

## Appendix A

Draft Fish and Habitat Sampling Protocol for the Powder River Project  
Wyoming Game and Fish Department  
March 2005

**Project Goal:** To describe aquatic habitat and the distribution of fishes in the mainstem Powder River and tributaries.

**Objectives:**

- 1) Describe the fish community at multiple sites throughout the study area and monitor spatial and temporal shifts in community structure.
- 2) Describe available aquatic mesohabitat at multiple sites throughout the study area and monitor spatial and temporal shifts in mesohabitat characteristics.
- 3) Describe mesohabitat use by individual fish species in the study area.
- 4) Monitor stream discharge and geomorphology in permanent reference reaches established in the study area.

**Methods:**

The Powder River between Kaycee and the Montana State Line (235 river miles) and Crazy Woman Creek downstream of Interstate Highway 90 were selected as the priority study areas for initial survey efforts. A segment-based approach will be used to monitor spatial and temporal changes in the fish assemblage and characteristics of aquatic habitat throughout the study area. Stream segments will be a minimum of 2.0 miles in length. Ten study segments will be located in the study area as follows. *Initial* landowner contacts are in parentheses.

Mainstem Powder River

- 1) Below Clear Creek. Near Clear Creek confluence. Representing 18-mile stream section between Clear Creek confluence and the Montana state line.
- 2) Above Clear Creek. Below direct influence of Crazy Woman Creek. Representing lower half of 57-mile stream section between Crazy Woman Creek and Clear Creek confluences.
- 3) Below Crazy Woman Creek. Near Crazy Woman Creek confluence. Representing upper half of stream 57-mile section between Crazy Woman and Clear Creek confluences.

# DRAFT

- 4) Above Crazy Woman Creek. Below influence of Salt Creek and Burger Draw. Representing lower portion of 128-mile stream section between Salt Creek and Crazy Woman Creek confluences.
- 5) Above Burger Draw. Below influence of Salt Creek. Representing middle portion of 128-mile stream section between Salt Creek and Crazy Woman Creek confluences. **Tom Lohse, Ranch Manager for the Falxa Ranch, kicked WGFD off the property after June 2004 sampling.** This site was then moved upstream to a state land section immediately upstream of Pumpkin Creek.
- 6) Below Salt Creek. Near Salt Creek confluence. Representing upper portion of 128-mile stream section between Salt Creek and Crazy Woman Creek confluences.
- 7) Above Salt Creek. Below Kaycee. Representing 32-mile stream section between Kaycee and Salt Creek confluence.
- 8) South Fork Powder River. Representing this tributary upstream of the confluence with the mainstem Middle Fork Powder.

## Crazy Woman Creek

- 9) Lower Crazy Woman Creek (State land section). Representing upper half of 65-mile stream section between Interstate Highway 90 and confluence with Powder River.
- 10) Middle Crazy Woman Creek near Interstate Highway 90 (Fred Hepp property immediately downstream of I-90). Representing lower half of 65-mile stream section between Interstate Highway 90 and confluence with Powder River.

All study segments are 2.0 miles long. Fish and fish habitat sampling will be conducted at discrete habitat units (mesohabitats; pool, riffle, run) within the ten study segments.

***Study Segment Location.*** GPS coordinates of the upper and lower boundaries of each 2.0 mile study section are available from the Wyoming Game and Fish Department.

***Laying out the Sample Reach.*** The 2.0-mile segments were located within habitat representative of that section of stream. The study segments were initially laid out after high flows had receded and individual habitat units could be defined within the channel. Using a 1:24,000 map, we determined GPS coordinates for the upper and lower ends of each 2.0-mile river segment and downloaded the coordinates to handheld GPS units before heading to the field. Using the GPS unit, we found the downstream end of each study segment. If the location fell in the middle of a mesohabitat unit (riffle, run, or pool), we shifted the boundary downstream to the end of the habitat unit and recorded a new GPS location at the active channel height on the side of the river that would be most accessible at high flow. We recorded the GPS coordinates and “river left” or “river right” and deployed a recording thermometer in a pool within the study segment. We placed thermometers within sections of heavy steel pipe, anchored the pipes securely to large trees or fence posts above the waters edge using stainless steel cable, recorded GPS coordinates for each thermometer and the time the thermometer was deployed.

We then used GPS to find the upstream end of each 2.0 mile section. If the location fell in the middle of a mesohabitat unit (riffle, run, or pool), we shifted the boundary upstream to the end of the habitat unit and recorded a new GPS location at the active channel height on the side of the river that would be most accessible at high flow and recorded GPS coordinates and “river left” or “river right”.

Once the upper and lower ends of the study segment had been determined, we used the track-log function of the GPS unit and walked the thalweg of the rivers edge upstream to downstream. We downloaded the track logs to All Topo Maps software and determined the actual location of the stream channel on the floodplain and measured the actual length of the stream channel in the study segment using the All Topo measuring tool.

**Monthly Sampling.** Using the track log, we divided each 2.0-mile section into eight equal length segments and located the beginning of each segment. We determined the GPS coordinates for each of these 8 points and numbered the points 1 through 8 in a downstream direction. Prior to sampling each month, we randomly selected one of the eight “starting points”. If the point was selected for sampling during a previous month, we excluded it from the pool of points. The randomly selected point served as the starting point for fish and habitat sampling in that stream segment. Fish and habitat sampling was conducted at each of the ten study segments (7 Powder River, 1 South Fork Powder, and 2 Crazy Woman Creek) during the first two weeks of the month from June through October. Standardized data sheets were used by each crew to record all data.

**Fish Sampling.** Beginning at the randomly selected starting point, we worked in a downstream direction. We characterized the mesohabitat downstream of the point as pool, riffle, run, backwater, or side channel and determine the upper and lower bounds of the unit. Using a 20-25 ft. 3/16 in. mesh bag seine, we seined the unit in a downstream direction and then recorded a GPS coordinate near the middle of the unit. We identified all fish to species, counted all individuals and measured the total length of the largest and smallest individual of each species that was captured. We then conducted a second seine haul and process fish similarly. We continued to conduct seine hauls until no new species were captured. Moving downstream, we continued to conduct fish sampling on individual habitat units. We sampled two units of each mesohabitat type (pool, riffle, run, backwater, side channel) for a total of 10 individual habitat units per 2.0 mile study section each month (June-October). If we reached the downstream end of the 2.0 mile segment without having encountered at least two of each habitat type, we returned to the randomly selected starting point and began working upstream until we had sampled two of each type of habitat unit.

2005 sampling will be conducted on three occasions; late April or early May, mid-July and late August or early September. If study sections become puddled, we will work at least four separate pool habitats as described above. If we collect a species in the fourth

pool that was not collected in any of the three previous pools, we will continue to work additional pool habitats until no new species are collected.

**Voucher Specimens.** We will collect at least two specimens of each species from each 2.0-mile study segment and preserve in 10% formalin. *Hybognathus sp.* cannot be reliably identified in the field. We will voucher up to 20 *Hybognathus* specimens from each habitat unit and up to 100 total from each 2.0-mile segment during each monthly sampling period. If a specimen is larger than 5.0 inches, we will make a small incision on the right side of the fish above the pelvic fin to allow formalin to penetrate the body cavity. No fin clips or incisions will be made on the left side of any voucher specimen. All specimens that are too small to be accurately identified in the field (young-of-the-year) will also be vouchered. All specimens collected at a given site during a given month can be vouchered in the same container. The *Hybognathus sp.* and small, unknown specimens will be preserved in 10% formalin until a reputable lab can identify them during the winter months (Colorado State University Larval Fish Lab or the Museum of Southwestern Biology).

Unique specimens that are too large to be preserved (*Hiodon alosoides*) will be carefully photographed on a gray background with 1-inch increments for scale. We will anesthetize fish if necessary and place the fish on the incremented, gray background and photograph the left side of the fish.

**Aquatic Habitat.** On the first day of each monthly sampling period at each site, we will measure water temperature, conductivity and turbidity (secchi tube) at a point within the 2.0-mile reach. After sampling fish, will conduct the Warmwater Stream Assessment (WSA) at each individual habitat unit and take a photograph of each habitat unit. Since water is likely to be extremely turbid, we will have someone stand in the habitat unit when taking the photograph. This will allow us to compare depths when reviewing photographs.

[The Warmwater Stream Assessment Manual is available from the University of Wyoming, Department of Zoology and Physiology, Biological Sciences Building, Room 428, Dept. 3166, 1000 E. University Avenue, Laramie, WY 82071. Phone (307) 766-4207). The WSA parameters include unit type (pool, riffle, run, backwater, side channel), unit length, unit width, stream width, maximum depth of pools, depth at pool tail crest, and characterization of substrate types (silt, sand, gravel, cobble, boulder, bedrock) and embeddedness. Type of substrate and presence or absence of aquatic vegetation, woody debris, undercut banks, and overhead cover are recorded for various ranges of water depths in each habitat unit.]

**Coordination with USGS.** During the 2005 field season, Wyoming Game and Fish Department (WGFD) biologists will coordinate efforts with those of USGS. Work described in the USGS proposal will be completed at the WGFD study sections on the same day as WGFD fieldwork. WGFD biologists will complete the fisheries sampling as described above. The WGFD will complete fieldwork at

**DRAFT**

all study sites in late April/early May, mid-July and late August/early September. USGS fieldwork will be conducted at the Powder River study sites during the first two sampling periods only as described in the USGS research proposal.