



♦ optimo•locus ♦

Number 11

The Newsletter of the Montana Natural Heritage Program

Fall 2011

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Some 2011 - 2012 Projects

Ecological Studies

- National Wetlands Condition Assessment
Funding partners: Fort Peck Tribe, MT-DEQ, Tetra Tech
- Ecosystem Sustainability. Funding Partner: US Forest Service, Region 1
- Effects of Sedimentation on Stream Macroinvertebrate Communities. Funding Partner: DEQ
- Riparian Integrity Along Large Rivers. Funding Partner: USEPA

Botanical Studies

- Integrating Plants into the State Wildlife Action Plan. Funding Partners: Doris Duke Charitable Foundation, NatureServe
- Wetland Plant Identification Workshops. Funding Partner: MT-DEQ
- Surveys and Monitoring for ESA-listed Plants. Funding Partner: USFWS

Zoological Studies

- Baseline monitoring of bats for White-Nose Syndrome. Funding Partners: MT-FWP, USFWS
- Bird Status Assessment across Bird Conservation Region 11. Funding Partners: MT-FWP, USFS, BLM, Rocky Mountain Bird Observatory
- Montana Bat Poster and Brochure on Living with Montana Bats. Funding Partners: MT-FWP, USFS

From the Director...

I had the honor in July of becoming Director of the Montana Natural Heritage Program. Four months into the position confirms the excellence of the Program overall and high levels of dedication of our knowledgeable staff.

A big thank you goes to Senior Zoologist, Dr. Bryce Maxell, who served as Interim Director after Sue Crispin, our previous Director, lost her battle with cancer. Amazingly, Bryce was still able to maintain his duties as Senior Zoologist during this time.

With this issue we resume the publication of *Optimolocus*, which will be appearing in the Spring and Fall. Our newsletter's name is a Latin transliteration of "best place." Its name alludes to two things: "(Last) Best Place", which describes Montana to the satisfaction of many, and the damselfly *Enallagma optimolocus*, which, when the newsletter began in 1999, was believed to be a new species and endemic to Montana.

Staff here debated whether to rename the newsletter. Why? Because newer data suggest that *E. optimolocus* is not a distinct species after all. However, we decided that *Optimolocus* still reflects the Montana lifestyle, and the Montana Natural Heritage Program as being a "best place" to work.

Past uncertainty about the identity of the damselfly underscores the ongoing and general need for additional biological and ecological survey work in Montana. Biologists sometimes talk now about biodiversity knowledge gaps in terms of Linnaean and Wallacean shortfalls.

The **Linnaean Shortfall** is the acknowledged reality that most biodiversity, especially in the species-rich tropics, has never been studied or given scientific names. The Linnaean

Shortfall in Montana centers mostly on invertebrates, bryophytes, fungi, and other less showy lineages.

The **Wallacean Shortfall** is named after Alfred Russell Wallace (the great biologist and explorer of Malesia) and refers to knowledge gaps concerning species' distributions. In the tropics such knowledge gaps generally are profound. However, Montana also has significant gaps in this regard, often including uncertainty about the relative size of species' populations within the state (see examples of addressing Wallacean shortfalls in Botany and Zoology program summaries). Outdated and incomplete distributional data can significantly affect modeling studies that try to predict how species' ranges might shift with climate change, the increased presence of non-native species, fire, disease and other variables. Staff at MTNHP, as well as many state and federal agencies, frequently carry out such modeling in the context of conservation considerations.

Although funding levels for conservation remain precarious, MTNHP remains as dedicated as ever to its mission of collecting, analyzing, and disseminating data about Montana's species and community types, especially those of conservation concern.

Please note, however, that MTNHP has several important projects we would like to bring to fruition, but which presently lack funding. If you want to contribute to help fund these projects, then please contact me.

We invite you to revisit our website (<http://mtnhp.org/>) to view its rich information and services and explore the ways our web delivery enables users to study the magnificent fauna and flora of Montana. As always, we greatly value your input.

- Neil Snow

Field Surveys of Threatened Plant Species

Much is still to be learned about the respective distributions, abundance and trends of two plant species of concern in Montana listed as Threatened under the Endangered Species Act: Spalding's catchfly (listed 10 years ago), and water howellia (listed 16 years ago). The Botany Program is filling these knowledge gaps with inventories and monitoring with a cooperative agreement with the USFWS.

In the past two years, suitable grassland habitat in northwest MT was surveyed for previously undocumented locations of Spalding's catchfly (*Silene spaldingii*), a need identified in its Recovery Plan. This summer we documented several significant new locations, including what is probably the second or third largest population range-wide (Fig. 1 and Fig. 2). Addition-

additional surveys of the remaining high quality habitat and implementation of population monitoring at several sites.

Fieldwork for water howellia (*Howellia aquatilis*) had taken a hiatus for many years, under the belief previous monitoring efforts by the Flathead NF and past survey efforts by MTNHP and others had largely fulfilled survey and monitoring needs. In retrospect, this was far from the truth, especially concerning the need to survey additional wetlands. Field surveys began anew in 2007 (representing the first surveys for the species by MTNHP since 1991), with the intent of re-visiting and monitoring previously documented locations that lacked current data. That goal soon shifted to surveying the large numbers of wetlands in the Swan Valley and

documented in approximately 15% of the sites visited. However, in 2011 only four new locations were documented. What changed? Conditions for germination and growth during Fall 2010 and Spring 2011 evidently were unfavorable, resulting in low population numbers of this winter annual. High water levels from heavy spring rains also made surveying many wetland sites significantly more difficult than in the recent past. As a result, MTNHP curtailed its surveys in 2011 but will continue those efforts next year with the hope of more favorable growing conditions.

The focus on the two species after 2012 likely will transition from surveying for new locations to increased monitoring of known populations, as the majority

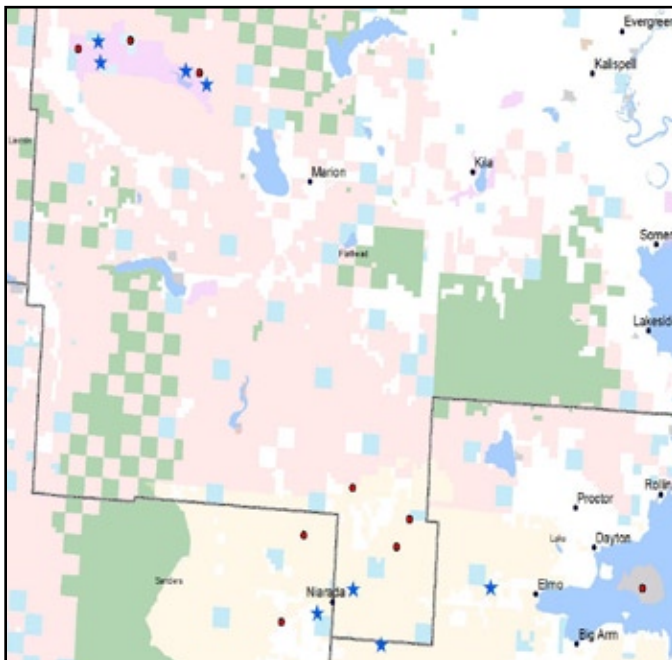


Figure 1. Spalding's catchfly in the Flathead region. Stars indicate new populations located in 2011.

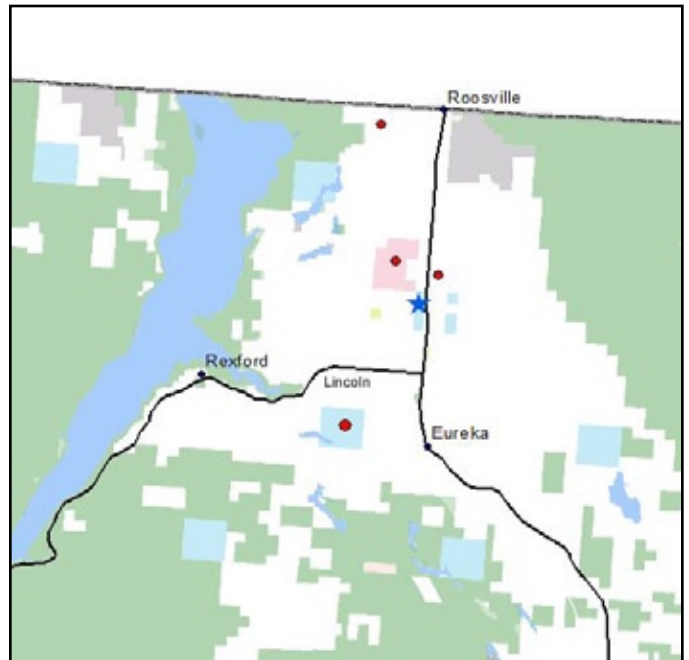


Figure 2. Spalding's catchfly in the Tobacco Plains region.

ally, we expanded the extent of several known occurrences and completed inventories of a few other critical areas, all of which provide more accurate and precise population estimates for the species. The surveys approximately double the estimated population size of Spalding's catchfly within MT compared to prior estimates. As a large portion of its distribution in MT is located on the Flathead Reservation, working in collaboration with the Confederated Salish and Kootenai's Tribal Wildlife Office was instrumental to the success of this effort. MTNHP's work with Spalding's catchfly is expected to continue over the next field season with

the neighboring Clearwater drainage for the presence and suitability of each wetland for harboring populations of water howellia. The shift in focus resulted from the relatively quick discovery of seven new water howellia locations in 2007 and the ensuing realization, after studying 2005 NAIP imagery, that hundreds of wetlands in the Swan Valley alone needed to be surveyed. Since 2007, the number of known locations has increased from approximately 140 to 215, largely as a result of MTNHP's survey efforts with funding from the USFWS. Conditions from 2007-2010 were favorable for surveying wetlands, with water howellia being

of potentially suitable habitat will have been surveyed. Important progress was made the past decade understanding the population structures and distributions of these species. The new information will be invaluable for making future decisions concerning their conservation status and needs under the ESA. Though the work is not always glamorous and the hours are long, field surveys and monitoring activities conducted under cooperative agreements have been, and will continue to be, instrumental to achieving the recovery goals of ESA-listed plants like Spalding's catchfly and water howellia.

Ecology News (in part)

Groundwater Dependent Ecosystem (GDE) Inventory and Condition Monitoring



Figure 3. Cattle Degraded, functional-at-risk spring

Groundwater dependent ecosystems (GDEs) include springs, seeps and certain wetlands (e.g., fens). Where these occur, there is generally a distinct assemblage of plants and animals specifically adapted to this type of stable environment. Heritage scientists have surveyed plant communities in many GDEs across the state, but aquatic organisms have been largely unsampled. BLM funded us in 2011 to conduct surveys of 24 springs and seeps on BLM lands in central and eastern Montana. While we found that cattle use and hydrologic modification (i.e., piping and excavation) have caused significant degradation to a number of GDEs (Fig. 3), we also identified biologically intact springs in relatively undisturbed landscapes (Fig. 4), as well as springs that have been improving with management practices (e.g., exclosure fences and cattle rotation). We are currently analyzing our macroinvertebrate data to determine if there are significant relationships between GDE structural condition and invertebrate diversity.



Figure 4. Fully functioning, biologically intact spring

Staff Spotlight - Ute Langer

Born near Dresden in the former East Germany, Ute finished her senior high school year at the University in Halle (Saale) before attending Kazan State University in Tatarstan, Russia during the exciting years of Perestroika and Glasnost. She spent her summers studying population dynamics of understory plants in surrounding forests, while travelling and mountaineering across the diverse cultures and landscapes of the former Soviet Republics. Back in East Germany after receiving her M.S., she began a PhD while working at the Institute for Landscape Research and Nature Conservation to establish a long-term monitoring program in the (unmanaged-because-unmanageable) "Total Reserves" of the German Democratic Republic. But two years later, the Berlin Wall fell, Germany was unified, and the Institute was shut down. Ute continued her career at State Office for Environmental Protection, evaluating environmental impact studies for federal traffic projects and overseeing a color infrared aerial photography project. Ute's interest in GIS began when she developed an interpretation key for



Saxony-Anhalt, and collaborated with a federal group of scientists on a key for all 16 states. When her husband took the opportunity to continue his PhD at MSU in Bozeman in 1993, she joined him to earn another Master's degree, in Earth Sciences (GIS). After a 3 month internship at ESRI in Redlands, CA, she took a position as a GIS analyst at the Landscape Biodiversity Lab at MSU, working on land cover change, bird population hotspots, and demographic change in the Greater Yellowstone Area. Ute and her husband fell in love with Montana, and after the birth of their third child decided to make it their permanent home. They moved to Missoula in 2002, and Ute began work at the Spatial Analysis Lab, focusing on a variety of wildlife, ecosystem and natural resource related projects. Since starting at the Lab, she has helped with the spatial analysis of habitat parameters for a nationwide bird parasitism and predation study, and supported several graduate students and faculty with their analyses of distribution and habitat for amphibians, turtles, cougar, sage grouse, osprey and other birds. She also contributed to an econom-

ics study with the Office of Research and Development, built a spatial database for the Paleontology Museum, and cooperated with the USFS on a variety of aquatic and terrestrial ecosystem management projects.

Since the integration of the Spatial Analysis Lab within MTNHP, Ute has been building data and models for the USFS Regional Office's Integrated Restoration and Protection Strategy. She has also mapped and modeled sage grouse nesting and wintering habitat in the Upper Powder River Basin for the BLM, applied the model to the Crow Reservation in Montana for the NRCS, helped segment river corridors for the EPA- and MLIA-funded large rivers riparian mapping project, and classified aquatic habitat in rivers in North Idaho and Montana. Recently, she has been working on a pilot project for PPL and DEQ, evaluating the use of satellite imagery to monitor blue-green algae growth in Hebgen Lake.

Ute enjoys the outdoors, watching wildlife, traveling, camping, hiking with her family and friends and cheering on her children at their sports meets. She runs, mountain bikes, skies, swims, and recently picked up climbing again to keep up with her athletic family. And although Ute embraces lots of Montana customs, she has not given up (yet) baking the traditional sourdough rye bread of her homeland.

Information Systems & Services News

Field Guide

The Montana Field Guide continues to grow in functionality and is our main information delivery and integrating web application. In the past year MTNHP has made great strides in integrating the Field Guide with the MapViewer, Species of Concern Reports for plants and animals, Natural Heritage Tracker, and adding new search functionality. In particular, we added cross links between animal and plant species and the ecological systems they occur within.

MapViewer

MapViewer, released last fall, is an interactive web mapping application enabling users to perform a variety of tasks. The application is designed around tools that allow display and exploration of various MTNHP datasets. The initial release displayed the newest Montana Land Cover data, which later was integrated with the Ecological Systems Field Guide. The second update added tools for viewing our geo-referenced photo database (>25,000 images). Later we added a new tool set enabling the display and query of the Montana Land Management Data, a database that depicts four main categories of land management: 1) Public Lands, 2) Conservation Easements, 3) Managed areas such as wildlife refuges, Research Natural Areas, wilderness, etc., and 4) private conservation lands. This summer MTNHP released a beta version in MapViewer of our animal and plant point observation database. It has over a million observations and provides all of the general species observation functions found in the Natural Heritage Tracker, including the ability to enter simple animal observations. Along with the incorporation of new datasets into MapViewer, we rolled out a number of enhancements and improvements in the overall software. These improvements included a more user friendly front end to the application; improved Identify tool; and new summary reports.

Land Management Database

New enhancements to the Land Management database have included: 1) updating of conservation easements (now over 2,000,000 acres statewide); 2) completion of the spatial alignment of all of the managed areas data to the statewide parcel database; 3) transfer of the data to the US Geological Survey's nationwide Protected Areas database (PAD-US); 4) revision and web publication of 102 PDFs of its 1:100,000 scale Land Management maps; and 5) publication in the NRIS GIS Portal and all of MTNHP's web applications of the revised Land Management data.

New Reference System

MTNHP recently developed a new reference management system that consolidates several databases and spreadsheets that we were using previously. It is built around a simple database that uses a web client for easy data entry and maintenance. The system automatically harvests information from a cataloging web service to populate citations and links to full library records and on-line content. In upcoming months the on-line links to content will begin to appear in the Montana Field Guide and MapViewer. The links will enable users to not only see a reference list, but also to access full-text articles or interlibrary loan information directly from our web pages.

Data Exchange

In July, MTNHP compiled and delivered data to NatureServe for our species data exchange. Systems and Services staff and Zoology staff completed a major update of our animal species of concern occurrence database. More than 38,000 animal and plant Species of Concern mapped occurrences were transferred to NatureServe's central database, which is used in many projects that cross jurisdictional boundaries. We expect to receive updated taxonomic information back from NatureServe soon.

Zoology News

The Zoology Program continues to compile animal observations across Montana. As of early November, the statewide Point Observation Database (POD) contains 1,095,363 animal observations (773,884 bird records and 321,479 nonbird records). We also have compiled 134,773 survey records where standard protocols have been followed to detect particular animal taxa. These observations are the basis for MTNHP to provide high quality occurrences of Species of Concern used in environmental reviews, predictive distribution models that agencies and others are using for regional planning efforts (Fig. 5), and provide critical information on the general distribution, status, and phenology of all species. This winter we will focus on integrating additional observation records from Ebird, Breeding Bird Surveys (BBS) routes, Denver Holt's ar-

Recent Publications

- Checklist of Montana Vascular Plants, June 2011
- A Reference Wetland Network for Assessment and Monitoring of Montana's Herbaceous Wetlands, February 2011
- Milk, Marias, and St. Mary Monitoring: Developing a Long-term Rotating Basin Wetland Assessment and Monitoring Strategy for Montana, March 2011
- Aquatic Invertebrate Species of Concern: Updated Distributions, Vital Watersheds and Predicted Sites within USFS Northern Region Lands, February 2010
- Evaluation of Salmonflies in Montana's Rivers: Are Statewide Populations Really Declining?
- Geographically Isolated Wetlands and Intermittent/Ephemeral Streams in Montana: Extent, Distribution, and Function, January 2009
- Bat Surveys on USFS Northern Region Lands in Montana: 2007, January 2009
- Wetlands of the Flathead Valley: Change and Ecological Functions, January 2009 - Revised February 2010
- Assessing Wetland Condition with GIS: A Landscape Integrity Model for Montana, March 2009
- Woody Island Coulee Grassland Bird Surveys - Blaine County, Montana - 2008, March 2009
- Assessment of the Red Rock River Subbasin and Wetlands of the Centennial Valley, June 2009
- Terrestrial Mollusk Surveys in Glacier National Park during 2008, including an Illustrated Key to All Documented Species, October 2009
- Montana Amphibian and Reptile Status Assessment, Literature Review, and Conservation Plan, June 2009
- Wetlands of the Gallatin Valley: Change and Ecological Functions, December 2009 - Revised February 2010

chives, and other observers in preparation for the 7th edition of P.D. Skaar's Montana Bird Distribution book series.

The Zoology Program also continues to collaborate with our partners on a variety of animal surveys across the state, including surveys for grassland birds, amphibians, reptiles, and bats. Heritage Zoologists are collaborating on two new bat surveys. The first is a multi-partner, statewide collaboration to gather year-round baseline information on the distribution and activity levels of bats using both passive acoustic recording devices and surveys of caves and mines. Blue squares in the image (Figure 6) indicate known mine or cave hibernacula for bats; brown squares indicate mines or caves known to be used as roosts during the active season; pink squares indicate mines and caves where bats have been acoustically detected near the entrances of mines and caves; and red dots indicate known and likely placements of year-round passive recording devices that are being installed in the fall and early winter of 2011. Members of the Northern Rocky Mountain Grotto will be a critical component of this effort since they have the expertise for surveying the state's caves and mines.

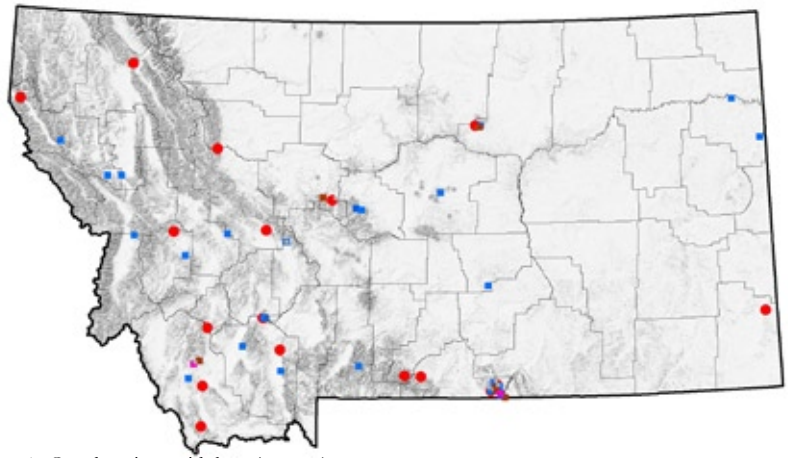


Figure 6. Cave locations with bats (see text).

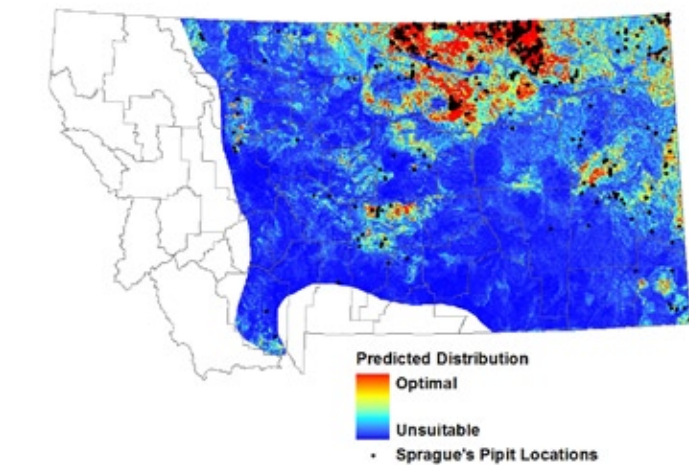


Figure 5. Sprague's Pipit - predicted habitat suitability

Another new initiative of Heritage Zoologists is collaborating with Heritage Ecologists, the EPA, and the BLM is comparative riparian surveys for bats on Yellowstone and Powder River floodplain sites dominated by Plains cottonwood or Russian olive. Our primary objective is to compare bat activity in riparian corridors in the two vegetation types, given that Russian olive is exotic and can replace native cottonwoods under most circumstances. Preliminary results from summer 2011 indicate significantly more bat activity (passes/hour) in mature cottonwood than Russian olive during July and August. Bat species diversity also tended to be greater in cottonwood stands, but overall bat diversity decreased by mid-September. Cottonwood stands tended to offer more bat habitat, including significantly more cavities constructed by primary cavity-nesting birds, greater availability of loose bark, and greater availability of standing snags. We also documented greater presence/diversity of primary cavity-nesting birds in cottonwood stands.

Ecology News (continued)

Large River Corridors Land Cover and Land Use



Figure 7. Detail of segmentation showing stands classified as Russian Olive

Riparian corridors have critical ecological significance in the semi-arid west, so knowing their distribution, composition, and quality is paramount to conservation efforts. While the MTNHP has recently released a broad-scale (1:100,000 scale) Land Cover map, the coarseness of the data source (30m pixel Landsat ETM+ scenes) does not allow for precise representation of spatially complex and diverse land cover types, such as wetlands and riparian areas. Although the need for accurate data will eventually be met through our statewide manual mapping of wetlands and riparian areas, that effort is far from complete. To fill the current data gap, Spatial Analysis Lab staff have developed an automated approach to mapping land cover and land use along major rivers from fine-scale (1m pixel), 2009 NAIP imagery, using image segmentation and classification. Valley bottoms surrounding 32 large Montana rivers are being mapped into 15 classes (Water, Sand Bars, Upland Emergent, Riparian Emergent, Shrub-Scrub, Open Forest, Closed Forest, Russian Olive, Disturbed, Roads, Structures, and four agricultural classes). This classification will also allow us to evaluate the size, structure and interspersed of natural land cover types, and identify particularly disturbed and undisturbed areas. It has also allowed us to identify Russian Olive sites for our bat and bird surveys (Fig. 7). We expect the classification will be available to partners by mid-winter 2012.

Yellowstone River Corridor Change Detection Pilot Project

We are collaborating with DTM Consulting of Bozeman on a pilot project designed to measure change over time in the structure and composition of wetland and riparian communities along the Yellowstone River. This project is part of the larger Yellowstone River Cumulative Effects Study being carried out by the Technical Advisory Committee of the Yellowstone River Conservation District, which seeks to distinguish between human and

natural drivers of change. Heritage cartographers are using aerial photointerpretation and heads up digitizing of historic imagery for the 1950s, 1976, and 2005 to map land cover types along the Yellowstone corridor, while DTM maps land use from the same imagery (Fig. 8 and Fig. 9). This project builds on earlier work done by Heritage, DTM, and Applied Geomor-

phology, Inc. to map and evaluate changes in the river and river valley.

The pilot project focuses on the riparian corridor along four reaches in distinct geomorphological and ecological settings. If this pilot project demonstrates that disparate imagery can be scaled to a common standard for change analysis, we will expand our approach to the entire Yellowstone River corridor.

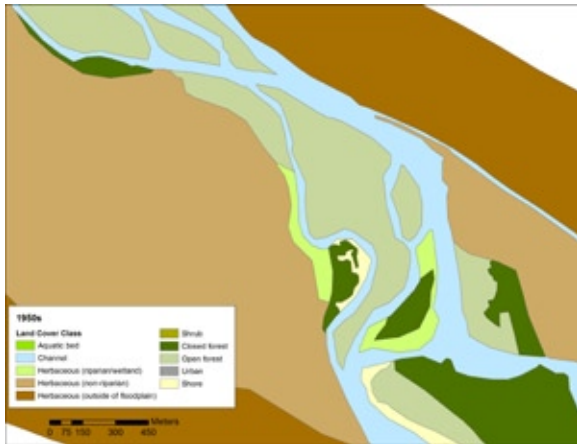


Figure 8. Riparian cover types along a Yellowstone River reach, 1950s.

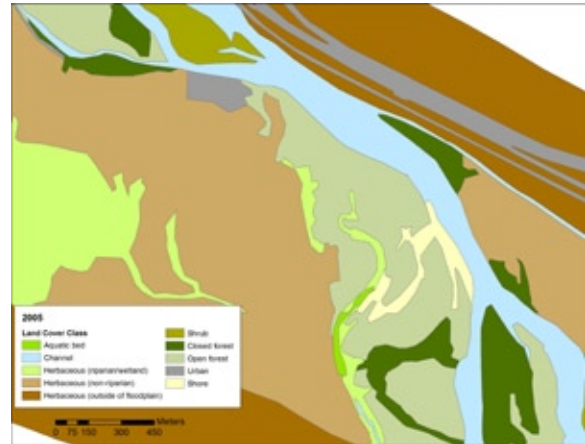


Figure 9. Riparian cover types along the same reach, 2005.

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 see "Staff Contacts" on our Website

THANK YOU...

to Matt Bell for donating his time and expertise to maintaining our bat detecting and recording equipment. His work allowed us to do ours!

Thanks, Matt

Previous Year Data Total

The Montana Natural Heritage Program continuously acquires new biological data. As of October 2011:

	New observations...		
	Via MTNHP	via Web	Total
Animals	79,292	2,697	81,979
Plants	1,031	-	1,031
	Grand Total		83,010

	Species Occurrences created...		
	Animals	Plants	Total
	16,014	558	16,572

	Updated records...		
	Animals	Plants	Total
Point Obs:	159,098	329	159,427
Species Occ:	11,281	202	11,483

	Total current...		
	Animals	Plants	Total
Point Obs:	1,095,362	10,962	1,106,324
Species Occ:	37,565	7,322	44,887