



# State Wildlife Action Plan E-Newsletter

## Study to Document Mussel Diversity in Wyoming

North America hosts the largest native mussel diversity in the world. There are nearly 300 species native to North America, but of those, over 70% have an imperiled conservation status. Native freshwater mussels are the canaries of the streams.

Wyoming is still in a discovery phase for its native mussels. There have been seven species identified statewide, none of which have a protected status under the Endangered Species Act, though western drainage species are beginning to receive attention from conservation groups. Even though certain metapopulations<sup>1</sup> are declining, the U.S. Fish and Wildlife Service does not currently list metapopulations of macroinvertebrates, such as native freshwater mussels. There are two species west of the continental divide in Wyoming: the California floater (*Anodonta californiensis*) and western pearlshell (*Margaritifera falcata*). The California floater has a limited distribution throughout its historic range and is only known from a single drainage in Wyoming. Western pearlshell populations have declined in Montana.

Native mussels seem to be simple creatures, but actually have a complex life history. They use a host fish during their reproduction cycle. The larval mussels (glochidia) are expelled from an adult mussel and attach to the gills or fins of a host fish. Once the glochidia have reached maturity (age depends upon species), they fall off the gills or fins of the host fish and will likely mature into adults if suitable habitat is available.

Starting in 2011, the Wyoming Game and Fish Department began systematic population surveys of native freshwater mussels. The focus has been on the drainages west of the continental divide where the California floater and western pearlshell are found. Perennial streams are being surveyed for native freshwater mussel presence/absence and the catch per unit effort, or the number of native freshwater mussel found per person-hour. Basic aquatic habitat information is also collected at each site (width, substrate composition, bank-full depth, etc.). Specimens were also deposited in a



(L to R) Travis Neebling, Joe Bailey, and Diana Miller using glass bottomed view buckets to search for native freshwater mussels in North Fork Fishermans Creek in the Jackson Region.

voucher collection at the University of Colorado Museum of Natural History. This collection formally documents both current and past populations (empty shells). Live specimens were also collected for both genetic sampling and shell morphometric studies by Karen Mock at Utah State University.

The 2011 field sampling season focused on two major drainages in Wyoming: Bear River and Snake River. The Bear River and its tributaries had live California floaters and western pearlshells, while the Snake River only had live western pearlshells. California floaters were found upstream of Wood-

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## Study to Document Mussel Diversity in Wyoming (Continued)

ruff Narrows Reservoir, which is the most upstream population known in the Bear River. The Smiths Fork just outside of Cokeville, was a wonderful surprise. There were nearly 300 mussels in the Smiths Fork, most of which were found in one of two mussel beds in the high gradient stream. The Jackson region had many streams with large populations (500 to 800-plus individuals); these populations had very few empty shells, which is odd, but exciting.

Minor sampling was also done in the North Platte River and its tributaries and observations were reported from regional fisheries biologists. Plain pocketbook and fatmucket shells were found in the North Platte River and its tributaries. Lander regional fisheries biologists found live fatmuckets in the Wind River drainage. Pinedale regional fisheries biolo-

gists found live western pearlshells in the New Fork River (Green River drainage), which was believed to be absent of native freshwater mussels. No native freshwater mussels were previously known from the entire Colorado River drainage, upstream of the Little Colorado River in Arizona.

A baseline survey of Wyoming's mussels is proving to be beyond the scope of a single short-term project. Project biologists will apply for a follow-up study with hopes to ensure that the work is completed statewide. High water levels put a damper on the start of the field season and on making satisfactory progress towards the statewide effort in 2011. Hopefully, early sampling before water levels rise in 2012 will be a benefit, but there will undoubtedly be at least a month or two next summer when rivers cannot be sampled. By increasing our knowl-

edge and informing the public, Wyoming's native freshwater mussels may one day be as well known as the antelope that roam the prairies.

Joe Bailey and Sarah Green snorkeling for native freshwater mussels in the Snake River near the border of Yellowstone NP.



<sup>1</sup>A metapopulation consists of a group of spatially separated populations of the same species which interact at some level.

## Study Investigates Changes in Bird Predation Associated with Energy Development

Within the Intermountain West, natural gas development has greatly increased over the past 20 years, largely within sagebrush dominated landscapes. Range-wide, sagebrush steppe systems have been significantly altered by activities such as agricultural conversion, overgrazing, altered fire regimes, and the introduction of invasive species. Prior research conducted by the Wyoming Cooperative Fish and Wildlife Research Unit in the Upper Green River Basin, Wyoming, demonstrated decreased abundance and increased nest predation of some species of sagebrush-obligate songbirds in areas with natural gas development. Their work identified trends in predation risk associated with both intensity and distance from energy development activities for three Wyoming Game and Fish Department (WGFD) Species of Greatest Conservation Need; Brewer's sparrow, sage sparrow, and sage thrasher.

In collaboration with the WGFD and the Wyoming Landscape Conservation Initiative (WLCI), M.S. student Matthew

Hethcoat and his advisor Dr. Anna Chalfoun are exploring alternative hypotheses for increased songbird nest predation across a gradient of natural gas development intensity in order to better understand the mechanisms underlying nest predation



Sage sparrow with well pad in background.

patterns. They delineated nest searching plots spanning the gradient of well densities found within the Pinedale Anticline Project Area and Jonah natural gas fields. These sites, located south of Pinedale, rank among the most highly concentrated and productive natural gas fields in North America.

The predator abundance hypothesis proposes increased nest predation is due to a numerical increase of predators with increased development intensity. Avian predator point counts, diurnal mammalian predator surveys, and scent stations are being used to explore potential changes in the predator community with increasing well density. In addition, infrared nest cameras are being deployed at a subset of nests to identify nest predators. The nests of songbirds, particularly smaller bodied species which have little hope of defending nest contents, are vulnerable to an extraordinary array of predators. Potential nest predators in the western U.S. run the gamut from 25 g deer mice to 600 lb. Elk, and everything in between. To date, confirmed songbird nest predators within Wyoming sagebrush steppe habitats via video evidence include the deer mouse, Wyoming ground squirrel, chipmunk spp., badger, weasel spp., raccoon, elk, garter snake, and loggerhead shrike.

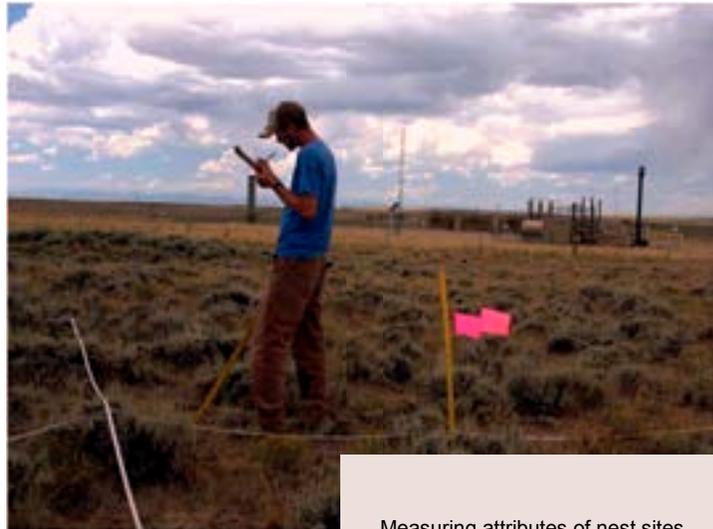
Alternatively, the habitat structure hy-

## Study Investigates Changes in Bird Predation Associated with Energy Development (Continued)

pothesis states that increased development intensity reduces vital habitat components, such as shrub cover or nest concealment, which may reduce nest discovery by predators. The measurement of critical habitat components and nest site characteristics will examine such indirect influences of energy development on nest predation rates. Fieldwork was conducted during spring/summer 2011 and will be repeated in 2012, consequently, much of the data is still in a preliminary phase of analysis.

Human activities that result in habitat loss, fragmentation, and alteration are major factors influencing wildlife populations. The need for understanding the viability of sagebrush-obligate songbird populations is highlighted by the fact that, according to the North American Breeding Bird Survey, many of these species are experiencing significant population declines across their range. Moreover, sagebrush steppe is regarded as one of the most imperiled ecosystems in North America. With increasing demands for domestic sources of energy, the identification of specific mechanisms

influencing nest predation is a critical next step in developing clear strategies for mitigating the impacts to songbirds breeding in energy fields.



Measuring attributes of nest sites.

## Designing Barriers to Prevent the Movement of Non-native Fish

The presence of non-native species has been linked to declines of both native and sport fisheries throughout the world. The Green River and Little Snake River drainages of southwestern Wyoming are no different. Within these rivers, non-native white suckers (*Catostomus commersonii*) and burbot (*Lota lota*) are negatively impacting native species such as the state threatened bluehead sucker (*Catostomus discobolus*) and flannelmouth sucker (*Catostomus latipinnis*) along with world class sport fisheries such as Flaming Gorge Reservoir. Mitigating the impacts of these invasions has been a focus of the Wyoming Game and Fish Department. One potential approach for protecting these valuable fisheries is the installation of barriers to prevent further invasions by

non-native fishes. The Wyoming Game and Fish Department is supporting a research project, that is designed to measure the swimming and jumping capabilities of burbot and white suckers in order to design effective barriers.

Burbot are historically native to the Big-horn, Powder, and Tongue River basins east of the Wind River Range in Wyoming. An illegal introduction into Big Sandy Reservoir in the early to mid 1990s, and a secondary introduction in the early 2000s into Fontenelle Reservoir, resulted in the establishment of burbot through the Green River Drainage in Wyoming. Currently, burbot are thought to be preying on native bluehead and flannelmouth suckers in the Big Sandy

River system. Additionally, burbot in Flaming Gorge and Fontenelle Reservoirs are consuming crayfish, smallmouth bass (*Micropterus dolomieu*), and kokanee salmon (*Oncorhynchus nerka*), leading to concerns that burbot may cause declines in the quality of these popular sport fisheries.

Similarly, white suckers were native to the eastern flowing river systems of Wyoming, but have successfully established themselves throughout the western portion of the state. White suckers have been shown to compete with sport fish such as trout for food and habitat. In addition to competition for resources, white suckers are capable of hybridizing with native bluehead and flannelmouth

# Designing Barriers to Prevent the Movement of Non-native Fish

suckers, which has led to population declines for these species.



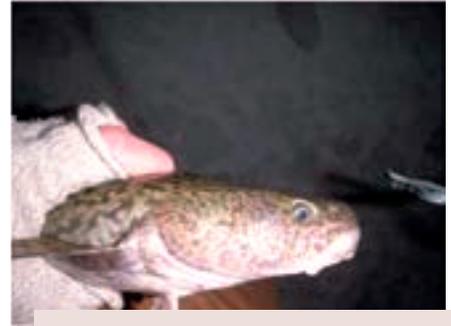
Preparing a burbot jumping trial by adjusting the height and plunge-pool depth of an artificial waterfall at Colorado State University.

Fish barriers offer an option for limiting the movement of non-desirable fishes. Barriers may be used as preventative measures or installed as part of a reclamation project to prevent upstream movements of the undesired species. Barriers may consist of dams, vertical drop structures, or high velocity chutes. The construction of barriers is difficult, time consuming, and expensive, so it is important that their designs are based upon accurate

swimming and jumping performance data to ensure their effectiveness. Colorado State University researchers are using a combination of swimming flume and artificial waterfall experiments to collect the swimming and jumping data needed for the construction of such barriers.

Swimming flumes, also known as fish treadmills, allow researchers to measure the swimming endurance of fish at pre-determined current speeds. This study is measuring burbot and white sucker endurance at higher swimming speeds so that we can provide barrier designers with information on how fast the water needs to move through a velocity barrier, and equally important, how long that barrier needs to be to effectively exclude the white sucker and burbot.

The study is also using artificial waterfalls to identify waterfall height and plunge-pool depths that prevent burbot and white sucker from jumping over an instream obstacle. Twenty-four experiments are run at different waterfall height and plunge pool depth combinations, recording the success or failure of individual fish at each combination. The data collected from these experiments will allow estimates about the probability of a



Burbot captured for this project ice fishing at Flaming George.

burbot or white sucker successfully jumping over an instream obstacle given the obstacle's height and depth of water at the base, and more importantly, provide engineers with guidelines for obstacle heights and water depths that prevent the fish from successfully jumping over the obstacles.

## Questions or Comments?

Questions or comments about the SWAP or this newsletter can be forwarded to:

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