MSL Progress Report for Statement of Work

Report for 7th and 8th Quarters FY16-17

The tables below come from Appendix 1, the Scope of Work for Operation of the Montana Natural Heritage Program, and Appendix 2, the Scope of Work for FY16-17 Wetlands and Land Cover MSDI Framework Services under the Contract for Services between the Montana State Library and the University of Montana for state fiscal years 2016 and 2017 (award number 20150731). The right column describes the status and progress during the reporting period. The status is generally summarized as in progress, completed, or not active, but also may include annotations.

Tasks in the left column of the tables list **Administrative, Information Services, Botany, Ecology, and Zoology** services from Appendix 1 and **Wetlands and Land Cover MSDI Framework Services** from Appendix 2.

The tables list four categories of tasks and services:

1) **Core Services**: Essential tasks and services that will be delivered principally with Core funding provided by this contract.

2) **Supplemental Core Services:** Essential tasks and services for which there is not sufficient Core funding but which will be delivered dependent on acquiring discretionary funding support from partner agencies.

3) **Project Supported Services:** Additional tasks and services that augment the essential core tasks and services that may be provided pending the availability of project funding.

4) **MSDI Core Services:** Wetland, Riparian, and Land Cover data development and coordination services for the Montana Spatial Data Infrastructure delivered primarily with Montana Land Information Act funds.

Tasks are highlighted with the following reporting indicators:

Green (no font distinction) – activity progressing as expected.

Yellow (italicized) – activity may be delayed but the delays do not necessarily rise to the level of Commission concern

Red (bolded) – activity is delayed and Commission attention is warranted

Blue (underlined) – addition or change to the original work plan

Core Administrative Services		
	1st through 6th Quarter FY 16-17 (July 1, 2015 – December 31, 2016)	**7th & 8th Quarter FY 16-17** (January 1, 2017 – June 30, 2017)
1. Coordinate all program activities with Partners and program areas	Ongoing - The annual MTNHP Partners Committee meeting was held December 7, 2015 at Montana Wild in Helena and was attended by over 40 partners. A meeting summary with links to powerpoints is posted on the MTNHP website at: http://mtnhp.org/about/announce.asp#PartnersMtg2015 - Expanded an existing task tracking document in One-Note for coordination of activities across program areas within MTNHP, between MTNHP and MSL, and between MTNHP and key partners. - Established and maintained weekly coordination meetings with Information Services staff, biweekly coordination meetings with database and web programming staff, approximately monthly program manager's meetings, and quarterly all staff meetings. - Numerous meetings were held with staff at FWP, BLM, USFS, DEQ, Department of Agriculture, NRCS, UM, TNC, MT Audubon, Department of Commerce, Land Trusts, NatureServe, Malmstrom Air Force Base, Western Association of Fish and Wildlife Agencies, Montana State University, other Heritage Programs in the United States and Canada, Missoula County Weed District, Protected Area Database staff at the U.S. Geological Survey, and MSL as well as Plant Conservation Conference attendees, Montana Chapter of the Wildlife Society attendees, Intermountain GIS Conference attendees, Governor's Invasive Species Summit attendees, Montana Wetland Council meeting attendees, and Montana Watershed Coordination Council meeting attendees. - The annual MTNHP Partners Committee meeting was held December 1, 2016 at Montana Wild in Helena and was attended by over 50 partners. A meeting summary with links to powerpoints is posted on the MTNHP website at: http://mtnhp.org/about/announce.asp#PartnersMtg2016	Ongoing - Numerous meetings were held with staff at FWP, BLM, USFS, USFWS, USGS, DEQ, DNRC, NRCS, Western Association of Fish and Wildlife Agencies, Montana State University, University of Montana, land trusts, Missoula County Weed District, NatureServe and other Heritage Programs in the United States and Canada, and members of the Montana Watershed Coordination Council and Montana Wetland Council.
2. Administer contracts and grants	Ongoing - MTNHP managed approximately 60 agreements during the reporting period - New project agreements initiated during the reporting period include, Howellia Survey and Monitoring Data with the Swan Ecosystem, Data Service Support for the USFS, Tepee	Ongoing - MTNHP managed approximately 60 agreements during the reporting period - New project agreements initiated during the reporting period included: Sagebrush data collection to support improved vegetation mapping in southwest Montana for the Beaverhead-

	Macroinvertebrate identification for the USFS, Data Service Support for the NRCS, Harlequin Duck, Amphibian, and Bat Monitoring for the USFS, Statewide Wetland Mapping for DEQ and MLIA, 2016 Wetland Plant Identification class support from DEQ, National Wetland Condition Assessment field sampling in 2016 for DEQ, Information to Support Weed Management for the Department of Agriculture, data service support for the Bonneville Power Administration, national wetland condition assessment field sampling support for the Department of Environmental Quality, wetland mapping for the USFS, Northern Long-eared bat surveys for the Custer-Gallatin National Forest, Howell's Gumweed genetic diversity monitoring for the Lolo National Forest, Greater Sage-Grouse modeling for the Beaverhead-Deerlodge National Forest, weed trust fund data support for the Department of Agriculture, plant conservation status reviews for the Department of Agriculture, bat acoustic monitoring on coal mines for the Department of Environmental Quality, data sharing for BLM through NatureServe, and moss and lichen inventory on the Milton Ranch from the Montana Native Plant Society, Albeni Falls bat monitoring for the U.S. Army Corps of Engineers, Predictive Distribution Model Creation and Conservation Status Reviews for Montana Animal Species of Concern for FWP, Data Service Support for the BLM, Data Service Support for the Environmental Conservation Online System and Information for Planning and Conservation website for the U.S. Fish and Wildlife Service, Wetland Assessment and Monitoring Tools for the EPA, Map Enhancement for the EPA, Data Services support for the USFS, Data Services support for Noxious Weed Trust Fund grants for the Department of Agriculture, Plant Conservation Status reviews under the Noxious Weed Trust Fund for the Department of Agriculture, and Data Services support for The Nature Conservancy.	Deerlodge National Forest, surveys for *Penstemon lemhiensis* for the Beaverhead-Deerlodge National Forest, collection of tissue samples from known Howell's Gumweed populations to inform conservation management decisions for the Region 1 Office of the USFS, Photo-Interpretation of vegetation patterns in the Blackfoot-Swan for the USFS, Assigning Coefficients of Conservatism values to 315 vascular plant species for DEQ, Biocontrol species data management and predicted distribution model creation for the Missoula County Weed District, Maintenance of comprehensive and up-to-date plant, animal, and community information resources for the Montana Department of Transportation, Mayfly baseline distributions and population status assessments in large prairie rivers for the World Wildlife Fund, Report on the relationship of forestry, roads, and fire disturbances to the persistence of Water Howellia for the USFWS, Maintenance of comprehensive and up-to-date plant, animal, and community information resources for the BLM, and Mapping wetland and riparian areas in USGS quads where only legacy mapping is available for the BLM.
3. Promote use of Heritage data resources through outreach and training sessions	Ongoing - MTNHP information resource trainings were provided to the Montana Education Association and Montana Federation of Teachers, the Department of Commerce, Malmstrom Air Force Base environmental planning staff, Montana Audubon staff, the Montana Invasive Species Advisory Council, librarians across Montana, Montana Plant Conservation Conference attendees, Montana Chapter of the Wildlife Society meetings attendees, the Noxious Weed Trust Fund Grant Committee, nongame staff at FWP, Intermountain GIS	Ongoing - MTNHP information resource trainings were provided to BLM state office staff, wildlife biologists and NEPA staff at the Region 1 Office of the USFS and on the Flathead, Custer-Gallatin, Beaverhead-Deerlodge National Forests, nongame staff at FWP, NatureServe and Natural Heritage Program staff across the U.S. and Canada, the Montana Wood Products Association, the Utah Division of Wildlife, the Region 1 Office of the U.S. Forest Service, librarians across Montana and at Montana State University, the Noxious Weed Trust Fund Grant

	conference attendees, Montana Wetland Council meeting attendees, NatureServe's Biodiversity without Boundaries conference attendees, Montana Land Trusts, Montana Department of Agriculture personnel, Natural Resources Conservation Service personnel, USFS Region 1 Wildlife Biology and NEPA personnel, Beaverhead-Deerlodge Forest Service resource planning personnel, Montana Watershed Coordination Council staff and members, a delegation of natural resource managers from Russia, the Montana Library Commission, NatureServe and Natural Heritage Program staff across the U.S. and Canada, Carroll College Environmental Careers Program, FWP Headquarters and Environmental Review staff, and the Montana Wood Products Association. Four posters on MTNHP information resources were displayed at the Governors Summit on Invasive species on April 12th and 13th.	Committee, Opencut and Air Quality staff at DEQ, faculty in the Wildlife Biology Program and Division of Biological Sciences at the University of Montana, environmental staff at MDT, staff and students at Blackfeet Community College, forestry and trust land staff at DNRC, Trout Unlimited, members of the Montana Chapter of the Wildlife Society, and members of the Montana Watershed Coordination Council.
4. Collaborate with Library staff to effectively represent the mandate, activities, and products of MTNHP through publications, reports, brochures, posters, maps, fact sheets, social media, etc.	Ongoing - Held biweekly coordination meetings with State Librarian & Digital Information Manager / CIO - Participated in regular MSDL Managers meetings - Provided an information overview and MTNHP contacts list to allow MSDL staff to answer patron questions directly. - Printed additional MTNHP information services pamphlets	Ongoing - Held biweekly coordination meetings with State Librarian & Digital Information Manager / CIO - Participated in regular MSDL Managers meetings
5. Participate in regional and national network coordination meetings and conference calls to help ensure continued compatibility and to take advantage of opportunities and advocate for initiatives that would benefit Montana.	Ongoing - Participated in monthly NatureServe Network Member Program coordinators calls, monthly U.S. Section Council calls, monthly spatial methodology review team calls, and quarterly predictive distribution modeling team calls. - Created, distributed, analyzed, and presented results of a survey to NatureServe network member programs that assessed the housing, funding, staffing capacity, guiding statutes, unique assets, and critical challenges faced by individual programs with the goal of strengthening the network and leveraging network assets. - Presented web data delivery of MTNHP information to approximately 50 NatureServe and Natural Heritage Program personnel across the U.S. and Canada via webinar on October 4th, 2016.	Ongoing - Participated in monthly NatureServe Network Member Program coordinators calls, monthly U.S. Section Council calls, monthly spatial methodology review team calls, and quarterly predictive distribution modeling team calls. - Created, distributed, analyzed, and presented results of a survey to NatureServe network member programs that assessed NatureServe products and services network member programs consider most valuable to their individual program missions and identified ways network-wide resources could be better leveraged. - Initiated a NatureServe Heritage network web developers forum for leveraging code that individual programs have developed for potential use across the network and to receive feedback on the Common Field Guide web platform that we are taking the lead on.
6. Finish an updated revision of the FY15-20 MTNHP 5-year Strategic Plan	**Completed** - The FY16-FY20 strategic plan was finalized in mid-December after review by MTNHP program managers and feedback from MTNHP partners at the 2015 annual partners meeting.	**Completed previously.**

Core Information Services Program Services		
	1st through 6th Quarter FY 16-17 (July 1, 2015 – December 31, 2016)	**7th & 8th Quarter FY 16-17** (January 1, 2017 – June 30, 2017)
1. Respond to requests for MTNHP information used in Environmental Assessments, Environmental Impact Statements, and other planning and resource management activities	Ongoing - Responded to 1,108 requests involving SOC reviews for environmental assessments.	Ongoing - Responded to 270 requests involving SOC reviews for environmental assessments. Additionally trained several dozen state and federal agency personnel on how to self-serve the new Environmental Summary reports from the Map Viewer web application.
2. Work with NatureServe to develop procedures and methods to conduct regular data exchanges.	On hold - This task is pending completion of task 3 below to ensure that element occurrence information has all of the appropriately associated element information.	In Progress - See task 3 below.
3. Develop procedures and methods to upload state element data to and download global element data from the BIOTICS 5 database	In Progress - A taxonomic data exchange was made with NatureServe during November of 2016. However, a longer-term solution for realtime data exchanges with NatureServe still needs to be undertaken and we are currently waiting on NatureServe to develop their portions of this exchange process.	On hold - We are currently waiting on NatureServe to develop their portion of a real-time data exchange process.
4. Administer databases for editing and storage of MTNHP data including: a. Coordinate overall MTNHP server architecture and development with MSL b. Design and maintain appropriate relational databases for botany, zoology, and ecology data. c. Administer MTNHP databases on internal server including database security and routine backup to prevent catastrophic loss d. Develop and maintain procedures and methods to disseminate information to web-facing servers external to the firewall e. Develop and maintain data processing and QC procedures for core databases	In Progress - We continue to coordinate server architecture, nightly mirror jobs between production and web servers, and backups to prevent catastrophic loss with MSL. - A new relational database for botany has been completed and minor revisions were made to assist with entry and tracking of new surveys and observations. - MTNHP databases are now all being administered on SQLPROD. Most MTNHP information is backed up off site regularly to the SITSD data center in Helena. Additionally, all MTNHP information is backed up using a raided 25 TB Drobo Drive array system that is stored off site at the Program Coordinator's house. - MTNHP staff continually work with MSL staff to manage nightly jobs that migrate information over to SQLWEB to serve information up on MTNHP websites. - Data processing and QC standards are still in the progress of being updated in order to deal with larger and larger data exchanges. For example, we received a 1.2 million bird observation records from the Ebird database which will need to be collapsed into seasonal representations for individual species, compared with existing records to	In Progress - We continue to coordinate server architecture, nightly mirror jobs between production and web servers, and backups to prevent catastrophic loss with MSL. - Data processing and QC standards are still in the process of being updated in order to deal with larger and larger data exchanges. We continue to use a 1.2 million bird observation record data set from the Ebird database to develop automated QA/QC procedures.

	prevent duplication, and evaluated for appropriate spatial and temporal presence. Automated routines are being developed to ensure QA/QC of this information	
5. Migrate all MTNHP databases from SQLINT to SQLPROD	**Completed** - The following databases were migrated from SQLINT to SQLPROD by November: Biotics01, NHP, NHPBat, NHPBotany, NHPEcology, NHPGen, NHPLandMan, NHPLayerData, NHPLayerGrids, NHPReference, NHPSpecies, NHPTools, NHPWeb, NHPZoology, Stewardship, NHPThumbsPlus, WetlandRiparian	**Completed in 1st and 2nd Quarter.**
6. Maintain a core photo database on SQLPROD	Ongoing - We use Thumbs Plus photo management software linked to a SQL database, NHPThumbsPlus, on SQLPROD to manage information on a growing photodatabase that currently includes over 142,249 photos. Many fields in this photodatabase are underpopulated and thus many of these photos cannot be shared on MTNHP websites. We are working on getting more and more photos attributed so that they can be shared on our websites. - Temporary employees were utilized to work on some of the backlog of photo attributing so that photos can be shared on MTNHP websites. A total of 3,553 photos were fully attributed with 3,933 photos added to species accounts on the Montana Field Guide. More than 1,200 species now have photos showing on the Montana Field Guide that previously had no photos. Large numbers of photos were added for grass, moss, moth, butterfly, and grasshopper species.	Ongoing - 24,358 photos were added to the NHPThumbsPlus photo database on SQLPROD and there are now 171,850 photos of animal and plant species, habitats, and survey locations across Montana in this database. - Temporary employees were utilized to work on some of the backlog of photo attributing so that photos can be shared on MTNHP websites. A total of 486 photos were fully attributed with 353 photos added to species accounts on the Montana Field Guide.
7. Work with Botanist to design and implement a revised and updated Botany database for observations and species occurrences	Ongoing - A new relational database for botany has been completed with minor revisions to assist with entry and tracking of new surveys and observations. Where possible the architecture of the botany database was aligned with the zoology database and this also necessitated a few updates to the zoology database. Overall this will streamline management of observation and survey data and code that is used to display information on MTNHP websites as well as construct predictive distribution models. - Observation and survey location data from the old database has been ported to the new database and associated plant species information from the old database has been appended to the new observation database. - Porting the data from the old database to the new database uncovered a number or observation and survey records that need additional hand review.	Ongoing - Coding for species occurrences processing still needs some minor updates to finalize the new species occurrence processing procedures. - Hand review of observation and survey records is ongoing.

8. Continue to work with Digital Library Division staff to enhance discovery of biological information in the MSL geographic information web and other MSL web sites.	Ongoing - We continue to work with MSL on discovery of MTNHP information through the MSL GIS Data List and MSDI Infrastructure web pages.	Ongoing - We continue to work with MSL on discovery of MTNHP information through the MSL GIS Data List and MSDI Infrastructure web pages.
9. Provide regular updates on the website, social media, and through emails as new resources become available (including reports, web tools, MapViewer, Species SnapShot, and Montana Field Guide enhancements, etc.).	Ongoing - Announcements of important MTNHP developments and releases of new reports continue to be posted on the MTNHP homepage. - A plan is being developed to use Instagram to post Montana Species, Wetland, and Ecological Systems photos to users in order to direct web traffic to the accounts on the Montana Field Guide. - A plan is being developed to use Facebook and Twitter posts to direct traffic to MTNHP web pages in general.	Ongoing - Announcements of important MTNHP developments and releases of new reports continue to be posted on the MTNHP homepage. - No information postings were made on Facebook, Instagram, or Twitter during this reporting period due to lack of time by the Program Coordinator. The Program Coordinator worked with MSL's new Marketing and Communications Director prior to their departure on plans for using a variety of social media to direct traffic to MTNHP websites.
10. Continue to maintain and improve the functionality and ease of use of Natural Heritage Program web pages	Ongoing - See task 15 below.	Ongoing - See task 15 below.
11. Finish the conversion of the MTNHP web site to conform to the Montana web standard including mobile device compatibility	In Progress - Work continues on updates to mobile compatibility and we are using this opportunity to clean up a variety of underlying coding. The Montana Field Guide now performs well on mobile devices.	On hold - This task remains on hold while staff time is focused on completion of a new Environmental Assessment tool in Map Viewer (see task 13 below). A new cloud-based Montana Field Guide will be mobile device compatible when it is completed in the spring of 2018.
12. Collaborate with the Digital Library Division User Services Team in the design and implementation of a Division wide process for tracking, managing, fulfilling and reporting mediated requests and user support. a. Participate in a Digital Library Division planning team for the implementation of a division wide request management system b. Participate in cross-training of the User Services Team in MTNHP services and resources.	In Progress - MTNHP developed a simple Request Tracking tool using a SQL database as the backend and Microsoft Access tables as the front end for entry of requests. Request tracking for requests other than standard environmental assessment Species of Concern reports, which will continue to be tracked in the old NRIS Request Router, were initiated on January 4, 2016. This simple request tracking tool can be imported by MSL-DLD when ready. - MTNHP continues to participate in MSL-DLD planning team meetings and we look forward to additional opportunities to train MSL-DLD staff on MTNHP information resources.	In Progress - MTNHP continues to track standard environmental review requests via the NRIS Request Router and other requests made of individual staff via our new simple Request Tracking tool. - MTNHP continues to participate in MSL-DLD planning team meetings and we look forward to additional opportunities to train MSL-DLD staff on MTNHP information resources.
13. Develop "Harold" type self-serve SOC search and review functionality for partners with certain privileges and for in-house data requests	In Progress - A new Environmental Summary Report task was released for trial use by agency-level users in MapViewer in late November. The tool provides summaries of species occurrences (i.e. polygons where plant and animal Species of Concern occur), species observations, species potentially	In Progress - The new Environmental Summary Report task replaced the old "Harold" report as the standard MTNHP information request for environmental reviews in early February. Several dozen agency personnel submitting mediated requests have been trained on the use of this new Environmental Summary

	present, structured surveys, land cover, wetland and riparian mapping, land management, and biological reports for user defined project areas. This new Environmental Summary tool is planned to replace the old "Harold" report for standard requests of MTNHP information in January of 2017; the "Harold" reports only provided Species of Concern Occurrences and wetland and riparian mapping information.	Report so that they can self-serve information for environmental reviews/permitting moving forward. Guidebooks were developed for standard use and for agency-specific use in order to promote consistent queries of information and consistent use of information in environmental reviews/permitting. Agency trainings have resulted in several revisions of the Environmental Summary Report and trainings will need to continue until all agencies have had some base-level of training and opportunity to provide feedback. Future trainings may be able to be recorded to reduce staff time commitments.
14. Continue to develop, maintain , improve, and collaborate on easy-to-use methods for data contributors to submit animal, plant, and habitat information, including observations, submitted directly to MTNHP, observations submitted to partners (e.g. iNaturalist and Ebird), plot data, and photographs	In Progress - A new plant observation reporting spreadsheet was developed and has been posted on the Observation Forms and Tools web page and passed on to members of the Montana Native Plant Society to encourage them to submit plant observations and photographs.	In Progress - MTNHP Zoology staff, FWP nongame staff, and USFS biologists have been testing the use of a Survey123 application that MTNHP developed for entry of plant and animal survey and observation data and photos during the 2017 field season. Plans are in place for testing by the BLM and other agencies and for surveys, observations, and photos submitted by approved agency users to be directly loaded to MTNHP observation, survey, and photo databases without staff review so that it will show up on MTNHP websites the day after it is uploaded.
15. Continue to maintain and improve the functionality and ease of use of the MTNHP core web apps including Montana Field Guide, MapViewer, Species SnapShot, and Species of Concern web reports	Ongoing - The Montana Field Guide, Species of Concern Report, Species Snapshot, and Map Viewer were updated to show status ranks under the new 2015 State Wildlife Action Plan rather than its predecessor that was released in 2005. - Mile markers on highways and railroads were added to the MapViewer application in response to a request from MDT. - The Discover It search was added to the list of web search engines for articles on individual species or ecological systems. - Worldcat and PDF links in the field guide species accounts were discontinued after it was discovered that many of the PDFs required purchase and WorldCat identifier links were not stable. - The Species Snapshot was updated to deliver custom field guides generated from users spatial and status filter selections. - The Species Snapshot was updated to include spatial filters for County, Town, Township, USGS 1:24,000 scale quadrangle maps, areas east and west of the Continental Divide, mountain ranges, soil and watershed Conservation Districts, National Parks, Major Land Resource Areas, Forest Service Forest and District boundaries, BLM Field	Ongoing - See progress on new Environmental Summary Tool in Map Viewer in #13 above. - The MTNHP Program Coordinator and Web Programmer initiated a NatureServe Heritage network web developers forum for leveraging code that individual programs have developed for potential use across the network and to receive feedback on the Common Field Guide web platform that MTNHP has begun to develop. By collaborating with programmers and database staff with advanced skills in other NatureServe network member programs and at NatureServe, we feel that we can not only advance the type of products provided by the entire network, but also enhance the stability of web products within individual programs across the network.

	Office boundaries, Landscape Conservation Cooperative boundaries, FWP Region, hunting districts, Wildlife Management Areas, Fishing Access Sites, state parks, State Wildlife Action Plan focal areas, state House and Senate Districts, watersheds, Bird Conservation Regions, Important Bird Areas, latilong, quarter-latilong, and quarter-quarter latilong blocks, Important Plant Areas, Bailey's Ecoregions, Omernik's Ecoregions, and tribal boundaries. Furthermore, we are working on implementing these same filters in the Advanced Search option of the Montana Field Guide. - The Species Snapshot web application was updated to include an Excel output for those individuals just interested in lists of species instead of custom field guides. - The Montana Field Guide was updated to make the pages compatible with viewing on mobile devices. - The Montana Field Guide was updated to provide options for custom field guide pdfs or a panel of images of all the species belonging to various taxonomic groupings (e.g., Class, Order, Family) in order to facilitate comparisons between species and identification of species people are seeing. - See progress on new Environmental Summary Tool in Map Viewer in #13 above.	
16. Continue to work with the MSL Digital Library Division staff to effectively cross reference and integrate new MTNHP information and data with the MSL catalogue, search methods, and reference services.	Ongoing - We provided 16 MTNHP reports to the State Publications Librarian that MTNHP staff completed in the past few years which need to be placed in the MSL catalogue and made accessible via the Internet Archive. - Six reports previously provided to the State Publications Librarian have been added to the internet archive.	Ongoing - Twenty seven reports previously provided to the State Publications Librarian still need to be added to the internet archive.
17. Maintain the Natural Heritage Program's reference system for literature on the plants, animals, and habitats of Montana	Ongoing - Added 4,175 literature references on Montana plant and animal species and biological communities to the MTNHP reference system. Many of these were made available to users via accounts in the Montana Field Guide. - Approximately 90% of the hard copy zoology files have been scanned into digital .pdf documents so that all files can be managed digitally moving forward and to allow for offsite backups to protect against catastrophic loss. - Approximately 50% of the hard copy botany element files were scanned into digital .pdf documents so that all files can be managed digitally moving forward and to allow for offsite backups to protect against catastrophic loss.	Ongoing - Added 4,175 literature references on Montana plant and animal species and biological communities to the MTNHP reference system and turned on 258 reference associations for 97 species in the Montana Field Guide. - Scanning of additional hard copy botany and zoology element files is on hold until funding and staff time are available.

Supplemental Core Information Services Program Services		
	1st through 6th Quarter FY 16-17 (July 1, 2015 – December 31, 2016)	**7th & 8th Quarter FY 16-17** (January 1, 2017 – June 30, 2017)
1. Create and maintain secure map services for MTNHP data that Partners can consume in their GIS or web applications, including species occurrences and animal/plant point observation data	Ongoing - A Species of Concern ARC-IMS map service continues to be delivered to MDT, BLM, and USFS. In collaboration with MSL-DLD staff we investigated using ARC-GIS feature services to deliver live species occurrence, point observation, and structured survey data. Unfortunately, these services fail on our full data sets due to large numbers of points or vertices. As an alternative, we are considering regular exchanges of File Geodatabases with these agencies to allow them to do the same thing free of any constraints posed by firewalls etc. on map or feature services. - Updates were made to the MSDI Land Cover and Wetland Riparian mapping data and this updated information is available via map services that can be consumed in anyone's local GIS environment.	Ongoing - A Species of Concern ARC-IMS map service continues to be delivered to MDT, BLM, and USFS. - We plan to explore use of Web Feature Services and open source GeoServer to accomplish live delivery of Species of Concern, observation, and survey information in the future as funding and staff time allows.
2. Provide support to train and inform agency Partners in effectively using technical resources, services, and applications, through webinars, PowerPoint presentations at professional meetings, or agency groups	Ongoing - MTNHP information resource trainings were provided to the Montana Education Association and Montana Federation of Teachers, the Department of Commerce, Malmstrom Air Force Base environmental planning staff, Montana Audubon staff, the Montana Invasive Species Advisory Council, librarians across Montana, Montana Plant Conservation Conference attendees, Montana Chapter of the Wildlife Society meetings attendees, the Noxious Weed Trust Fund Grant Committee, nongame staff at FWP, Intermountain GIS conference attendees, Montana Wetland Council meeting attendees, NatureServe's Biodiversity without Boundaries conference attendees, Montana Land Trusts, Montana Department of Agriculture personnel, Natural Resources Conservation Service personnel, USFS Region 1 Wildlife Biology and NEPA personnel, Beaverhead-Deerlodge Forest Service resource planning personnel, Montana Watershed Coordination Council staff and members, a delegation of natural resource managers from Russia, the Montana Library Commission, NatureServe and Natural Heritage Program staff across the U.S. and Canada, Carroll College Environmental Careers Program, FWP Headquarters and Environmental Review staff, and the Montana Wood Products Association. Four posters on MTNHP information resources were displayed at the Governors Summit on Invasive species on April 12th and	Ongoing - MTNHP information resource trainings were provided to BLM state office staff, wildlife biologists and NEPA staff at the Region 1 Office of the USFS and on the Flathead, Custer-Gallatin, Beaverhead-Deerlodge National Forests, nongame staff at FWP, NatureServe and Natural Heritage Program staff across the U.S. and Canada, the Montana Wood Products Association, the Utah Division of Wildlife, the Region 1 Office of the U.S. Forest Service, librarians across Montana and at Montana State University, the Noxious Weed Trust Fund Grant Committee, Opencut and Air Quality staff at DEQ, faculty in the Wildlife Biology Program and Division of Biological Sciences at the University of Montana, environmental staff at MDT, staff and students at Blackfeet Community College, forestry and trust land staff at DNRC, Trout Unlimited, members of the Montana Chapter of the Wildlife Society, and members of the Montana Watershed Coordination Council.

	13th.	
3. Gather information from users about user information needs, format/access preferences, and the effectiveness of our delivery systems and tools	Ongoing - Partner feedback is provided during various MTNHP information resource trainings listed in #2 above and other meetings attended by MTNHP staff. - We also received feedback from MTNHP partners at the annual MTNHP partners meetings on December 7th 2015 and December 1st, 2016. see the meeting summaries posted at: http://mtnhp.org/about/announce.asp#PartnersMtg2015 and http://mtnhp.org/about/announce.asp#PartnersMtg2016 - In preparation for a training to land trusts, feedback from land trusts was provided in response to an MTNHP generated survey.	Ongoing - Received partner feedback during all MTNHP information resource trainings listed in #2 above as well as additional meetings attended by MTNHP staff.
4. Evaluate ArcGIS on-line capabilities and develop strategy	In Progress - We evaluated ArcGIS on-line during the course of working on Species of Concern polygons for the USFWS's Information for Planning and Conservation website in order to get feedback from a variety of data partners. We plan to use ArcGIS on-line in the future to share datasets in a dynamic and interactive manner as needed. We plan to re-evaluate ArcGIS on-line capabilities to deliver information to our partners more broadly at some point in the next biennium. - We also plan to investigate the potential of AppStudio for ArcGIS to allow partners to view predictive distribution models and other information via Apps on their smart phones, Survey123 for ArcGIS to allow partners to collect animal and plant observations via Apps on their smart phones, and Collector for ArcGIS to allow MTNHP staff and agency partners to gather animal and plant observations. - We have determined that the easiest way to provide partners direct access to the latest predicted distribution models is to generalize 90-meter pixel output into hexagon vectors that are 1 square mile in area. This will allow us to show predictive distribution models with observation, survey, and range map information in the Single Species Overview task in Map Viewer.	Ongoing - We are under discussions with the Montana Invasive Species Advisory Council members on using ArcGIS online to show static maps of distribution, survey, and detection that do not require any filtering by observers (e.g., single maps or story maps that convey a targeted message).
5. Examine the feasibility of developing techniques and tools for mobile data collection for staff and citizen scientist's	Ongoing - We received feedback from other Heritage Programs that they found the use of iNaturalist and Survey 123 for ArcGIS to be the most valuable methods for data collection from the public and their staff, respectively. We are exploring the potential use of these applications in Montana.	Ongoing - MTNHP Zoology staff, FWP nongame staff, and USFS biologists have been testing the use of a Survey123 application that MTNHP developed for entry of plant and animal survey and observation data and photos during the 2017 field season. Plans are in place for testing by the BLM and other agencies and for surveys, observations, and photos submitted by approved agency users to be directly loaded to

		MTNHP observation, survey, and photo databases without staff review so that it will show up on MTNHP websites the day after it is uploaded.
6. Continue to participate in a work group with MSL Geographic Information to develop a new workflow for land information data creation, maintenance, and dissemination that includes the managed areas, conservation easements, public lands and private conservation lands data.	In Progress - We continue to consult with the MSL-DLD GIS Programmer/Analyst lead on the land management data in order to make sure that all map features represented in the past are properly considered for current and future display. - We consulted with USGS staff that manage the Protected Areas Database of the United States (PAD-US) and provided an update of Montana protected areas for them to incorporate into the national database.	In Progress - We continue to consult with the MSL-DLD GIS Programmer/Analyst lead on the land management data in order to make sure that all map features represented in the past are properly considered for current and future display.
7. Continue to maintain and update a statewide Land Management GIS database in collaboration with MSL Geo Info program	In Progress See Task 6 above.	In Progress See Task 6 above.

Project Supported Information Services Program Services		
	1st through 6th Quarter FY 16-17 (July 1, 2015 – December 31, 2016)	**7th & 8th Quarter FY 16-17** (January 1, 2017 – June 30, 2017)
1. Design, develop, and deploy a "Mid-level" functional access to MTNHP Species of Concern (SOC), habitat, and species list information in the Natural Heritage MapViewer to support planning and resource management activities of local government, private consultants, and conservation organizations	In Progress - See Task 13 under the Information Program Services Core Services above.	In Progress - See Task 13 under the Information Program Services Core Services above. We are currently training agency partners on the use of this new Environmental Summary tool and have incorporated updates and guidebooks as a result of their feedback. This application is now being used to answer standard mediated requests of MTNHP information.
2. Work with MSL to identify, catalog, and make accessible via the Internet Archive gray literature and other unpublished reports and documents related to the flora, fauna, and ecological systems of Montana	Ongoing - We provided 16 MTNHP reports to the State Publications Librarian that MTNHP staff completed in the past few years which need to be placed in the MSL catalogue and made accessible via the Internet Archive. - Six reports previously provided to the State Publications Librarian have been added to the internet archive.	Ongoing - Twenty seven reports previously provided to the State Publications Librarian still need to be added to the internet archive.
3. Work with Zoology staff to design and implement a website to display bat acoustic and associated data in a dynamic manner that allows patrons to analyze bat activity patterns over time across the state.	No progress - pending time availability of web programmer.	No progress - pending time availability of web programmer.

Core Botany Program Services		
	1st through 6th Quarter FY 16-17 (July 1, 2015 – December 31, 2016)	**7th & 8th Quarter FY 16-17** (January 1, 2017 – June 30, 2017)
1. Maintain a comprehensive database and taxonomic list of vascular plants occurring in Montana.	Ongoing: - Researched the presence/absence of eight plants reported for Montana that are categorized as Status Under Review. - Acquired and reviewed data on two new species for the State: *Castilleja kerryana* and *Anelsonia eurycarpa*. - Reviewed feedback that two species occurring in Montana were mis-identified, and may need to be removed from the Montana Vascular Plant Checklist & Field Guide. - Catalogued changes to the nomenclature, presence/absence, and/or origin of species listed in the 2013 Vascular Plant Checklist. - Cataloguing changes to the nomenclature, presence/absence, and/or origin of species listed in the 2013 Vascular Plant Checklist. - Removed three species from the checklist; these plants were 'reported" but research revealed they are actually absent from Montana. - Corresponded with various botanists to properly identify and understand the taxonomy of various Status Under Review plants. - Corresponded with other experts on a variety of taxonomic topics for vascular plants, lichens, and mosses.	Ongoing: - Worked on updating the 2013 Vascular Plant Checklist, carefully reviewing taxonomy, origin, & species presence/absence. Reviewing literature and herbaria that provides plant survey data. An updated Vascular Plant Checklist will be completed during the winter of 2017/2018. - Corresponded with a variety of botanical experts on specific species reported as occurring in Montana to determine actual presence and identity. - Reviewed nomenclature and taxonomy used by Montana's botanical authorities, NatureServe, Flora of North America, NRCS PLANTS database, and Biota of North American Program (BONAP) to update vascular plant checklist and MTNHP database.
2. Collect, evaluate, and manage observation data for vascular plants, including integrating regional databases of herbarium specimens.	Ongoing: - Verified identification of numerous plant observations submitted by people from a variety of affiliations for entry into database. - Verified identification of numerous observations on about 20 vascular plants categorized as "Status Under Review" for entry into database. - Constantly receiving observation data from public and partnering organizations. Conducted quality control measures, and have it ready for data entry. - Conducted quality control measures on data from the Consortium of Pacific Northwest Herbaria which is being entered as staff time allows. - Requested observation information and photographs on Status Under Review plants from attendees at the Montana Plant Conservation Conference. - Working with Database Manager and Assistant to train Botany Assistant in data entry and mapping plant observations.	Completed: - Provided direction on data entry for 8,739 plant observations completed by Botanist, Botany Assistant, and Database Assistants. - Formatted the Biotic Source Codes (system that identifies the location of the original plant observation data) to improve consistency for locating Water Howellia observations made from 1988-2007. Ongoing: - Performed quality control checks (accuracy of identification and completeness of information provided) on plant observations submitted to the MTNHP and on specimens found in the Consortium of Pacific Northwest Herbaria (CPNWH). - Maintained an organizational structure and tracking system for data entry that includes reviewing, entering data, and archiving data for each observation. - Responded to patrons who submit data, inquire about submitting data, or who have plant questions.

	- About 166 plant observations from Consortium of Pacific Northwest Herbaria (CPNWH) entered into Botany Database and mapped by Database Assistant. - About 65 plant observations from CPNWH entered into an Excel spreadsheet and waiting for approval before putting into database. - About 345 plant observations submitted by partner organizations entered into botany database and mapped by Botany Assistant. - Several times a week, assesses quality control measures on plant observation data received from public and partner organizations before accepting into database. - Requested and received observation data from Montana Botanists on Status Under Review plants.	- Prioritized data entry workload as data backlog grows and needs by our partners and projects and funding sources change.
3. Work with Information Services staff to design and implement a revised and updated Botany database for observations and species occurrences	Ongoing: - Worked with Database Manager and Program Coordinator to determine the changes needed in the Botany Database. Constructed new Botany database. We streamlined the fields and created some auto-entry capabilities to reduce the back-log in entering plant observation data. - Corrected problems associated with at least 50 vascular plant observations. Most observations are now in the Botany database or have been archived in the deleted database. - Participated in 1-2 hour meetings every other week with Database Manager to work on database tasks. - Worked with Database Manager and Data Assistants to tweak the revised Botany Database to be more efficient. - Worked with Database Manager and Data Assistants to develop a data entry manual.	Completed: - The new botany database is completed. How we enter in and organize information has become more uniform with current data entries. Staff were trained in the new methods. - A list of 'data clean-up needs' from old data entries has been identified and agreed upon between Database Manager and Botanist. Ongoing: Participated in 1-2 hour meetings every other week with Database Manager to work on Botany-Database tasks. - Working with Database Manager to identify problem Species Occurrences (SOs) and to improve consistency in mapping and defining Species Occurrences for SOC. - Clean-up of past data entries is continual and dependent upon staff time.
4. Create species' occurrences for vascular plant, bryophyte and lichen Species of Concern.	Ongoing: - Corrected all data associated with a particular moss SOC after receiving verification on its true identification. Work was conducted in response to updating the Montana Moss Checklist. - Corrected the location of two lichen SOCs after receiving better information. Work was completed in response to a request by an MDT Biologist. - Created 3,183 Species Occurrences for vascular plant Species of Concern; 2,054 of these were for Whitebark Pine (*Pinus albicaulis*) - Having frequent discussions with Database Manager on Species Occurrence mapping. - Working with Database Manager to review Species Occurrence mapping for select Species of Concern plants.	On-Hold - Creating or modifying SOs for Lichen and Moss SOC is on-hold until the taxonomy is updated in the botany database. Ongoing: - Creating new, or modifying existing, SOs for SOC as staff time and funding allow. A back-log of SO creation for vascular plants is building.

5. Review the status of vascular plants, assign state ranks and, where appropriate, assign global ranks, and document these status ranks	Ongoing: - Under a 2015 Noxious Weed Trust Fund grant from the Department of Agriculture, we obtained information (taxonomy, distribution, ecology, population, threats) on 45 vascular plants categorized as Status Under Review and assigned State Ranks. - Compared State rank results and methodology using the MTNHP Rank Calculator and NatureServe Rank Calculator and did some preliminary ranking. - Completed: the state ranking process for *Anelsonia eurycarpa* – S2 State Rank. - Participated in the Cascadia Regional Conference of heritage programs and collectively reviewed the global ranks of 5 plants. Compiled Montana data to assist in global ranking.	Ongoing: - Reviewing the status and rank of 81 plants categorized as Status Under Review through Noxious Weed Trust Fund grants from the Montana Department of Agriculture. Gathering observation (location) data, reviewing taxonomy and literature, and gathering input from those who are knowledgeable on particular species.
6. Respond to requests for information on the identification, biology, ecology, conservation status, management, and appropriate survey methods for vascular plants, bryophytes and lichens.	Ongoing: - Responded to 62 requests for information on vascular plants, mosses, lichens, fungi, and appropriate methods to survey these taxa. - Identified 16 plant specimens given to me by private individuals. - Provided feedback on at least 4 moss specimens photographed by private individual.	Ongoing: - Spent about 66 hours responding to 30 requests for information on vascular plants, mosses, and lichens. - Responded to at least 15 inquiries about 'wetland plant identification' trainings, as has been done for the past 6 springs. Unfortunately, the source funding for this work was not available this year. - Provided feedback on monitoring techniques for *Penstemon lemhiensis*. - Responded to 4 requests for help in identifying moss species that were photographed.
7. Work with other Heritage staff to regularly exchange information with NatureServe.	Ongoing: - Worked with NatureServe Botanists and a Data Assistant to inform them and get feedback on our process for reviewing and updating the Montana moss and lichen checklists. - Updated the origin classification of about 10 vascular plants in NatureServes' Biotics database. - Updated the presence classification of 1 lichen and 1 moss in Biotics. - Worked with Database Assistant and NatureServe to prepare data on diatoms for entering into Biotics and MTNHP Species databases. - Participated in Cascadia Conference, Nov 1-2, with regional Botanists to discuss: specific program structure & botanical workloads for 9 regional heritage programs; the Coefficient of Conservatism ranking process; review/revision of the Global ranks for specific plants of regional interest; reporting negative data; and other topics.	Ongoing:: - Exchanged information with Idaho Natural Heritage Program on Howell's Gumweed (SOC) and how they implement the NatureServe methodology for ranking plants. - Updated information in Biotics database on about 515 moss species and 15 vascular plant species. - Requested NatureServe to assign an ELCODE for a moss that was recently documented in Montana and previously absent in NatureServe's database.
8. Work with other Heritage staff to maintain and improve content and	Ongoing: - Botany Assistant and Botanist worked with the Web	Ongoing:: - Revised about 5 vascular plant profiles on the Field Guide.

delivery of botanical information on MTNHP websites, including Field Guide, SOC Report and MapViewer.	Programmer and Database Manager to fix numerous issues with Vitalis (literature database) and Thumbs-Plus (photo database). - Attributed photos so that 226 species, mostly grasses, that previously had no photos showing on the Montana Field Guide, now have photos. - Provided feedback on MTNHP websites and tools. - Reviewed and revised a few species accounts on the Montana Plant Field Guide.	- Wrote captions on Field Guide photographs representing 49 grass species. - Updated, removed, or added numerous links posted on our website for botanical resources (websites, publications, etc.)
9. Present information on MTNHP botanical services and data products, and Montana's plant resources at professional and public meetings.	Completed: - Presented botany program tasks, accomplishments, and objectives at the 2015 and 2016 MTNHP Partner's Meeting. - Presented to about 50 natural resource experts at the Montana Plant Conservation Conference. Informed audience of updates on the website, sought feedback on how to provide observation data to MTNHP, and provided information on the products, services, and organizational structure of MTNHP. - Presented on how Montana is developing Coefficient of Conservatism values for plants to regional botanists at the Cascadia Regional Conference.	Completed: - Initiated a conference call to discuss state-wide funding and work projects for Spalding's Catchfly. The 8 attendees included CSKT and USFWS Biologists, Spaldings' Catchfly Technical Team Leader, and Consultant. - Presented to the Spaldings' Catchfly Technical Team in Spokane, WA on the Montana process for submitting USFWS Section 6 program proposals. - Presented a grant proposal on Status Under Review plants to the Noxious Weed Trust Fund in March and it was approved in April. Ongoing: - Working with committee to develop the 2018 Montana Plant Conservation Conference to be held in Helena.
10. Create and maintain information on vascular plants related to their taxonomy, biology, ecology, status, identification and management.	Ongoing: See #12 under Core Botany Program Services. - Obtained at least 15 scientific papers and 5 books through interlibrary loan to gain knowledge, and trace the origin of, particular plants in Montana, etc. - Identified 3 MTNHP botany reports and various scientific papers that are not in Vitalis; Found hardcopies, scanned reports, and entered into Vitalis. - Botany Assistant created or expanded profiles on the Field Guide for about 18 "Status Under Review" vascular plants. - Continually reviewing taxonomic treatments by Flora of North America and other authorities.	Ongoing: See #12 under Core Botany Program Services. - Continually requesting scientific papers and books through Interlibrary Loan on a variety of botanical species and topics.
11. Compile photographic images of vascular plants, bryophytes and lichens.	Ongoing: - Trained Botany Assistant in organizing, annotating, captioning, and posting photos on the Field Guide and using Thumb's Plus Photo Database. Compiled and captioned multiple photos for each of 58 moss species and 10 "Status Under Review" vascular plants. - Added more than 1,700 new photos to the Thumbs Plus photo database and attributed them and others for display on the Montana Field Guide; including more than 200 vascular plants, 28 mosses, 1 liverwort, 2 lichens, and 19 "Status	Completed: - Sent out a call for photographs on about 525 moss taxa to a network of professional and amateur botanists. - Added, attributed, and captioned about 30 moss photos on the Montana Field Guide. - Organized all 626 moss photos in ThumbsPlus (photograph database). Ongoing:: - Maintain an organizational structure and tracking system for photographs submitted to MTNHP or taken by Botanist that

	Under Review" species that previously did not have photos. - Worked to reduce the backlog of unattributed botany photographs, while receiving new photographs, examining new photos for accuracy and quality, and organizing them for future posting.	includes review for identification accuracy, standards for re-naming files, attributing images in ThumbsPlus, and archiving images for storage. - Organized approximately 825 photographs from 2016-2017 projects which are currently awaiting staff time to be uploaded and attributed in ThumbsPlus.
12. Compile literature on vascular plants, bryophytes and lichens.	Ongoing: - Through Interlibrary Loan actively acquired numerous articles and books on vascular plant, moss, and lichen taxonomy, ecology, and management. - Through the "botany network" received and read many peer-reviewed articles on particular vascular plants from agency and consulting botanists - Acquired the Grass and Sedge Family treatments of Flora of North America to be used in developing 2017 classes and for specimen verification. - Added 213 plant literature references to the MTNHP reference system and turned on approximately 5,217 reference associations for more than 3,555 plant species accounts in the Montana Field Guide. - Obtained at least 20 articles on lichens, biological soil crusts, and mosses through interlibrary loan for use in developing proposals and for developing knowledge-base on these species. - Acquired the Mosses of California publication.	Ongoing:: - Continually requesting scientific papers and books through interlibrary loan on vascular plant, moss, and lichen taxonomy, ecology, and management. - Acquired newly published books on mosses, lichens, Mustard & Willow Families.

Supplemental Core Botany Program Services		
	1st through 6th Quarter FY 16-17 (July 1, 2015 – December 31, 2016)	**7th & 8th Quarter FY 16-17** (January 1, 2017 – June 30, 2017)
1. Create associations between vascular plant Species of Concern and the Ecological Systems/habitats in which they occur.	On hold pending funding and staff time.	On hold pending staff time and funding.
2. Create associations between vascular plant Species of Concern and the National Wetland and Riparian wetland and riparian map classes in which they occur.	On hold pending funding and staff time.	On hold pending staff time and funding.
3. Compile and maintain a database of bryophyte and lichen taxa occurring in Montana.	Ongoing: - Working with Joe Elliot to finalize the revision to the 1993 Montana Moss Checklist. - MTNHP volunteer revised lichen checklist based on Bruce McCune's 2014 Montana Lichens: An Annotated List.	Completed: - Developed a Moss Reporting Form and sent to the botanical network in hopes of making it easier to obtain moss species observation data. - Revised the presence/absence, origin, and taxonomy of 525

	Volunteer updated common names and resolved some issues with nomenclature.	moss taxa that occur in Montana (497 species, 23 varieties, 5 subspecies) following the Flora of North America taxonomy. Data on species found in Montana came from herbaria, experts, or recent publications. - Updated the synonyms and common names for Montana mosses and formatted naming to create consistency. On Hold Pending Staff Time and Funding: - Data entry of at least 9,000 moss observations obtained from herbaria, experts, or recent publications. - Staff time is needed to update lichen and moss nomenclature in various MTNHP databases to support revision of the lichen and moss checklists.
4. Review the status of bryophytes and lichens, assign state ranks and, where appropriate, assign global ranks, and document these status ranks	Ongoing: - Had an SOC moss verified by Dr. Dale Vitt. The identification led to the removal of this species from the SOC list and a status update in the State Checklist.	On Hold Pending Staff Time and Funding: - Conservation status reviews for mosses and lichens will not occur until the revised moss and lichen checklists are completed, nomenclature has been updated in MTNHP databases, and sufficient data has been entered into the observation database; at least 9,000 moss observations obtained from herbaria, experts, or recent publications needs to be entered in various MTNHP databases.
5. Collect, evaluate, and manage observation data for bryophytes and lichens.	Ongoing: - Obtained over 2,500 observations of mosses in Montana from Dr. Bruce McCune. - Obtained at least 600 observations of mosses and liverworts in Montana from the Consortium of Pacific Northwest Herbaria. - Entered observation data for 93 moss and lichen species into Excel for appending to the main observation database. - Curated moss and lichen specimens for accession to the University of Montana herbarium.	Ongoing: - Lichen data is being sought and archived; however data entry is pending until a revision to our lichen checklist and taxonomy is completed. - A request for moss observations, photographs, and other data was sent to 147 people. On Hold Pending Staff Time and Funding: - Data entry of at least 9,000 moss observations obtained from herbaria, experts, or recent publications. - Data entry for at least 230 moss, lichen, and cyanobacteria specimens. - Organizing and editing about 200 moss and lichen species and habitat photographs in order to post the best on the Montana Field Guide.
6. Create and maintain information on bryophytes and lichens related to their taxonomy, biology, ecology, status, identification, and management.	See #12 under Core Botany Program Service	See #12 under Core Botany Program Service
7. Maintain a subject guide of authoritative web resources relevant to vascular plants, bryophytes, and lichens.	See #12 under Core Botany Program Service	See #12 under Core Botany Program Service
8. Develop and maintain a geodatabase	Ongoing	On Hold Pending Staff Time and Funding:

of unique habitats such as fens that are of special importance for Montana's botanical resources.	- Database is populated, but no new data entries have occurred.	- Database is populated, but no new data entries have occurred.

Project Supported Botany Program Services		
	1st through 6th Quarter FY 16-17 (July 1, 2015 – December 31, 2016)	**7th & 8th Quarter FY 16-17** (January 1, 2017 – June 30, 2017)
1. Conduct training sessions on the identification and ecology of Montana's vascular plants, bryophytes, and lichens.	Ongoing: - Gave 3 wetland plant identification trainings for DEQ to 43 participants affiliated with government, non-profits, academics, and private sectors. Taught 1-day classes in Sheridan, Lewistown, and Ovando. - Taught two 2-day intermediate wetland plant identification trainings in Bozeman and Missoula for DEQ to 40 participants affiliated with government, non-profits, academics, and private sectors.	Completed: - Taught a half-day class on upland grasses and shrubs to DEQ's Open-Cut and Coal Programs. On Hold Pending Funding - Funding to teach wetland plant identification through DEQ's Wetland Program is no longer available. Ongoing: - Searching for funding opportunities to teach botanical identification classes on a variety of topics and species.
2. Monitor populations of ESA-listed and globally rare vascular plants.	Ongoing: Spalding's Catchfly (*Silene spaldingii*) for USFWS - Monitoring: Collected Year-1 data from 10 transects on the Confederated Salish Kootenai Tribe's (CKST) land. The pilot study served to test the design for collecting demographic data. Demographic studies track individual plants through time and collect data on presence/absence (dormancy rate), plant height, reproductive characteristics, herbivory, and habitat cover (vascular, rock, bare soil, non-vascular), and disturbance (animal, weeds, physical). - Surveys: Visited 11 known SOs (sub-populations) on CSKT land to get updated information. Water Howellia (*Howellia aquatilis*) for USFWS - Monitoring: Surveyed 3 SOs that had burned and 3 unburned SOs to determine plant's status. Collected data using the USFS Monitoring protocol. Ute Ladies'-tresses for MDT - Verified species and surveyed project area for an MDT highway re-alignment project with MDT District Biologist and the consultant. Also re-visited two SOs to determine current status. Lemhi Beardtongue (*Penstemon lemhiensis*) for NPS - Assisted the National Park Service in their 7th year of monitoring Lemhi Penstemon at the Big Hole Battlefield, Wisdom.	Ongoing: Spalding's Catchfly (*Silene spaldingii*) for USFWS - Prepared, submitted, and won a competitive Section 6 grant to conduct a 3-year monitor project on the Confederation Salish Kootenai Tribe. Monitoring will begin July 2017. Water Howellia (*Howellia aquatilis*) for USFWS - Obtained USFWS funding to evaluate the effects of land management (forestry, grazing, road development, and fire) on the persistence of Water Howellia from 1978-2015. Completed: analysis and report in March 2017. - A USFS proposal was funded to revise maps and graphs for development of a peer-reviewed paper. Ute Ladies'-tresses (*Spiranthes diluvialis*) - Provided data on the federally threatened *Spiranthes diluvialis* to Wyoming Natural Diversity Database who is authorized to develop a predictive habitat model across its range.
3. Conduct field surveys for vascular plants, bryophytes and lichens,	Ongoing: Surveys for BLM	Completed: - National Wetland Condition Assessment – EPA: Identified at

focusing on Species of Concern and under-surveyed geographic areas.	- Re-visited several SOs of known BLM Sensitive plants to collect updated information. - Trained BLM Botanist and Range Technician how to find and identify Idaho Sedge (*Carex idahoa*) in the field - Shoshonea (*Shoshonea pulvinata*). Collected Year-7 data on a study spanning 25-years. Collected demographic data on 3 permanent transects installed in 1991. - Recruited and organized 9 bryologists/lichenologists for first moss and lichen surveys in Mussellshell County. Collected and identified about 230 specimens representing about 27 moss, 104 lichen, and 3 cyanobacteria species. Photographed species and habitats for posting on the Lichen and Plant Field Guides. Surveys for USFS - Assisted expert Botanist and USFS in surveying a portion of the Italian Peaks to map 8 vascular plant SOCs and 1 potential vascular plant SOC. One of these species was the first known occurrence for Montana. - Developed protocols to assist the Lolo National Forest in a genetic study of *Grindelia howellia* (Howell's gumweed), an SOC/Forest Sensitive plant. - Re-visited at least 21 locations of Howell's gumweed to collect updated data and to collect leaves for a genetic analysis.	least 400 plant specimens collected in wetlands by the Ecology program, and reported results to EPA. - Conducted re-visits to Wagner Research Natural Area and two other locations collectively known to have 10 orchid species. Obtained new population data and photos, and assessed current habitat conditions. On-going - Obtained funding to assist USFS Botanist to census a population of *Penstemon lemhiensis*.
4. Develop reports and peer-reviewed publications on the distribution, taxonomy, biology, ecology, status, identification and management of Montana's vascular plants, bryophytes and lichens.	Ongoing: - Completed: Spalding's Catchfly report which summarized monitoring and survey data for CSKT and USFWS. - Completed: data analysis and graphical/tabular summaries on 220 Species Occurrences (SO) of Water Howellia from 1978-2015. Analysis and summaries were provided to the Flathead National Forest and Swan Ecosystem Center. The analysis summarized USFS monitoring studies; relationship between presence/absence of plant, air temperature, and precipitation; presence/absence of plant versus timber prescriptions, grazing, roads, and fire; summary of each pond (SO) and their 300-foot buffer relative to land ownership, tree species/size/density, lifeform, and disturbance regime (timber, fire, road, and grazing); and much more. - Finalized the 1991-2015 demographic monitoring study on *Shoshonea pulvinata* (Shoshonea). The report to the BLM summarized population data on plants tracked during 7 years over a 25-year period. The report included data on impacts from wild horses and potential oil & gas projects. Also summarized 2015 data on SOC populations visited	Completed: - Analyzed data and wrote report on the effects of land management (forestry, grazing, road development, and fire) on the persistence of Water Howellia from 1978-2015 (March 2017). Ongoing: - Obtained funding to assist USFS Botanist with Phase II of a *Grindelia howellia* genetic study. - Obtained funding from MDA to review the status of 38 Status Under Review plants. - Obtained funding to assign Coefficient of Conservatism values to about 315 vascular plants.

	while conducting the Shoshonea monitoring. - Reviewed draft survey report for the Italian Peaks rare plant survey. - Wrote Coefficient of Conservatism Rankings for the Flora of Montana: Part II. - Wrote article and report on conducting the first documented moss and lichen surveys in Mussellshell County.	
5. Create predicted distribution maps for vascular plant, bryophyte and lichen Species of Concern.	Ongoing: - Reviewed draft maps and variables used to predict distribution for federally-threatened plants (Spalding's catchfly, Water Howellia, and Ute ladies'-tresses) for the USFWS IPAC effort.	Ongoing - Received grant from USFS to created predictive distribution models for a minimum of 39 plant Species of Concern that are USFS Sensitive Species. Modeling will be conducted in the late summer and fall of 2017.
6. Compile and maintain data on other taxonomic groups: Fungi, Algae, Diatoms.	Ongoing: - Obtained MTDEQ database on diatoms (150,000 observations identified by diatom experts). - Obtained database on *Didymosphenia* diatom that has been developed by MFWP and university researchers. - Found the only checklist of Montana Algae, compiled from 1891-1977.	On Hold Pending Staff Time and Funding: - Development of an algae taxa checklist - Entry of diatom data - Working with fungal experts

Core Ecology Program Services		
	1st through 6th Quarter FY 16-17 (July 1, 2015 – December 31, 2016)	**7th & 8th Quarter FY 16-17** (January 1, 2017 – June 30, 2017)
1. Respond to user requests for information on the distribution, composition, successional dynamics, conservation status, management, and appropriate survey methods for terrestrial and wetland communities	Ongoing - Respond to ~ 15 requests per month for vegetation community information, esp. wetlands, sagebrush, whitebark pine, and Russian olive - Respond to ~ 2 requests per month about wetland survey methods	Ongoing - Responded to ~ 15 requests per month for vegetation community information, esp. wetlands, sagebrush, whitebark pine, and Russian Olive - Responded to ~ 4-6 requests per month about wetland survey methods, and share technical products with users in MT and other states - Responded to ~ 2 requests per month on land cover disturbance
2. Respond to user requests for assistance using or interpreting wetland and land cover map products	Ongoing - Respond to ~ 4 requests per month for updated Land Cover mapping - Respond to ~ 6 requests per month for clipped or provisional wetland mapping - Respond to ~ 4 requests per month for help interpreting wetland mapping	Ongoing - Responded to ~ 4 requests per month for updated Land Cover mapping - Responded to ~ 6 requests per month for clipped or provisional wetland mapping - Responded to ~ 4 requests per month for help interpreting wetland mapping. Provide agency partners with sample analyses to encourage use of products
3. Compile photographic images of wetland and terrestrial habitats representative of those found in	Ongoing - Photographs from 2015 Whitebark Pine surveys and 2013 grassland surveys entered into Thumbs Plus	On hold pending acquisition of new photos during 2017 field season

Montana and make them available on MTNHP websites	- Photographs from 2015 forested wetland ecosystems loaded into ThumbsPlus.	
4. Create and maintain accounts for terrestrial and wetland land cover classes and/or ecological systems in the Montana Field Guide that describe the composition, distribution, status, successional dynamics, and management/restoration needs of each.	Ongoing - All forested ecosystem descriptions have been updated with new information on disturbance and dynamics; new references to support info all entered into Vitalis - Completed crosswalk between NVC and Ecological Systems and linked to MT Field Guide	Ongoing - Aggregated wetland polygons into mosaics and began assigning mosaics to Ecological Systems with goal of achieving better representation of wetland ecological systems in mapping and on Montana Field Guide - Began review of all Ecological System Field Guide descriptions to update information and references
5. Work with Information Services staff to maintain and improve content of ecological information on Heritage websites, including wetland mapping and assessments, land cover mapping, ecological community accounts, and georeferenced photos.	Ongoing - Built new database structures (SQL with Access front end) to allow consolidation of all wetland assessment data in a single database accessible from MapViewer	Ongoing - Migrating wetland assessment data from 800+ sites from individual project databases to new SQL structure so that all assessment data can ultimately be accessed via MapViewer
6. Collaborate with other Heritage Program and NatureServe ecologists from the Rocky Mountain Region to ensure compatibility of ecological mapping and classification systems	Ongoing - Continue to work with NatureServe to update the NVC. - Reviewed final version of NVC to identify new groups for Montana - Working with Natureserve on continental-scale mapping and assessment of grassland systems - Consulted with CNHP on ecological system and ecological site tracking - Continued to work with NatureServe to resolve occurrence questions for Systems, Groups and Alliances, and to more accurately describe Montana vegetation communities	Ongoing - Working with CNHP and WYNDD to help them update their wetland classification systems to include Landform, Landscape Position, Water Path and Water Flow (LLWW) modifiers
7. Update information on ecological communities and systems to reflect the 2015 National Vegetation Classification Standard mandated for use by all agencies receiving federal funds for vegetation classification activities.	In Progress - Crosswalk between all current levels of NVC and Ecological Systems completed - Continued to work with NatureServe to continue to resolve occurrence questions for Systems, Groups and Alliances, and to more accurately describe Montana vegetation communities - Revising Field Guide database to include new classification structures from NVC	On hold pending staff time
8. Maintain a subject guide of authoritative web resources relevant to terrestrial and wetland communities	On hold pending staff time.	On hold pending staff time.

Supplemental Core Ecology Program Services		
	1st through 6th Quarter FY 16-17 (July 1, 2015 – December 31, 2016)	**7th & 8th Quarter FY 16-17** (January 1, 2017 – June 30, 2017)
1. Assess the status of terrestrial and wetland communities and ecosystems, assign state ranks, and document the justification behind status ranks	Ongoing - Have developed the databases necessary to assign status rankings to individual wetlands - Continue to work with National Assessment and Monitoring workgroups to refine wetland assessment methods and create cross-state compatibility - Completed 24 two-three day intensive wetlands surveys at 22 sites around Montana for the National Wetlands Condition Assessment - Collected specimens of county plant records at ~ 20 wetlands sites	Ongoing - Surveys underway for wetland and sagebrush ecosystems during 2017 field season
2. Identify ecological sites of particular conservation concern that should be included in MTNHP information provided for environmental assessments	Ongoing - Completed value-added wetland mapping geodatabase and developed methodology to assign "wetlands of Special Significance status" to wetland polygons - Assigned "wetlands of special significance" modifier to wetland polygons, and began preparing metadata to support release of the data to public	Ongoing - Surveys underway for 2017 field season
3. Compile literature on terrestrial, and wetland communities with emphasis on those of conservation concern	Ongoing - References on forested ecosystem disturbance and dynamics were added to Vitalis - Reviewed literature on forested wetlands - A handful of wetland assessment references were added to the MTNHP reference system.	Ongoing - Reviewed literature on 61 invasive plants species found in Montana wetlands and assigned "invasibility" rankings to each one. Prepared report with links to literature which will be published to website after final editing.
4. Maintain crosswalks between different vegetation classification schemes to facilitate use of MTNHP products and products created by others	Ongoing - Have completed NVC-Ecological system crosswalk for Forested and Wetland ecological systems - Completed descriptive crosswalking for all ecological systems - Made minor adjustments to descriptive crosswalk - Integrated crosswalks into mapping products	On hold until additional funding can be secured
5. Work with Information Services to make wetland assessments available on the MTNHP website	On-Hold - Pending database revision to address incompatibly between different project databases	In Progress - Completed new SQL database. Working on migrating project databases into this central database.
6. Compile vegetation data collected by others to support current and future vegetation classification and mapping efforts	Ongoing - Integrated forest service survey data into Whitebark Pine mapping - Worked with partners to prepare Landsat 8 imagery from 2014 and 2015 for further analysis - Worked with USFS to develop methodology for classifying relative abundance of Whitebark Pine, and completed work on Gallatin-Custer, Helena, and Lolo National forests	Ongoing - Collecting data on sagebrush habitats in the Beaverhead-Deerlodge National Forest in partnership with USFS

	- Prepared Landsat 8 imagery from 2016 for further analysis and made it available to partners - Consolidated, crosswalked, and corrected grassland survey data to support Ecological Site Descriptions by NRCS and BLM - Acquired and processed Whitebark Pine survey data from Kootenai and Idaho Panhandle National Forests	
7. Present results of surveys or status assessments of terrestrial and wetland communities at professional and public meetings	Ongoing - Presented results of surveys and status assessments of Headwater wetlands at Montana Wetland Council October 29, 2015 - Presented new value-added wetland mapping attributes to over 80 state and federal partners in EPA regions 10 and 8 - Presented overview of wetland mapping, assessment and analysis to Pacific Northwest Natural Heritage programs at regional conference in British Columbia - Presented land cover and other data summaries in Map Viewer to Intermountain West biologists and landscape ecologists in Denver and discussed sagebrush mapping and development of a sagebrush ecosystem protection strategy	Ongoing - Presented workshops on new value-added wetland mapping at the 2018 URISA conference for GIS users in Montana and Idaho in West Yellowstone

Project Supported Ecology Program Services		
	1st through 6th Quarter FY 16-17 (July 1, 2015 – December 31, 2016)	**7th & 8th Quarter FY 16-17** (January 1, 2017 – June 30, 2017)
1. Conduct field surveys for underrepresented or uncommon ecological communities in under-surveyed geographic areas	Ongoing - Mapped the distribution and extent of Whitebark Pine with 2015 surveys on the Bitterroot and Lolo NFs for the USFS - Surveyed and assessed the condition of 9 uncommon forested wetlands in northwestern Montana - Completed 24 two-three day intensive wetlands surveys at 22 sites around Montana for the National Wetlands Condition Assessment	Ongoing - Conducting sagebrush surveys in partnership with USFS and BLM for 2017 field season
2. Develop reports and peer-reviewed publications on the composition, distribution, and status of Montana's wetland and terrestrial communities.	Ongoing - Completed reports on Headwater wetlands in the Missouri Headwaters HUC and on results of assessments in the Blackfoot-Swan area - Completed chapter on use of LLWW attributes for forthcoming book on wetland landscape assessment - Completed report on Wetland Prioritization Geodatabase for MTDEQ - Completed report on assignment of Wetlands of Special Significance	Ongoing - Prepared report on Russian Olive invasion of eastern Montana Rivers for EPA - Prepared report on landscape-level assessments of PPR wetlands for EPA - Prepared an Index of Alien Invasiveness, including invasibility rankings for 61 exotic species found in Montana wetlands, for EPA - Currently completing final edits so that reports can be posted on website
3. Evaluate the status of wetland and	Ongoing	Ongoing

terrestrial communities with field surveys	- Continued Whitebark Pine and forested wetland ecosystem surveys - Completed wetland surveys for DEQ/EPA (see number 1, above) - Completed Whitebark Pine surveys in Kootenai and Idaho Panhandle National Forests	- Currently conducting field surveys in sagebrush ecosystems in the Beaverhead-Deerlodge National Forest - Currently conducting field surveys on wetlands across Montana to refine statewide wetland reference network
4. Collaborate with partner agencies to develop ecological site descriptions when funding allows	Not Active - No current funding for this activity	Not Active - No current funding for this activity

Core Zoology Program Services		
	1st through 6th Quarter FY 16-17 (July 1, 2015 – December 31, 2016)	**7th & 8th Quarter FY 16-17** (January 1, 2017 – June 30, 2017)
1. Respond to requests for information on the identification, biology, ecology, conservation status, management, and appropriate survey methods for vertebrate and invertebrate species.	Ongoing - Responded to over 1300 requests from federal, state, and tribal personnel as well as consultants and members of the public.	Ongoing - Responded to approximately 450 requests from federal, state, and tribal personnel as well as consultants and members of the public.
2. Continue to gather, manage, and review animal point observation data in a statewide point observation database (POD) for all animal species.	Ongoing - 60,114 observations were added to the animal point observation database for 611 animal species. 27,953 observation records for 414 species were reviewed for final acceptance into the point observation database with a focus on Montana Species of Concern. - 6,260 structured survey locations for 23 different formal animal survey protocols were added to the structured survey database. - An additional 282,265 observation records (17% of all records in the database) still need to be reviewed for final acceptance into the database.	Ongoing - 14,326 observations were added to the animal point observation database for 550 animal species. 231,161 observation records for more than 375 species were reviewed for final acceptance into the point observation database with a focus on Montana Species of Concern. - 7,687 structured survey locations for 14 different formal animal survey protocols were added to the structured survey database. - An additional 51,180 observation records (3% of all records in the database) still need to be reviewed for final acceptance into the database.
3. Work with Information Services staff to maintain and improve content of zoological information on Heritage websites.	Ongoing - Reviewed range maps shown on the Montana Field Guide and Map Viewer web pages relative to observation data for 309 Montana SOC and PSOC and updated or created range maps where necessary for 63 species. - Worked with information services staff to revise the charts and data sections of the Map Viewer web application. - Worked with information services staff to create additional spatial filters for display on the Species Snapshot web application so that custom Field Guides can be created for a variety of spatial boundaries across the state. - See Supplemental Core Zoology Program Services Task 3	Ongoing - Worked with Information Services staff on the format of information provided in the new Environmental Summary Report task of Map Viewer. - See Supplemental Core Zoology Program Services Task 3 below.

	below. - Posted write-ups for predictive distribution models for all Montana SOC on the MTNHP's predictive distribution modeling web page. - Added information detailing inventory and monitoring needs for Species of Greatest Inventory Need to the SOC Report tool, so that all species have current information - Worked with Information Services staff on the format of information provided in the Environmental Summary Report task of Map Viewer.	
4. Collect and manage observational data on animal SOC that has been gathered by others.	Ongoing - 8,465 observations were added to the animal point observation databases for 117 vertebrate and 24 invertebrate Montana Animal Species of Concern and Potential Species of Concern.	Ongoing - 5,749 observations were added to the animal point observation databases for 94 vertebrate and 36 invertebrate Montana Animal Species of Concern and Potential Species of Concern.
5. Maintain animal species occurrences for existing SOC species from high value observations of animal SOC that can be used in environmental assessments.	Ongoing - Reviewed and/or updated nearly 30,000 observation records for animal Species of Concern in preparation for constructing species occurrences. - Updated 9,500 species occurrences and created 2,938 new species occurrences for more than 100 vertebrate and more than 32 invertebrate species.	Ongoing - Reviewed and/or updated 1,378 observation records for 72 animal Species of Concern in preparation for constructing species occurrences. - Created 3,628 new species occurrences for 39 vertebrate and 2 invertebrate species. Reviewed all Species of Concern observation data that was pending a final review in the process of doing this.
6. Maintain a complete taxonomic list of vertebrate animal species for Montana.	Ongoing - Updated taxonomy and four-codes for birds to correspond with the changes made in the American Ornithologists' Union 56th supplement to the Check-list of North American Birds. - Updated taxonomy for mammals to correspond with the Revised Checklist of North American Mammals North of Mexico, 2014. - Added 246 species to the MTNHP Species database table, including 6 beetles, 11 bumble bees, 10 butterflies, 1 moth, 105 grasshoppers, katydids, or crickets, and 106 spiders. - Began compiling information on additional moth and earthworm species that are known to be present in Montana	Ongoing - Added 12 invertebrate and 0 vertebrate species to the MTNHP Species database table. - Summarized changes made in the American Ornithologists' Union 58th supplement to the Check-list of North American Birds in preparation for updating taxonomy and four-codes.
7. Work with other Heritage staff to regularly exchange information with NatureServe.	Ongoing - Received taxonomic data exchange from NatureServe in November of 2016. Some taxonomic updates are still needed within MTNHP databases as a result of this exchange.	Ongoing - Made some taxonomic and global rank updates resulting from data exchange with NatureServe, but some taxonomic updates are still needed within MTNHP databases.

Supplemental Core Zoology Program Services		
	1st through 6th Quarter FY 16-17 (July 1, 2015 – December 31, 2016)	**7th & 8th Quarter FY 16-17** (January 1, 2017 – June 30, 2017)
1. Review the status of vertebrate and invertebrate animal taxa, assign state ranks, assist NatureServe with assigning global ranks when appropriate, and document these status ranks.	Ongoing - Reviewed the inventory and monitoring status of winter-breeding owls and Harlequin Ducks in conjunction with the Montana Animal Species of Concern Committee and removed Eastern Screech-Owl, Short-eared Owl, Great Horned Owl, Long-eared Owl, Northern Saw-whet Owl, and Harlequin Duck from the list of Species of Greatest Inventory Needs.	Ongoing - Conservation status reviews conducted for 149 vertebrate species, final status pending committee review in Fall 2017.
2. Create animal species occurrences for newly designated SOC species from high value observations of animal SOC that can be used in environmental assessments.	Not Active - No species were newly designated as Species of Concern during the reporting period.	Not Active - No species were newly designated as Species of Concern during the reporting period.
3. Maintain species accounts, including state and Western Hemisphere range maps and observational maps, in the Montana Field Guide for all animal SOC.	Ongoing - Added literature to references section of the Montana Field Guide for Harlequin Duck, Evening Grosbeak, Sage Thrasher, Long-billed Curlew, Brewer's Sparrow, and Sage Sparrow. - Created range maps for 180 species including 1 terrestrial mollusk, 1 millipede, 19 bumble bee species, 51 beetle species, 9 butterfly species, and 101 grasshopper, katydid, and cricket species. - Updated 203 range map polygons for 28 vertebrate species and 49 terrestrial mollusk species for display on the Montana Field Guide and use in predictive distribution models. - Added 1,639 photos to the Montana Field Guide, including photos for 941 invertebrate species (moths, butterflies, grasshoppers, katydids, crickets, and bumble bees) that previously had no photos. - Improved the format of more than 750 references that were appearing on the Montana Field Guide. - Reviewed all non-SOC species in the Montana Field Guide to make sure that literate cited in the species accounts was appropriately in the reference sections of the species accounts. - Added species account information from the Hendricks (2012) Guide to the Land Snails and Slugs of Montana to 83 terrestrial mollusk species accounts on the Montana Field Guide. - Added fully referenced species accounts to the Montana Field Guide for 32 Bumble Bee species and nearly 100	Ongoing - Updated information content in 38 vertebrate species accounts and created 70 new fully referenced species accounts for butterflies. - Reviewed range polygons for all bat and shrew species and updated range polygons for 4 bat and 2 shrew species to reflect better knowledge of range and seasonal distribution.

	butterfly species.	
4. Create predicted distribution models for animal SOC.	Ongoing - Established python and other coding to mostly automate creation of inductively and deductively based predicted distribution models and generate associated report output. This reduces staff time in creating and evaluating the models from a minimum of eight hours per species to approximately one hour per species, thus reducing costs of updating predictive distribution models by a factor of eight. Predictive distribution models for all Montana Animal Species of Concern can now be updated on a quarterly basis as new data becomes available. - Models created and reviewed for 62 vertebrate SOC and 1 vertebrate PSOC.	Ongoing - Models created and reviewed for 24 vertebrate SOC.
5. Work toward a complete taxonomic list of invertebrate animal species for Montana.	Ongoing - Added 247 species to the MTNHP Species database table, including 7 beetles, 11 bumblebees, 10 butterflies, 7 moth, 105 grasshoppers, katydids, or crickets, and 106 spiders. - Compiled information on additional moth and earthworm species that are known to be present in Montana.	Ongoing - Added 12 invertebrate species to MTNHP database tables, including 4 beetles, 2 moths, 1 lacewing, 1 dragonfly, 2 wind scorpions, and 1 earthworm.
6. Create and maintain species accounts, including state and Western Hemisphere range maps and observational maps, in the Montana Field Guide for animal species that are not SOC.	Ongoing - See Supplemental Core Zoology Program Services Task 3 above. The conservation status of these species has not been evaluated, but the vast majority of them are unlikely to be classified as SOC.	Ongoing - See Supplemental Core Zoology Program Services Task 3 above. The conservation status of these species has not been evaluated, but the vast majority of them are unlikely to be classified as SOC.
7. Maintain a subject guide of authoritative web resources relevant to vertebrates and invertebrates.	Ongoing - Added links to web resources for bumble bees and butterflies at the bottom of all insect pages on the Montana Field Guide to support federal initiatives on pollinators.	Ongoing - Updated broken web links on MTNHP's Related Web Sites page.
8. Create predicted distribution models for animal species that are not SOC.	Ongoing - Established python and other coding to mostly automate creation of inductively and deductively based predicted distribution models and generate associated report output. This reduces staff time in creating and evaluating the models from a minimum of eight hours per species to approximately one hour per species, thus reducing costs of updating predictive distribution models by a factor of eight. - Created predictive distribution models for 3 vertebrate and 26 invertebrate species that are not SOC.	Not active due to lack of funding and/or staff time.
9. Create associations between animal SOC and the Ecological Systems in which they are known to occur.	Not active due to lack of funding and/or staff time.	Not active due to lack of funding and/or staff time.
10. Create associations between animal	Not active due to lack of funding and/or staff time.	Not active due to lack of funding and/or staff time.

species that are not Species of Concern and the Ecological Systems in which they are known to occur.		
11. Create associations between animal SOC and the National Wetland and Riparian wetland and riparian map classes in which they occur.	Not active due to lack of funding and/or staff time.	Not active due to lack of funding and/or staff time.
12. Create associations between animals that are not SOC and the National Wetland and Riparian wetland and riparian map classes in which they occur.	Not active due to lack of funding and/or staff time.	Not active due to lack of funding and/or staff time.
13. Compile literature on vertebrate and invertebrate animal species with an emphasis on SOC and use it to update references and content in the Montana Field Guide.	Ongoing - See Supplemental Core Zoology Program Services Task 3 above - Compiled over 750 articles on Montana bat species which have not yet been added to the References section of the Montana Field Guide - Added 3,382 literature references on bats, birds, and a variety of invertebrate groups to the MTNHP reference system and turned on approximately 14,138 reference associations for more than 1,558 animal species accounts in the Montana Field Guide. - Combined pdf scans of hard copy literature in MTNHP element files with literature originally obtained in a digital format to create a single common digital filing system for zoology literature. - Completed cross walk of literature in the recently published Marks et al. (2016) Birds of Montana book with references currently in the MTNHP reference system. References still need to be associated with individual species for inclusion in the References section of individual species accounts on the Montana Field Guide.	Ongoing - Added 204 literature references on butterflies, birds, and mammals to the MTNHP reference system and turned on reference associations for 79 species.
14. Compile photographic images of vertebrate and invertebrate animal species and locations where animal surveys have been conducted for Montana SOC.	Ongoing - Loaded bat acoustic survey, mist net survey, and roost survey photos from MTNHP, FWP, USFS, and BLM surveys conducted between 2015 and 2017 into the Thumbs Plus photo database. - Loaded Harlequin Duck survey photos from 2015 into the Thumbs Plus photo database. - Loaded Breeding Bird Survey (BBS) route photos contributed by BBS volunteers into the Thumbs Plus photo database. - Loaded photos into the Thumbs Plus photo database from 2016 projects including Western Toad monitoring, Bat	Ongoing - Loaded photos into the Thumbs Plus photo database from 2017 hibernacula surveys and attributed hibernacula survey photos from earlier surveys. - Archived photos collected during bat hibernacula monitoring to assess human visitation rates.

	Surveys from the BLM Pryor Mountains bat project, and Northern Goshawk surveys conducted on the Custer-Gallatin National Forest for USFS.	
15. Compile photographic images of vertebrate and invertebrate animal species and locations where animal surveys have been conducted for Montana non-SOC.	Ongoing - Loaded bat acoustic survey, mist-net survey, and roost survey photos from MTNHP, FWP, USFS, and BLM surveys conducted in 2015 to the Thumbs Plus photo database. - Loaded bat roost survey photos from MTNHP surveys conducted in winter of 2016 into the Thumbs Plus photo database. - Loaded Breeding Bird Survey (BBS) route photos contributed by BBS volunteers into the Thumbs Plus photo database. - Loaded photos into the Thumbs Plus photo database from 2016 projects including Western Toad monitoring, Bat Surveys from the BLM Pryor Mountains bat project, and Northern Goshawk surveys conducted on the Custer-Gallatin National Forest for USFS.	Ongoing - See Supplemental Core Task 14 above.
16. Scan animal species element files into optical character recognized PDF files so that they can be more readily shared with patrons, digitally archived, and serve as the basis for moving forward with a digital element file system; prioritize animal SOC over non animal SOC and prioritize field observation forms and notes over published articles. NHP staff will consult with MSL staff before providing the public access to copyrighted material.	Ongoing - While optical character recognized scans proved to be impossible, approximately 90% of the hard copy zoology files have been scanned into digital .pdf documents so that all files can be managed digitally moving forward and to allow for offsite backups to protect against catastrophic loss. - Combined pdf scans of hard copy literature in MTNHP element files with literature originally obtained in a digital format to create a single common digital filing system for zoology literature. - Scanned approximately 1/8th of field survey forms for MTNHP bird surveys. - Approximately 10% of zoology element files and 88% of zoology survey forms remain to be scanned.	Not active due to lack of funding and/or staff time.
17. Work with Information Services staff to build the element reference files through automated literature database searches for individual species; prioritize animal SOC over non animal SOC.	Not active due to lack of funding and/or staff time.	Not active due to lack of funding and/or staff time.

Project Supported Zoology Program Services		
	1st through 6th Quarter FY 16-17 (July 1, 2015 – December 31, 2016)	**7th & 8th Quarter FY 16-17** (January 1, 2017 – June 30, 2017)
1. Conduct field surveys for vertebrate and invertebrate species with a focus on SOC and under-surveyed geographic areas and habitats.	Ongoing - Conducted acoustic and mist net surveys for bats in conjunction with USFS, BLM, and FWP across Montana and on USFS lands in the western Dakotas. - Conducted Harlequin Duck surveys across western Montana in conjunction with FWP and the USFS. - Conducted winter roost surveys for bats in conjunction with USFS, BLM, and FWP across Montana and on USFS lands in the western Dakotas. - Deployed bat acoustic roost loggers and trail cameras at Azure, Lick Creek, and Ophir Caves to monitor bat activity levels in association with human visitation. - Continued to decommission our regional network of ultrasonic bat acoustic detector stations in order to focus on analyzing and summarizing existing data. - Conducted call playback surveys for Northern Goshawks on the Ashland and Sioux Districts of the Custer-Gallatin National Forest. - Conducted surveys of Western Toad (*Bufo boreas*) breeding sites across the species' known range in western Montana in conjunction with FWP to evaluate the species conservation status. - Conducted amphibian call surveys across Montana in conjunction with FWP, USFS, and BLM partners. - Conducted mist net, rock outcrop and cave and mine surveys within BLM managed and associated lands in the Pryor Mountains. - Ground truthed Black-tailed Prairie Dog colonies mapped off of NAIP imagery in the Miles City and Billings areas. - Conducted surveys for Northern Myotis in collaboration with FWP and USFWS along major river drainages in eastern Montana. - Conducted bat mist net surveys for the USFS on the Ashland District of the Custer-Gallatin National Forest. - Conducted kick net surveys for aquatic invertebrates in streams on the Sioux District of the Custer-Gallatin National Forest. - Conducted point-based calling surveys for Northern Goshawks on both the Sioux and Ashland Districts of the Custer-Gallatin National Forest. - Maintained bat acoustic roost loggers and trail cameras at Lick Creek, Ophir, and Whitaker Sink and conducted visual	Ongoing - Conducted rock outcrop surveys for bats to assess active season use across western Montana. - Conducted bridge surveys for bats across southeast Montana to identify bat roosts. - Conducted sampling for the fungus that causes White-Nose Syndrome and bat counts at Azure, Lick, Old Drywolf, Blacktail Ranch, Lewis and Clark, Mystery, Four-eared Bat, Froggs Fault, and Lick Creek Caves. - Placed/ replaced loggers at Mystery and Frogg's Fault caves.

	surveys for bats while in these caves.	
2. Develop reports, posters, books, web pages and peer-reviewed publications on the distribution, status, biology of, and human impacts on Montana's animal species.	Ongoing - Developed PowerPoint summaries of some of the bat acoustic and roost surveys for USFS, BLM, FWP, and Northwestern Energy - Created the following reports: Maxell, B.A. Coordinator. 2015. Montana Bat and White-Nose Syndrome Surveillance Plan and Protocols 2012 - 2016. Montana Natural Heritage Program. Helena, MT. 205 p. Maxell, B.A., B. Burkholder, S. Hilty, and S. Blum. 2015. Acoustic assessment of bats near the Landusky wind turbine site in the Little Rocky Mountains of North Central Montana and management recommendations for bats. Report to Environmental Management Bureau of the Permitting and Compliance Division of the Montana Department of Environmental Quality. Montana Natural Heritage Program, Helena, Montana 66 pp. plus appendices. Maxell, B.A. 2016. Flammulated Owl surveys on the Big Timber, Bozeman, Gardiner, and Livingston Ranger Districts of the Custer Gallatin National Forest: 2013. Report to Custer Gallatin National Forest. Montana Natural Heritage Program, Helena, Montana 27 pp. plus appendices. Maxell, B.A. 2016. Northern Goshawk surveys on the Beartooth, Ashland, and Sioux Districts of the Custer Gallatin National Forest: 2012-2014. Report to Custer Gallatin National Forest. Montana Natural Heritage Program, Helena, Montana 65 pp. plus appendices. Maxell, B.A., S. Hilty, B. Burkholder, and S. Blum. 2016. Long-term acoustic assessment of bats at Maiden Rock on the lower Big Hole River in the Pioneer Mountains of southwestern Montana and management recommendations for bats. Report to Beaverhead-Deerlodge National Forest and Dillon Field Office of the Bureau of Land Management. Montana Natural Heritage Program, Helena, Montana. 57 pp. plus appendices. Maxell, B.A., B. Burkholder, S. Hilty and S. Blum. 2016. Long-term acoustic assessment of bats on Big Sheep Creek in the Tendoy Mountains of southwest Montana and management recommendations for bats. Prepared for Beaverhead-Deerlodge National Forest and Dillon Field Office of the Bureau of Land Management. Montana Natural Heritage Program. Helena, MT. 49 pp plus	Ongoing - Updated Bats of Montana Poster and printed an additional 10,000 copies in collaboration with FWP. - Created the following reports: Bachen, D.A., B.A. Maxell, A.L. McEwan, B. Crees. 2016. Mapping of Black-tailed Prairie Dogs (*Cynomys ludovicianus*) using National Agriculture Imagery Program (NAIP) 2015 imagery. Montana Natural Heritage Program, Helena, MT. 18p. Bachen, Dan, Bryce Maxell, Ellen Whittle. 2017. Measurements, body condition, and reproductive status of bats captured in Montana, northern Idaho, and western South Dakota. Montana Natural Heritage Program, Helena MT. 13p. Bachen, D.A., A. McEwan, B. Burkholder, S. Blum, and B. Maxell. 2017. Long-term acoustic assessment of bats at coal mines across southcentral Montana and management recommendations for bats. Preliminary report to Montana Department of Environmental Quality. Montana Natural Heritage Program, Helena, Montana. 154 pp. plus appendices.

	appendices. Maxell, B.A. 2016. Amphibian and reptile surveys on and around the, Ashland Beartooth, and Sioux Districts of the Custer Gallatin National Forest: 2002-2015. Report to Custer-Gallatin National Forest. Montana Natural Heritage Program, Helena, Montana 45 pp. plus appendices.	
3. Present results of surveys or status assessments of animals at professional and public meetings.	Ongoing - Gave presentations to: - Approximately 25 teachers at the Montana Education Association and Montana Federation of Teachers annual meeting on Amphibians, Reptiles, and Bats: an overview, in Billings on October 15th, 2015. - BLM, USFWS, FWP, MDT, USFS and Northern Rocky Mountain Grotto representatives on the status of bat and White-Nose Syndrome surveillance efforts in Montana via webinar on December 15th, 2015. - To the Spion Kop wind energy facilities technical advisory committee on bat acoustic surveillance results at that facility so far at Montana Wild in Helena on January 21st, 2016 - Approximately 50 professional biologists at the Montana Chapter of the Wildlife Society Meetings on Montana's bat acoustic surveillance efforts in Missoula on February 29th, 2016 - Approximately 10 members of the wind energy industry and representatives from the Natural Heritage Network on Montana's bat and white-nose syndrome surveillance efforts at the 2016 Biodiversity without Boundaries conference in San Juan, Puerto Rico on April 20th, 2016, - Approximately 40 members of the Northern Rocky Mountain Grotto and representatives of the USFS and FWP on the status of bat and White-Nose Syndrome surveillance efforts in Montana at Lewis and Clark Caverns on April 9th, 2016. - Approximately 25 USFS, BLM, FWP, and USFWS personnel on bat mist net capture, bat handling, and acoustic surveillance methodologies in the Pryor Mountains on July 19-21, 2016. - Collaborated with FWP on a poster on Bat Roost Surveillance efforts in Montana for the National Abandoned Mine Lands Conference in Bozeman September 25-28, 2016. - Approximately 35 NatureServe and Natural Heritage Program personnel on predictive distribution modeling for animal species in Montana via a webinar on October 4th, 2016. - Approximately 30 USFS, BLM, and USFWS personnel on Montana Bat Surveillance Efforts at the Interagency Cave	Ongoing - Gave presentations to: - Approximately 40 members of the USFS across the United States that lead local efforts on cave/karst management on Montana Bat Surveillance Efforts and Collaborations with Northern Rocky Mountain Grotto and Big Fork Caving Club members via webinar on February 7th, 2017. - Spion Kop Wind Farm Technical Committee on results of bat acoustic monitoring at the Spion Kop Wind Farm in Helena on February 16th, 2017. - Update on current bat survey efforts to the USFS Region 1 RIM Board in Missoula on February 21st, 2017. - Gave talks and presented posters to 20-40 people at the Montana Chapter of the Wildlife Society Meeting in Helena Montana March 7th -10th, 2017: • Rediscovery of the Northern Myotis in Montana (talk) • Baseline Indices for Calling Amphibians and Western Toads (talk) • In-Hand Measurements of Adult Bats in the Northern Great Plains and Rocky Mountains (poster) • Acoustic Assessment of Year Round Bat Activity and Distribution in Montana and Surrounding Areas (poster) - Organized the Annual Montana Bat Working Group Meeting in Helena on March 7th, 2017. Attended by proximately 35 people from USFS, BLM, USFWS, FWP, University of Montana, Montana State University, CSKT Tribe, and others. - Approximately 30-40 members of the Northern Rocky Mountain Grotto and representatives of the USFS, USFWS, BLM, and FWP on the status of bat and White-Nose Syndrome surveillance efforts in Montana at Lewis and Clark Caverns on April 8th, 2017. - Gave talks and presented posters to > 150 people at the Biannual Meeting of the Western Bat Working Group, in Fort Collins, Colorado, May 11th - 14th, 2017: • Acoustic Assessment of Year-round Bat Activity and Distribution in Montana and Surrounding Areas (talk) • Bat Use, Human Visitation, and Environmental Attributes of Cave Hibernacula in Montana (talk)

	and Karst Workshop in Great Falls on October 13th, 2016. - Approximately 50 members of the Northern Rocky Mountain Grotto on bat surveillance efforts in Montana in Monarch on October 15th, 2016. - Five teachers at the Montana Education Association and Montana Federation of Teachers annual meeting on Amphibians, Reptiles, and Bats: an overview, in Helena on October 21st, 2016. - Approximately 50 MTNHP partners on Zoology Program activities at the MTNHP annual partners meeting in Helena on December 1st, 2016.	• In-Hand Measurements of Adult Bats in the Northern Great Plains and Rocky Mountains (poster)

APPENDIX 2: SCOPE OF WORK
For FY16
Wetlands and Land Cover MSDI Framework Services

Core Wetlands and Land Cover Services		
	1st through 6th Quarter FY 16-17 (July 1, 2015 – December 31, 2016)	**7th & 8th Quarter FY 16-17** (January 1, 2017 – June 30, 2017)
1. Provide coordination and stewardship of the Wetlands MSDI GIS database if funding is available	Ongoing - Updated status maps and partners' maps for web page - Acquired additional "historic" NWI mapping for review - Worked with NWI and other partners to determine status of "historic and scaleable mapping" - Added detailed information and examples of different mapping categories to MTNHP wetland web page - Revised MSDI database to include current, "outdated" and "incomplete" mapping, which is just short of a statewide mapping layer - Published "statewide" NWI mapping as geodatabase and map service reflecting modern, outdated and incomplete mapping status categories	Ongoing - Continued to pursue funding for additional mapping
2. Participate in a work group with NRIS to develop a new workflow for hydrologic data creation, maintenance, and dissemination that includes the wetlands/riparian database	Ongoing - Attended meetings of the Hydrology workgroup	Ongoing - Attended meetings of the Hydrology workgroup
3. Provide coordination and stewardship of the MSDI Land Cover GIS database if funding is available	Ongoing - Added updates to structures and agriculture - "Burned in" Russian olive mapping completed in a different project	On hold pending funding
4. Working with NRIS, provide data and assist with maintaining map services and metadata for Wetlands and Land Cover data sets as part of the MSDI map services, and GIS Portal downloads	Ongoing - Worked with MSL to archive earlier wetland GDBs - Updated metadata and added current wetland mapping GDB to MSDI web services - Worked with MSL to archive earlier wetland GDBs - Updated metadata and added current wetland mapping and Land Cover GDB to MSDI web services	Ongoing
5. If funding is available from MLIAC and other sources, maintain and update the 2013 statewide Land Cover data set based on the annual work plan included in the overall Land Information Plan submitted to MLIAC	Ongoing - Provided a partially updated Land Cover data set, without full metadata, to partners on request - Reviewed and provided input to MSDI Land Plan - Used project funding and some core funding to produce and publish a 2016 Land Cover GIS database - Revised metadata for Land Cover to make changes easier to track	On hold pending funding

6. Revise, add and delete map classification units as necessary to improve map usability, if funding is available	Ongoing - Reviewed ecological systems classification to determine whether it can be cross walked to NVC	On hold pending funding

Project Supported Wetlands and Land Cover Services		
	1st through 6th Quarter FY 16-17 (July 1, 2015 – December 31, 2016)	**7th & 8th Quarter FY 16-17** (January 1, 2017 – June 30, 2017)
1. With outside project funding, develop a statewide data layer of wetland and riparian mapping information from NAIP imagery. Interpret and map wetlands and riparian areas for approximately 100 USGS Quads	Ongoing - Initiated discussions with tribal partners (Crow and Blackfeet) about additional wetland mapping - Continued to map wetlands with outside funding, ~ 50 quads - Submitted proposal to EPA on behalf of Blackfeet nation to map reservation (not funded) - Prepared proposal to map Crow reservation and submitted to EPA (not funded) - Prepared proposal to map additional 13 Forest Service quads (USFS funded) - Prepared proposal to map additional 5 quads in MT (DEQ) - Met with USFS hydrologists from Greater Yellowstone Area to discuss possibility of new mapping initiative. Responded to requests for cost estimates.	Ongoing - Prepared second proposal to map Crow reservation and submitted to EPA (pending) - Prepared proposal for mapping of additional 38 quads on BLM land (funded through November 2018)
2. With outside project funding, conduct field surveys to improve land cover classification accuracy	Ongoing - Used EPA funding to evaluate forested ecosystems in NW Montana - Used Forest Service funding to map Whitebark Pine in Bitterroot and Lolo National Forests - Used EPA funding to evaluated aspen-dominated springs and wetlands in southwest Montana - NRCS funding to improve grassland classification accuracy - Used Forest Service funding to complete field surveys for Whitebark Pine in Montana National Forests	Ongoing - Obtained funding from USFS and BLM to collect sagebrush data in Beaverhead-Deerlodge National Forest
3. With outside project funding, conduct field surveys to improve wetland mapping accuracy	Ongoing - Used EPA funding to survey forested wetlands - Used EPA funding (NWCA) to survey wetlands statewide	Completed - Using EPA funding to add to wetland reference network
4. With outside project funding, add attributes to wetland mapping to improve usability and transferability	Ongoing - With DEQ funding, began work on an "NWI++" product Used DEQ funding to complete first version of a Montana NWI++ product. - Used EPA funding (NWCA) to survey wetlands statewide	Ongoing/completed - With EPA funding, completed assignment of all LLWW modifiers to current wetland geodatabase, and crosswalked these to wetland functions - Currently preparing metadata so LLWW modifiers can be released with NWI database