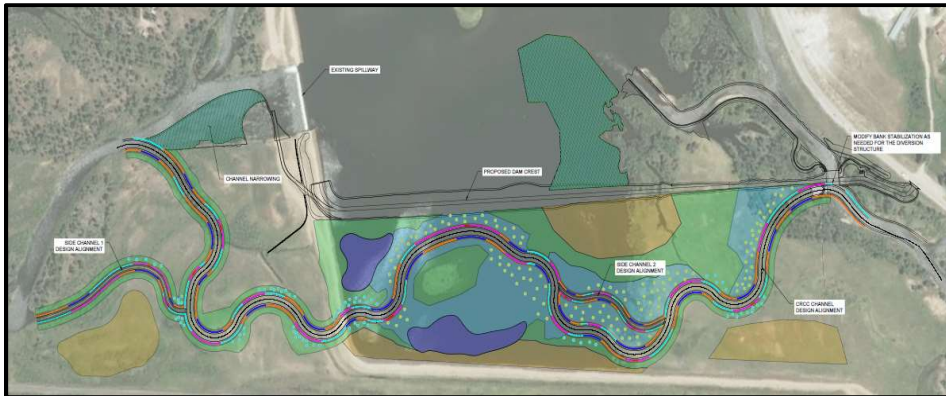


Windy Gap Fish Movement Study



EVALUATING MOVEMENT IN THE COLORADO AND FRASER RIVERS PRIOR TO CONSTRUCTION OF THE CRCC

Windy Gap Fish Movement Study Objectives



The Windy Gap fish movement study is being conducted in Grand County in conjunction with the construction of the Colorado River Connectivity Channel (CRCC), which will reconnect the Colorado and Fraser rivers above Windy Gap Reservoir to the Colorado River below Windy Gap Reservoir for the first time since the early 1980s. Construction of the CRCC around Windy Gap Reservoir will allow fish

movement and provide access to favorable habitats, such as optimal spawning locations, that have been previously unavailable to populations upstream and downstream of the reservoir. The primary objectives of the study are to evaluate fish movement patterns prior to the construction of the CRCC, and that the CRCC is being used for fish passage after construction. Evaluations are taking place on Northern Water, City of Granby, and private properties above and below Windy Gap Reservoir. To accomplish this, the fish movement study involves collaboration between these entities, as well as CPW aquatic researchers and biologists, Trout Unlimited, and Grand County Learning by Doing.

Population Estimates and PIT Tagging

Population estimates conducted in 2020-2022 provide baseline data on fish populations, and allow researchers to monitor and compare changes in these populations before and after construction of the CRCC. These estimates also allow opportunities to tag fish with Passive Integrated Transponder (PIT) tags used to evaluate fish movements. PIT tags use the same technology as those commonly used to identify pets, providing a unique ID for every fish that is detected by an antenna. PIT-tagged fish were released annually in the fall at two sites in the Colorado River and two sites in the Fraser River above Windy Gap Reservoir. Additionally, PIT-tagged fish were released in the spring throughout a four-mile stretch of the Colorado River below Windy Gap Reservoir. Since the study began in 2020, 4,234 fish have been PIT tagged in the Colorado and Fraser rivers, including 3,138 Brown Trout, 611 Rainbow Trout, 6 Cutbows (hybrids of Cutthroat Trout and Rainbow Trout), and 479 Mottled Sculpin. Mottled Sculpin are currently absent downstream of Windy Gap Reservoir. The CRCC is intended to facilitate sculpin distribution, increasing the diversity of the Colorado River downstream of the reservoir.

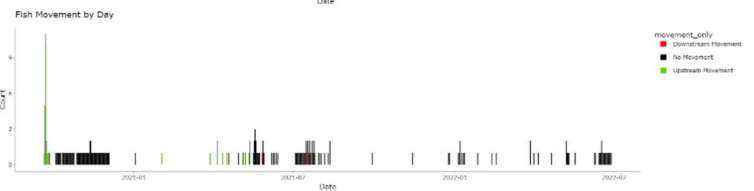
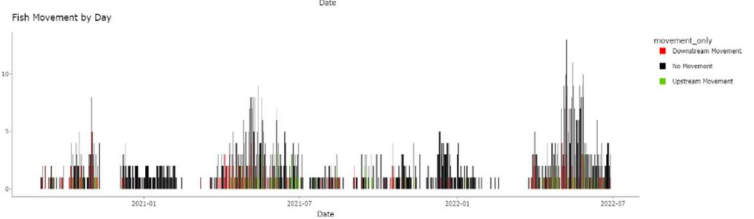
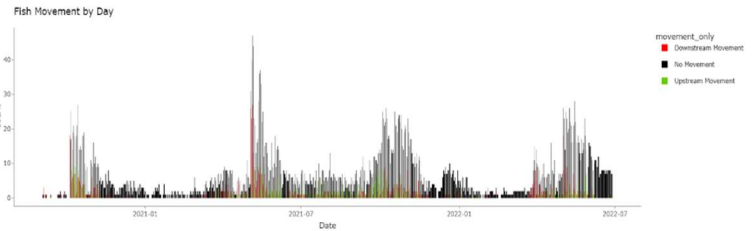


Left to right: 32-mm PIT tag for evaluating Brown Trout and Rainbow Trout movements in the Colorado and Fraser rivers; 12-mm PIT tag being inserted into a Mottled Sculpin; paired stationary antennas installed on the bottom of the river used to evaluate directionality of movement; antenna station containing readers for recording tags as they pass stationary antennas; mobile antennas deployed in the Fraser River.

Monitoring Movement with Stationary and Mobile Antennas

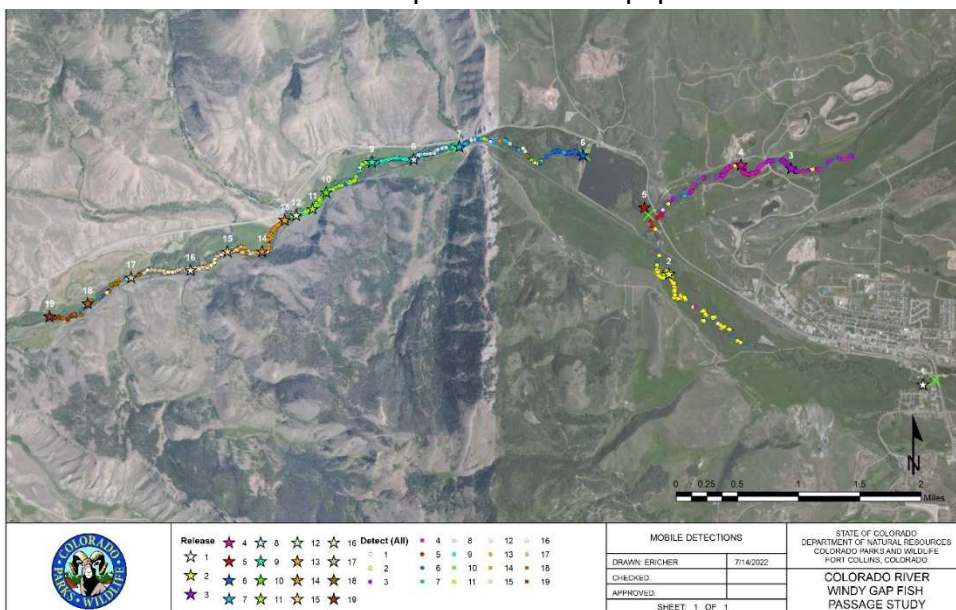
Movements of PIT-tagged fish are passively monitored using two stationary antenna sites in the Colorado River below Windy Gap Reservoir and one stationary antenna site at the confluence of the Colorado and Fraser rivers above Windy Gap Reservoir. Paired antennas were installed on the bottom of the river to allow researchers to determine direction of movement, depending upon which of the two antennas a fish passes first. The antennas are connected to readers that store the date and time for every tag detected and are operated continuously 24 hours a day, 365 days a year. Antennas constructed in the bottom of rafts use GPS sensors to actively locate PIT-tagged fish in the Colorado and Fraser rivers in April, July, and October. These mobile antennas allow researchers to determine the location of sedentary fish such as Mottled Sculpin or certain age classes of Brown Trout and Rainbow Trout that move shorter distances, making it less likely that they would be detected as a stationary antenna site.

Data collected by the stationary antennas have provided some valuable insights into fish movement within the study area. Generally, fish move more often at night than during the day, especially Brown Trout, likely to avoid predators. Brown Trout and Rainbow Trout exhibit seasonal movements concurrent with their spawning seasons, Brown Trout in the fall and Rainbow Trout in the spring. Movement distance and timing is also dependent on fish size. Mottled sculpin do not exhibit seasonal movements, but rather move sporadically throughout the year.



Visualizing the Data

Maps such as this one depicting tagged fish release sites in colored stars and the location of fish from those release sites in the same colored circles allow researchers to draw conclusions about the distances fish have moved and overall movement patterns of the populations as a whole.



Using data obtained from the mobile antenna surveys, we have seen that, upstream of Windy Gap Reservoir, some fish released in the Fraser River moved into the Colorado River, and vice versa, and that long distance movements are made in the Colorado River below Windy Gap Reservoir during certain times of year. Data collected from the stationary antenna sites, mobile antenna surveys, and recaptures of tagged fish during the population estimates will be used to obtain estimates of detection, survival, and movement probabilities, by species and fish size, before and after construction of the CRCC.