

Appendix VI

Monitoring Of Reptiles, Amphibians, Fishes, Mollusks, and Crustaceans

Monitoring of SGCN is closely linked to and, in many cases, overlaps with the conservation actions outlined in Section 4. In addition, essentially all monitoring efforts will NOT be focused on individual species, but rather will be based on sampling/monitoring of specific geographic locations and habitat types. Standard sampling methods and gear types will be designed to capture information relative to all species of concern. Information for all species collected or observed will be documented for all sampling efforts. To adequately and successfully monitor species, there must be a foundation for systematic and standardized sampling efforts, data storage and retrieval, and trend assessments. These “tools” are currently in-place within the Department.

Reptiles and Amphibians

Due to the lack of information about most amphibians in Wyoming the initial focus for our monitoring efforts has been on geographic distribution, abundance and inventories. These efforts were prioritized using three factors: 1) the amount of data on the species; 2) the imminent dangers to the species (disease, reported declines, natural resource development); and 3) the status of the species (WGFD Native Species Status and Federal listing status). This work will proceed by surveying major river drainages. The first drainage surveyed was the Green River, due to the presence of the Boreal Toad and the lack of data. Surveys were conducted in 2002 and 2003. Additional surveys will be conducted in 2005. The second drainage being examined is the Powder River. The rapid development of Coal Bed Methane Resources and the lack of data drove this decision. Surveys began in 2004, and will continue with EPA funding through 2006. State Wildlife Grant funding continues to be used to support the program and to fund temporary personnel to conduct fieldwork under the supervision of the Herpetological Coordinator through 2007.

Future Monitoring and Related Efforts

- Complete fieldwork in the Powder River drainage.
- Identify gaps in the distributional data for all species of reptiles and amphibians. Use all available information to prioritize herpetological sampling needs for each region.
- Initiate field sampling of amphibians and reptiles in highest priority areas.
- Develop research and grant proposals to fund additional herpetological work.
- Continue to coordinate Boreal Toad management efforts in Wyoming and represent the WGFD on the Boreal Toad Recovery Team.
- Represent the WGFD on the Wyoming Toad Recovery Team.
- Continue to coordinate efforts with those of other state and federal agencies and universities.

Fishes

In 2001, as part of the Department's Strategic Habitat Plan implementation process, we identified 74 "priority" watersheds within the State of Wyoming (Map 9). In general, these watersheds are 5th order HUCs (as defined by "Federal Standards For Delineation of Hydrologic Unit Boundaries"). These watersheds are used to guide/prioritize efforts to monitor, conserve and manage aquatic wildlife in Wyoming. Monitoring within these watersheds is guided by several sets of "standard protocols". These protocols include assessing both habitats and biological communities.

Standard Protocols

Monitoring in Priority Watersheds will be based, in part, on the Wyoming Habitat Assessment Method (WHAM) protocols. The WHAM was developed by the Wyoming Game & Fish Department in an attempt to address the limitations associated with reach-based and other small-scale aquatic habitat assessment methodologies. This system can be viewed as a combination of three levels (i.e., Levels I, II, and III) whose structure and focus parallel the hierarchical nature of stream systems. Progression through each level is a cumulative process wherein each assessment builds upon previous levels. A Level I assessment serves as a foundation for all other assessments and focuses on large-scale habitat characteristics (i.e., watershed features). Level II assessments are conducted at a smaller scale (i.e., reach) and include sampling protocols such as the Habitat Quality Index (HQI; Binns 1982) and Warmwater Stream Assessment (WSA; Quist et al. 2004). Level III assessments are most intensive and focus on project-level activities such as habitat enhancement activities. Conducting a Level I assessment assures that more intensive efforts are time and cost efficient. A Level I assessment also enables biologists to make more informed and accurate management decisions. Thus, Level I assessments can be considered the basic component of the WHAM process because they provide the foundations for other activities.

The Level I assessment provides a comprehensive characterization of upland, riparian, and aquatic habitat conditions driven by the desire to identify potential problems and management opportunities in a watershed. Although the focus of a Level I assessment is on watershed processes, the watershed is dissected into smaller, more manageable sampling units that can provide a cumulative assessment of factors influencing the function of an entire watershed when considered together. Variables measured in the Level I assessment were selected to represent large-scale processes. Collection of detailed, reach-scale habitat characteristics are the function of more intensive, already established assessment techniques such as the HQI, WSA, and riparian vegetation transects. Therefore, the Level I assessment is not applicable to reach-based evaluations or enhancement projects, beyond the purpose of identifying where such evaluations and enhancements should occur.

Level II monitoring in Priority Watersheds will utilize the HQI or WSA protocols, depending on the stream type. For cold water systems, the Department developed and has extensively field-tested the Habitat Quality Index protocol (HQI; Binns 1979, 1982) to quantify habitat for Wyoming trout streams. Using the assumptions that the best habitat for trout would be associated with a high standing crop of trout and that standing crop is a consistent index of existing habitat quality, 22 physical, chemical, and biological attributes characterizing fluvial

trout habitat were field-tested to develop the HQI. After field measurements are completed, each habitat attribute is rated with a rating chart, with five categories from zero (worst) to four (best). Relationships between habitat attributes and trout standing crop then were explored with multiple regression analysis. Nine attributes were significantly correlated with trout standing crop at the 95% confidence level. The HQI estimates of trout standing crop on large streams often have proven quicker, easier, and cheaper to obtain than estimates made by conventional fish sampling techniques. The HQI method also can be modified to evaluate habitat in habitat units (HU), defined as the amount of habitat quality needed to produce an increase in the trout standing crop of 1 kg/hectare.

The WSA was developed for us in warm water or prairie stream systems in Wyoming. The WSA is a nontraditional method for assessing stream resources that has several benefits not realized with other reach-based sampling and assessment techniques. Sampling and assessment methods in the WSA are not designed for intensive monitoring efforts, but rather the data can be used to reveal general trends in fish assemblages and habitat dynamics. The WSA also provides information on the expected historic native fish assemblages in a given stream reach.

Other monitoring protocols utilized include the “Standing Water Fishery Assessment Manual” (WGFD, 2002) and the “Flowing Water Fishery Assessment Manual” (WGFD, in preparation).

Computer Databases

The Department has developed and maintained several databases to store and track biological and habitat data collected during our monitoring efforts. Databases are maintained on a statewide basis. Primary databases maintained, include:

- Stream Lake Inventory: Lists and maintains data for each water in the state. Includes location data, species present and other related information.
- River Station: Tracks and maintains fish sampling/population data for river stations.
- Lake Station: Tracks and maintains fish sampling/population data for lake stations.
- Wyoming Habitat Assessment Method: The Wyoming Habitat Assessment Method (WHAM) database tracks and maintains data collected for use in habitat condition documentation and evaluation.

Geographic Information Systems (GIS)

A significant component of our monitoring program will utilize GIS capabilities and tools. All the above appropriate database information is also spatially referenced for interaction with our geographic information systems. Use and application will include map-making capabilities, wildlife distribution, habitat modeling and analysis, refinement and analysis of data collected within priority watersheds and attached information. In addition, land cover-type data is important for developing management strategies for maintaining/enhancing habitats. Aerial, color infra-red photos from 2001 are available for the entire state. Recently mapped, moderate

resolution, land cover is available for approximately one half of Wyoming. Both these imaged data sets will serve as important baseline information.

The Department has also invested considerable resources in the development of a “Decision Support System (DSS)”. This GIS-based tool provides an intuitive interface for visualization and mapping of data, some simple window-based analytical processes, and lends itself to the beginner as well as more advanced GIS users. It is an excellent manner in which the Department can make management decisions regarding SGCN. This system will encourage and facilitate the use of available GIS data to all Department personnel making the needs of SGCN known to all, not just a select few.

Ongoing/Proposed Field Efforts

Each of our regional and statewide crews prepare annual work schedules which detail proposed work efforts in detail for the coming year, as well as broader-scale objectives for the upcoming five years. Below are portions of those work schedule efforts which are applicable to CWCS mentoring activities for the 2005 – 2006 season.

SNAKE RIVER DRAINAGE

Lower Salt River Basin - 4LS

Objectives:

1. Enhance aquatic and riparian habitats to maximum ecological potential by providing sufficient habitat and habitat diversity to increase Snake River cutthroat trout populations in the tributaries of the drainage.
 - Complete Flat Creek / Salt River Confluence Restoration Project
 - Post-monitoring of Flat Creek / Salt River Confluence Restoration Project
 - Contact landowners on headwaters of Flat Creek for planning future projects
 - Complete Limekiln and Aspen subwatershed WHAM Level 1 inventories
 - Work cooperatively with private landowners, private consultants, Lincoln County NRCS, USFS, and other agencies to coordinate, plan, and implement habitat improvement projects
2. Improve and maintain the native SRC fishery.
 - Monitor redds (Christensen Spring, Cranney Creek, Laker Spring, and Flat Creek)
 - Eyed-egg stocking (Cranney Creek, Flat Creek, Laker Spring)
 - Population estimates (AG Lane, Special Regulations, Etna Lane)
 - Telemetry study (Salt River)
3. Reduce the threat of competition.
 - Assess chemical rehabilitation potential (Dry Creek Lake)
4. Inventory native species assemblages.
 - LSC sampling (Jackknife Creek)

Snake River Basin (Below Jackson Lake) - 4BJ

Objectives:

1. Enhance aquatic and riparian habitats to maximum ecological potential by providing sufficient habitat and habitat diversity to increase Snake River cutthroat trout populations.
 - Complete Spring Creek Channel Enhancement Project
 - Post-monitoring of Spring Creek Channel Enhancement Project
 - Assist with planning, pre- and post-monitoring, and evaluating Flat Creek Project
 - Work cooperatively with private landowners, private consultants, Teton County NRCS, Teton Conservation District, and other agencies to coordinate, plan, and implement habitat improvement projects
2. Improve and maintain the native SRC fishery.
 - Monitor redds (Blacktail Spring Creek, Blue Crane Spring Creek, Cowboy Cabin Creek, Fish Creek, Flat Creek, Little Bar BC Spring Creek, Nowlin Creek, Price Spring, Spring Creek, Three Channel Spring Creek, Upper Bar BC Spring Creek, and Snake River side channel)
 - *Myxobolus cerebralis* sampling (Snake River)
 - Population estimates (Flat Creek and Snake River-Section 4)
 - Lower Bar BC spawning trap

Greys River Basin - 4GR

Objectives:

1. Pre-monitoring, post-monitoring, and project planning of the Weiner Creek Basin Project that improves watershed function, native cutthroat trout and non-game fish habitat.
 - Coordinate with USFS, THAB, and BFH personnel to discuss planning aspen enhancement project.
 - Utilize LSAT imagery to prepare ARC view map depicting vegetative communities for prescribe burn plans
 - Complete WHAM Level 1 in Squaw Creek Subwatershed
 - Survey habitat parameters (spawning, migration)
 - Sample fish population
2. Reduce the threat of hybridization.
 - Assess chemical rehabilitation potential (Stump Lake)

Buffalo Fork Basin - 4BF

Objectives:

1. Reduce the threat of hybridization.
 - Assess chemical rehabilitation potential (Mystery Lake)
2. Inventory native species assemblages.
 - LSC sampling (Buffalo Fork River)

Snake River Basin (Above Jackson Lake Dam) - 4AJ

Objectives:

1. Inventory existing conditions.
 - Basin survey
 - Update game and nongame species distribution
 - Amphibian monitoring

Pacific Creek Basin - 4PC

Objectives:

2. Improve and maintain the native SRC fishery.
 - Eyed-egg stocking (Two Ocean Creek)
 - Net Benchmark Lake
 - Trail Creek population assessment
3. Inventory native species assemblages.
 - LSC sampling (Pacific Creek)

Teton River Basin - 4TR

Objectives:

1. Inventory native species assemblages.
 - Update native species maps

Palisades Basin - 4PB

Objectives:

1. Inventory native species assemblages.
 - Update native species maps

Green River Drainage

Beaver Creek - 7BE

Objectives:

1. A complete inventory of CRC populations throughout the watershed and identify purity and genetic diversity of populations.
 - Electrofish headwaters stations on Chalk Creek and South Beaver to gather baseline population data and collect whole CRC for genetic analysis

Cottonwood Creek - 7CO

Objectives:

1. Inventory selected CRC populations throughout the watershed and identify purity and genetic diversity of populations.
 - Electrofish established sites on North Cottonwood Creek, South Cottonwood Creek and Bare Creek to gather baseline population data
 - Establish sample sites on Maki Creek to gather baseline population data, collect whole CRC for genetic analysis, and remove non-native species
2. Evaluate barrier sites within Cottonwood drainages to determine relative vulnerabilities based on physical barrier characteristics.

- Measure physical characteristics of all upstream migration barriers in Cottonwood drainages and use brook trout jumping probability model to determine relative vulnerabilities of each barrier to upstream brook trout migration

Green River (below New Fork Confluence)

Objectives:

1. Establish baseline datasets for FMS, RTC, and BHS.
 - Assist the AA Crew doing a basin wide survey

Green River (Above New Fork Confluence)

Objectives:

1. Establish baseline datasets for FMS, RTC, and BHS.
 - Assist the AA Crew doing a basin wide survey
2. Assist with development and maintenance of projects around the Huston Access area.
 - Fence weir and stabilization project maintenance
 - Discuss potential of developing a more stable diversion structure at the Ada Ditch
 - Work cooperatively with Jerry Moore and Audubon Society in developing and monitoring effectiveness of their waterfowl ponds, the enclosure to protect cottonwoods, and the development of a riparian pasture

Halfmoon Lake - 7HA

Objectives:

1. Collect baseline data on the native fish community.
 - Use TS and gillnets to determine catch rates, size structure, and other information

Horse Creek - 7HO

Objectives:

1. Establish representative sampling sites and inventory native aquatic species to obtain baseline population data.
 - Establish two new representative sampling sites above and below previously established sites to determine where adults are located within South Horse Creek

LaBarge Creek - 7LA

Objectives:

1. Remove nonnative salmonids within the LaBarge watershed upstream from the fish migration barrier.
 - Apply antimycin and rotenone to the mainstem LaBarge Creek during August
 - Apply antimycin and rotenone to tributaries of LaBarge Creek during July and those not covered during the mainstem treatment in August
2. Provide effective fish migration barriers by conducting necessary modifications and maintenance.

- Provide necessary maintenance for main stem barrier on LaBarge Creek and all temporary barriers by observing function during spring and fall. Proper steps will be conducted to remove debris, install necessary modifications, and secure downstream plunge pool components
- 3. Protect the upper section of LaBarge Creek from reinvasion of exotic species.
 - Construct sheet piling barrier at end of the LaBarge Creek meadows
 - Coordinate activities with federal agencies and complete all necessary permitting with regulatory agencies
- 4. Restore connectivity in drainage to provide unrestricted fish movement.
 - Work cooperatively with the BLM on the removal of the old wood fish migration barrier on Rock Creek
- 5. Continue to coordinate with FS to collect and analyze data necessary for development of a long-term AMP.
 - Inventory aspen communities to develop a treatment plan and emphasize enhancement of beaver habitat
 - Enhance habitats as opportunities arise
- 6. Protect riparian habitat that has been destroyed by livestock grazing
 - Continue annual maintenance of the Nameless Creek riparian enclosure

Meadow Lake - 7ME

Objectives:

1. Maintain grayling population size that is appropriate for the productive capacity of Meadow Lake and prevent stunting of adult fish.
 - Conduct mark/recapture survey of grayling in order to accurately estimate population size
 - Assist grayling spawning operations on Meadow Lake
 - Measure D.O. concentrations in Meadow Lake prior to ice-off in the spring in order to evaluate potential for winter-kill

New Fork Lake - 7NF

Objectives:

1. Collect baseline data on the native fish community
 - Use TS and gillnets to determine catch rates, size structure, and other information

North Piney Creek - 7NP

Objectives:

1. Inventory selected CRC populations throughout the watershed and identify purity and genetic diversity of populations.
 - Locate and establish sample sites on Roaring Fork Creek to gather baseline population data, collect whole CRC for genetic analysis, and remove non-native species collected
 - Evaluate CRC stocking success in Roaring Fork Lake #1

New Fork River - 7NR

Objectives:

1. Ensure habitat quality and quantity is consistent with fishery goals.
 - Assess impacts from livestock grazing and determine opportunities to improve riparian habitat.
 - Develop a cooperative riparian management plan with the lessee on the state Airport Section
 - Work with other landowners to improve livestock management on private lands
 - Potential opportunities to begin development of a long-term comprehensive wildlife, fisheries and riparian habitat management plan with two large acreage landowners

Little Halfmoon Lake

Objectives:

1. Determine growth rates and a population estimate of RTC in Little Halfmoon Lake.
 - Catch fish with TS and mark them with VI or Floy tags

South Piney Creek - 7SP

Objectives:

1. Inventory selected CRC populations throughout the watershed and identify purity and genetic diversity of populations.
 - Locate and establish sample sites at the headwaters of South Piney Creek and Spring Creek to gather baseline population data, collect whole CUT (records indicate presence of “large spotted cutthroat”) for genetic analysis, and remove non-native species collected

Upper Green River Tributaries - 7UG

Objectives:

1. Inventory and evaluate selected CRC populations throughout the watershed and remove nonnative salmonids from the system.
 - Investigate CRC population in headwaters of Rock Creek and remove nonnative species that might threaten CRC population persistence
 - Survey Gypsum Creek CRC populations to determine stocking success

Little Snake River Basin – 3LS

Objectives:

1. Assess native fish populations.
2. Assure habitat quantity and quality is consistent with fishery goals.

North Fork Little Snake River Basin – 3NF

Objectives:

1. Complete CRC population surveys throughout the North Fork Little Snake River (NFLSR) basin.

- Complete fish population estimates at established sampling stations on the main stem of the NFLSR and tributaries (West Branch, Solomon, Harrison, Deadman, Green Timber, Third, Ted, Dale, Rhodine and Happy creeks). Tributaries of the West Branch to survey include Rabbit, Standard and Deadline creeks
2. Develop a profile on the CRC population genetics throughout the NFLSR basin
 - Collect whole fish or tissue samples from 25 CRC throughout the NFLSR drainage where the necessary number of samples has not been collected to identify pure and genetically diverse populations for brood stock development and use for reintroduction in other streams in the Little Snake River (LSR) drainage. Additional CRC samples from Third Creek above Stage II (12), Third Creek below Stage II (18), Deadman Creek headwaters (20), Dale Creek (22), Happy Creek (13), Standard Creek (10), North Fork above confluence of Third Creek (25), and North Fork above fish barrier (25) will be sent to Dr. Robb Leary at the University of Montana for DNA (PINES test) or protein (electrophoresis) analysis
 3. Re-establish native fish assemblages following chemical treatments.
 - Establish a brood stock of the NFLSR strain of pure CRC in the Middle Fork ponds located on 3-Forks Ranch property, CO for use by the Colorado Division of Wild life Resources (CDOW) and Wyoming Game and Fish Department (WGFD) to re-establish CRC populations throughout the Little Snake River drainage where pure CRC populations have been extirpated
 - Renew agreement between the WGFD, CDOW and the 3-Forks Ranch to transplant pure CRC from Green Timber Creek to the Middle Fork ponds for a period of 3 years. The numbers of CRC to be transplanted each year shall depend on the availability of pure CRC in Green Timber Creek.

Roaring Fork Basin – 3RF

Objectives:

1. Restore continuous habitat (number of miles) for CRC and other native fish through the chemical removal of all exotic fishes. Renovate the present fish barrier or build a new fish barrier on the State land (R86W, T13N, S16) above the Wyoming-Colorado Stateline.
2. Re-introduce CRC from the pure headwater populations and all native non-game fishes historically present in the Roaring Fork by utilizing wild stocks of these fish from the Little Snake River or its tributaries.
3. Ensure habitat quantity and quality is consistent with fishery goals.
4. Monitor fish populations at previously established stations to maintain trends on fish populations in the basin.
5. Collect whole fish samples (60) once every 5 years below the present fish barrier to determine the presence of whirling disease in the upper portion of the drainage.

Battle Creek Basin – 3BC

Objectives:

1. Ensure habitat quality and quantity consistent with fishery goals. Copper effluent from the Ferris-Haggerty Mine continues to contaminate Haggerty Creek from the mine downstream to just above the confluence of Green Creek. Work with other state and federal agencies as well as the mine owner to eliminate copper leaching from the mine into Haggerty Creek.
2. Introduce fingerling CRC into Haggerty Creek and viable tributaries (Little Haggerty, Deep Rock, Vole, Bachelor and Bachelor AI creeks) to restore and enhance CRC populations in the basin.
3. Develop a brood stock of CRC from the pure strain of CRC in the Belvidere Ditch for High Savery Reservoir.

Muddy Creek Basin – 3MC

Objectives:

1. Restore continuous habitat for CRC and other native non game fishes in the Muddy Creek Basin.
 - Chemical Treatment of Upper Muddy Creek
 - Complete pretreatment survey and chemical treatment of Muddy Creek from the culvert (BLM Road 3306 crossing) downstream approximately 4 miles to just below the bridge (BLM Rd 3306 crossing) and 1.7 miles of Littlefield Creek below the fish barrier
 - Install temporary fish barrier on Muddy Creek
 - Plan, design and coordinate the construction of a temporary fish barrier made of steel sheet pilings to facilitate chemical treatment of Muddy Creek. The structure should be designed to not only serve as a fish barrier, but a grade control structure. The barrier should be located downstream of the BLM Road 3306 bridge crossing (R89W, T17N, S18). Similar structures are found in this area, but are in danger of failing. These structures were not designed to serve as fish barriers
 - Complete fish population and HQI estimates at previously established sampling stations on Littlefield Creek to identify movement of transplanted CRC, identify PIT tagged fish and evaluate natural reproduction
2. Ensure habitat quality and quantity is consistent with fishery goals.
3. Advocate sound livestock grazing management practices on the Grizzly WHMA in order to restore healthy vegetative communities and sustained ecosystem function to benefit terrestrial and aquatic wildlife.
 - A riparian habitat enclosure was constructed on upper Muddy Creek in 1998. Willow monitoring information is intended to be used to evaluate willow community re-establishment, browsing effects, and allow for the further development of grazing management strategies to address riparian habitat objectives for the Grizzly WHMA. Project task includes routine enclosure fence maintenance

Savery Creek Basin - 3SC

Objectives:

1. Monitor fish populations in the Savery Creek basin.
 - Electrofish established fish population stations in Savery Creek drainage that will be influenced by the HSDR.
2. Re-establish native fish assemblages following chemical treatment.
 - Transplant MSC from Deep Creek below the fish barrier (USFS Road 801) or other sources in the Savery Creek drainage above the HSDR site to the chemically rehabilitated portion of Deep Creek to complete the re-establishment of native fishes found in this portion of the stream
3. Ensure habitat quantity and quality is consistent with fisheries goals.
 - Work with federal land management agencies to enhance/restore watershed health

High Savery Reservoir– 3HR

Objectives:

1. Through stocking of pure CRC from LSR drainage (Haggerty Creek), establish and maintain a wild brood stock of approximately 15,000 adult CRC necessary to produce the eggs required for restoration efforts.
 - Implement annual spring gill netting program on HSDR to determine trends in developing fish populations

Eastside Flaming Gorge Tributaries Basin - 3ES

Objectives:

1. Monitor the status and distribution of native fish and other aquatic species with emphasis on CRC abundance and population structure.
 - Conduct electrofishing surveys at upper two stations on Currant Creek
2. Remove genetically introgressed CRC and non-native trout species, and restore genetically pure CRC populations to the drainage.
 - Conduct pretreatment electrofishing surveys to document distribution and abundance of CRC, assess habitat conditions, and locate a fish barrier site
3. Promote treatment of successional advanced plant communities to achieve sound watershed health and function.
 - Assist BLM with implementation of basin-wide prescribed burn projects (Firehole Basin, Red Creek Headwaters, Upper Sage Creek/Miller Mountain)
4. Restore beaver to suitable and sustainable habitats.
5. Restore or enhance native woody riparian vegetation in watersheds where potential and opportunity exists.

Bitter Creek Basin - 3BI

Objectives:

1. Document the status and distribution of native fish (particularly FMS) and other aquatic species, and assess habitat conditions.
2. Eliminate or reduce the distribution of WHS in drainage and expand the FMS population.
3. Improve habitat condition for native sucker populations.

Henry's Fork River Basin - 3HF

Objectives:

1. Assess the distribution, abundance and genetic purity of native fish populations (particularly CRC, BHS, FMS, and RTC), and evaluate habitat conditions.

Blacks Fork River Basin - 3BF

Objectives:

2. Assess the distribution, abundance and genetic purity of native fish populations (particularly CRC, BHS, FMS, and RTC) and other aquatic species, and evaluate habitat conditions.
3. Monitor abundance and structure of fish populations in Meeks Cabin Reservoir with an emphasis on the wild CRC.
4. Improve instream habitat condition and riparian function in the watershed.

Ringdahl Reservoir Basin - 3RR

Objectives:

1. Protect and monitor the BHS population.

Smiths Fork River (Green River) Basin - 3SF

Objectives:

1. Assess the distribution, abundance and genetic purity of native fish populations (particularly CRC, BHS, FMS, and RTC), and evaluate habitat conditions.
 - Gilbert Creek
 - Barrier evaluation: Electrofish from the main fish barrier to the confluence of Little Gilbert Creek annually for the foreseeable future.
 - Electrofishing surveys: Establish three monitoring/evaluation stations on Gilbert Creek. Plan to monitor these established station every year for the foreseeable future. These stations will be used to monitor the rebuilding of the CRC, MSC and MTS populations.
 - Improve habitat condition and restore native fish assemblages at the watershed level.

Lower Hams Fork River Basin - 3LH

Objectives:

1. Assess the status and distribution of native fish populations, other aquatic species, and habitat conditions.

Upper Hams Fork River Basin - 3UH

Objectives:

1. Assess the status and distribution of native fish populations, other aquatic species, and habitat conditions.

- Conduct electrofishing surveys of streams that drain the west slope of the Hams Fork valley on USFS lands
- Conduct WHAM level one surveys of streams within the upper Hams Fork Drainage (upstream of the Devils Hole Creek confluence)
- Monitor the status and genetic purity of CRC populations, and identify potential CRC restoration opportunities in the drainage

Viva Naughton Reservoir/Kemmerer City Reservoir Basin - 3VR

Objectives:

1. Document the status and distribution of native fish populations and other aquatic species, and assess habitat conditions.
2. Establish a genetically pure, self-sustaining BHS population in Kemmerer City Reservoir.
 - Transplant BHS captured from Ringdahl Reservoir to Kemmerer City Reservoir.

Middle Green River - 3GR

Objectives:

1. Monitor the status and distribution of native fish populations and other aquatic species, and document habitat conditions.
2. Maintain/improve habitat quantity and quality, particularly winter and juvenile trout habitat.

Lower Big Sandy River Basin - 3BS

Objectives:

1. Document the status and distribution of native fish and other aquatic species, and assess habitat conditions.
2. Improve instream habitat and riparian function in the watershed to benefit the aquatic invertebrate community and native fish assemblage.
 - Assist the local T.U. chapter with planning and oversight of maintenance work on 4 existing sill structures on the lower Big Sandy River
3. Monitor riparian habitat and evaluate condition trends.
 - Assist the Big Sandy Working Group with willow community trend surveys at five stations along the Big Sandy River between Farson and the Green River confluence. Trend transects were established in 2002 in an effort to monitor the effects of grazing management changes to riparian habitat condition. Data regarding willow heights and frequency of browsed willows are being collected.

Little Sandy River Basin - 3LT

Objectives:

1. Assess the distribution, abundance and genetic purity of native fish populations (particularly BHS and FMS).
 - Establish two electrofishing stations on Little Sandy Creek
2. Eliminate WHS from the drainage and restore BHS and FMS populations.

3. Promote improvement of aquatic habitat condition and riparian function in the watershed.
4. Reduce or eliminate the BBT and WHS populations.

Upper Big Sandy River Basin - 3US

Objectives:

1. Assess the distribution, abundance and genetic purity of native fish populations (particularly BHS and FMS).
 - Establish two electrofishing stations on Dutch Joe Creek
 - Establish one electrofishing station on Squaw Creek
2. Eliminate WHS from the drainage and reestablish BHS and FMS populations.
3. Promote improvement of aquatic habitat condition and riparian function.

Slate Creek Basin - 3SL

Objectives:

1. Assess the status and distribution of native fish populations and habitat.
2. Promote improvement of aquatic habitat condition and reduce sedimentation of Slate Creek.

Fontenelle Creek Basin - 3FC

Objectives:

1. Assess the distribution and abundance of native fish populations and other aquatic species, and evaluate habitat conditions.
2. Promote improvement of aquatic habitat condition and watershed function.

Bear River Drainage

Upper Bear River Basin - 3BE

Objectives:

1. Document the status and distribution of trout, native fishes, and other aquatic species (particularly BRC and LSC); and assess habitat conditions.
 - Sample the fish assemblage to document species composition and relative abundance at ten sites on the Bear River
 - Conduct electrofishing depletion estimates at four sites on Mill Creek to document species distribution and abundance, particularly BRC and LSC. Collect LSC tissue samples for genetic analysis and voucher samples
2. Identify Bear River habitat improvement needs in Uinta County and implement projects to benefit native fish, particularly BRC populations.

Upper Yellowstone River – 2YS

Objectives:

1. Determine the seasonal movement patterns and macrohabitat use of YSC in the upper Yellowstone River drainage.
 - Implant radio transmitters in YSC near the mouth of the Yellowstone River in May 2005
 - Conduct weekly telemetry flights to determine fish locations throughout the

- watershed
- Ground truth aerial telemetry while sampling fish population and habitat characteristics in the watershed
 - Determine fish distribution characteristics and document the presence of resident and adfluvial YSC populations
 - Systematically sample fish populations in all perennial tributaries in the Thorofare Creek Drainage
2. Evaluate YSC length frequencies to determine age structure of the populations sampled.
 3. Determine habitat characteristics of the watershed.
 4. Identify all barriers to fish migration within the watershed.
 5. Collect site scale habitat data that Kruse (1998) found to be significant at predicting trout presence.
 6. Conduct a level 1 WHAM on all drainages sampled.

Madison River Basin (This drainage within Wyoming is entirely within Yellowstone National Park. The National Park Service has authority for fisheries management within YNP boundaries).

Wind-Bighorn River Drainage

Upper Wind River Basin

Objectives:

1. Identify gears that are effective for sampling BBT populations and size structure (status) in the upper Wind River.
 - Compare effectiveness of trammel nets, cod traps, and hoop nets for capturing BBT from Boysen Reservoir and Torrey Lake
 - Work with University of Wyoming Cooperative Fish and wildlife Research Unit (UW Coop) and USFWS to develop and fund research projects related to BBT within the Wind River Drainage
2. Continue to participate in refinement of YSC management plan.
 - Identify fish communities and suitability for YSC in the upper Dunoir River Drainage
3. Sauger Investigations
 - Cooperate with UW Coop to conduct research to identify habitat features and location of earlier life stages of SAR
 - Assist graduate students with sampling activities
4. Obtain baseline inventory information for amphibians.
 - Conduct surveys in select drainages.
 - Record pertinent information from any amphibian sightings and submit to the Herpetological Coordinator.

Boysen Reservoir - 6BO

Objectives:

1. Identify status of native aquatic wildlife through baseline and trend sampling.

Juvenile fish – Seining

- CCF – Trot lining
- Mussels – Visual search
- WAE and SAR – Standardized netting

East Fork Drainage - 6EF

Objectives:

1. Work with USFS, BLM, East Fork Technical Committee, and Department regional personnel to maintain drainage health
2. Evaluate survival of stocked YSC within the East Fork Wind River

North Tributaries of the Wind River above Dubois - 6WN

Objectives:

1. Monitor the grazing pressure during mid-summer
 - Tour the drainage during mid-August to check cattle distribution
2. Monitor spawning potential and success of redd in the Long Creek Drainage
 - Tour the watershed during the spring spawning period

Pilot Canal

Objectives:

1. Conserve BBT populations.
 - Prior to salvage, complete Risk Assessment Matrix and obtain approval from fish staff
 - Salvage fish trapped in Pilot Canal after it is shut off
 - Electrofish Kinnear Drop and pool below Pilot Butte Dam and transplant salvaged BBT to Ocean Lake

Badwater, Tough, and Birdseye Creek Drainages - 6BT

Objectives:

1. Assess native fish communities and their habitats, identify potential problems, and make appropriate recommendations.

Beaver Creek Drainage - 6BV

Objectives:

1. Work with the Forest Service to make sure the riparian habitat enclosures on Beaver Creek are maintained according to the cooperative agreement.
 - Inspect enclosure and make appropriate recommendations

Clark's Fork Drainage

Objectives:

1. Continue to develop a concept design to restore Sunlight creek.
 - Work with Earl Holding and possibly other landowners to modify diversion systems
 - Monitor revetments on the Sunlight WHMA especially the sharp meander in danger of cutting through
 - Monitor and evaluate the joint Holding/WGFD project

2. Complete WHAM Level 1 on the upper reaches of Little Sunlight and Gravel Bar.
3. Conduct fish population and habitat investigation for possible chemical rehabilitation.

Lower Bighorn River – 2LB

Objectives:

1. Use seining in backwaters, side-channels, and other slow-water habitats to determine species present.
 - Sample 50 sites approximately 2 miles apart from Worland to Big Horn Lake causeway
 - Identify fish species present and relative abundance
 - Collect specimens from genus *Hybognathus* for expert identification to species
2. Use Warmwater Stream Assessment (WSA) as a template for habitat data collection.
3. Use telemetry to identify potential spawning sites for sturgeon.
 - Implant fish with radio-tags and track during June

Nowood River

Objectives:

1. Provide connectivity for species migrating from the Nowood River to the Bighorn River.
 - Contact landowners and water users concerning diversions and potential fish passage modifications
 - Undertake survey work needed for initial designs. Request assistance from Department surveyor or instream flow biologist
 - Initiate fish passage concept designs
 - Investigate funding potential
 - Estimate fish entrainment during irrigation season

Paintrock Creek Drainage – 2PR

Objectives:

1. Protect and enhance YSC population.
 - Remove BKT between cascades and sink on Dry Medicine Lodge Creek
 - Conduct survey to determine preliminary information needed to perform chemical treatment
 - Use electrofishing to determine the extent of non-native fish in the stream
 - Identify springs, seeps, and sink locations
 - Measure flow and discharge at base-flow
 - Coordinate with land management agencies
 - Determine logistics, manpower, and chemical needed to conduct treatment

Porcupine Creek Drainage – 2PC

Objectives:

1. Create a refugia for YSC in the Porcupine Creek drainage above Porcupine Falls.
 - Conduct survey to determine preliminary information needed to perform chemical treatment
 - Determine the upstream boundary of fish occupation in the watershed above Porcupine Falls
 - Determine total stream miles occupied by TRT
 - Identify tributaries, beaver dams, springs, seeps and other hydrologic features relevant to chemical renovation
 - Determine the need for, and potential locations of temporary barriers
 - Consult and coordinate with Big Horn National Forest
 - If restoration effort is deemed feasible begin to develop I and E effort to garner public support

Shell Creek Drainage – 2SH

Objectives:

1. Create an YSC refugia in unoccupied water of Upper South Trapper Creek.
 - Collect habitat information needed to determine probability of establishing a cutthroat population according to Harig and Fausch (2002)
 - Retrieve temperature loggers deployed in 2004
 - Measure mean bankfull width and the number of pools >30cm deep
 - Determine the logistics of moving YSC from Dry Medicine Lodge Creek to South Trapper Creek
 - Provide habitat extension and investigate potential habitat improvements on Trapper and Beaver Creeks

Greybull River

Objectives:

1. Provide connectivity to the YSC population within the drainage.
 - Contact landowner, survey Franc's Fork irrigation structure, and initiate process to develop and install a fish passage structure
 - Evaluate fish populations to document fish passage need
 - Sample Franks Fork irrigation ditch to quantify fish loss
 - Add information concerning this structure to USFWS funding database
 - Conduct additional habitat surveys and YSC evaluations on upper Greybull River and Wood River tributaries as necessary
 - Determine genetic integrity of YSC in lower Greybull River to ensure barriers are not separating pure and introgressed populations
- 2 Work with Greybull and Wood River landowners to chemically treat Rose Creek, Little Rose Creek, and Dick Creek.
- 2 Sample YSC from lower Greybull River to identify any RBT introgression in the YSC population.
- 2 Phenotypically evaluate YSC in the lower Greybull River for introgression with RBT

2. Collect genetic samples from questionable YSC captured to determine if introgressed with RBT.

North Fork Shoshone

Objectives:

1. Provide fish screens on Trout Creek diversions to protect YSC.
 - Continue working with TU and landowners to ensure success of the rotating drum project installed in spring 2005
 - Evaluate success of the drum project
 - Determine fish loss in irrigation canals post drum construction
 - Work with landowners to modify other head gates on Trout Creek

South Fork Shoshone

Objectives:

1. Protect or enhance YSC habitat, especially in streams with pure genetics.
 - Contact landowners for potential habitat extension (Marquette Creek)
 - Evaluate stream for YSC habitat improvement
 - Investigate potential barriers
2. Identify YSC refugia in unoccupied habitats in the South Fork Shoshone River.
 - Determine genetic integrity and genetic structure of YSC in the upper South Fork Shoshone River and Marquette Creek for possible replication of those populations
 - Evaluate basin scale habitat and probability of YSC persistence in Boulder Basin, Ishowooa Creek, and Needle Creek

Platte River Drainage – South Platte

South Platte River Basin - 5SP

Objectives:

1. Protect native species assemblages and their habitats by and conserving landscape-scale dynamics of hydrology, vegetation, beaver populations and aquatic wildlife.
 - Investigate the feasibility of greenback cutthroat re-introduction to the Dale Creek drainage
 - Complete a WHAM Level-1 survey on at least one 6th level watershed within the Pole Mountain Area.
 - Conduct warmwater stream assessments in Lower Lodgepole Creek and Muddy Creek Evaluate status of orangethroat darter and plains topminnow)

Platte River Drainage – North Platte

Bear, Cherry and Deer Creeks Basin - 5HC

Objectives:

1. Maintain native fish assemblages and their habitats throughout the basin.
 - Assess native fish populations (especially plains topminnow) and habitat
 - Conduct WSA's throughout the basin

- Identify opportunities for improvement and conservation

Horse Creek

Objectives:

1. Maintain native fish assemblages and their habitats throughout the basin.
 - Assess native fish populations (especially suckermouth minnow and plains topminnow) and habitat
 - Conduct WSA's throughout the basin
 - Identify opportunities for improvement and conservation

Lower Laramie River Drainage Basin - 5LR

Objectives:

1. Assess native fish populations (especially hornyhead chub and plains topminnow) and habitat.
 - Conduct warmwater stream assessments in Lower Laramie River from Wheatland Reservoir #2 downstream to Grayrocks Reservoir
 - Identify opportunities for improvement and conservation

Chugwater and Wheatland Creeks Basin - 5CC

Objectives:

1. Assess native fish populations (especially plains topminnow) and habitat.
 - Conduct warmwater stream assessments in Chugwater Creek and Wheatland Creek
 - Identify opportunities for improvement and conservation

North Laramie River and Drainages Basin - 5NL

Objectives:

1. Assess native fish populations (especially hornyhead chub) and habitat
 - Conduct warmwater stream assessment in Lower North Laramie River
 - Identify opportunities for improvement and conservation

Jack Creek and Spring Creek Basin - 5JC

Objectives:

1. Conduct WHAM-Level 1 surveys and identify opportunities for habitat improvement.

Bates Hole

Objectives:

1. Monitor response of upper drainages in Bates Hole to aspen and sagebrush burns.
 - Establish and measure greenlines on treated and untreated riparian areas
 - Install stage monitors on treated and untreated areas
2. Reintroduce beaver to Bolton Creek.
 - Locate, trap and transplant nuisance beavers to Bummer Ranch
 - Construct weirs in incised channel to promote dam construction
 - Establish greenlines to monitor effect on riparian area

North Bank Tributaries to North Platte River

Objectives:

1. Inventory habitat in Rawhide Creek and Lower North Platte basins.
 - Inventory eighth priority in region using WHAM. 80 hours AHAB
 - Contact landowners and arrange access
 - Conduct WHAM level 1 surveys in basin
2. Characterize plains topminnow habitat.
 - Continue habitat observations begun in 2004
3. Gain a better understanding of the aquatic resources and native fish distribution in reach

Niobrara Drainage - 1NI

Objectives:

1. Gain a better understanding aquatic resources and native fish distribution.

North Slope of the Laramie Range (Garden Creek to Cottonwood Creek) - 1LR

Objectives:

1. Gain a better understanding aquatic resources and native fish distribution.

South Fork of the Powder River and Salt Creek drainages - 1SS

Objectives:

1. Gain a better understanding of the aquatic resources and native fish distribution while maximizing the sport fish potential.

Northeast Wyoming Drainages

Belle Fourche River Basin- 8BF

Objectives:

1. Maintain or enhance native fish populations throughout the drainage.
 - **North Redwater Creek and Hemler Reservoir:** Historical records indicate that FSD, a NSS1 species, may be present in these waters. In coordination with Black Hills Forest personnel, sample for FSD and begin to document distribution

Cheyenne River Basin – 8CR-

Objectives:

1. Maintain the endemic fish populations in Cheyenne River basin streams.
 - STK were found in Turner Creek in 2004. The Forest Service is interested in eliminating the STK in the drainage but does not know to what extent the STK have established. In coordination with the FS, sample throughout Turner Creek to begin to learn where STK occur, distributions of native fishes, and feasibility of removing STK
2. Elevate water tables, increase riparian water detention, and enhance habitats for riparian-dependent and aquatic wildlife.
 - Beaver were transplanted to the North Fork of Cole Canyon Creek in 2004. Explore the transplant drainages for evidence of colony establishment

Crazy Woman Basin- 8CW-

Objectives:

1. Maintain endemic fish populations in Crazy Woman Creek basin streams with special attention to channel catfish, shovelnose sturgeon, and goldeye.
 - Continue to collect data on fish populations and habitat at sites established last year on Crazy Woman Creek
2. Establish baseline riparian and geomorphic monitoring.

Powder River Basin- 8PR

Objectives:

1. Support actions that maintain the Powder River as a free-flowing stream to perpetuate viable populations of endemic fish species in the Powder River, such as goldeye, sturgeon chub, shovelnose sturgeon and channel catfish.
 - Continue to collect data on fish populations and habitat at sites established last year on the Powder River. A site on the Powder River near Berger Draw will be added in 2005

Tongue River Basin- 8TR

Objectives:

1. Maintain populations of native fish.
 - Study the feasibility of getting fish around the Welsh diversion structure (near I-90). Sampling stations will be established above and below the diversion to collect baseline data.
2. Investigate areas where native trout subspecies (Yellowstone cutthroat) can be reintroduced into habitats believed to be historical range.

Little Bighorn River Basin

Objectives:

1. Establish priorities for YSC habitat suitability and/or watershed level assessments.
 - Obtain or assemble YSC distribution information in GIS format
 - Assimilate level 1 and 2 assessments from 2002 and 2003 surveys. Compile administrative report for HUC 100200160101 and provide recommendations.

Clear Creek Basin

Objectives:

1. Rehabilitate diversion structures with fish passage friendly structures; rehabilitate channel dimension, pattern, profile, and floodplain connectivity to the extent practical and acceptable with affected interests.
2. Implement diversion rehabilitation projects on Clear Creek.
3. Initiate final design and implementation phases on Kendrick fish passage project.

Crustaceans & Mollusks

Monitoring efforts for these taxa have been previously outlined. See Section V, What's Happening Now?, Invertebrates.

Map 9. Priority watersheds identified to conserve aquatic SGCN and their habitats in Wyoming.

