

A Spawning Migration of Colorado squawfish
(Ptychocheilus lucius) in the Yampa and
Green Rivers, Colorado and Utah, 1981.

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Abstract--Spawning migration of Colorado squawfish has been hypothesized but never documented until late June and early July, 1981 when eight Colorado squawfish were radiotracked from the upper Yampa and lower Green Rivers to spawning grounds in the lower 32 km of the Yampa River. Seven Colorado squawfish migrated from 80 to 160 km downstream in the Yampa River and one migrated 154 km upstream from the Green River to enter the spawning grounds. Radiotagged fish remained in the lower Yampa from June 26 to July 10 and contact was reestablished with seven fish near their premigratory location about two weeks after this period. Three Colorado squawfish originally tagged with dangler tags on the upper Yampa River in 1978 and 1980 and on the upper Green River in 1981 were recaptured on the spawning grounds from June 18 to July 9. Collection of larval Colorado squawfish in the lower 20 km of the Yampa River confirmed that successful spawning occurred.

Una Migracion Para la Reproduccion del Squawfish
del Colorado (Ptychocheilus lucius) en los Rios
Yampa y Green, en los Estados de Colorado y Utah, 1981.

Abstracto--Mucho se ha teorizado, pero nunca antes documentado, acerca de la migracion con propositos de reproduccion de el Squawfish del Colorado hasta a finales de Junio y principios de Julio de 1981 cuando ocho ejemplares fueron observados mediante el uso de radioteleметрия en movimiento migratorio desde la cabecera del Rio Yampa y desde la region mas inferior del Rio Verde (Green River), hacia la zona de reproduccion: 32 kms en la parte mas inferior del Rio Yampa. Siete ejemplares migraron 80 - 160 kms con la corriente rio abajo en Rio Yampa; y uno fue observado en el Rio Green migrando 160 kms contra la corriente y entrar en la zona de reproduccion en la parte mas inferior del Rio Yampa. Estos peces permanecieron en dicha zona desde Junio 26 hasta Julio 10 y posteriormente, dos semanas mas tarde, siete de ellos fueron detectados aproximadamente en la zona original previa adicho movimiento migratorio. Tres Squawfish del Colorado fueron marcados previamente con etiquetas dangler y liberados en las cabeceras de los Rios Yampa y Green en 1978 y en 1980; estos peces fueron recapturados en la zona de reproduccion en la parte mas inferior del Rio Yampa en la epoca de Junio 18 a Julio 9 de 1981. Se confirma la reproduccion exitosa del Squawfish mediante la colecta de larvas en la region de 20 kms de la zona mas inferior del Rio Yampa.

The U. S. Fish and Wildlife Service began a comprehensive study of the fishes of the Yampa River in March, 1981. Included as part of that study was a study of the movement and habitat preferences of Colorado squawfish (Ptychocheilus lucius), using conventional dangler tags and radiotelemetry. During this study investigators were able to document the first recorded spawning migration of Colorado squawfish. This paper presents general observations about that spawning migration. More detailed information about the Yampa study can be obtained from Miller, et al (1982). Work is continuing to analyze the results of this study and relate them to other Fish and Wildlife Service studies in progress in the upper Colorado River Basin.

Field collections on the Yampa River began in April, 1981. By May 14, seven Colorado squawfish were surgically implanted with AVM Radiotransmitters. In late June the radiotagged fish began moving downstream from their original points of capture and in early July were relocated in the lower 32 km of Yampa Canyon. By late July all the radiotagged fish had left the lower Yampa Canyon and when relocated, were generally found at the same area of initial capture. Found in association with these fish was one Colorado squawfish radiotagged in the lower Green River (km 397) near Ouray, Utah, which also returned to its initial location in late July.

Radiotelemetry of Colorado squawfish in the Green River in 1980, suggested that such long distance movement at that time of year was associated with spawning (Tyus et al 1981). Although study objectives of the Yampa study did not permit disturbance of the radiotagged squawfish, extensive collecting with floating trammel nets was conducted near them. Collections made from July 1 to July 9, 1981 produced 34 Colorado squawfish in spawning condition. These fish were either ripe males or spent females and catches reflected a very high catch per effort of ripe Colorado squawfish from short pool-riffle-pool habitat sections in the lower Yampa Canyon.

The spectacular change in movement patterns of the eight radiotagged Colorado squawfish migrating into the lower Yampa River is indicated in Figure 1, which displays the movement during June and July. Distances traveled during spawning migration were calculated for those fish that returned to the initial point of capture and remained at that location. Table 1 provides movement information for the eight radiotagged Colorado squawfish. One of these fish (No. 1) moved past the initial capture point and relocated 93 km upstream. Contact with Fish No. 2 was lost on the spawning grounds; however, since the fish was originally tagged in October at km 85 by Colorado DOW and recaptured two years later at this same location, the assumption is made that this fish returned there (with an inoperable radiotag). The remaining six fish (Nos. 3-8; Table 1) exhibited a spawning migration that accounted for 96% of the total movement during the study period.

Data from conventional tag recaptures substantiate the movement exhibited by the radiotelemetered fish. Three Colorado squawfish were recaptured on the spawning grounds. Two of these (Table 2) were tagged on the upper Yampa in August 1978 and 1980, and the other was tagged in the upper Green in May 1981.

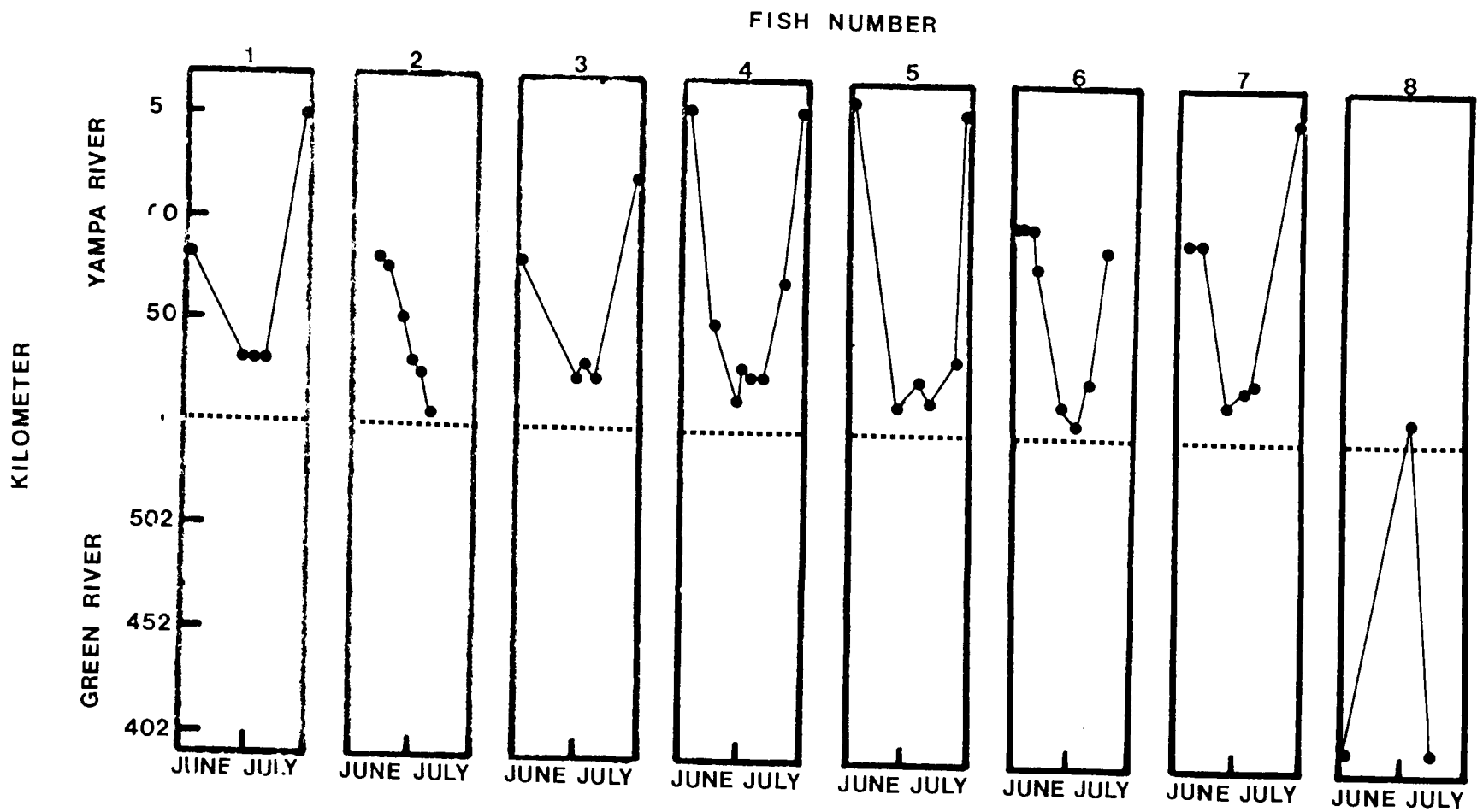


Figure 1. Movement of 8 tagged Colorado squawfish, Yampa and Green River, 1981. (Mouth of the Yampa River is where the Yampa River enters the Green River at km 552.)

Table 1. Movement of radiotelemetered Colorado squawfish, Yampa and Green Rivers 1981

Fish	TL ²	Initial Capture			At Spawning Grounds ¹		Last Contact		Movement		
		Date	River	Location ³	Dates	Location	Date	Location	Spawning	Total	% ⁴
1	533	4-22-81	Yampa	83	7-1 to 7-8	29-30	8-18-81	174	- ⁵	237	-
2	528	4-22-81 ⁶	Yampa	88	7-1 to 7-11	2-29	7-11-81	- ⁷	-	88	-
3	520	4-22-81	Yampa	88	7-1 to 7-24	26-29	8-05-81	120	157	157	100
4	624	5-06-81	Yampa	157	6-26 to 7-10	14-30	9-03-81	163	291	336	86
5	542	5-07-81	Yampa	157	6-26 to 7-10	6-26	8-27-81	158	288	306	94
6	601	5-08-81	Yampa	157	6-26 to 7-8	16-29	9-09-81	106	230	230	100
7	657	5-14-81	Yampa	142	6-26 to 7-5	13-26	8-05-81	154	270	270	100
8	614	4-28-81	Green	397	7-2 to 7-5	8-10	9-01-81	394	327	350	93

1 lower 32 km of Yampa River

2 km, rounded

3 km, rounded, river mouth = 0

4 % = spawning movement ÷ total

5 fish did not establish pre and post spawning territory

6 originally tagged by Colorado DOW 10/11/79 at km 85.

7 contact was lost on this date.

Long distance (over 100 km) spawning migrations in freshwater fish species is generally uncommon in North America although Nikolsky (1961) cites examples in Asia of Cyprinid fishes that migrate over 1,000 km. Other fishes of the genus Ptychocheilus include the northern squawfish P. oregonensis and the Sacramento squawfish (P. grandis). These two squawfishes, the only living congeners of the Colorado squawfish, also make freshwater spawning migrations (Reid, 1971; Moyle 1976).

Other workers have postulated spawning migrations in Colorado squawfish and there are many reports of spring spawning migrations by early settlers who called the Colorado squawfish "salmon" (Sigler and Miller 1963). Joseph et al (1977) provides a review of known information concerning movement and spawning and concluded that large individuals possibly migrate long distances and smaller ones may move shorter distances. It is likely that the observed spawning migration is historic since Holden and Stalnaker (1975) reported increased numbers of ripe Colorado squawfish in the lower Yampa River in July 1968-1970. Collections made by Seethaler (1978) also indicated increased numbers of Colorado squawfish in the lower Yampa River in July 1974-75.

Although in general agreement with hypotheses of others regarding spawning, the findings of this study disagree with the hypothesis (Joseph et al 1977) that Colorado squawfish spawn in the same area in which they live all year.

The presence of ripe fish does not necessarily reflect a spawning area. This appears to be particularly true for Colorado squawfish since ripe males can be stripped of milt for an extended period. Therefore, it is important to consider the results of larval fish collections in Dinosaur National Monument conducted by the Colorado Division of Wildlife in August 1980, and the more intensive sampling by the Colorado Division of Wildlife and Fish and Wildlife Service in July - August 1981. The 1980 collections produced larval Colorado squawfish in the lower 16 km of the Yampa River. Although the lower 190 km of the Yampa River was intensively sampled in 1981, larval Colorado squawfish (9-13 mm) were collected only in the lower 20 km. This is conclusive proof that spawning occurred in the Yampa River both years and indicates that spawning may be restricted to the lower 32 km as suggested by radio-telemetry.

Identification and protection of long distance spawning migrations of Colorado squawfish may be the most significant factor for the preservation of this endangered fish. The loss of fish passage may offer an explanation for its disappearance from the lower Colorado River Basin. Blockage of such spawning migrations by the construction of dams may result in its loss from the upper basin as well; however, it is possible that passageways might be utilized by Colorado squawfish since northern squawfish have been reported to use them (Park and Farr 1972).

Table 2. Recapture of Colorado squawfish tagged with dangler tags on spawning grounds, Yampa River, 1981.

Fish No.	Capture				Recapture				Distance ³
	Date	River	Location ¹	TL ²	Date	River	Location	TL	
9	5-27-81	Green	491	560	6-18-81	Yampa	5	560	66
10	10-8-80	Yampa	147	593	7-9-81	Yampa	27	607	120
11 ⁴	8-21-78	Yampa	88	452	7-5-81	Yampa	26	506	62

1 km, mouth of river = 0

2 mm

3 given from point of capture to point of recapture

4 tagged by Biowest, Inc.

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