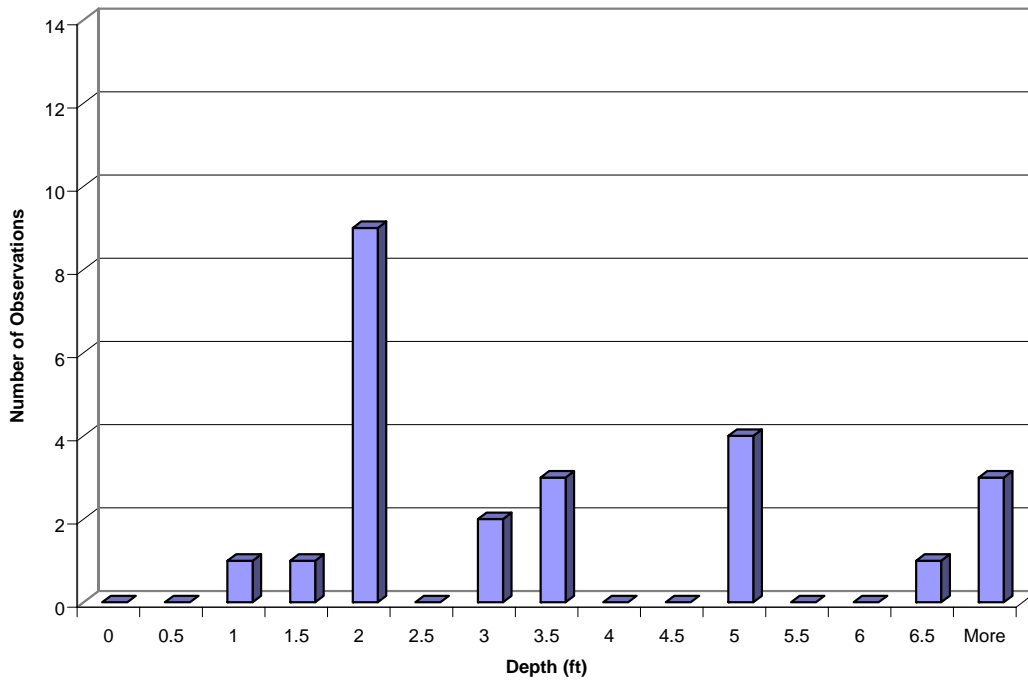


Figure 3. Summary of mean velocities at all flannelmouth sucker locations during daytime hours.

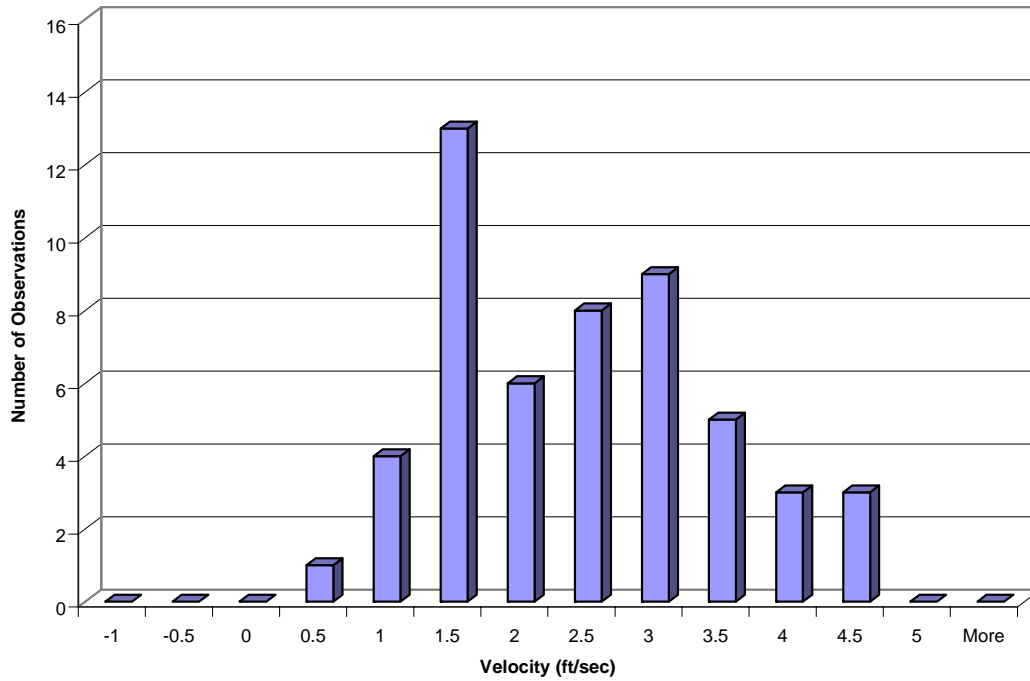


Figure 4. Summary of mean velocities at flannelmouth sucker locations during nighttime hours.

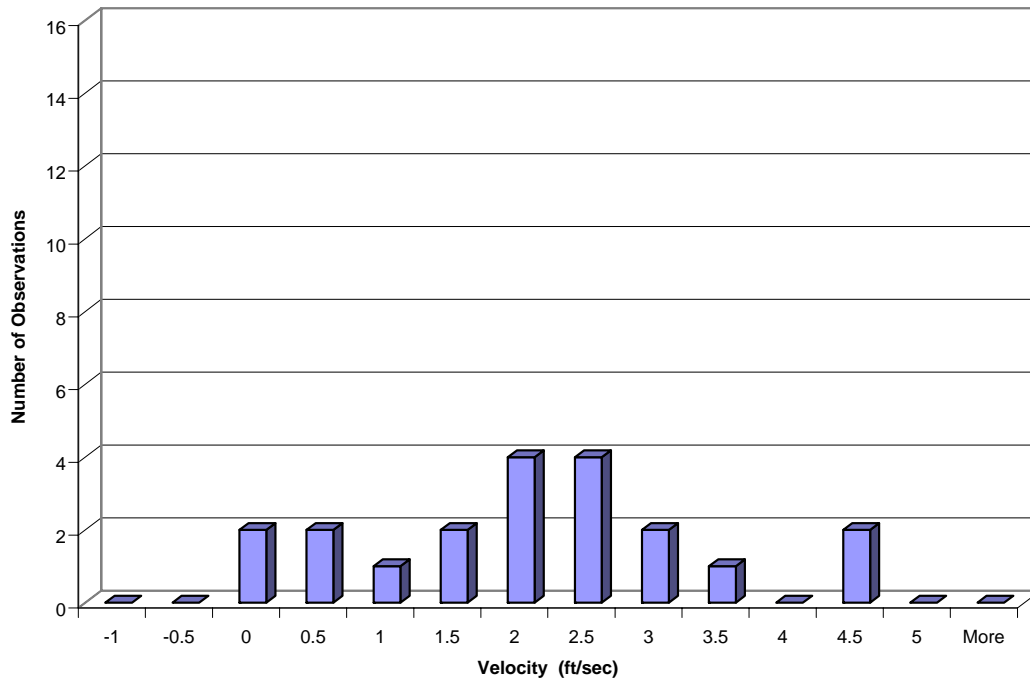


Figure 5. Summary of bottom velocities at flannelmouth sucker locations during daytime hours.

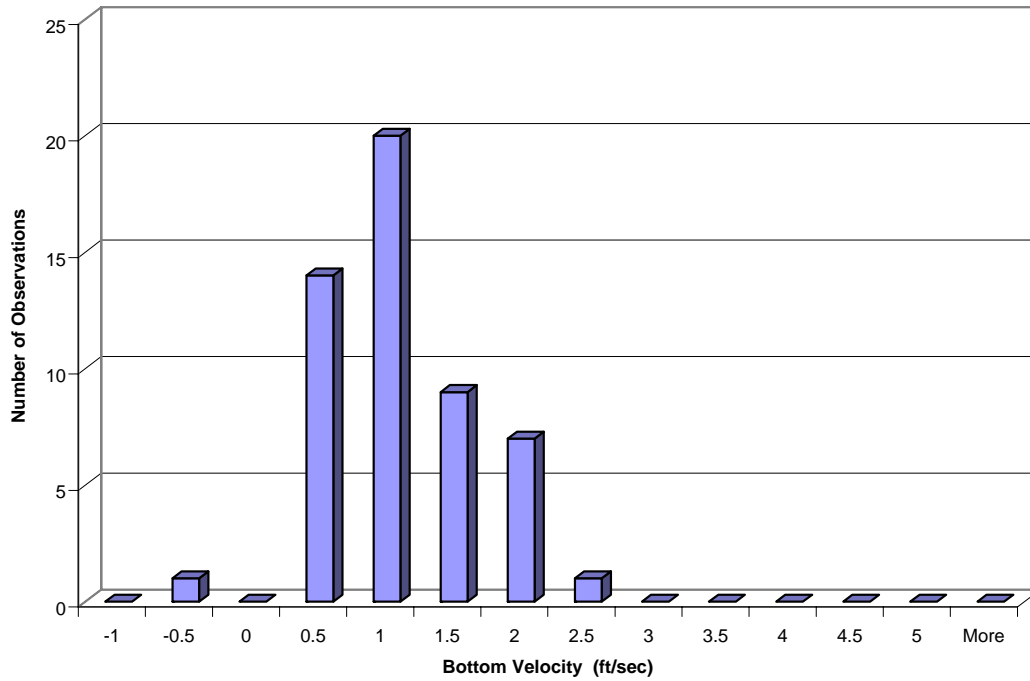


Figure 6. Summary of bottom velocities at flannelmouth sucker locations during nighttime hours.

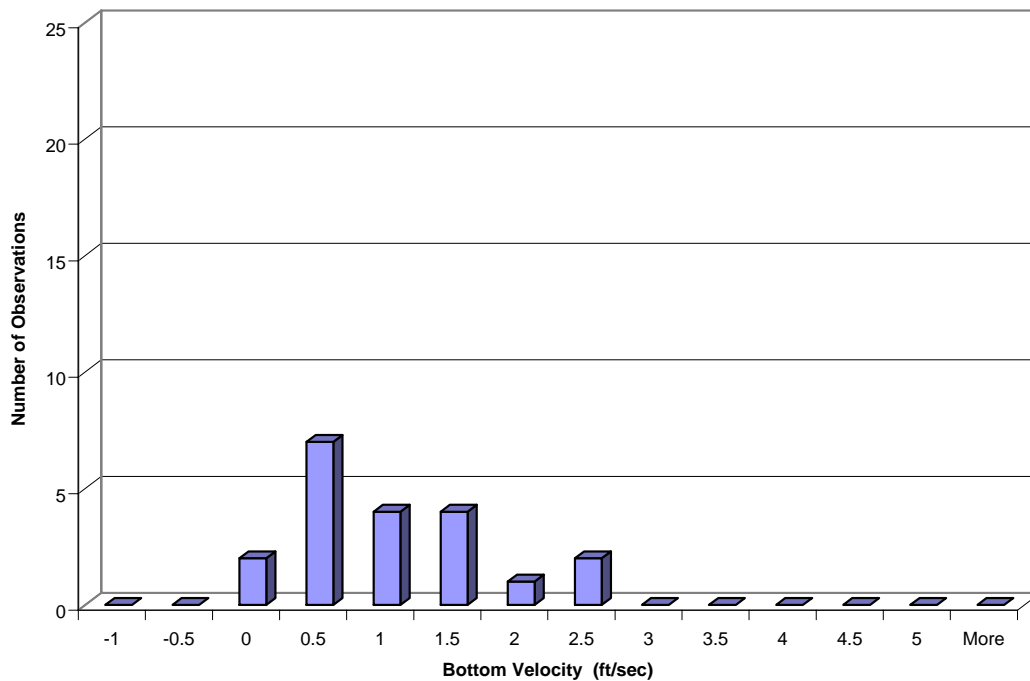


Figure 7. Summary of movement types by flannelmouth sucker during day observations.

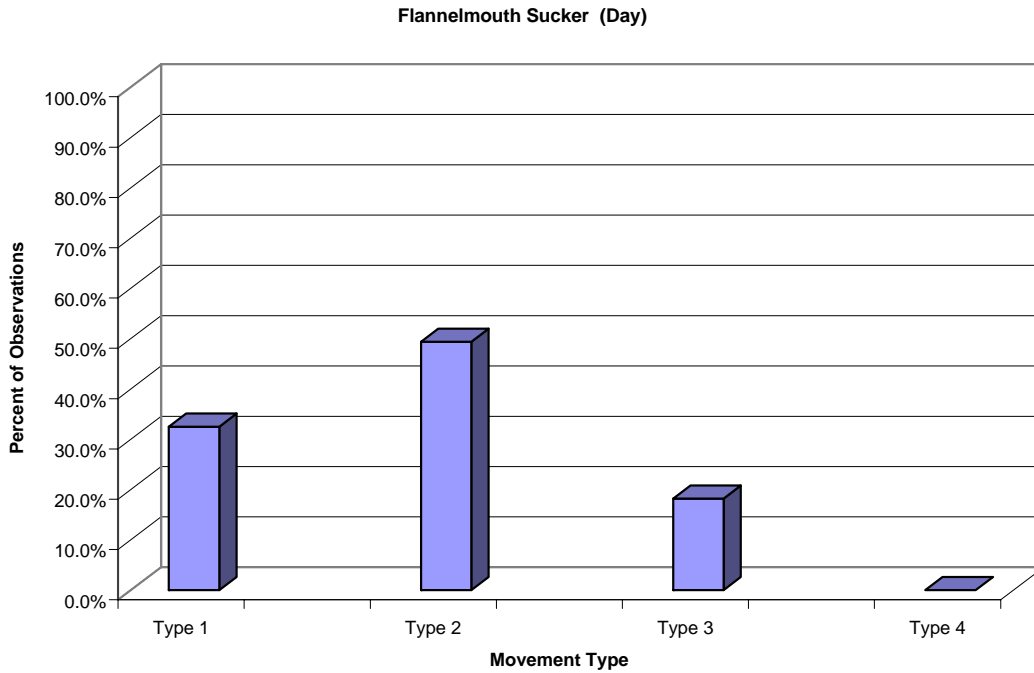


Figure 8. Summary of movement types by flannelmouth sucker during night observations.

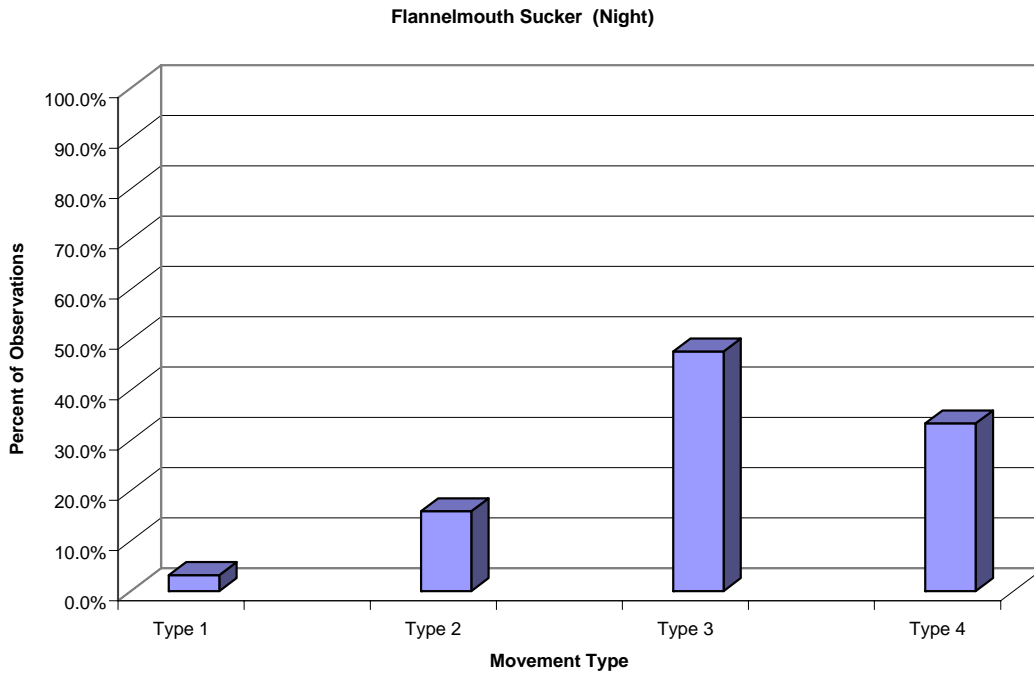
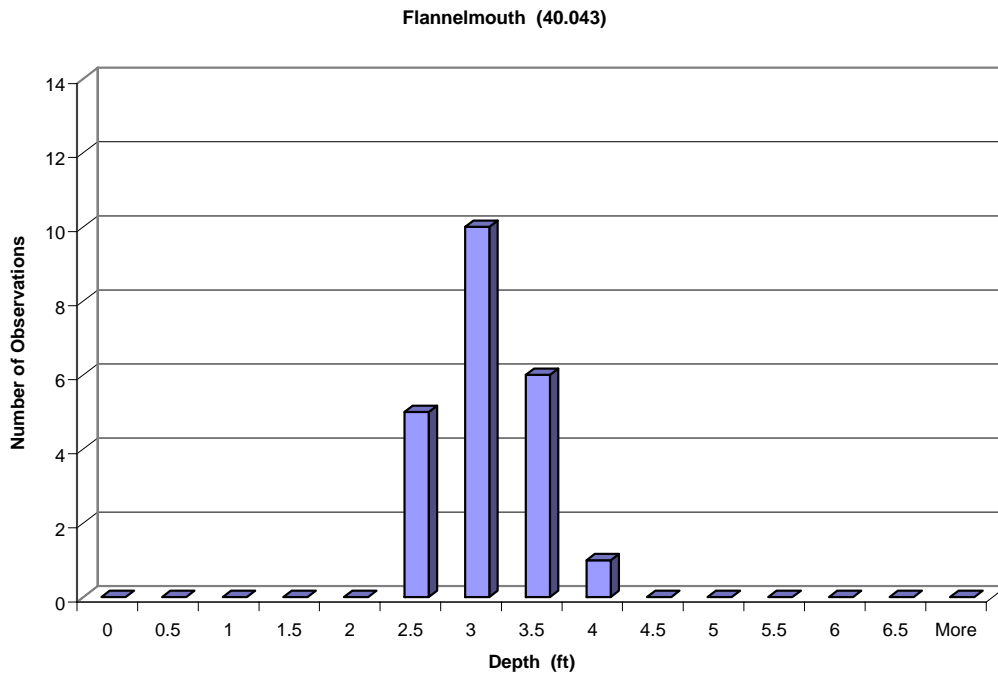
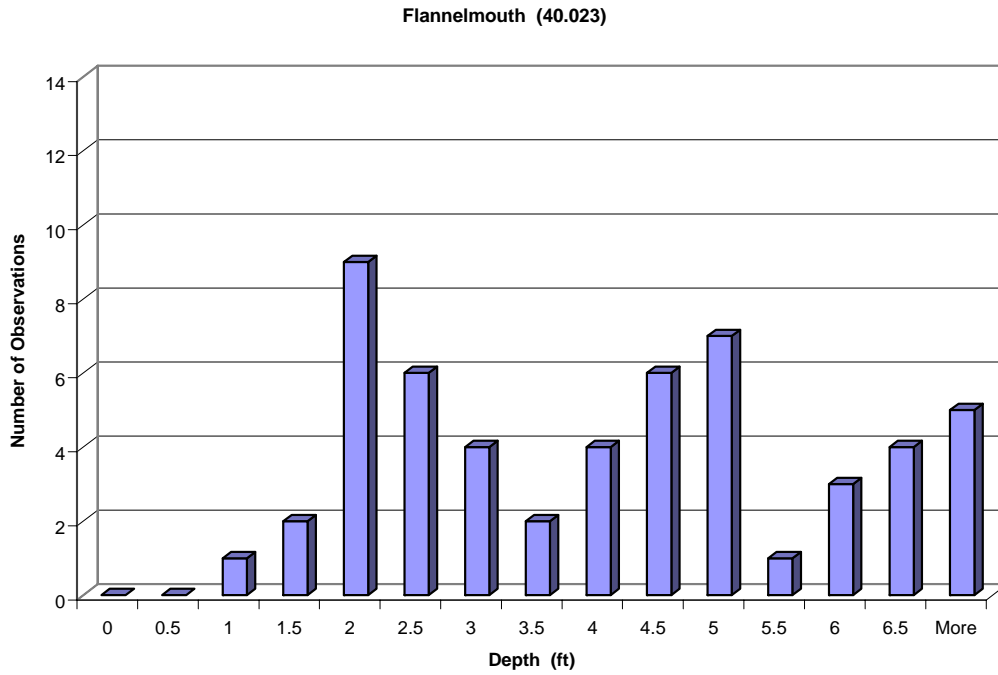


Figure 9. A summary of depths used by two flannelmouth suckers during radio telemetry observations.



REFERENCES

Beyers, D.W., C. Sodergren, J.M. Bundy, and K.R. Bestgen. 2001. Habitat use and movement of bluehead sucker, flannelmouth sucker, and roundtail chub in the Colorado River. Prepared for the Colorado Division of Wildlife, Grand Junction, Colorado.

APPENDIX A

Table A1. Location and habitat information for roundtail chub (40.083) in the Colorado River near Grand Junction.

Species	Frequency	Date	Time	Position	northing	easting	Depth	Velocity (cfs)	Bottom Vel.	Habitat	Substrate	Movement
RT	40:083	14-Aug-01	13:45	1			6.0	1.90	1.60	run	cobble	2
RT	40:083	21-Aug-01	14:10	1			6.0	0.65	0.40	run	silt	1
RT	40:083	21-Aug-01	14:40	2			6.0	0.90	0.20	run	cobble	2
RT	40:083	21-Aug-01	15:10	3			5.9	0.66	0.50	run	silt	2
RT	40:083	10-Sep-01	13:30	1	4325330.94721	715663.06354	2.2	2.34	0.71	run	cobble	2
RT	40:083	10-Sep-01	14:00	2	4325337.44271	715665.52302	1.7	1.48	0.65	run	cobble	2
RT	40:083	11-Sep-01	10:45	7	4325319.95692	715626.17813	6.0	2.18	0.43	run	cobble	1
RT	40:083	11-Sep-01	12:45	8	4325316.63209	715641.86471	5.5	2.28	0.88	run	cobble	2
RT	40:083	11-Sep-01	13:45	3	4325316.72437	715666.99412	5.7	2.40	0.17	riffle/run	cobble	2
RT	40:083	11-Sep-01	16:45	4	4325312.41579	715681.90531	4.2	2.70	0.80	riffle/run	cobble	2
RT	40:083	11-Sep-01	18:45	5	4325329.04366	715642.33178	5.7	1.84	1.60	run	cobble	3
RT	40:083	12-Sep-01	9:00	6	4325343.15160	715602.48021	4.9	1.07	0.17	run	cobble	1

Table A2. Location and habitat information for bluehead sucker (40.111) in the Colorado River near Grand Junction.

Species	Frequency	Date	Time	Position	northing	easting	Depth	Velocity (cfs)	Bottom Vel.	Habitat	Substrate	Movement
BH	40:111	14-Aug-01	12:15	1	4325669.25411	716949.18081	2.3	1.90	0.70	run	cobble	1
BH	40:111	14-Aug-01	12:45	3	4325647.51900	716936.78982	4.0	2.71	1.10	run	cobble	2
BH	40:111	14-Aug-01	12:30	2	4325662.39828	716954.17457	3.8	3.16	0.89	run	cobble	3
BH	40:111	15-Aug-01	13:40	1	4325673.10478	716924.08493	4.0	2.60	0.65	run	cobble	1
BH	40:111	15-Aug-01	15:35	2	4325668.31235	716908.77949	>6.0			run	cobble	2
BH	40:111	15-Aug-01	17:30	1	4325673.10478	716924.08493	4.0	2.60	0.65	run	cobble	1
BH	40:111	15-Aug-01	19:30	2	4325668.31235	716908.77949	>6.0			run	cobble	2

Table A3. Location and habitat information for flannelmouth sucker (40.023) in the Colorado River near Grand Junction.

Species	Frequency	Date	Time	Position	northing	easting	Depth	Velocity (cfs)	Bottom Vel.	Habitat	Substrate	Movement
FM	40:023	14-Aug-01	13:20	1	4325693.33767	716681.09648	2.6	1.30	0.80	run	cobble	1
FM	40:023	15-Aug-01	10:10	1	4325681.11471	716618.97783	2.3	4.47	1.89	run	cobble	2
FM	40:023	15-Aug-01	11:10	2	4325705.73919	716629.35161	2.2	3.47	1.70	run	cobble	2
FM	40:023	15-Aug-01	12:10	3	4325727.62219	716776.64105	4.3	3.00	1.37	riffle	boulder	4
FM	40:023	15-Aug-01	13:10	4	4325713.86477	716733.01724	>6.0			run		4
FM	40:023	15-Aug-01	14:10	5	4325670.54879	716649.49219	2.1	2.60	1.80	run	cobble	2
FM	40:023	15-Aug-01	15:10	6	4325674.31230	716663.03747	2.3	2.30	2.04	run	cobble	3
FM	40:023	15-Aug-01	16:10	7	4325714.05557	716650.32628	1.5	3.00	1.47	run	cobble	3
FM	40:023	15-Aug-01	17:10	8	4325698.41946	716728.73787	5.3	2.20	0.80	run	cobble	2
FM	40:023	15-Aug-01	18:10	9	4325697.62353	716752.37672	2.7	0.47	0.07	run	cobble	1
FM	40:023	15-Aug-01	19:10	10	4325710.30716	716770.63792	6.5	2.15	1.90	riffle/run	cobble	2
FM	40:023	15-Aug-01	20:10	11	4325722.90936	716744.40823	>6.0			run		2
FM	40:023	15-Aug-01	21:10	11	4325722.90936	716744.40823	>6.0			run		1
FM	40:023	15-Aug-01	22:10	12	4325695.95833	716767.07604	2.0	0.01	0.14	run	cobble	2
FM	40:023	15-Aug-01	23:10	13	4325687.20587	716715.49588	2.0	1.30	1.10	run	cobble	1
FM	40:023	16-Aug-01	0:10	14	4325719.05471	716771.22048	>6.0			riffle		4
FM	40:023	16-Aug-01	1:10	15	4325720.25967	716704.90387	5.0	2.50	0.60	run	boulder	4
FM	40:023	16-Aug-01	2:10	16	4325691.21330	716684.71049	5.0			run	cobble	2
FM	40:023	16-Aug-01	3:10	17	4325701.94739	716760.71701	4.9	-0.25	-0.30	eddy	cobble	2
FM	40:023	16-Aug-01	4:10	17	4325701.94739	716760.71701	4.9	-0.25	-0.30	eddy	cobble	2
FM	40:023	16-Aug-01	5:10	10	4325710.30716	716770.63792	6.5	2.15	1.90	riffle/run	cobble	1
FM	40:023	16-Aug-01	6:10	12	4325695.95833	716767.07604	2.0	0.01	0.14	run	cobble	2
FM	40:023	16-Aug-01	7:10	18	4325691.86527	716655.50741	4.9	4.03	1.20	run	cobble	2
FM	40:023	16-Aug-01	8:10	5	4325670.54879	716649.49219	2.1	2.60	1.80	run	cobble	1
FM	40:023	16-Aug-01	9:10	5	4325670.54879	716649.49219	2.1	2.60	1.80	run	cobble	1
FM	40:023	21-Aug-01	12:40	1	4325710.19008	716729.59243	4.7	3.10	0.80	run	cobble	3
FM	40:023	21-Aug-01	13:10	2	4325701.20189	716686.59551	4.5	2.10	0.95	run	cobble	1
FM	40:023	21-Aug-01	13:40	2	4325701.20189	716686.59551	4.5	2.10	0.95	run	cobble	2

Table A3 (continued). Location and habitat information for flannelmouth sucker (40.023) in the Colorado River near Grand Junction.

Species	Frequency	Date	Time	Position	northing	easting	Depth	Velocity (cfs)	Bottom Vel.	Habitat	Substrate	Movement
FM	40:023	10-Sep-01	12:20	1	4325715.03547	716738.51701	6.0	2.20	1.70	run	cobble	2
FM	40:023	10-Sep-01	12:50	2	4325705.64829	716721.73593	4.4	3.75	1.40	run	cobble	2
FM	40:023	10-Sep-01	13:20	3	4325711.23453	716723.64214	5.0	3.70	0.16	run	cobble	1
FM	40:023	11-Sep-01	9:30	1	4325703.36935	716715.30590	3.6	3.25	0.30	run	cobble	2
FM	40:023	11-Sep-01	10:30	2	4325702.35786	716680.10848	3.9	3.90	0.50	run	cobble	2
FM	40:023	11-Sep-01	11:30	3	4325710.73173	716706.47389	4.2	4.11	1.05	run	cobble	2
FM	40:023	11-Sep-01	12:30	4	4325696.81488	716692.89386	4.0	3.15	0.15	run	cobble	2
FM	40:023	11-Sep-01	13:30	5	4325690.92974	716676.97701	4.0	2.72	0.37	run	cobble	2
FM	40:023	11-Sep-01	14:30	6	4325713.57192	716738.41749	6.6	1.91	1.20	riffle	boulder	4
FM	40:023	11-Sep-01	15:30	7	4325707.50294	716761.31188	6.0	1.25	0.81	eddy	cobble	4
FM	40:023	11-Sep-01	16:30	8	4325725.35581	716782.07082	6.4	1.37	0.47	riffle	cobble	2
FM	40:023	11-Sep-01	17:30	7	4325707.50294	716761.31188	6.0	1.25	0.81	eddy	cobble	4
FM	40:023	11-Sep-01	18:30	9	4325716.53148	716737.07383	6.2	0.70	-0.50	riffle	boulder	4
FM	40:023	11-Sep-01	19:30	10	4325671.13769	716660.41333	1.6	1.90	0.85	run	gravel	2
FM	40:023	11-Sep-01	20:30	10	4325671.13769	716660.41333	1.6	1.90	0.85	run	gravel	1
FM	40:023	11-Sep-01	21:30	11	4325659.15322	716627.35926	0.8	1.64	1.18	run	gravel	2
FM	40:023	11-Sep-01	22:30	10	4325671.13769	716660.41333	1.6	1.90	0.85	run	gravel	1
FM	40:023	11-Sep-01	23:30	12	4325671.71964	716674.35807	1.4	1.28	0.36	run	gravel	1
FM	40:023	12-Sep-01	2:30	13	4325695.28212	716641.40492	3.5	4.10	2.20	run	cobble	2
FM	40:023	12-Sep-01	3:30	14	4325673.26116	716625.54351	1.9	3.10	1.40	run	cobble	1
FM	40:023	12-Sep-01	4:30	15	4325670.75031	716625.69918	1.9	2.65	0.22	run	cobble	1
FM	40:023	12-Sep-01	5:30	16	4325682.26731	716667.07789	2.6	2.64	1.48	run	cobble	2
FM	40:023	12-Sep-01	6:30	17	4325676.86606	716674.56294	2.0	2.10	0.20	run	cobble	2
FM	40:023	12-Sep-01	7:30	18	4325683.63579	716675.70481	2.7	2.27	0.73	run	cobble	2
FM	40:023	12-Sep-01	8:30	19	4325699.62373	716712.46779	4.2	2.90	0.95	run	cobble	2
FM	40:023	12-Sep-01	0:30	13	4325695.28212	716641.40492	3.5	4.10	2.20	run	cobble	1

Table A4. Location and habitat information for flannemouth sucker (40.043) in the Colorado River near Grand Junction.

Species	Frequency	Date	Time	Position	northing	easting	Depth	Velocity (cfs)	Bottom Vel.	Habitat	Substrate	Movement
FM	40:043	13-Aug-01	15:30	1	4326155.72626	718391.98479	1.5	1.25	0.51	run		2
FM	40:043	14-Aug-01	10:50	1	4326180.31596	718322.28991	2.9	1.90	0.01	run	cobble	2
FM	40:043	14-Aug-01	11:05	2	4326159.96998	718313.49429	2.4	0.70	0.50	run	mud	3
FM	40:043	14-Aug-01	11:10	3	4326175.20449	718321.48401	2.8	1.01	0.42	run	cobble	3
FM	40:043	14-Aug-01	11:20	4	4326154.52341	718348.13755	3.0	0.90	0.10	run	mud	2
FM	40:043	14-Aug-01	11:25	3	4326175.20449	718321.48401	2.8	1.01	0.42	run	cobble	2
FM	40:043	14-Aug-01	11:40	5	4326163.55048	718334.27693	2.8	1.26	0.60	run	cobble	1
FM	40:043	17-Aug-01	10:15	1	4326224.36043	718272.39325				run		1
FM	40:043	20-Aug-01	13:20	1	4326213.80796	718332.17565				riffle/run		2
FM	40:043	20-Aug-01	13:50	2	4326219.15549	718314.65825				riffle/run		2
FM	40:043	20-Aug-01	14:20	3	4326222.82394	718288.20251				run		2
FM	40:043	21-Aug-01	9:27	1	4326202.99736	718280.41029	3.0	2.00	0.85	run	cobble	3
FM	40:043	21-Aug-01	9:57	1	4326202.99736	718280.41029	3.0	2.00	0.85	run	cobble	1
FM	40:043	21-Aug-01	10:27	2	4326194.96573	718280.96355	3.3	2.14	0.73	run	cobble	2
FM	40:043	22-Aug-01	14:50	1	4326179.70299	718304.49760				run		2
FM	40:043	22-Aug-01	15:50	2	4326193.52148	718307.24720				run		2
FM	40:043	22-Aug-01	16:50	3	4326174.76843	718334.43254				run		3
FM	40:043	23-Aug-01	9:15	1	4326155.39398	718326.51970	2.7	0.95	0.72	run	silt	2
FM	40:043	23-Aug-01	10:15	2	4326157.38904	718325.36183	2.3	1.22	0.60	run	cobble	1
FM	40:043	23-Aug-01	11:15	2	4326157.38904	718325.36183	2.3	1.22	0.60	run	cobble	1
FM	40:043	23-Aug-01	12:15	3	4326174.38488	718328.41302	3.5	1.85	0.57	run	cobble	2
FM	40:043	23-Aug-01	13:15	4	4326179.57081	718351.85138	3.2	2.85	1.10	run	cobble	1
FM	40:043	23-Aug-01	14:15	5	4326155.77156	718336.45868	3.5	1.15	0.40	run	silt	2
FM	40:043	23-Aug-01	15:15	4	4326179.57081	718351.85138	3.2	2.85	1.10	run	cobble	1
FM	40:043	23-Aug-01	16:15	6	4326162.29489	718429.81291	3.9	3.40	1.10	run	cobble	4
FM	40:043	23-Aug-01	17:15	7	4326181.48435	718422.26347	3.0	1.25	0.82	run	cobble	3
FM	40:043	23-Aug-01	18:15	2	4326157.38904	718325.36183	2.3	1.22	0.60	run	cobble	1
FM	40:043	23-Aug-01	19:15	8	4326217.19609	718317.59310	3.4	2.09	0.16	run	cobble	1
FM	40:043	23-Aug-01	20:15	9	4326147.58259	718354.99496	2.7	0.65	0.45	run	cobble	1