MSL Progress Report for Statement of Work

Report for 3rd and 4th Quarters FY16

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 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.

Core Administrative Services		
	1st & 2nd Quarter FY 16 (July 1, 2015 – December 31, 2015)	**3rd & 4th Quarter FY 16** (January 1, 2016 – June 30, 2016)
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 and 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	Ongoing - 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. Continued to track meeting discussions in MS One-Note for task tracking and to promote communication between staff.

	MTNHP, between MTNHP and MSL, and between MTNHP and key partners. - Established weekly coordination meetings with Information Services staff and biweekly coordination meetings with database and web programming staff, and approximately monthly program manager's meetings. All staff meetings will be held approximately quarterly. - Numerous meetings were held with staff at FWP, BLM, USFS, DEQ, NRCS, UM, TNC, MT Audubon, Department of Commerce, Land Trusts, NatureServe, Malmstrom Air Force Base, and MSL.	- Numerous meetings were held with staff at FWP, BLM, USFS, DEQ, Dept. of Agriculture, NRCS, UM, MT Audubon, Land Trusts, NatureServe, librarians across Montana, and MSL, 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 members.
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 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, and Information to Support Weed Management for the Department of Agriculture	Ongoing - MTNHP managed approximately 60 agreements during the reporting period - New project agreements initiated during the reporting period included: 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.
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, and NRCS.	Ongoing - MTNHP information resource trainings were provided to 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 personnel, Beaverhead-Deerlodge Forest Service resource planning personnel, Montana Watershed Coordination Council members, and a delegation of natural resource managers from Russia.

		- Four posters on MTNHP information resources were displayed at the Governors Summit on Invasive species on April 12th and 13th.
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 - Provided an information overview and MTNHP contacts list to allow MSDL staff to answer patron questions directly. - Printed additional MTNHP information services pamphlets
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 NatureServe Network Member Program coordinators calls, spatial methodology review team calls, and predictive distribution modeling team calls.	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.
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 previous quarter.**

Core Information Services Program Services		
	1st & 2nd Quarter FY 16 (July 1, 2015 – December 31, 2015)	**3rd & 4th Quarter FY 16** (January 1, 2016 – June 30, 2016)
1. Respond to requests for MTNHP information used in Environmental Assessments, Environmental Impact Statements, and other planning and resource management activities	Ongoing - Responded to 325 requests involving SOC reviews for environmental assessments.	Ongoing - Responded to 410 requests involving SOC reviews for environmental assessments.
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.	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.
3. Develop procedures and methods to upload state element data to and	On hold	On hold

download global element data from the BIOTICS 5 database	- We are currently waiting on NatureServe to develop their portions of the exchange process for element information. This has been targeted for the fall of 2016 by NatureServe.	- We are currently waiting on NatureServe to develop their portions of the exchange process for element information. This has been targeted for the fall of 2016 by NatureServe.
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 with MSL. - See task 7 below for update on botany database. - 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 in the progress of being updated in order to deal with larger and larger data exchanges. For example, we just 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 prevent duplication, and evaluated for appropriate spatial and temporal presence. Automated routines are being developed to ensure QA/QC of this information	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 in the process of being updated in order to deal with larger and larger data exchanges. We are using a 1.2 million bird observation record data set from the Ebird database to develop automated QA/QC procedures. - See #7 below regarding development of a new relational database for botany observation survey data.
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 previous 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 88,000 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.	Ongoing - 4,750 photos were added to the NHPThumbsPlus photo database on SQLPROD and there are now 92,750 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 3,553 photos were fully attributed with 3,344 photos added to species accounts on the Montana Field Guide. 1,167 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.

7. Work with Botanist to design and implement a revised and updated Botany database for observations and species occurrences	In Progress - A new relational database for botany data is under construction that will track plant observations and plant surveys. Where possible the architecture of this database is being aligned with the zoology database in order to take advantage of data management scripts and web programming that has been developed for animals.	Completed - A new relational database for botany has been completed. 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. Coding for species occurrences processing still needs some minor updates finalize the overall effort. - Porting the data from the old database to the new database uncovered a number or observation and survey records that need additional hand review.
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.	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. - Facebook posts have not been initiated in recent months pending a redesign of the MTNHP Facebook page which is scheduled for late spring of 2016.	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 as a result of covering duties associated with the Senior Zoologist position and hiring and training the new Senior Zoologist.
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 is on hold while staff time is focused on completion of a new Environmental Assessment tool in Map Viewer (see task 13 below).
12. Collaborate with the Digital Library Division User Services Team in the design and implementation of a	In Progress - MTNHP developed a simple Request Tracking tool using a SQL database as the backend and Microsoft Access tables	In Progress

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.	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. - We have participated in MSL-DLD planning team meetings and look forward to additional opportunities to train MSL-DLD staff on MTNHP information resources.	- 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 - Programming on a new Environmental Assessment Summary tool has been initiated. This tool will allow users to digitize boundaries for a polygon of interest and the resulting polygon will then be intersected with a grid of hexagons that contain pre-generated summaries of documented species, potential species, land cover, wetland and riparian mapping, land management, biological reports and custom field guides. The application will then do on-the-fly summaries of attributes across the selected hexagons and deliver the overall summaries to the user.	In Progress - Programming on a new Environmental Assessment Summary tool is approximately three quarters complete and we expect to release the first version of the tool to agency-level users in MapViewer in September. The tool currently provides summaries of documented species, structured surveys, land cover, wetland and riparian mapping, land management, and biological reports for a user defined project area. Programming continues on providing summaries of species potentially present in the project area based on evidence of within range polygon, predicted distribution model output, and presence of appropriate habitats.
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	No progress during this reporting period.	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.
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 MapViewer 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	Ongoing - 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 Species Snapshot was also 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 Office boundaries, Landscape Conservation Cooperative boundaries, FWP Region, hunting districts, Wildlife Management Areas, Fishing Access Sites, state parks, State Wildlife Action Plan

	PDFs required purchase and WorldCat identifier links were not stable. - A new tool to deliver custom field guides generated from users spatial and status filter selections has been released on the Species Snapshot web page. This has proven to be so popular with users that additional spatial filters are being added for Major Land Resource Areas, Forest Service Districts, Fishing Access Sites, Wildlife Management Areas, National Parks, National Wildlife Refuges, Bird Conservation Regions, Watersheds, Important Bird Areas, Important Plant Areas, and Conservation Districts. Furthermore, we are working on implementing these same filters in the Advanced Search option of the Montana Field Guide.	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 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 12 MTNHP reports to the State Publications Librarian that we completed in the past few years that need to be placed in the MSL catalogue.	Ongoing - We provided 4 recently completed MTNHP reports to the State Publications Librarian that need to be placed in the MSL catalogue. - Ten reports previously provided to the State Publications Librarian have been 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 - 301 literature references on Montana plant and animal species and biological communities were added 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.	Ongoing - Added 2,063 literature references on Montana plant and animal species and biological communities to the MTNHP reference system and turned on 18,147 reference associations for 5,113 species in the Montana Field Guide. Many of these were made available to users via accounts in the Montana Field Guide. - 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.

Supplemental Core Information Services Program Services		
	1st & 2nd Quarter FY 16 (July 1, 2015 – December 31, 2015)	**3rd & 4th Quarter FY 16** (January 1, 2016 – June 30, 2016)
1. Create and maintain secure map services for MTNHP data that Partners can consume in their GIS or web applications, including species	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 are investigating practicalities of upgrading this to an ARC-GIS feature service that would	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,

occurrences and animal/plant point observation data	allow those agency users to select and analyze data. Alternatively, 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. - The MSDI Land Cover and Wetland map services continue run and can be consumed in local GIS environments by anyone.	and structured survey data. Unfortunately, these services fail on our full data sets due to large numbers of points or vertices. We have begun to explore use of Web Feature Services to accomplish live delivery of this information. - 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.
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 on October 15, Malmstrom Air Force Base environmental planning staff on November 3rd, NRCS on November 9th, and Department of Commerce on December 1st. - Future MTNHP information resource trainings were scheduled with MSL for librarians statewide, Land Trusts, the Invasive Species Advisory Council, NRCS, and attendees of the Montana Wetland Council Meeting.	Ongoing - MTNHP information resource trainings were provided to Montana Audubon staff on January 7th, the Montana Invasive Species Advisory Council on January 20th, librarians across Montana via webinar on January 26th, Montana Plant Conservation Conference attendees on February 10th, Montana Chapter of the Wildlife Society meetings attendees on February 26th, Noxious Weed Trust Fund Grant Committee on March 2nd, nongame staff at FWP on April 5th, Intermountain GIS conference attendees on April 6th, Montana Wetland Council meeting attendees on April 14th, NatureServe's Biodiversity without Boundaries conference on April 18th, Montana Land Trusts via webinar on April 26th, Montana Department of Agriculture personnel on May 6th, Natural Resources Conservation Service personnel on May 9th, USFS Region 1 Wildlife Biology personnel on May 11th, Beaverhead-Deerlodge Forest Service resource planning personnel on May 12th, Montana Watershed Coordination Council members via webinar on May 26th, and a delegation of natural resource managers from Russia on June 8th. - Four posters on MTNHP information resources were displayed at the Governors Summit on Invasive species on April 12th and 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 and meetings attended by MTNHP staff. - We also received feedback from MTNHP partners at the annual MTNHP partners meeting on December 7th: see the meeting summary posted at: http://mtnhp.org/about/announce.asp#PartnersMtg2015 - In preparation for a future 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	Ongoing - We have determined that the easiest way to provide partners direct access to the latest predicted distribution models is to

	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.	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. We should be able to show predictive distribution models for animal Species of Concern in Map Viewer in the next quarter.
5. Examine the feasibility of developing techniques and tools for mobile data collection for staff and citizen scientist's	No Progress - We plan to evaluate Collector for ArcGIS and iNaturalist for mobile data collection by agency partners and the general public, respectively, in 2016.	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.
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.	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 & 2nd Quarter FY 16 (July 1, 2015 – December 31, 2015)	**3rd & 4th Quarter FY 16** (January 1, 2016 – June 30, 2016)
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	In Progress - See Task 13 under the Information Program Services Core Services above. It is our intent that this new Environmental Assessment Summary tool will be made available to project	In Progress - See Task 13 under the Information Program Services Core Services above. It is our intent that this new Environmental Assessment Summary tool will be made available to project partners and consultants after they receive training on its use.

support planning and resource management activities of local government, private consultants, and conservation organizations	partners and consultants after they receive training on its use.	
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 12 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.	Ongoing - We provided 4 recently completed MTNHP reports to the State Publications Librarian that need to be placed in the MSL catalogue. - Ten reports previously provided to the State Publications Librarian have been 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 & 2nd Quarter FY 16 (July 1, 2015 – December 31, 2015)	**3rd & 4th Quarter FY 16** (January 1, 2016 – June 30, 2016)
1. Maintain a comprehensive database and taxonomic list of vascular plants occurring in Montana.	Ongoing - Researching to determine the presence/absence of two plants reported for Montana that are categorized as Status Under Review. - Acquiring and reviewing data on new species for the State: *Castilleja kerryana* and *Anelsonia eurycarpa*. - Reviewing feedback that two species occurring in Montana were mis-identified, and may need to be removed from the Montana Vascular Plant Checklist & Field Guide.	Ongoing - Researching to determine the presence/absence of six plants reported for Montana. - Researching and reviewing the state rank for 42 species categorized as Status Under Review. - Cataloguing changes to the nomenclature, presence/absence, and/or origin of species listed in the 2013 Vascular Plant Checklist. Changes will be made in the next version of the checklist.
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 all affiliations) for entry into database. - Verified identification of numerous observations on about 20 vascular plants categorized as "Status Under Review" for entry into database.	Ongoing - Constantly receiving observation data from public and partnering organization. Conducted quality control measures, and have it ready for data entry. - Conducting some quality control measures on data from the Consortium of Pacific Northwest Herbaria; entering in observation data as time allows. - Requested observation information and photographs on Status Under Review plants from attendees at the Montana Plant Conservation Conference.
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. New database is under construction.	Ongoing - Worked with Database Manager to re-construct the 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.
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 14 SOs for vascular plant Species of Concern.	On-going - Created 3,169 Species Occurrences for vascular plant Species of Concern; 2054 of these were for Whitebark Pine (*Pinus albicaulis*)
5. Review the status of vascular plants, assign state ranks and, where appropriate, assign global ranks, and document these status ranks	Ongoing - Under a Noxious Weed Trust Fund grant from the Department of Agriculture, we are researching and obtaining information (taxonomy, distribution, ecology, population, threats) on 45 vascular plants categorized as Status Under Review. State Ranks will be assigned in 2016. - Compared State rank results and methodology using the MTNHP Rank Calculator and NatureServe Rank Calculator and did some preliminary ranking. - Supervised former MTNHP Botanist who conducted a review of and completed the state ranking process for *Anelsonia eurycarpa* – S2 State Rank.	Ongoing - Under a Noxious Weed Trust Fund grant from the Department of Agriculture, the process to review the status or Stake Rank of 45 vascular plants categorized as Status Under Review has begun and will be completed by September 2016.
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 requests for information on vascular plants: 2 for TE plants, 1 SOC, and 5 for common species. - Responded to 1 request on a particular moss plant. - Responded to 1 request on a particular lichen SOC. - Responded to 1 request on a particular fungus.	Ongoing - Responded to requests for information on vascular plants: 2 TE plants, 3 SOC, and 10 common species. - Corresponded with various authors of the Flora of North America to obtain taxonomic and observation data on at least 8 species of moss. - Assisted Missoula City Parks and UM Researcher to distribute a survey on the exotic *Rhamnus carthartica* in order to better map its distribution in Montana.
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 the Montana moss and lichen checklists.	Ongoing - 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. - Sought information from the NatureServe database as Montana updates its lichen and moss checklists.

8. Work with other Heritage staff to maintain and improve content and delivery of botanical information on MTNHP websites, including Field Guide, SOC Report and MapViewer.	Ongoing - Botany Assistant and Botanist worked with the Web Programmer and Database Manager to fix numerous issues with Vitalis (literature database) and Thumbs-Plus (photo database).	Ongoing - Temporary assistant attributed photos so that 226 species, mostly grasses, that previously had no photos showing on the Montana Field Guide, now have photos.
9. Present information on MTNHP botanical services and data products, and Montana's plant resources at professional and public meetings.	Ongoing - Presented the 2015 botany program tasks / accomplishments and some 2016 objectives at the 2015 MTNHP Partner's Meeting.	Ongoing - 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.
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.	Ongoing - 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.
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. - Receiving and verifying vascular plant photos from numerous sources and adding them to Thumb's-Plus photo database for future posting.	Ongoing with most work completed using supplemental core funding from partners: - Temporary Assistant and Botany Data Assistant added 1,664 new photos to the Thumbs Plus photo database and attributed 1,705 photos for display on the Montana Field Guide. - Botany Assistant posted and annotated photos on the Field Guide for at least 25 moss species, 1 liverwort, 2 lichens, and 19 "Status Under Review" vascular plants. - Temporary Assistant posted photographs for approximately 180 vascular plants (majority being grasses) on the Field Guide which previously had no photos. - Worked to reduce the backlog of botany photographs, while receiving new photographs, examining new photos for accuracy and quality, and organizing them for future posting.
12. Compile literature on vascular plants, bryophytes and lichens.	Ongoing - Through Interlibrary Loan actively acquiring 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	Ongoing - 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

	- Acquired the Grass and Sedge Family treatments by Flora of North America to be used in developing 2017 classes and specimen verification.	developing proposals and for developing knowledge-base on these species. - Acquired the Mosses of California publication.

Supplemental Core Botany Program Services		
	1st & 2nd Quarter FY 16 (July 1, 2015 – December 31, 2015)	**3rd & 4th Quarter FY 16** (January 1, 2016 – June 30, 2016)
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 funding and staff time.
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 funding and staff time.
3. Compile and maintain a database of bryophyte and lichen taxa occurring in Montana.	Ongoing - Working with Dr. Joe Elliott to revise the 1993 Montana Moss Checklist and to find moss specimen data for future acquisition. - Met with Dr. Bruce McCune and MTNHP volunteer to develop a process and timeline to update the Montana Lichen List based on McCune's 2014 Montana Lichens: An Annotated List.	Ongoing - Joe Elliott and Andrea Pipp finalized the revision to the 1993 Montana Moss Checklist; although small changes will continue until it can get posted on the MTNHP website. - MTNHP volunteer revised lichen checklist based on McCune's 2014 Montana Lichens: An Annotated List. Volunteer updated common names and resolved some issues with nomenclature. On hold pending staff time: - Staff time is needed to change the nomenclature in the lichen database, species tables, and Field Guide, and update Biotics. - Staff time is needed to change the nomenclature in the moss database, species tables, and Field Guide, and update Biotics.
4. Review the status of bryophytes and lichens, assign state ranks and, where appropriate, assign global ranks, and document these status ranks	On hold pending funding and staff time. - One exception was to get an SOC moss verified by Dr. Dale Vitt. The identification led to the removal of this species from the SOC list and revised the listing in the State Checklist.	On hold pending funding and staff time. - Status reviews will not occur until the revised moss and lichen checklists are completed, posted on the website, and reflected in the databases.
5. Collect, evaluate, and manage observation data for bryophytes and lichens.	Ongoing - Revised the locations of two lichen SOC species. - Added a few moss observations to the database. - Added a few lichen observations to the database.	Ongoing - Added at least 25 moss species observations to the database. - 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.

		- Botany Assistant has completed profiles for about 30 moss species in the Field Guide. On hold pending staff time, completion of the new Botany Database, and revision to the Lichen & Moss Checklists: - Data entry of the approximate 2,500 moss observations obtained from Dr. McCune and liverwort and moss data from the Consortium of Pacific Northwest Herbaria. - Identified sources of lichen data at herbaria and the Lichen and Moss Consortium databases.
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 of unique habitats such as fens that are of special importance for Montana's botanical resources.	Ongoing - Database is populated, but no new data entries have occurred.	Ongoing - Database is populated, but no new data entries have occurred.

Project Supported Botany Program Services		
	1st & 2nd Quarter FY 16 (July 1, 2015 – December 31, 2015)	**3rd & 4th Quarter FY 16** (January 1, 2016 – June 30, 2016)
1. Conduct training sessions on the identification and ecology of Montana's vascular plants, bryophytes, and lichens.	Not Active due to lack of funding.	Completed - Completed 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.
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.	Ongoing - USFWS did not provide funding to collect Year 2 monitoring data for Spalding's Catchfly. Currently working with the CSKT and USFWS to pursue funding possibilities through Small Grants for Plants and Tribal Wildlife Grants. - Assisted the National Park Service in their 7th year of monitoring Lemhi Penstemon at the Big Hole Battlefield, Wisdom.

	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.	
3. Conduct field surveys for vascular plants, bryophytes and lichens, focusing on Species of Concern and under-surveyed geographic areas.	Ongoing BLM Sensitive Species Surveys - 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. Italian Peaks Survey 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.	On-going - Developing protocols to assist the Lolo National Forest in a genetic study of *Grindelia howellia* (Howell's gumweed), an SOC/Forest Sensitive plant.
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. - Working on Water Howellia report to Swan Eco Center to summarize and analyze monitoring data-sets collected by 2 USFS, 1 TNC, and 1 MTNHP studies. Also analyzing timber prescription, landowner, and climate data-sets relative to Water Howellia populations. - Working on Shoshonea report to BLM to statistically summarize and analyze all data collected from 1991-2015. - Reviewed draft survey report for the Italian Peaks rare plant survey.	Completed - 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 while conducting the Shoshonea monitoring.

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.	On hold pending checklist revisions, funding, and staff time - The moss and lichen checklists must get updated in the database and data brought in prior to creating predicted distribution maps for mosses and lichens. - Approximately $25,000 of funding is needed to complete predicted distribution maps for SOC vascular plants.
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.	On hold pending staff time and funding - A potential Fungi expert for Montana has been identified, but staff time is needed to make the contact. - Data on diatoms is on hold while the Botany database is under construction.

Core Ecology Program Services		
	1st & 2nd Quarter FY 16 (July 1, 2015 – December 31, 2015)	**3rd & 4th Quarter FY 16** (January 1, 2016 – June 30, 2016)
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 ~ 10 requests per month for vegetation community information, esp. wetlands, sagebrush, whitebark pine, and Russian olive - Respond to ~ 1 request 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 ~ 1 request per month about wetland survey methods
2. Respond to user requests for assistance using or interpreting wetland and land cover map products	Ongoing - Respond to ~ 2 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
3. Compile photographic images of wetland and terrestrial habitats representative of those found in Montana and make them available on MTNHP websites	Ongoing - Photographs from 2015 whitebark pine surveys entered into Thumbs Plus - Photographs from 2015 forested wetland ecosystems compiled and ready for entry into Thumbs plus	Ongoing - Loaded photographs from 2013 and 2014 grassland surveys into Thumbs Plus - Made photos from grassland surveys available through Map Viewer
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 - In process of updating National Vegetation Classification (NVC) crosswalks in Ecological Systems Database so that updated ecosystem descriptions can be added to field guide.	Ongoing - Continue to update National Vegetation Classification (NVC) crosswalks in Ecological Systems Database so that updated ecosystem descriptions can be added to field guide.

	- Have developed new Ecological System description for Intermontane Prairie Potholes, a previously undescribed system in Montana	
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 - Worked with Info Services staff to identify changes required to databases before assessment data can be integrated into MapViewer - Worked with Information Services staff to update wetland mapping status map	Ongoing - Continue to work on changes to existing databases that will allow assessment data to be integrated into Map Viewer. Amount of work will require outside funding to complete.
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 all NVC groups for Montana for next iteration of NVC	Ongoing - Reviewed final version of NVC to identify new groups for Montana - Working with Natureserve on continental-scale mapping and assessment of grassland systems
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 - See number 4, second bullet point, and number 6 above.	In Progress - See number 4, second bullet point, and number 6 above.
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 & 2nd Quarter FY 16 (July 1, 2015 – December 31, 2015)	**3rd & 4th Quarter FY 16** (January 1, 2016 – June 30, 2016)
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	Ongoing - Work with EPA and other states on National Wetland Condition Assessment Protocols
2. Identify ecological sites of particular conservation concern that should be included in MTNHP information provided for environmental assessments	Ongoing - Creating new value-added wetland mapping geodatabase intended to support identification of "Wetlands of Special Significance"	Ongoing - Completed value-added wetland mapping geodatabase and developed methodology to assign "wetlands of Special Significance status" to wetland polygons

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 - Current focus is on forested wetlands	Ongoing - A handful of wetland assessment references were added to the MTNHP reference system.
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 wetlands	Ongoing - Have completed NVC-Ecological system crosswalk for forested ecosystems
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	On hold pending outside funding
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	Ongoing - Worked with USFS to develop methodology for classifying relative abundance of whitebark pine, and completed work on Gallatin-Custer, Helena, and Lolo 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	Ongoing - Presented new value-added wetland mapping attributes to over 80 state and federal partners in EPA regions 10 and 8; - Presented new value-added wetland mapping attributes at Intermountain GIS Conference

Project Supported Ecology Program Services		
	1st & 2nd Quarter FY 16 (July 1, 2015 – December 31, 2015)	**3rd & 4th Quarter FY 16** (January 1, 2016 – June 30, 2016)
1. Conduct field surveys for underrepresented or uncommon ecological communities in under-surveyed geographic areas	Ongoing - Continuing to map 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	Ongoing - Work continues as part of 2016 National Wetlands Condition Assessment for DEQ/EPA, which began in June.
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	Ongoing - Completed chapter on use of LLWW attributes for forthcoming book on wetland landscape assessment - Completed report on Wetland Prioritization Geodatabase for MTDEQ
3. Evaluate the status of wetland and terrestrial communities with field surveys	Ongoing - Continued whitebark pine and forested wetland ecosystem surveys	Ongoing - Wetland surveys began in June for DEQ/EPA. - Whitebark pine surveys are on hold until snow melts at higher elevations.

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 & 2nd Quarter FY 16 (July 1, 2015 – December 31, 2015)	**3rd & 4th Quarter FY 16** (January 1, 2016 – June 30, 2016)
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 just over four hundred 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 - 20,359 observations were added to the animal point observation database for 474 animal species. 23,670 observation records for 414 species were reviewed for final acceptance into the point observation database with a focus on Montana Species of Concern. - 1,331 structured survey locations for 12 different formal animal survey protocols were added to the structured survey database. - An additional 277,000 observation records (16% of all records in the database) still need to be reviewed for final acceptance into the database.	Ongoing - 9,548 observations were added to the animal point observation database for 489 animal species. 4,283 observation records for 267 species were reviewed for final acceptance into the point observation database with a focus on Montana Species of Concern. - 4,929 structured survey locations for 12 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.
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 MapViewer 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 MapViewer 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.	Ongoing - See Supplemental Core Zoology Program Services Task 3 below.
4. Collect and manage observational data on animal SOC that has been gathered by others.	Ongoing - 3,740 observations were added to the animal point observation databases for 109 Montana Animal Species of Concern and Potential Species of Concern.	Ongoing - 1,998 observations were added to the animal point observation databases for 81 vertebrate and 1 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 28,500+ observation records for animal Species of Concern in preparation for constructing species occurrences. All Species of Concern observation data that was pending a final review was reviewed. - Updated 9,500 species occurrences and created >700 new species occurrences for 37 vertebrate and 31 invertebrate species.	Ongoing - Created 1,386 new species occurrences for 49 vertebrate and 9 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.	Ongoing - Added 239 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.
7. Work with other Heritage staff to regularly exchange information with NatureServe.	Not Active - Scheduled for fall of 2016.	Not Active - Scheduled for fall of 2016.

Supplemental Core Zoology Program Services		
	1st & 2nd Quarter FY 16 (July 1, 2015 – December 31, 2015)	**3rd & 4th Quarter FY 16** (January 1, 2016 – June 30, 2016)
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.	Not active due to lack of funding and/or staff time.
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	Ongoing - See Core Zoology Program Services Task 3 above - Added literature to references section of the Montana Field Guide for Harlequin Duck, Evening Grosbeak, Sage	- 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.

Montana Field Guide for all animal SOC.	Thrasher, Long-billed Curlew, Brewer's Sparrow, and Sage Sparrow.	- 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.
4. Create predicted distribution models for animal SOC.	Ongoing - Examined potential to use coding to run models for numerous species at once. We think we can do this sometime in 2016, but it is likely to take the equivalent of one month of one staff members time to get this up and running.	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. - Will begin updating predictive distribution models for all Montana Animal Species of Concern in the next quarter.
5. Work toward a complete taxonomic list of invertebrate animal species for Montana.	Not active due to lack of funding and/or staff time.	Ongoing - See Core Zoology Program Services Task 6 above.
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.	In Progress - See Core Zoology Program Services Task 3 above	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.	Not active due to lack of funding and/or staff time.	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.
8. Create predicted distribution models for animal species that are not SOC.	Ongoing - Examined potential to use coding to run models for numerous species at once. We think we can do this sometime in 2016, but it is likely to take the equivalent of	Ongoing - Established python and other coding to mostly automate creation of inductively and deductively based predicted distribution models and generate associated report output.

	one month of one staff members time to get this up and running.	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. - We believe we can create predictive distribution models for all vertebrate, and many invertebrate, non-SOC in the next quarter.
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 species that are not Species of Concern 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.
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	Ongoing - Added 1,853 literature references on bats, birds, and a variety of invertebrate groups to the MTNHP reference system and turned on approximately 12,930 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. - Began cross walk of literature in the recently published Marks et al. (2016) Birds of Montana book with references currently in the MTNHP reference system.
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 in 2015 into the Thumbs Plus photo database. - Loaded Harlequin Duck survey photos from 2015 into the Thumbs Plus photo database.	Ongoing - 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

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.	Ongoing - 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
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.	Ongoing - 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. - Approximately 10% of zoology element files and 100% of zoology survey forms remain to be scanned.
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 & 2nd Quarter FY 16 (July 1, 2015 – December 31, 2015)	**3rd & 4th Quarter FY 16** (January 1, 2016 – June 30, 2016)
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.	Ongoing - Conducted winter roost surveys for bats in conjunction with USFS, BLM, and FWP across Montana and on USFS lands in the western Dakotas. - 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.
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	Ongoing - Developed PowerPoint summaries of the latest bat acoustic and roost surveys for USFS, BLM, FWP, and Northwestern Energy. - Created the following final bat acoustic monitoring reports: 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 appendices.
3. Present results of surveys or status assessments of animals at professional and public meetings.	Ongoing - Gave the following presentations: - 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. - A general update on the Zoology Program to MTNHP partners at the annual MTNHP partners meeting in Helena on December 7th. - 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.	Ongoing - Gave the following presentations: - 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. - 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. - 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. - 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.

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

Core Wetlands and Land Cover Services		
	1st & 2nd Quarter FY 16 (July 1, 2015 – December 31, 2015)	**3rd & 4th Quarter FY 16** (January 1, 2016 – June 30, 2016)
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	Ongoing - 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
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	Ongoing - Little funding for this task, but were able to use temporary project funding to provide basic coordination and stewardship of the MSDI Land Cover GIS database
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	Ongoing - Worked with MSL to archive earlier wetland GDBs - Updated metadata and added current wetland mapping and Land Cover GDB to MSDI web services
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	Ongoing - 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
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	No funding for this task

Project Supported Wetlands and Land Cover Services		
	1st & 2nd Quarter FY 16 (July 1, 2015 – December 31, 2015)	**3rd & 4th Quarter FY 16** (January 1, 2016 – June 30, 2016)
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, completing ~ 50 quads	Ongoing - Submitted proposal to EPA on behalf of Blackfeet to map reservation (not funded) - Prepared proposal to map Crow reservation and submitted to EPA (Pending) - Prepared proposal to map additional 13 Forest Service quads (funded) - Prepared proposal to map additional 5 quads in MT (DEQ, funded)
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 NFs	Ongoing - Using EPA funding to evaluated aspen-dominated springs and wetlands in SW Montana - Using NRCS funding to improve grassland classification accuracy
3. With outside project funding, conduct field surveys to improve wetland mapping accuracy	Ongoing - Used EPA funding to survey forested wetlands	Ongoing - Using EPA funding (NWCA) to survey wetlands statewide
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	Ongoing/completed - Used DEQ funding to complete first version of a Montana NWI++ project. EPA funding to advance work pending.