

APPENDIX 1: SCOPE OF WORK

THE UNIVERSITY OF MONTANA for operation of the Montana Natural Heritage Program

FY 2016 - FY 2017

The Scope of Work (SOW) for the “Core Services” in this contract (hereinafter referenced as “Core Contract”) is taken largely from the preliminary Montana Natural Heritage Program’s (NHP) Strategic Plan for 2015-2020 (Appendix 3), which received review from MTNHP staff, MSL staff, and from state, federal, and private partners. In addition, the Wetlands and Land Cover MSDI services (Appendix 2) are based on the MSDI Work Plan: Montana FY15/FY16.

The Appendices 1 & 2: Scope of Work (SOW) outlines essential core, supplemental core services of the MTNHP Botany, Zoology, Ecology, and Information Services program areas that are required to be completed under the Core Contract and the Wetlands and Land Cover MSDI statement of work.

Funding Source Definitions

- **Core:** This funding represents the \$878,226 included in the MSL-UM contract for “Essential Core Services.” Examples of essential core services include: fulfilling information requests across all program disciplines, adding new data to program databases, administering and managing all program databases and systems, maintaining species status, maintaining and improving web delivery of information, and program administration.
- **Supplemental Core:** Funding provided by partner agencies that contribute to the support of core services and information and may be allocated at the discretion of the Program for those essential core services. This funding is not specified or allocated in the MSL-UM contact. Examples include: data compilation, species or community status reviews, data system maintenance, development of web pages and applications, answering user requests, and providing trainings on the use of MTNHP resources.
- **Project:** Funding that supports the overall mission of the program but entails specific deliverable products for partners. Project funding does not allow discretionary spending by the Program and does not directly support essential core services. This funding is not specified or allocated in the MSL-UM contact. Examples include: requests for development of new datasets, web resources, or field surveys to address data needs such as assessments of the status of species or communities.

- **MSDI Core:** This funding is contained in the MSL-UM contract and is dedicated to the Wetlands and Land Cover MSDI data development and coordination. For FY16-17 no funding is currently allocated for these tasks.

Montana Natural Heritage Program Services FY16 - FY17

The tables below list Administrative, Information Services, Botany, Zoology, and Ecology services for FY16-17. The tables may list three categories of tasks:

- 1) **Core Services:** Tasks and services that will be delivered principally with the Core funding in this contract.
- 2) **Supplemental Core Services:** 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 services that may be provided pending the availability of project funding. This category does not list all of the anticipated projects.

Core Administrative Services
1. Coordinate all program activities with Partners and program areas
2. Administer contracts and grants
3. Promote use of Heritage data resources through outreach and training sessions
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.
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.
6. Finish an updated revision of the FY15-20 MTNHP 5-year Strategic Plan

Core Information Services Program Services
1. Respond to requests for MTNHP information used in Environmental Assessments, Environmental Impact Statements, and other planning and resource management activities
2. Work with NatureServe to develop procedures and methods to conduct regular data exchanges.
3. Develop procedures and methods to upload state element data to and download global element data from the BIOTICS 5 database
4. Administer databases for editing and storage of MTNHP data including: <ol style="list-style-type: none"> 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

<ul style="list-style-type: none"> 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
5. Migrate all MTNHP databases from SQLINT to SQLPROD
6. Maintain a core photo database on SQLPROD
7. Work with Botanist to design and implement a revised and updated Botany database for observations and species occurrences
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.
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.).
10. Continue to maintain and improve the functionality and ease of use of Natural Heritage Program web pages
11. Finish the conversion of the MTNHP web site to conform to the Montana web standard including mobile device compatibility
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. <ul style="list-style-type: none"> 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.
13. Develop "Harold" type self-serve SOC search and review functionality for partners with certain privileges and for in-house data requests
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
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
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.
17. Maintain the Natural Heritage Program's reference system for literature on the plants, animals, and habitats of Montana
Supplemental Core Information Services Program Services
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

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
3. Gather information from users about user information needs, format/access preferences, and the effectiveness of our delivery systems and tools
4. Evaluate ArcGIS on-line capabilities and develop strategy
5. Examine the feasibility of developing techniques and tools for mobile data collection for staff and citizen scientist's
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.
7. Continue to maintain and update a statewide Land Management GIS database in collaboration with MSL Geo Info program

Project Supported Information Services Program Services

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
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
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 analysis bat activity patterns over time across the state.

Core Botany Program Services

1. Maintain a comprehensive database and taxonomic list of vascular plants occurring in Montana.
2. Collect, evaluate, and manage observation data for vascular plants, including integrating regional databases of herbarium specimens.
3. Work with Information Services staff to design and implement a revised and updated Botany database for observations and species occurrences
4. Create species' occurrences for vascular plant, bryophyte and lichen Species of Concern.
5. Review the status of vascular plants, assign state ranks and, where appropriate, assign global ranks, and document these status ranks
6. Respond to requests for information on the identification, biology, ecology, conservation status, management, and appropriate survey methods for vascular plants, bryophytes and lichens.
7. Work with other Heritage staff to regularly exchange information with NatureServe.
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.

9. Present information on MTNHP botanical services and data products, and Montana's plant resources at professional and public meetings.
10. Create and maintain information on vascular plants related to their taxonomy, biology, ecology, status, identification and management.
11. Compile photographic images of vascular plants, bryophytes and lichens.
12. Compile literature on vascular plants, bryophytes and lichens.

Supplemental Core Botany Program Services

1. Create associations between vascular plant Species of Concern and the Ecological Systems/habitats in which they occur.
2. Create associations between vascular plant Species of Concern and the National Wetland and Riparian wetland and riparian map classes in which they occur.
3. Compile and maintain a database of bryophyte and lichen taxa occurring in Montana.
4. Review the status of bryophytes and lichens, assign state ranks and, where appropriate, assign global ranks, and document these status ranks
5. Collect, evaluate, and manage observation data for bryophytes and lichens.
6. Create and maintain information on bryophytes and lichens related to their taxonomy, biology, ecology, status, identification and management.
7. Maintain a subject guide of authoritative web resources relevant to vascular plants, bryophytes and lichens.
8. Develop and maintain a geodatabase of unique habitats such as fens that are of special importance for Montana's botanical resources.

Project Supported Botany Program Services

1. Conduct training sessions on the identification and ecology of Montana's vascular plants, bryophytes, and lichens.
2. Monitor populations of ESA-listed and globally rare vascular plants.
3. Conduct field surveys for vascular plants, bryophytes and lichens, focusing on Species of Concern and under-surveyed geographic areas.
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.
5. Create predicted distribution maps for vascular plant, bryophyte and lichen Species of Concern.
6. Compile and maintain data on other taxonomic groups: Fungi, Algae, Diatoms.

Core Ecology Program Services

1. Respond to user requests for information on the distribution, composition, successional dynamics, conservation status,

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| management, and appropriate survey methods for terrestrial and wetland communities |
| 2. Respond to user requests for assistance using or interpreting wetland and land cover map products |
| 3. Compile photographic images of wetland and terrestrial habitats representative of those found in Montana and make them available on MTNHP websites |
| 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. |
| 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. |
| 6. Collaborate with other Heritage Program and NatureServe ecologists from the Rocky Mountain Region to ensure compatibility of ecological mapping and classification 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. |
| 8. Maintain a subject guide of authoritative web resources relevant to terrestrial and wetland communities |

Supplemental Core Ecology Program Services

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| 1. Assess the status of terrestrial and wetland communities and ecosystems, assign state ranks, and document the justification behind status ranks |
| 2. Identify ecological sites of particular conservation concern that should be included in MTNHP information provided for environmental assessments |
| 3. Compile literature on terrestrial, and wetland communities with emphasis on those of conservation concern |
| 4. Maintain crosswalks between different vegetation classification schemes to facilitate use of MTNHP products and products created by others |
| 5. Work with Information Services to make wetland assessments available on the MTNHP website |
| 6. Compile vegetation data collected by others to support current and future vegetation classification and mapping efforts |
| 7. Present results of surveys or status assessments of terrestrial and wetland communities at professional and public meetings |

Project Supported Ecology Program Services

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| 1. Conduct field surveys for underrepresented or uncommon ecological communities in under-surveyed geographic areas |
| 2. Develop reports and peer-reviewed publications on the composition, distribution, and status of Montana's wetland and terrestrial communities. |
| 3. Evaluate the status of wetland and terrestrial communities with field surveys |
| 4. Collaborate with partner agencies to develop ecological site descriptions when funding allows |

Core Zoology Program Services

1. Respond to requests for information on the identification, biology, ecology, conservation status, management, and appropriate survey methods for vertebrate and invertebrate species.
2. Continue to gather, manage, and review animal point observation data in a statewide point observation database (POD) for all animal species.
3. Work with Information Services staff to maintain and improve content of zoological information on Heritage websites.
4. Collect and manage observational data on animal SOC that has been gathered by others.
5. Maintain animal species occurrences for existing SOC species from high value observations of animal SOC that can be used in environmental assessments.
6. Maintain a complete taxonomic list of vertebrate animal species for Montana.
7. Work with other Heritage staff to regularly exchange information with NatureServe.

Supplemental Core Zoology Program Services

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.
2. Create animal species occurrences for newly designated SOC species from high value observations of animal SOC that can be used in environmental assessments.
3. Maintain species accounts, including state and Western Hemisphere range maps and observational maps, in the Montana Field Guide for all animal SOC.
4. Create predicted distribution models for animal SOC.
5. Work toward a complete taxonomic list of invertebrate animal species for Montana.
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.
7. Maintain a subject guide of authoritative web resources relevant to vertebrates and invertebrates.
8. Create predicted distribution models for animal species that are not SOC.
9. Create associations between animal SOC and the Ecological Systems in which they are known to occur.
10. Create associations between animal 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.
12. Create associations between animals that are not SOC and the National Wetland and Riparian wetland and riparian map classes in which they occur.

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..
14. Compile photographic images of vertebrate and invertebrate animal species and locations where animal surveys have been conducted for Montana SOC.
15. Compile photographic images of vertebrate and invertebrate animal species and locations where animal surveys have been conducted for Montana non-SOC.
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.
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.
Project Supported Zoology Program Services
1. Conduct field surveys for vertebrate and invertebrate species with a focus on SOC and under-surveyed geographic areas and habitats.
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.
3. Present results of surveys or status assessments of animals at professional and public meetings.

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

Core Wetlands and Land Cover Services

1. Provide coordination and stewardship of the Wetlands MSDI GIS database if funding is available
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
3. Provide coordination and stewardship of the MSDI Land Cover GIS database if funding is available
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
5. If funding is available from MLIAC and other sources, maintain and update the 2013 statewide Land Cover data set based on the annual workplan included in the overall Land Information Plan submitted to MLIAC
6. Revise, add and delete map classification units as necessary to improve map usability, if funding is available

Project Supported Wetlands and Land Cover Services

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
2. With outside project funding, conduct field surveys to improve land cover classification accuracy
3. With outside project funding, conduct field surveys to improve wetland mapping accuracy
4. With outside project funding, add attributes to wetland mapping to improve usability and transferability