TETON COUNTY
VEGETATION AND NON-VEGETATION COVER TYPE MAPPING
FINAL REPORT

ON THE COVER
The Teton Mountains (black and white background)
The Snake River Corridor, Jackson Square - Town of Jackson, and Teton Village (color left to right)
Photographs by: Dan Cogan and Chris Lea

FINAL REPORT: VEGETATION AND NON-VEGETATION COVER TYPE MAPPING

For Land Use Planning Purposes on All Lands in Teton County, Wyoming - Excluding Land within Federal Ownership

Teton County, Wyoming

December 2013

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This report received both informal and formal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data. The background and expertise of some reviewers of this report put them on par technically and scientifically with the authors of the information.

This report is available from the Teton County Planning and Development Department website (http://www.tetonwyo.org/plan/)

Please cite this publication as:
Cogan, D., and S. Johnson. 2013. Final Report: Vegetation and Non-vegetation Cover Type Mapping for Teton County. Jackson, Wyoming. Available online at: http://www.tetonwyo.org/plan

Teton County Vegetation and Non-Vegetation Cover Type Mapping – Final Report

Creating a GIS Digital Layer of Designated Vegetation and Non-Vegetation Cover Types for Land Use Planning Purposes on All Lands in Teton County, Wyoming, Excluding Land within Federal Ownership

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ACKNOWLEDGEMENTS

Cogan Technology, Inc. (CTI) would like to thank the following people and organizations who helped make this project possible:

First, we would like to express our gratitude to Susan Johnson, Principal Planner with the Teton County Planning and Development Department for her leadership, support, and assistance throughout all stages of this project. Susan helped with contracting, meeting facilitation, answering questions, reviewing draft products, providing logistical support, and interacting with various landowners. Without Susan's guidance, this project would not have been possible.

We would also like to thank all of the other excellent staff at the Planning and Development Department for their support: Jeff Daugherty (Planning Director), Alex Norton (Senior Planner), Shawn Means (Staff Planner), Jennifer Anderson (Code Compliance Officer), Katrina VanEvery (Planning Service Coordinator), and Charlotte Reynolds (Teton County Grant Writer).

Thanks also to Rich Greenwood and Angie Rudolph from Greenwood Mapping and the Teton County GIS Department for providing digital data and providing valuable assistance throughout the project.

CTI would also like acknowledge the Teton County Board of County Commissioners for making this project possible. Board members include Hank Phibbs, Paul Vogelheim, Ben Ellis, Andy Schwartz, Paul Perry, Melissa Turley, and Barbara Allen.

The members of the Natural Resources Technical Advisory Board were crucial to this project and we greatly appreciate their help with reviewing numerous draft products, attending meetings, and providing insightful guidance throughout. NRTAB members include Dave Adams, Tom Segerstrom, Patrick Wright, Steve Kilpatrick, Mike Brennan, and Doug Wachob.

A real big thank you goes to the Community Foundation of Jackson Hole and the Teton Conservation District for their financial support and to the Jackson Hole Wildlife Foundation, Jackson Hole Conservation Alliance, Grand Teton National Park, and the Wyoming Game and Fish for providing letters of support.

CTI would also like to express appreciation to all of the various private landowners and local/state organizations that provided access onto their properties. These include, but are not limited to, The Nature Conservancy, Wyoming Office of State Lands and Investments, Wyoming Game and Fish, Jackson Hole Conservation Alliance, Bar BC Ranch, and Bill Resor. From these, a special thank you goes to Bill Resor for his unwavering support, patience, enthusiasm, and hospitality during our various fieldwork sessions. Without their permission, this project would not have been as successful.

Jim Von Loh, Klara Varga, and Chris Lea (all sub-contractors to CTI on this project) were once again a pleasure to work with. Their professionalism, dedication, and ecological and botanical knowledge were integral to the data collection, analysis, report writing/reviewing, and implementation of the National Vegetation Classification System for Teton County.

Finally, let me conclude by apologizing to anyone I may have inadvertently left off this list. Please know that I had a great experience working and meeting with everyone associated with this endeavor and I really appreciate all the effort that went into this project. – Dan Cogan.

LIST OF ABBREVIATIONS AND ACRONYMS

3-D	3-Dimensional
AA	Accuracy Assessment
BLM	Bureau of Land Management
CIR	Color Infrared Photography
CTI	Cogan Technology, Inc.
DEM	Digital Elevation Model
DVD	Digital Video Disk
FGDC	Federal Geographic Data Committee
GIS	Geographic Information System(s)
GPS	Global Positioning System
GTNP	Grand Teton National Park
JODR	John D. Rockefeller, Jr. Memorial Parkway
LIDAR	Light Detecting and Ranging Elevation Data
MMU	Minimum Mapping Unit
NAD	North American Datum
NAIP	National Agriculture Imagery Program
NER	The National Elk Refuge
NPS	U.S. National Park Service
NRTAB	Natural Resources Technical Advisory Board
NVIP	NPS National Vegetation Inventory Program
rUSNVC	revised U.S. National Vegetation Classification
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
YELL	Yellowstone National Park

EXECUTIVE SUMMARY

Teton County encompasses approximately 4,222 square miles (10,930 km2) in northwestern Wyoming adjacent to the Idaho and Montana borders. In 2012, Cogan Technology, Inc. (CTI) under contract to the Teton County Planning and Development Department initiated a project to develop a digital layer of designated vegetation and non-vegetation cover-types for the Teton County's current Geographic Information System (GIS). Included in this project were 87,547-acres of privately owned lands, lands managed by state and local organizations, and lands administered by the Bureau of Land Management (BLM).

To complete the mapping, CTI conducted a 4-phase project beginning with the Phase 1 creation of a draft vegetation GIS layer. CTI created the draft vegetation layer using existing information from the nearby and partially overlapping 2002-2005 Grand Teton National Park (GTNP) vegetation inventory project and new mapping/interpretation efforts. Base maps for the mapping and interpretation included the 2011 imagery (provided by Teton County) and the 2012 National Agriculture Imagery Program (NAIP) ortho-photography. Fifty-four map units based on the GTNP project were adopted, modified, and expanded to interpret the vegetation and land-use patterns.

In Phase 2, CTI ecologists visited numerous sites within Teton County and collected 2,015 ground-based verification points and 115 observation point locations. The ground-based data was geo-located and used to update the vegetation map layer. The revised vegetation layer was subsequently reviewed and modified by Teton County Planning and Development Department and the Natural Resources Technical Advisory Board (NRTAB) staffs.

During Phase 3, independent ecologists familiar with the Teton County flora were sub-contracted by CTI to collect 382 ground-based accuracy assessment (AA) data points. AA points were randomly distributed throughout the project area and target locations were based on access and the frequency/abundance of the various map units. The AA points were then placed on the final Teton County land cover map layer to calculate an overall thematic accuracy ranging from 79%-93%.

Phase 4 involved creating all of the necessary deliverables and reports as summarized below:

- A GIS-based digital map of vegetation and other cover-types with specified polygon attributes and associated metadata.
- A DVD containing the final report and results of the AA process including error matrices (contingency tables) and for each AA site its location, photos, description of vegetation, and the three map unit assignments.
- A Final Report, with Executive Summary, Introduction, Scope of Work, Methods, Results, Discussion, Tables, and Figures

For more information about this project, please visit Teton County Planning and Development Department website at: http://www.tetonwyo.org/plan

To view the spatial products created by this project and described within, go to the Teton County's GIS website at: http://www.tetonwyo.org/gis

PROJECT STATISTICS

Field Work:
- Observation Points = 115
- Verification Points = 2,015
- Accuracy Assessment Points = 382

GIS Database:

Basemap Imagery
1. 2011 - Ortho-rectified Color Infrared Imagery acquired by Teton County - 1 Foot Pixels
2. 2012 - Ortho-rectified True Color Aerial Photography provided by the National Agriculture Imagery Program - 1 Meter Pixels

54 Map Classes
- 13 - Woodland and Forests
- 2 - Regeneration Vegetation
- 8 - Shrublands
- 1 - Dwarf Shrublands
- 6 - Herbaceous Vegetation
- 4 - Sparse Vegetation
- 20 - Land-cover and Agricultural-use

Project Area Size = 87,547acres
- 23,091 acres - Woodland and Forests
- 286 acres - Regeneration Vegetation
- 18,483 acres - Shrublands
- 2 acres - Dwarf Shrublands
- 5,443 acres - Herbaceous Vegetation
- 1,580 acres - Sparse Vegetation
- 38,661 acres - Land-cover and Land-use

Total Size = 63,494 Polygons
- 18,851 - Woodland and Forest
- 259 - Regeneration Vegetation
- 12,408 - Shrublands
- 1 - Dwarf Shrublands
- 7655 - Herbaceous Vegetation
- 1,574 - Sparse Vegetation
- 23,201- Land-cover and Land-use

Average Polygon Size = 1.4 acres

Overall Thematic Accuracy
- Binary Level = 79%
- Acceptable Level = 91%
- Reasonable Level = 93%

The Town of Jackson and Jackson Hole Valley in Teton County

INTRODUCTION

TETON COUNTY, WYOMING

Teton County was created in 1923 by a special act of the State Legislature that separated 4,222 square miles (10,930 km2) of northwestern lands previously administered by Lincoln County into a new Wyoming county. The new county was named after the prominent Teton Mountain Range located along the western boundary with Idaho. Teton County is comprised of approximately 97% public and federal lands including all of Grand Teton National Park (GTNP), John D. Rockefeller Memorial Parkway (JODR), the National Elk Refuge (NER), and portions of Yellowstone National Park (YELL), Bridger-Teton National Forest, and the Caribou-Targhee National Forest (**Figure 1**).

As of 2010, the population of Teton County was estimated to be at 21,294 with a population density of approximately five people per square mile (2/km^2). Residents are concentrated on privately owned ranch lands and in towns, villages, and developments in the southern half of the county around the Jackson Hole area. The county seat is located in the Town of Jackson and other towns in the county include, Kelly, Moose, Moran, and Wilson. Unincorporated residential and commercial areas in the county include Teton Village, Grand Targhee, Spring Gulch, Hoback Junction, Alta, and Buffalo Valley.

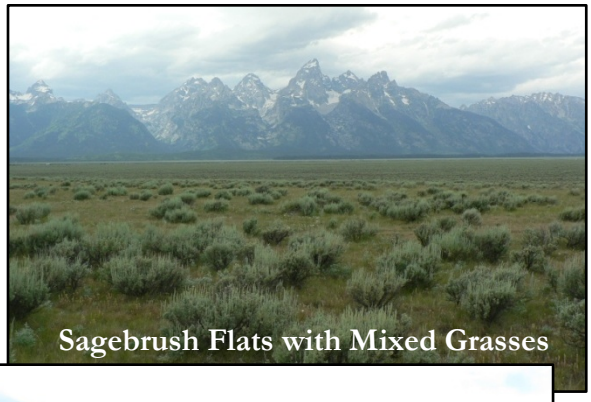
Teton County lies at the heart of the Greater Yellowstone ecosystem and Jackson Hole is one of the principal gateways into GTNP and YELL. Tourism is a major draw to the area and approximately 3.8 million people are reported to visit GTNP and the Jackson Hole area annually. Visitors to the area enjoy viewing the natural alpine, forest and sagebrush habitats, the wildlife diversity, the lakes, streams and waterfalls, and the stunning mountain and valley vistas.

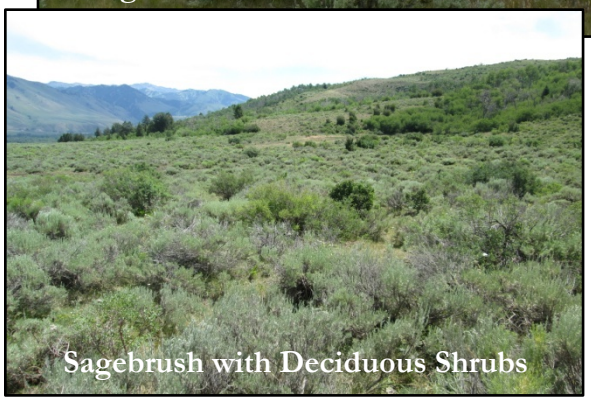
Figure 1. Teton County Map showing Federal Lands (green) and Private Ownership (white)►

LOCAL VEGETATION

Teton County's extreme elevation relief coupled with its geologic complexity creates a myriad of growing conditions supporting a large number of native plants and plant communities (Cogan et al. 2006). In previous studies (Cogan et al. 2006, Weber 1976; Peet 1988, Stohlgren 1998), topographic positions and other stratification systems were used to help describe the vegetation based on life zones and ecosystems. Noted in these studies is the capacity of the dominant plant species within life zones to intermingle and leapfrog around the landscape. This patterning coupled with the difficult topography and regular disturbance events (i.e. fire, flooding, and avalanches) results in a patchwork mosaic of vegetation types. Therefore, Teton County's vegetation can only be generally divided into distinct vegetation zones (from lowest to highest elevation) that include: (1) Sagebrush Flats, (2) Riparian Forests, (3) Montane Seral Forests, (4) Douglas-Fir Woodlands, (5) Spruce - Fir Forests, (6) Subalpine Whitebark Pine Forests, (7) Treeline Vegetation, and (8) Alpine Tundra. Of these, the alpine, treeline, and subalpine types are all primarily located on federal lands. The remaining native vegetation types can all be found on both the federally owned land the various privately owned and BLM administered lands within the county and include the following types.

Sagebrush Flats cover large plains in low elevations throughout the Jackson Hole and other upper valley floors. Local communities can be dominated by low sagebrush (*Artemisia arbuscula*), three-tip sagebrush (*Artemisia tripartita*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and may also co-mix with antelope bitterbrush (*Purshia tridentata*). Low sagebrush communities usually occur on dry sites with thin soils and the mountain big sage and bitterbrush communities occur on more moderate sites with deeper soils. Moister areas may also support shrubby cinquefoil (*Dasiphora floribunda)* and silver sagebrush (*Artemisia cana*). Disturbed or reclaimed areas along roadways in Teton County often contain rabbitbrush (*Ericameria nauseosa*) or basin big sagebrush (*Artemisia tridentata* spp. *tridentata*). Drier, well-drained low hillsides often lack shrubs and instead contain various grasses such as bluebunch wheatgrass (*Pseudoroegneria spicata*) and needlegrasses (*Stipa* spp.).

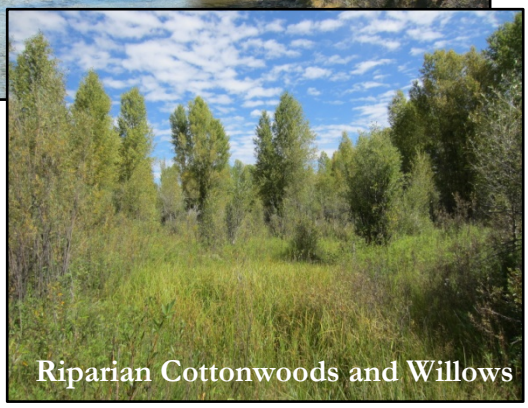

Sagebrush Flats with Mixed Grasses


Sagebrush with Deciduous Shrubs

In some areas of Teton County, the big sagebrush and grassland types may extend unto higher elevations including mountain toe and foot slopes. In these montane settings, the grass understories are replaced with more forb-dominated understories and often contain high cover of various deciduous shrubs. Conspicuous mesic forbs occurring on these sites include arrowleaf balsamroot (*Balsamorhiza sagittata*), one-flowered helianthella (*Helianthella uniflora*), and mulesears (*Wyethia amplexicaulis*). Common associated deciduous shrubs include mountain snowberry (*Symphoricarpos oreophilus*), serviceberry (*Amelanchier alnifolia*), Wood's rose (*Rosa woodsii*), and chokecherry (*Prunus virginiana*).

Riparian Forests comprised of broad-leaved deciduous narrowleaf cottonwoods (*Populus angustifolia*) and willows (*Salix* spp.) line the Snake River corridor, its many tributaries, and other perennial streams throughout Teton County. In some areas, large stands of blue spruce (*Picea pungens*) and aspen (*Populus tremuloides*) are common and may intermingle with the willows and cottonwoods forming complex mosaics. Blue spruce, Engelmann spruce (*Picea engelmannii*), and lodgepole pine (*Pinus contorta*) trees are also prevalent in Snake River floodplains (especially those with protective levies) and the presence of conifers in the understory may represent a gradual replacement of the cottonwood trees. Other major streams and rivers, especially in the Alta area, contain stands of closely related black cottonwood (*Populus balsamifera*) trees.

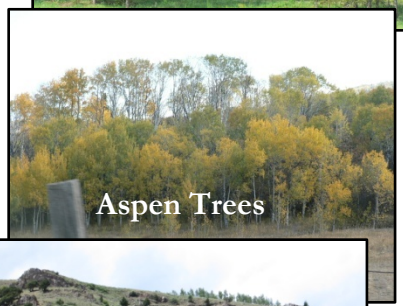

Riparian Blue Spruce Forest

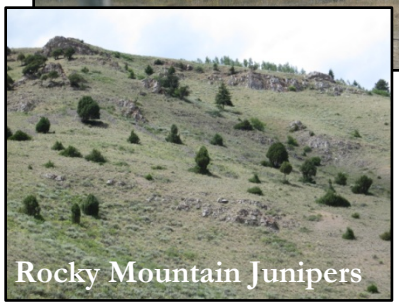

Riparian Cottonwoods and Willows

The understory and herbaceous layers in riparian communities are often disturbed and contain Kentucky bluegrass (*Poa pratensis),* a naturalized but non-native species, and various forbs and shrubs including groundsels (*Senecio* spp.), asters (*Aster* spp.*, Erigeron* spp.), alders (*Alnus incana*), willows, and sagebrush.

Montane Seral Forests containing solid or mixed stands of lodgepole pine, quaking aspen, and Rocky Mountain juniper *(Juniperus scopulorum*) are found throughout Teton County on dry mid-mountain slopes, in upper valleys, and buttes. Lodgepole pine forests are characterized by their dense tree formations and a sparse or absent understory dominated by pinegrass (*Calamagrostis rubescens*), elk sedge (*Carex geyeri*), grouse whortleberry (*Vaccinium scoparium*), and/or highbush huckleberry (*Vaccinium membranaceum*.).


Lodgepole Pine Forest


Aspen Trees


Rocky Mountain Junipers

Upland aspen forests and woodlands are usually on more mesic sites and are characterized by a well-developed understory with an array of mostly deciduous shrubs, forbs, and graminoid species. Some of these same understory shrub species including mountain snowberry, serviceberry, Wood's rose (*Rosa woodsii*), and chokecherry also form dense thickets on mesic drainages, along the bases of rock outcrops, and in shallow valleys. Rocky Mountain juniper communities are sparse in Teton County and usually contain a mix graminoid understory. Rocky Mountain juniper stands can be found on arid south and east-facing slopes and on rocky ridges. Local stands of Rocky Mountain juniper on the hills and buttes around the Town of Jackson may also contain some limber pine (*Pinus flexilis*) trees.

In the absence of fire and disturbance, some lodgepole and aspen stands have a high Douglas fir (*Pseudotsuga menziesii*) component that may eventually grow to replace the other conifer tree species. Some stable lodgepole and quaking aspen forests/woodlands do occur in Teton County and good examples of large, intact aspen stands can be found in the Alta area. Lodgepole and aspen ecosystems are fire-resilient and can be rejuvenated by low to moderate intensity burns resulting in a rapid growth of even-aged stands as witnessed in the post-burn areas near the town of Wilson.

Douglas-Fir Woodlands grow throughout Teton County and form montane communities between the sagebrush flats and the spruce-fir forest life zones. Douglas-fir stands tend to grow on more mesic slopes and along upper drainages as compared to the drier lodgepole pine forests. Douglas fir woodlands and forests can be relatively pure or form mixed stands with other common conifers including limber pine, lodgepole pine, Engelmann spruce, and subalpine fir (*Abies lasiocarpa).*The understory of Douglas fir communities tend to be fairly open, and are often dominated by pinegrass or spirea (*Spiraea betulifolia*). Douglas-fir trees in woodland settings are bushy in appearance whereas Douglas fir trees in closed, mature forests have pointed crowns. Examples of Douglas fir communities can be found around the Snow King and Teton Village developments.


Douglas-fir Woodland

Spruce - Fir Forests are relatively rare on privately owned and BLM administered lands in Teton County. Where they do occur, they represent the lower reaches of the sub-alpine life zone and consist primarily of mixed stands of Englemann spruce and subalpine fir. Understories are often sparse but can contain similar grass, forb, and short shrub species as found in the montane types. These include pinegrass, spirea, and elk sedge. Examples of spruce-fir forest are found in the eastern portion of the Alta area and at high elevations near the Teton Village Ski Resort.

NON-NATIVE, DISTURBED, AND AGRICULTURAL VEGETATION


Planted Non-native Trees and Pasture Grasses

Ranching and farming along with commercial, residential, and recreational development are common on the privately owned lands in Teton County. As a result, some of the native vegetation has been manipulated through grazing, irrigation, and tiling and some has been replaced by non-native grasses, shrubs, and trees. Specific examples are the presence of Kentucky bluegrass, smooth brome (*Bromus inermis*) and other introduced grasses sown for lawns, golf courses, hay fields, and pastures. In addition some of the common landscape trees/shrubs used around houses and businesses include introduced lilacs (*Syringa* species), golden willow (*Salix alba vitellina*), European larch (*Larix decidua*), and ornamental maple trees (*Acer* species). In some cases, introduced species may have spread on their own into abandoned sites or into disturbed native plant communities. Other problematic non-native and invasive plant species are found in the county in isolated patches. These include spotted knapweed (*Centaurea maculosa*), houndstongue (*Cynoglossum officinale*), St. John's wort (*Hypericum perforatum*), Dyer's woad (*Isatis tinctoria*), and Canada thistle (*Cirsium arvensis*).

PROJECT PURPOSE

In 2012, Teton County developed a comprehensive plan for growth and development to protect the health, safety, and welfare of the county and preserve the community character for future generations (**Figure 2**). A central theme of the plan is a general appreciation of the unique natural setting of Teton County in the Greater Yellowstone ecosystem and the quality of life that this area affords. To help maintain the natural character, the county recognizes the importance of ecosystem stewardship, growth management, and quality of life. The plan recognizes the ecological richness and international significance of the roughly 2.6 million acres of federally protected lands within the County and extends that ethic to the 3 percent of private lands where most of the community lives and works. Specifically, section 1.1.S.1 of the comprehensive plan outlines the strategy of creating a vegetation cover map for the county to help identify and protect natural habitats and areas of critical importance (Teton County 2012).

To address the vegetation mapping need outlined in the Comprehensive Plan, the Teton County Planning and Development Department awarded Cogan Technology, Incorporated (CTI) a contract in 2012 to develop a geographic information system (GIS) digital layer of designated vegetation and non-vegetation cover types. The resulting vegetation spatial layer will be integrated into the County's GIS, housed on the GIS department's MapServer system (**Figure 3**), and will be ultimately used by the various Teton County Departments for planning, development, and other uses. Lands within federal ownership, including those managed by the National Park Service (NPS), U.S. Fish and Wildlife, (USFWS) and the U.S. Forest Service (USFS) were excluded. Lands administered by the Bureau of Land Management (BLM) were included in this project and were mapped accordingly.

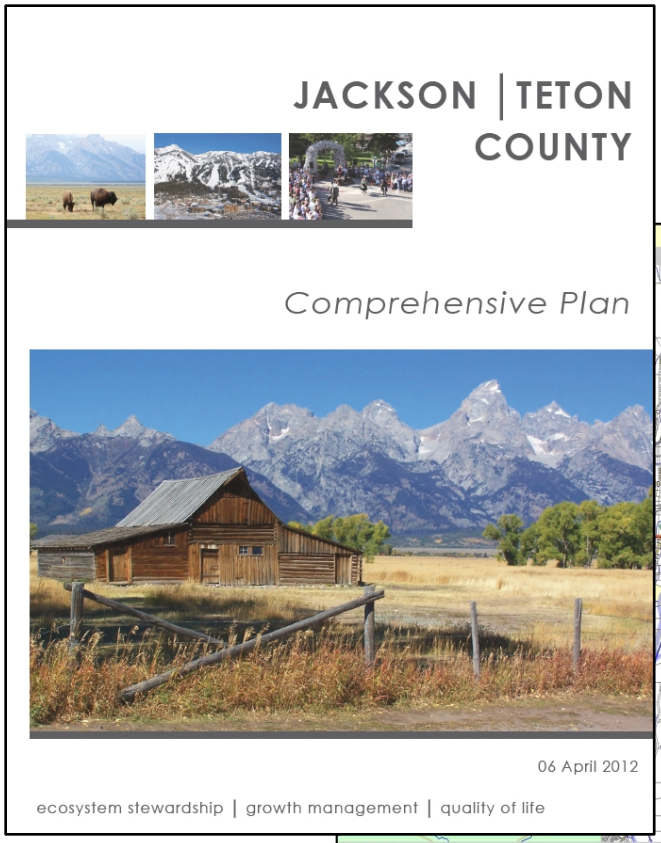
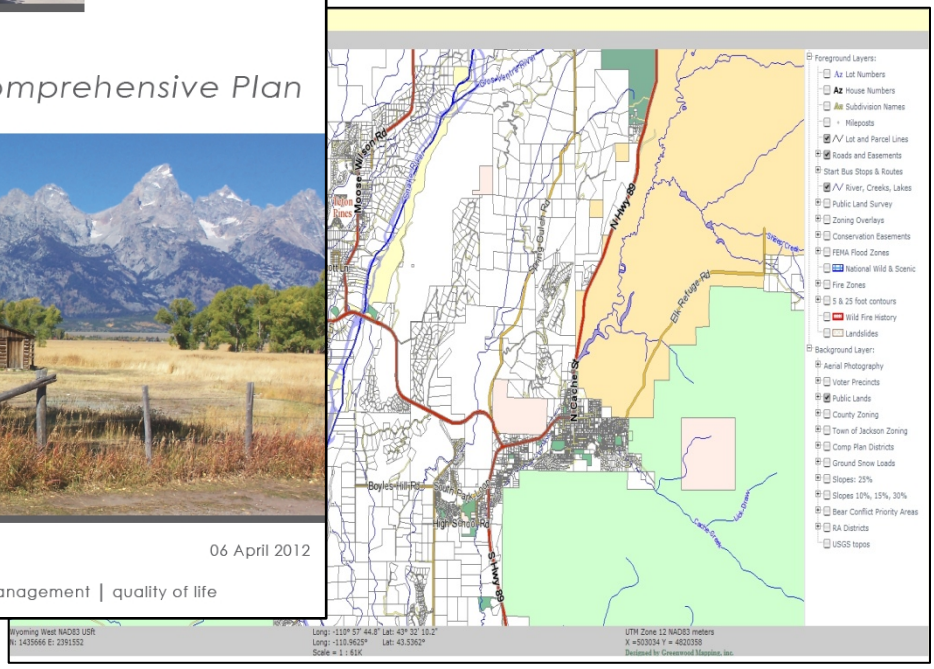


Figure 2. Jackson and Teton County Comprehensive Plan Ownership ◄

Figure 3. Teton County's MapServer Website ▼



PROJECT BACKGROUND AND SCOPE

The Teton County Vegetation Mapping Project as outlined in the request for proposals is closely based on the National Vegetation Inventory Program (NVIP) created in part by the NPS in 1995. The NVIP was successfully implemented at GTNP and JODR in 2005 and the results of these efforts were used to help plan the Teton County vegetation mapping project. Included in the NVIP are the following procedures, standards, and protocols that insure consistency, reliability, and usefulness of the spatial and ancillary products:

- 12-Step Guidance for NPS Vegetation Inventories (NPS 2009);
- United States National Vegetation Classification Standard revised, Version 2 (rUSNVC) (FGDC 2008),
- Federal Geographic Data Committee (FGDC) Vegetation and Mapping Standards (FGDC 1997 & FGDC 2008);
- Field Methods for Vegetation Mapping (Grossman et al. 1994)
- Vegetation Classification Guidelines version 2.0 (Lea 2011)
- Thematic Accuracy Assessment Procedures version 2.0 (Lea and Curtis 2010).

Use of standardized methodologies insures that all vegetation data are compatible with other studies at the National, State, County, and Local levels. A standard system is also critical for a systematic inventory and classification of the nation's biological resources for more efficient stewardship and to help prioritize conservation efforts among various entities (FGDC 2008).

The key to the success of the NVIP is the use of the rUSNVC as a standardized guide to plant communities. The rUSNVC is a hierarchical system that allows for vegetation classification at multiple scales, uses a systematic approach to classify a continuum, emphasizes natural and existing vegetation, uses a combined physiognomic-floristic hierarchy, and identifies vegetation units based on both qualitative and quantitative data (FGDC 2008). There are eight levels with specific criteria set for each level (**Table 1**). The upper three levels are based on climate and physiognomic characteristics that reflect geographically widespread topographic and edaphic factors. The middle three levels focus on broad sets of diagnostic plant species and habitat factors along regional-to-continental topographic, edaphic, and disturbance gradients (Faber-Langendoen et al. 2010). The lower two levels are the alliance and association and are distinguished by differences in local floristic composition (Grossman et al. 1998).

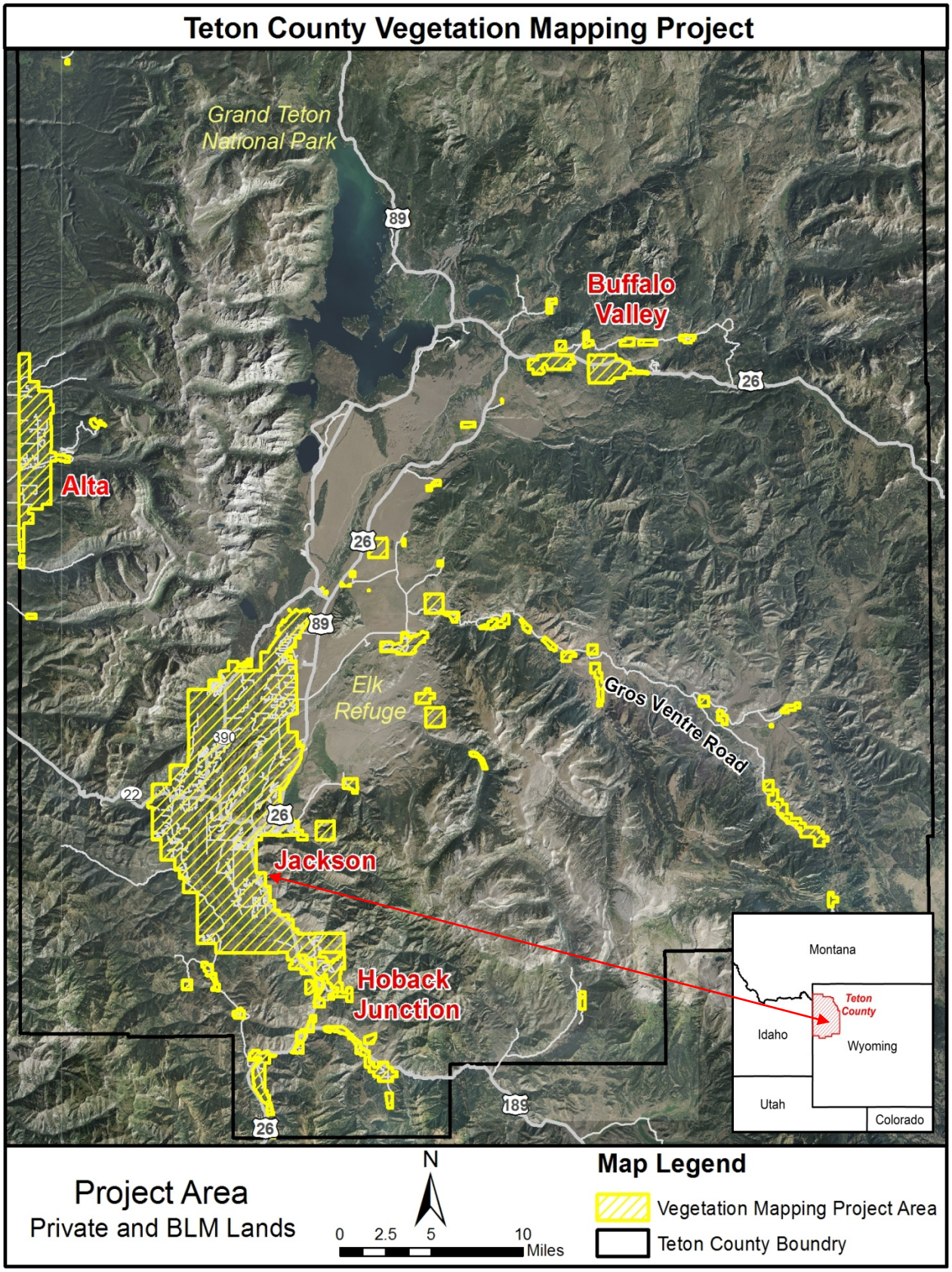
The broader alliances are physiognomically distinct groups (i.e. forests, woodlands, shrublands, herbaceous vegetation, etc.) of plant associations sharing one or more differential or diagnostic species (Mueller-Dombois and Ellenberg 1974). These are commonly the dominant(s) species found in the uppermost strata of vegetation. The plant association is the base unit of the classification, and following Jennings et al. (2009) is defined as "a vegetation classification unit defined on the basis of a characteristic range of species composition, diagnostic species occurrence, habitat conditions, and physiognomy." Content for the rUSNVC is currently maintained by NatureServe and is being peer reviewed through collaboration with federal agencies and the Ecological Society of America (Faber-Langendoen et al. 2009). The content is available to the public and is regularly updated through NatureServe Explorer (2013) (http://www.natureserve.org/explorer).

Table 1. Summary of rUSNVC Hierarchy Levels and Criteria for Natural Vegetation.

Hierarchy Level	Criteria
Upper:	Physiognomy plays a predominant role.
L1 – Formation Class	Broad combinations of general dominant growth forms that are adapted to basic temperature (energy budget), moisture, and substrate/aquatic conditions.
L2 - Formation Subclass	Combinations of general dominant and diagnostic growth forms that reflect global macroclimatic factors driven primarily by latitude and continental position, or that reflect overriding substrate/aquatic conditions.
L3 – Formation	Combinations of dominant and diagnostic growth forms that reflect global macroclimatic factors as modified by altitude, seasonality of precipitation, substrates, and hydrology.
Mid:	Floristics and physiognomy play predominant roles
L4 – Division	Combinations of dominant and diagnostic growth forms and a broad set of diagnostic plant species that reflect biogeographic differences in composition and continental differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes.
L5 –Macrogroup	Combinations of moderate sets of diagnostic plant species and diagnostic growth forms, that reflect biogeographic differences in composition and sub-continental to regional differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes.
L6 – Group	Combinations of relatively narrow sets of diagnostic plant species (including dominants and co-dominants), broadly similar composition, and diagnostic growth forms that reflect regional mesoclimate, geology, substrates, hydrology and disturbance regimes.
Lower:	Floristics plays a predominant role
L7 – Alliance	Diagnostic species, including some from the dominant growth form or layer, and moderately similar composition that reflect regional to subregional climate, substrates, hydrology, moisture/nutrient factors, and disturbance regimes.
L8 – Association	Diagnostic species, usually from multiple growth forms or layers, and more narrowly similar composition that reflect topo-edaphic climate, substrates, hydrology, and disturbance regimes.

Upon contract award in 2012, CTI was provided with digital copies of the GTNP/JODR vegetation inventory project report, GIS data, rUSNVC list of types/descriptions, Teton County overhead/aerial imagery, and access to all pertinent Teton County GIS layers including ownership, roads, zoning, hydrology, conservation easements, digital elevation models (DEMs), natural resources, Light Detecting and Ranging elevation (LIDAR), and other ancillary data. The Teton County land ownership layer was used to create the project boundary by querying for all parcels either owned by private entities, administered by the BLM, or by various State and Local authorities. The clipped parcel layer was sent to the Teton County GIS department for approval and revision. Once approved, the final boundary for this project encompassed about 87,547 acres, focused in the residential and commercial areas of Jackson, Hoback Junction, Alta, and Buffalo Valley. Other isolated parcels were also included in the project area and included private USFS or NPS in-holdings/sub-divisions/developments and small estates occurring along the U.S. and State Highways 26, 89, 189, and the Gros Ventre Road (**Figure 4**).

Figure 4. Approximate Project Boundary of Private and BLM Lands in Teton County.



Within the 87,547-acre project boundary, CTI was responsible for developing a digital layer of designated vegetation and non-vegetation types based on the NVIP methods, using the rUSNVC list of plant associations/alliance from GTNP/JODR, and to deliver the final products as specified in the contract. Project specifications and requirements included the following (summarized below).

- **Map Units**: Vegetation map units for Teton County will be based on the GTNP Vegetation Mapping Project (Cogan et al. 2006). Other non-vegetative and additional vegetation map unit may be used and further refined or divided into subunit classifications. All new map units will be discussed and approved by the County Planning and Development Staff and the NRTAB members.

- **Map Base:** Digitized map units will use the 2011 Teton County color 1 foot/pixel ortho-rectified aerial photography as the base map. Additional ancillary data and imagery may be used as needed.

- **Photo-interpretation**: Areas of readily identifiable homogeneous vegetation shall constitute the initial polygons. Within any polygon, areas of a different recognizable vegetation type whose largest dimension exceeds the resolution ranging from 2 – 200 feet (depending on map unit) will be mapped as a separate polygon. Any initial polygon comprising more than 30% disturbed area will be exempt, except for the mapping of water bodies

- **Digital Transfer**: Digital transfer will be performed as nearly as possible in the manner outlined in the GTNP vegetation inventory project report and so as to be fully compatible with the Teton County GIS database and Arc GIS.

- **Map Verification**: Adequate ground truthing will be performed (site visits are required for a minimum of 35% of the polygons) and ground photos will be taken. Access to private lands will be acquired only via verbal or written permission from the landowner. Polygons without access will be assessed by visual reconnaissance from adjacent public land and private lands where access has been acquired. All verification data will be used to revise the map.

- **Accuracy Assessment - Positional Accuracy:** Accuracy of map unit polygon lines will meet the National Map Accuracy Standards for 1: 12,000-scale maps (90% within 10.2 meters) and must meet the standards for incorporation into the Teton County GIS database.

- **Accuracy Assessment - Thematic Accuracy**: Each map unit will have a stratified random number of target sites ranging from 5-40 based on abundance and frequency. Adjustments to the number of targets can be made based on the level of accuracy achieved and access restrictions. The location of each target will be recorded using a global positioning system (GPS) receiver and ground photos will be taken. Three assessments, in the form of error matrices, will be made. Minimum allowable accuracies will be 60%, 70%, and 80% for binary, acceptable, and reasonable accuracies, respectably.

- **Deliverables**: The primary deliverable will be a GIS-based digital map of vegetation and cover-types with polygon attributes. Additional deliverables will include a final report that with the methods, AA results, keys ,and map unit descriptions. Both hardcopies and digital versions of the report and vegetation map will be created.

METHODS

Work began on the project with initial planning, data gathering, and coordination. Preparation included dividing the project into five major steps based on the overall project scope and contract responsibilities, these included the following:

- Planning, Data Gathering, and Coordination;
- Mapping and Photo Interpretation;
- Map Verification and Ground-truthing;
- Accuracy Assessment;
- Final Project Report and Deliverables.

PLANNING, DATA GATHERING, AND COORDINATION

Initial planning for the Teton County vegetation mapping project occurred during various phone calls, e-mails, and file transfers between the Teton County Planning and Development staff and CTI during the summer of 2012. This was followed with more correspondence and periodic updates as needed. One overview meeting was held in the Town of Jackson in conjunction with the map verification and ground-truthing stage and another progress meeting was held in Jackson prior to the start of the AA fieldwork.

OVERVIEW MEETING

Following review and approval of the draft vegetation layer for Teton County, CTI contractors worked with Teton County Planning and Development staff to schedule a project overview meeting for October 2, 2012. To minimize travel expenses, CTI Staff combined this meeting with the field verification work. Meeting attendees included two senior CTI GIS and Ecology Staff members, NRTAB members, representatives from the Teton County Commission, representatives from the Town of Jackson, and other interested partners.

Topics discussed at the meeting included:

- Introduction of key personnel;
- Review of draft vegetation layer and project boundary;
- Review and verification of the project tasks and goals;
- Private land access policy review;
- Discussion and approval of field forms and databases structures;
- Questions or clarifications for contract specifications;
- Coordination of the project timeline; and
- Approval of project milestones and progress payments.

The overview meeting was held in the Teton County Boardroom in the Town of Jackson and the agenda featured a brief project overview, a detailed CTI presentation, a thorough discussion of mapping methods and access-related issues, and several informal follow-up discussions and introductions with NRTAB staff.

Decisions made at the overview meeting included:

- Mapping residential land-use to the extent of mowed/lanscaped lawns;
- Mapping main-stem irrigation canals (especially with willows) but not lateral branches;
- Mapping vegetated cobble bars in the major rivers but not braided channels, and;
- Include mapping of urban vegetated wildlife movement corridors consisting of both planted and naturally occurring trees and shrubs.

PROGRESS AND UP-DATE MEETING

Another project meeting was conducted prior to the start of the AA fieldwork. On July 9,2013 CTI staff met with Teton County Planning and Development staff and NRTAB members at their offices in the Town of Jackson. The purpose of this meeting was two-fold. First, CTI gave an overview of the status of the project, timeline, and discussed some possible NRTAB requested modifications to the map unit classification and the spatial layer. During this time CTI presented mapping highlights including the high levels of detail in the mapping of urban and wetland areas and the emphasis placed on separating impervious from pervious map units.

Other meeting discussion topics included:

- Delineation of 2-track roads, social and horse trails will be done if they are wide enough to delineate at 1:12,000-scale or if it looks like a regularly used system;
- Irrigation canals and channels will be mapped if they represent mainstems of the system or if the cannals are wide enough to delineate at 1:12,000-scale. Smaller laterals and side-channels will not be mapped at this time but could be addressed later using lines instead of polygons;
- New map units were added for non-native vs. native tree plantings, mixed big sagebrush/deeciduous shrub stands, and irrigated pastures with native graminoids.

The second part of the meeting was an informal discussion dealing with the planning of the AA fieldwork. CTI staff outlined the AA procedures, presented the AA form, key to map units, field maps, and locations of the AA targets. Teton County Planning and Development and NRTAB staffs reported on their efforts to contact and get permission from landowners and the possible need for a 1-day float trip down the Snake River. General safety procedures were discussed including contacting the sheriff's office if needed, reviewing the off-limit roads, and the need to call certain landowners before accessing their lands.

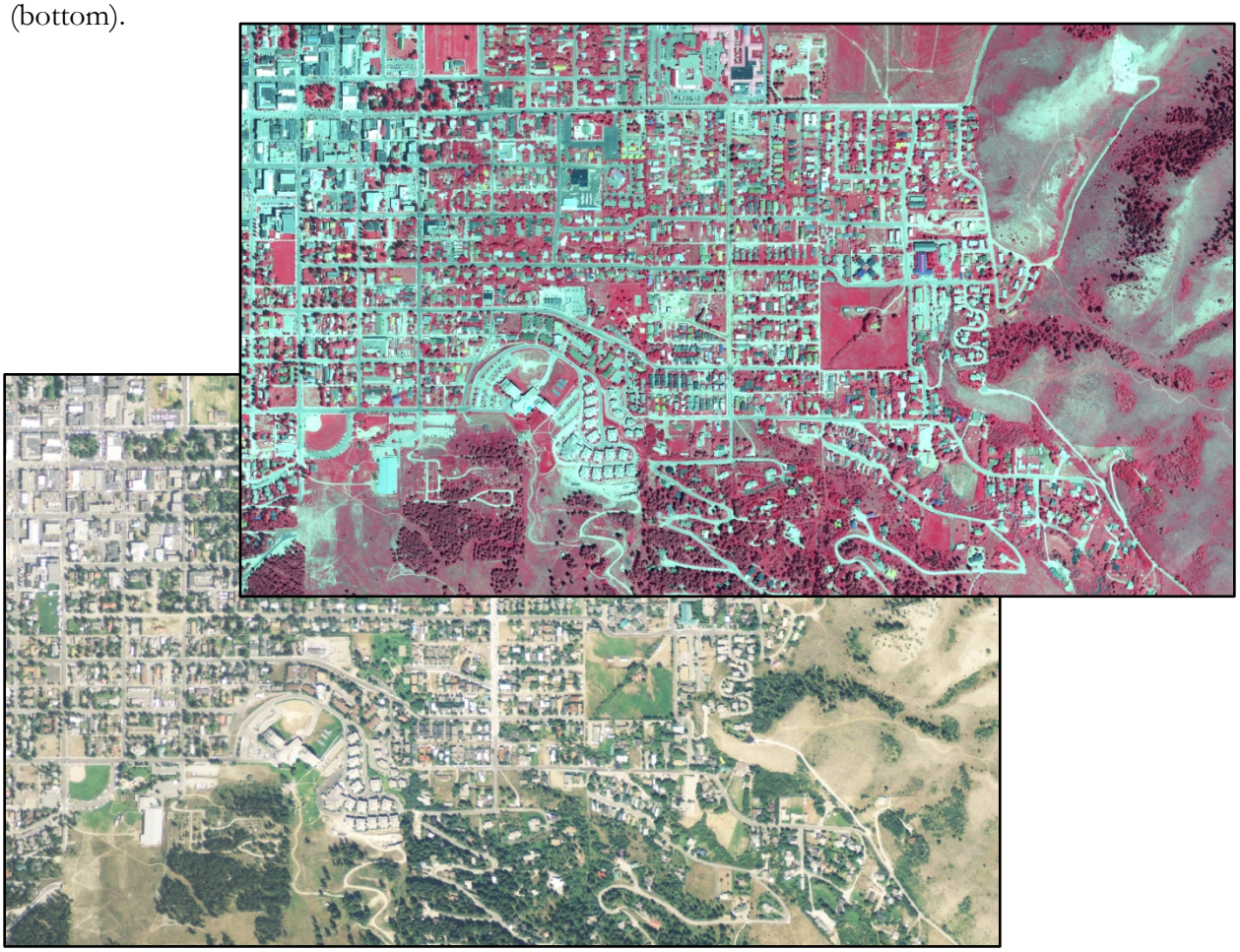
MAPPING AND PHOTO INTERPRETATION

After the initial planning and contract award the vegetation mapping stage for Teton County began with the transfer of Teton County's GIS imagery/data, the approval of the official project boundary, and the creation of the vegetation geo-spatial database. Mapping began on approximately August 1, 2012 and progressed up until December 1, 2013 during various stages of drafts, reviews, revisions, updates, and finalizations.

DIGITAL IMAGERY AND DATABASE CREATION

During the planning and coordination phase, Teton County GIS staff provided digital copies of the ortho-rectified color infrared imagery (1-foot pixel resolution) that was obtained by the county in 2011. The imagery footprint was focused on the Jackson, Hoback Junction, Wilson, Alta, and Buffalo Valley areas. Some of the out-lying parcels were not covered by the 2011 imagery so CTI downloaded the 2012 (most recent) ortho-rectified true color aerial photography (1-meter pixel resolution) from the National Agriculture Imagery Program as a supplement. Both products were reviewed by CTI staff and were found to be adequate for vegetation mapping purposes (**Figure 5**). The 2011 imagery was found to be superior to the 2012 NAIP product due to the finer resolution and the presence of a color infrared (CIR) band.

Figure 5. Examples of the 2011 Teton County CIR (top) and 2012 NAIP True Color Imagery (bottom).



All of the imagery and ancillary data was uploaded into CTI computers dedicated to GIS mapping and spatial database production. In addition to the imagery, the following ancillary and supporting GIS layers were also included in the Teton County spatial database:

- Final Project Boundary -based on the Teton County ownership layer ;
- Existing Digital Vegetation Mapping Layers:
- GTNP Overlap Areas;
- Select Privately-owed Areas - based on recent conservation easement analyses;
- LIDAR Elevation Layers - for limited areas of the County;
- Roads, Road Easements and Transportation Layer;
- 30-meter Digital Elevation Models (DEM);
- Hydrology, Hydrography, Land Cover, Soils, and Bedrock Geology Layers;
- Land Owenership, Easements, Zoning and other County Boundary Files.

The initial draft spatial database layer for Teton County was created by first importing both the final project boundary and the existing GTNP vegetation layers into a custom GeoDatabase using ArcGIS software. The project boundary was then used to clip out the portions of the existing GTNP vegetation map that overlapped onto private or BLM-managed lands in Teton County. (**Figure 6**). Existing vegetation layers created for conservation easements were also imported at this time and both vegetation layers were subsequently cleaned and updated using the 2011 imagery as the new base.

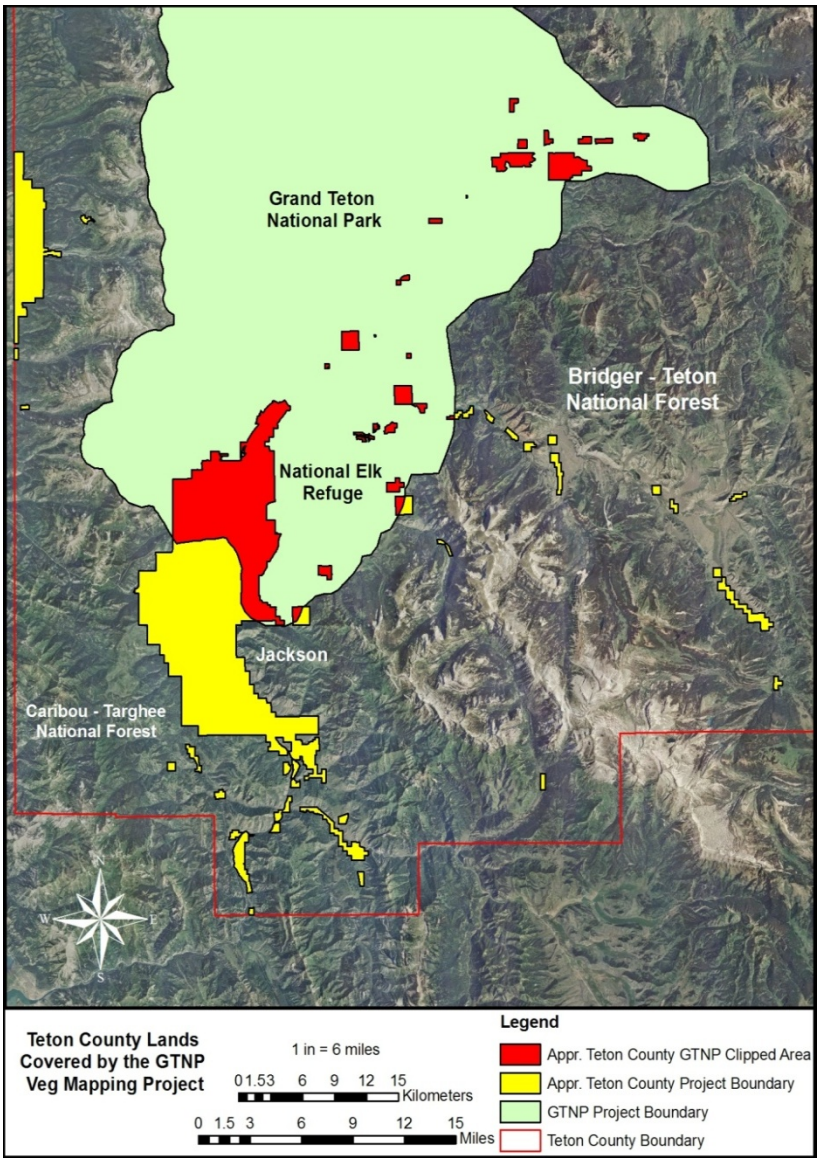


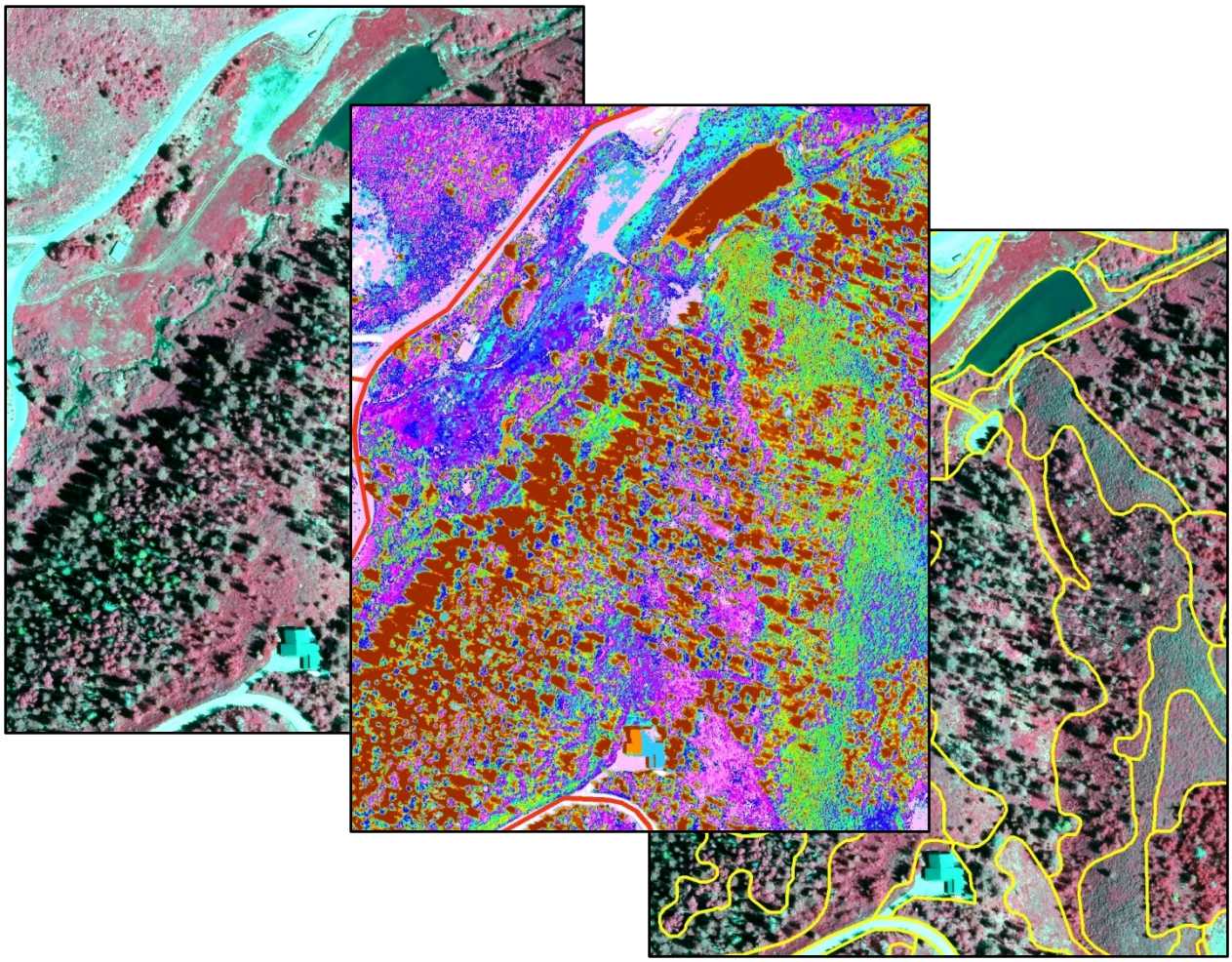
Figure 6. Teton County Project Area Included in the GTNP Vegetation Inventory Project. ►

PRELIMINARY MAPPING

Interpretation and mapping of the vegetation for the remaining areas began by mosaicing and manipulating the 2011 imagery using image processing and segmentation techniques (e.g. unsupervised image classification and normalized difference vegetation index) to highlight any subtle vegetation signature differences (**Figure 7**). All of the preliminary results were evaluated for usefulness and the best examples were converted from rasters to lines. The preliminary lines were then combined with the data from the existing vegetation layers to create draft polygons.

Building off the results of the preliminary image classification efforts, all draft polygons were exported as ArcMap shapefiles and converted to ArcInfo coverages. The resulting coverages were run through a series of smoothing routines provided in the ArcGIS software. Following the smoothing, the draft polygons were manually cleaned to remove extraneous lines, sliver polygons, and any polygons that obviously split across physiognomic life forms. The cleaning stage was considered complete when all resulting polygons closely matched the homogenous stands of vegetation apparent on the 2011 CIR imagery (**Figure 7**).

Figure 7. Examples of the 2011 Teton County CIR Imagery (left), Results of an Unsupervised Classification Effort (middle), and Preliminary Polygon Lines (right).



The preliminary lines were further manipulated at this point using a photo-interpretation effort. To meet the polygon resolution and AA goals specified in the contract, CTI used 3-dimensional (3-D) computer monitors to digitize and revise the draft polygons directly off the 2011 CIR and 2012 NAIP background imagery. Digital 3-D monitors provided stereoscopic viewing (critical in high-relief landscapes) but eliminated the need to manually scan and transfer line-work. All of the draft polygons were visually inspected and manually moved, edited and updated in ArcGIS programs as needed. Any obvious problems in the mapping (such as shifting and breaking polygons) were edited and resolved. Areas of readily identifiable homogeneous vegetation were further reviewed to determine if any areas contained within the polygon could be further split into separate polygons. Digital copies of the initial mapping were sent to Teton County for review and comment.

MAP UNITS AND ATTRIBUTION

In conjunction with creating the draft polygons, initial labels (i.e. attributes) were recorded for each polygon. Attribution included both attaching the appropriate preliminary map unit name and code (**Table 2**) and any ancillary information (**Table 3**) to each polygon. The vegetation map unit names were largely based on map units created for the GTNP vegetation inventory project (Cogan et al. 2006). Other non-vegetative map units were also provided for land cover classes (such as open water) and areas currently being used for agricultural purposes.

Table 2. Preliminary List of Map Unit Names and Codes.

Map Code	Map Unit Name
FAP	Aspen Forest
FEP	Mixed Conifer - Aspen Forest
FCW	Cottonwood Riparian Forest
FBS	Blue Spruce Riparian Forest
FRM	Mixed Cottonwood - Blue Spruce Riparian Forest
FMC	Mixed Conifer Forest
FDF	Douglas-Fir Forest
FSF	Subalpine Fir- Engelmann Spruce Forest
FLP	Lodgepole Pine Forest
FJ	Rocky Mtn. Juniper Woodland Stand
SAI	Alder Shrubland
SMR	Mixed Tall Deciduous Shrubland
SWL	Willow Shrubland
SSD	Sagebrush Dry Shrubland
DSE	Low Sagebrush Dwarf Shrubland
SES	Sage - Antelope Bitterbrush Mixed Shrubland
SSW	Sage/Shrubby Cinquefoil Mesic Shrubland

Map Code	Map Unit Name
HGL	Mixed Grassland Herbaceous
HFD	Montane Mesic Forb Herbaceous
HGS	Flooded Wet Meadow Herbaceous
HA	Herbaceous Aquatics
VCT	Cliff & Talus Sparse Vegetation
VEH	Exposed Hillside Sparse Vegetation
VSL	Exposed Shore - Stream Deposit Sparse Vegetation
VRB	Recently Burned Sparse Vegetation
NIP	Cropland and Pasture
NVS	Non-Vegetated Sand Bars
NRD	Transportation, Communication, and Utilities Structures
NSM	Strip Mines, Quarries, & Gravel Pits
NST	Streams
NID	Irrigation canals
NLP	Lakes & Reservoirs

Table 3. Preliminary List of Polygon Attributes.

ATTRIBUTE	DESCRIPTION
AREA*	Surface area of the polygon in meters squared
PERIMETER*	Perimeter of the polygon in meters
TECOVEG*	Unique code for each polygon minus the universal polygon
TECOVEG_ID*	Unique identification code for each polygon
MAP_CODE	Map Unit Code
VEG_CNAME	Map Unit Common Name
ACRES	Surface area of the polygon in acres
HECTARES	Surface area of the polygon in hectares
ELEV_M	Elevation of the polygon centroid in meters
ELEV_FT	Elevation of the polygon centroid in feet
SLOPE	Average slope of the polygon at the centroid in degrees (0 flat– 90)
ASPECT	Average aspect of the polygon at the centroid in degrees (0-360)
DENS_MOD	Percent cover of the upper stratum layer in the polygon **Sparse** < 25%, **Open** 25-50%, **Discontinuous** 50-75%, **Closed** 75-100%
PTRN_MOD	Vegetation pattern within polygon **Homogeneous – Evenly Dispersed, Alternating, Clumped/Bunched, Gradational/Transitional**
HT_MOD	Height range of dominant vegetation layer (for Mixed Evergreen-Poplar and Mixed Cottonwood-Blue Spruce Riparian Forest the heights should be those poplars and cottonwoods, respectively) **< 5 meters, 5-15 meters, > 15 meters**
DOM_MOD	Dominant species present (use USDA plant codes)
ASPEN	Presence of aspen (Yes/No)
BURN	Evidence of recent (< 30 years) burning (Yes/No)
CULTIVATED	Evidence of recent (< 10 years) agricultural cultivation (Yes/No)
COMMENTS	Additional Comments on a specific polygon

***ArcInfo© default items

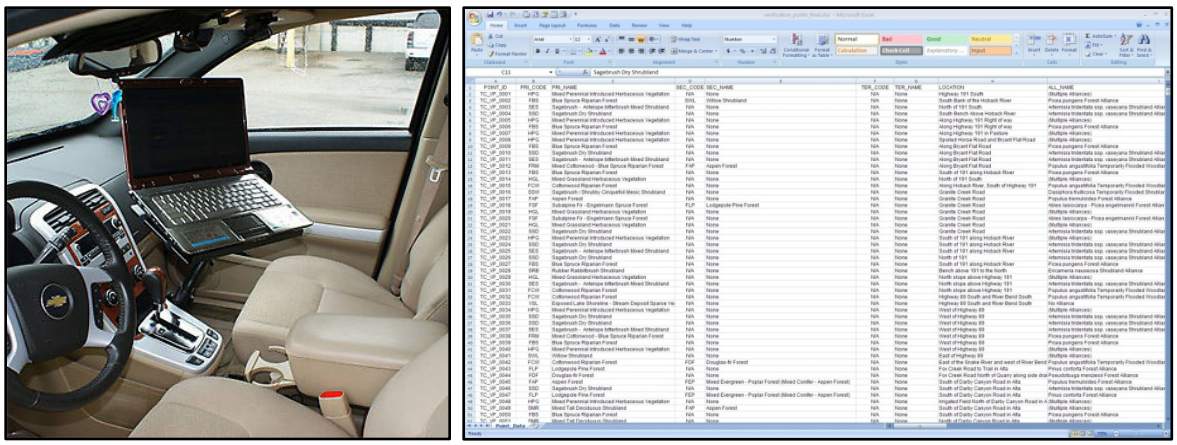
Included in the vegetation map attribution were other useful statistics obtained by combining the vegetation polygons with a Digital Elevation Model (DEM). The DEM for Teton County was obtained from the USGS National Elevation Data coverage (30-meter resolution) and imported into a spatial grid. Through a linking procedure between the centroid of the vegetation polygons and the DEM ,the average slope, aspect, and height of the polygon centers were calculated and included in the final spatial database.

MAP VERIFICATION AND GROUND-TRUTHING

A verification trip was conducted by CTI scientists over 9 days starting on October 2, 2012. The goal of the ground-truthing effort was to both verify existing vegetation polygons and to document the diversity and distribution of the rUSNVC associations/alliances within the project boundary. To minimize travel expenses, the map verification efforts were conducted immediately prior to, and just after the overview meeting. The meeting and verification work was timed for early autumn to accommodate schedules, maximize attendance, and to allow for easy identification of deciduous tree and shrub species (i.e. fall leaf color). Two senior CTI ecology experts familiar with the flora of Teton County were used to accomplish the verification work.

In preparation for the field verification effort, the draft Teton County vegetation layer along with base imagery, county roads, property boundary, and other ancillary data was uploaded into hand held and laptop computers. The computers were linked to mobile and vehicle based GPS receivers to provide correct orientation while running mobile GIS programs (**Figure 8**). Back-up paper field maps were also created with vegetation and land use polygon outlines, mapping codes and unique polygon identifiers. The use of mobile computers also allowed for streamlined digital recording and tallying of verification points using spreadsheets and the efficient downloading of corresponding digital ground photos from cameras.

Figure 8. Examples of the Mobile GPS, Laptop-based GIS (left), and Verification Point Spreadsheet Data (right) used during the Verification and Ground-Truthing Stage.



Based on previous experience and guidance form NRTAB staff, the Teton County project area was split into sub-regions for daily planning purposes. Sub-regions and the day(s) they were visited included:

1. Highways 89 and 191 South of Jackson (10/2/12 & 10/10/12);
2. Alta (10/3/12);
3. Town of Jackson (10/4/12);
4. Town of Wilson, Moose-Wilson Road, Teton Village and Fish Creek Road (10/5/12);
5. Buffalo Valley, Pacific Creek Sub-division, Town of Kelly and Highway 89 North (10/6/12);
6. Fall Creek Road (10/7/12);
7. Gros Ventre River Road (10/8/12);
8. Spring Gulch Road and Sub-divisions North of Jackson by the airport (10/9/12);
9. Highway 22, Paintbrush Trail, and Mallard Road (10/10/12).

All verification efforts were limited to public roads, lands, and some private lands were CTI had permission to work. Work on inaccessible private lands was restricted to remotely viewing vegetation from public pullouts, parking lots, roadsides and other safe viewing locations. Areas were CTI did have permission included the Resor Ranch Properties, BLM lands, and the Snake River levees (walking only). In these accessible locations, vegetation stands were viewed directly from the ground. Exact location of the vegetation was based on precise GPS positioning using the 2011 Teton County and the 2012 NAIP imagery as shown on the mobile GIS programs. For remotely viewed polygons additional compass headings, bearings and estimated distances were used. All verification points were projected into their corresponding polygons for future overlay analyses.

During the nine days of field work, CTI staff collected data at 2,015 individual ground-based verification points (**Figure 9**). Verification data collected at each point included various information on the dominant species and associated environmental variables. Verification data was recorded directly into a digital spreadsheet that matched a modified NPS rapid assessment form (**Appendix A**). Classifying the vegetation at each location was based in part on using the GTNP photo-interpretation mapping conventions and visual key, the GTNP field key to the plant associations, and the GTNP list of Anderson et al. (1976) land-use and land-cover types (Cogan et al 2006). Additional information on height, pattern, density, disturbance, and representativeness of the plant community was also recorded. If the dominant species could not be determined or if the polygon included more than one map class (i.e. ecotones) secondary and sometimes tertiary map class calls were included.

In addition to the verification effort, CTI staff also collected observation point data at 115 locations (**Figure 10**). Observations were taken to help document the vegetation map units and to describe the existing rUSNVC (and potentially any new) associations/alliances occurring in the project area. The observation points were digitally recorded using a standard NPS form (**Appendix A**) that recorded the dominant/characteristic plant species, vegetation stand height, cover of each vegetation strata (herbaceous, shrub, tree), environmental data, and percent canopy cover of the major species. Other nearby vegetation types and any recent disturbance were also noted.

Following collection of the verification and observation points, CTI staff processed the data into a standard spreadsheet based on the NPS- PLOTS database. The recorded GPS receiver UTM coordinates for both the verification and observation points were used to create a GIS shapefiles with all of the vegetation and location based attributes and a hot-link field for joining the points to their corresponding digital ground photographs. All of the collected field data were used to confirm or revise existing vegetation map polygon labels and to improve the overall quality of the Teton County vegetation classification. Polygon lines were also revised throughout the Fall and Winter of 2012-2013 to improve the spatial accuracy of the vegetation layer. Throughout the revision process, NRTAB members and Teton County staff provided invaluable assistance by providing comments on mislabeled polygons and indicting polygon lines that needed to be moved, added, or eliminated.

Figure 9. Distribution Map of the Verification Points for Teton County

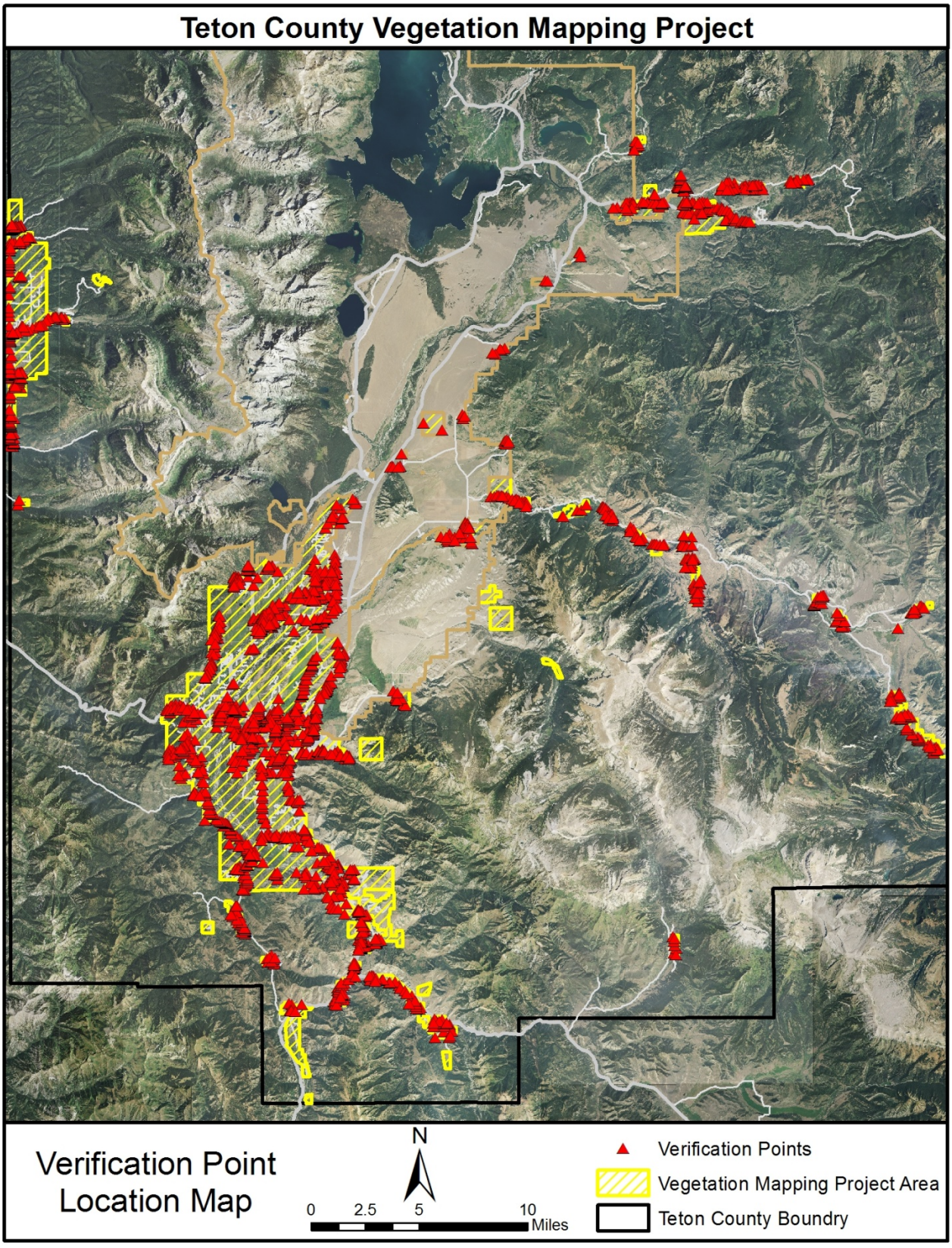
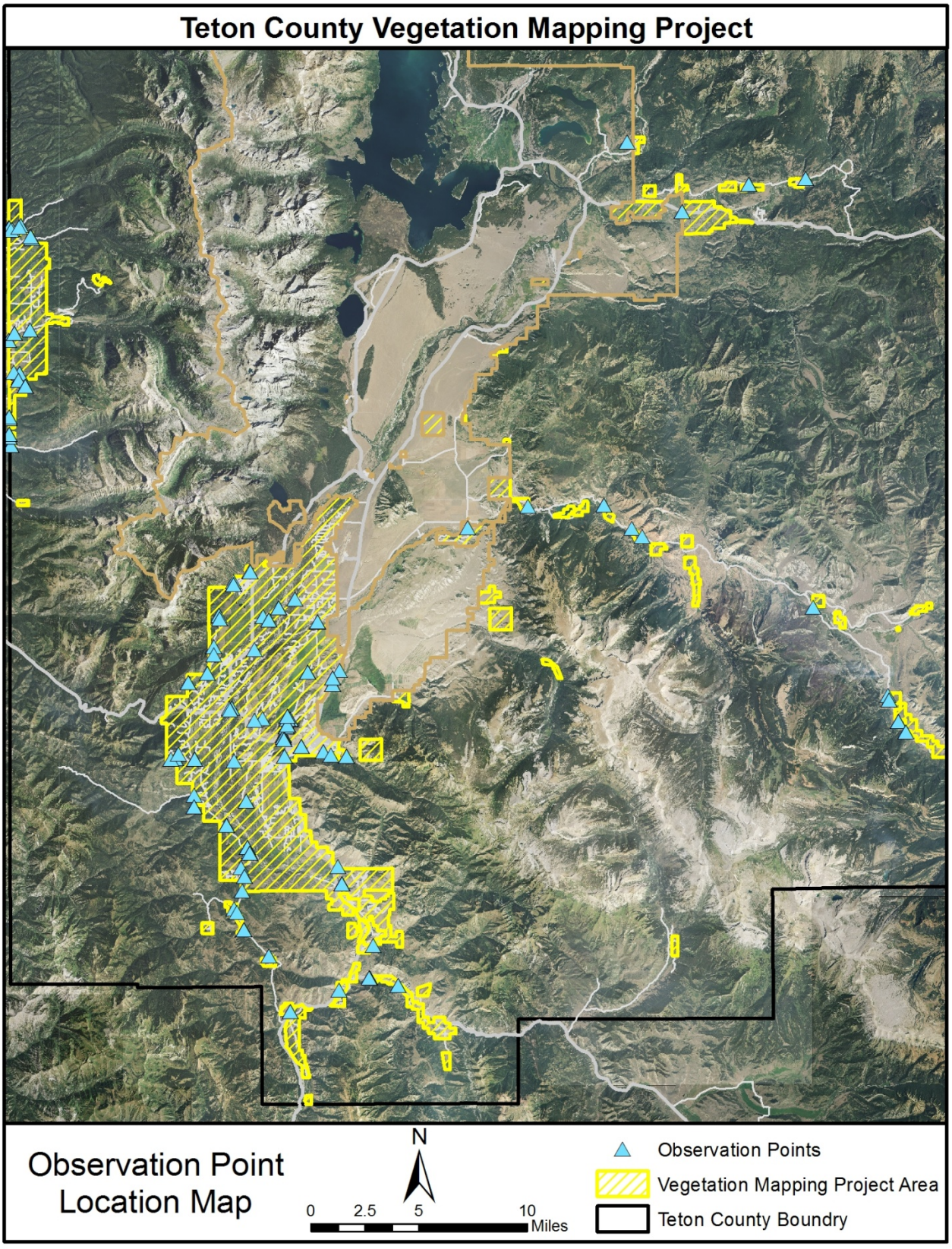


Figure 10. Distribution Map of the Observation Points for Teton County



ACCURACY ASSESSMENT

The AA portion of the Teton County project was started in the Spring of 2013 following the completion of the verification trip, ground-truthing, and subsequent revisions to the spatial layer. The AA was conducted in three basic stages that included:

1. AA Design and Site Selection;
2. AA Data Collection; and
3. AA Data Analyses.

All AA work was completed by CTI with assistance from sub-contracted local and experienced botanists/ecologists familiar with identifying plant species and vegetation communities in Teton County. The three stages of the AA work were assisted, supervised, and approved by Teton County's Planning and Development Department and by various NRTAB members.

AA DESIGN AND SITE SELECTION

The thematic accuracy of the vegetation map was assessed in part using the methodology provided by the NVIP (Lea and Curtis 2010) and as specified in the Teton County contract with CTI. The design of the Teton County AA loosely followed the three possible scenarios provided in the NPS standard field manual. The NPS guidelines indicate placing a specified number of stratified random targets in each map unit based on their relative frequency and abundance (**Table 4**). The sample sizes were further modified by Teton County and the final number of types and potential AA targets for each map unit are provided in **Table 5**.

Table 4. Standard Sample Size Allocations for AA Points Based on Map Unit Area.

MAP CLASS TOTAL AREA*	OBSERVATIONS PER MAP CLASS
> 50 hectares	30**
8.33 to 50 hectares	0.6 per hectare**
< 8.33 hectares	5**

* - as measured before buffering for cost surface (access buffer) or for map class boundary buffer.
** - or as many spatially independent (non-overlapping) observation sites as map class area, MMU size and other considerations will allow.

Table 5. List of Potential AA Targets by Map Unit for Teton County.*

Map Code	# of AA Sites	Map Code	# of AA Sites	Map Code	# of AA Sites
FAP	20	FJ	5	HFD	10
FEP	20	SAI	5	HGS	20
FCW	20	SMR	20	HA	10
FBS	20	SWL	40	VCT	5
FRM	20	SSD	10	VEH	5
FMC	15	DSE	10	VSL	5
FDF	15	SES	10	VRB	5
FSF	15	SSW	10	NIP	5
FLP	15	HGL	10		

Total = 350

*Note : Teton County also specified that a lesser number of targets than those listed above could be used if a high level of accuracy could be demonstrated for a specific map unit.

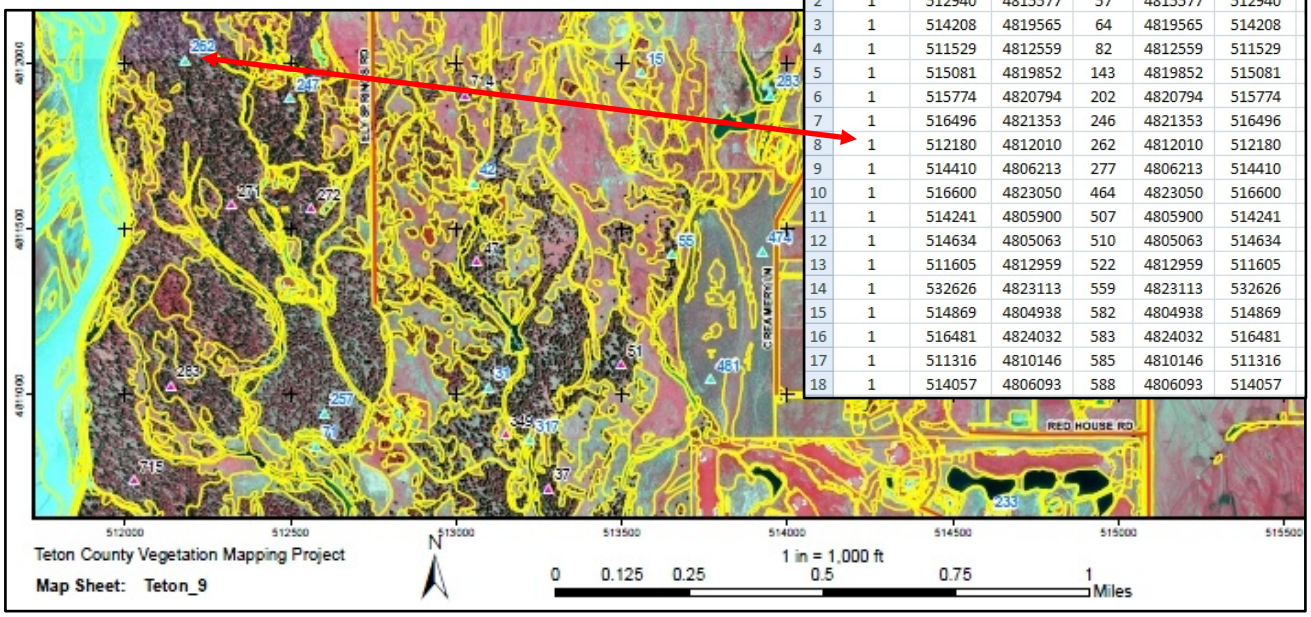
In addition to the map units listed in Table 5, CTI also created some new map units that were later included in the AA site selection. The new map units were developed during the revision and verification stages to address potentially new vegetation types in the County not previously described during the GTNP project. The new map units were added before the potential target AA sites were selected and were processed in a similar manner to the existing map units.

To select the AA target sites, CTI loaded the sample size allocation parameters into a custom GIS program along with the draft Teton County vegetation layer. The GIS program automatically picked the necessary number of random targets per map unit and buffered them 10 meters (33 feet) away from other polygon boundaries and 50 meters (165 feet) from any other data points. Being able to choose minimum distance to polygon boundaries helped to minimize confusion and account for horizontal error typically encountered in common GPS receivers (±5 m). To help account for the limited access, CTI created an independent set of back-up AA targets to be used if targets in the first or primary set could not be reached.

AA DATA COLLECTION

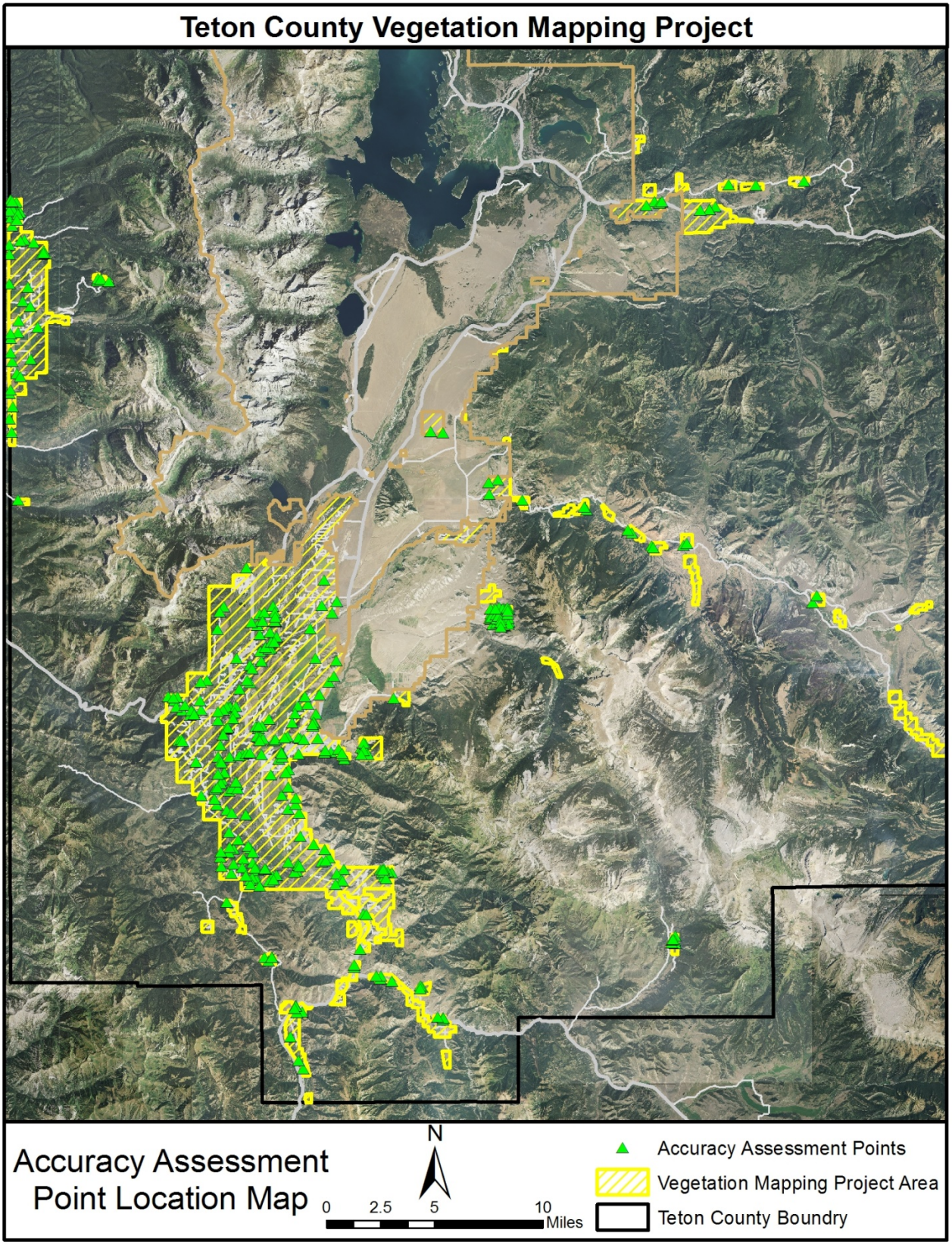
Once the target locations were selected, independent botanists/ecologists were provided field maps with the AA point target locations (**Figure 11**), overview maps, the key to the map units (**Appendix B**), and digital GPS files containing the location of the target AA sites. No descriptions of the map units were provided and identification of the site was based solely on the performance of the map unit key. From July 9-22 in 2013, ecologists collected data at 351 AA sites by either traveling directly to the AA target sites or remotely observing them with binoculars. At most AA points, the observation area was equal to 0.5 hectare (5,000 square meters). Smaller observation areas of 0.25 hectare or 0.1 hectare were used for rare vegetation types that typically occur in stands of less than 0.5 hectare. Results of the first AA sampling revealed an overall lack of AA points in riparian and wetland map units and another AA sampling trip was conducted on September 5, 2013 using raft support on the Snake River. Vegetation data was collected at 31 additional AA targets during the second AA trip yielding a project total of 382 AA points (**Figure 12**).

Figure 11. AA Field Map ▼and Target Location Example. ►



	A	B	C	D	E	F
1	River	X	Y	ident	yproj	xproj
2	1	512940	4815577	57	4815577	512940
3	1	514208	4819565	64	4819565	514208
4	1	511529	4812559	82	4812559	511529
5	1	515081	4819852	143	4819852	515081
6	1	515774	4820794	202	4820794	515774
7	1	516496	4821353	246	4821353	516496
8	1	512180	4812010	262	4812010	512180
9	1	514410	4806213	277	4806213	514410
10	1	516600	4823050	464	4823050	516600
11	1	514241	4805900	507	4805900	514241
12	1	514634	4805063	510	4805063	514634
13	1	511605	4812959	522	4812959	511605
14	1	532626	4823113	559	4823113	532626
15	1	514869	4804938	582	4804938	514869
16	1	516481	4824032	583	4824032	516481
17	1	511316	4810146	585	4810146	511316
18	1	514057	4806093	588	4806093	514057

Figure 12. Distribution Map of the Accuracy Assessment Points for Teton County.



All AA fieldwork was limited to public roads, lands, and private lands were CTI had permission. Work on inaccessible private lands was restricted to remotely viewing polygons. At each AA point, field crews recorded surveyor name(s), survey date, X and Y coordinates, species name, stratum in which the species occurred, percent cover by species, total tree cover, total shrub cover, total herb cover and total non-vascular cover on a modified NPS AA form (**Appendix B**). Only dominant or diagnostic species in each stratum were recorded to facilitate working through the map unit key. Once dominant species and cover data was recorded, the primary map unit was then determined. Secondary and tertiary map units were also recorded if the vegetation was mixed or if the target point fell on an ecotone. Any nearby map units outside the 150-foot radius and any recent disturbance that may have altered the vegetation was also documented. Ground-based photographs were taken at each AA point to photo-document the current state of the vegetation. For remotely viewed targets additional compass headings, bearings and estimated distances were also recorded.

AA DATA ANALYSES

All of the AA field data was entered into a digital spreadsheet by CTI technicians and was reviewed by senior staff for quality and completeness. Spreadsheet columns were added for the projected AA points to include both the actual X Y coordinates where the AA point was viewed and the coordinate location of the proposed target. The digital spreadsheet data was then imported into ArcMap and used to create a GIS point file that was overlain on the vegetation map analysis. During three rounds of examination, the map unit determined in the field was automatically compared to the corresponding polygon map unit designation in the following manner:

1. **Binary Accuracy Assessment** - All of the AA field calls were restricted to only the primary map code recorded by the field crews. Results of the binary assessment were recorded in an error matrix (*i.e.*, contingency table) that included 90% confidence intervals, user's and producer's errors and Kappa statisitics.

2. **Acceptable Accuracy Assessment** - The AA points were recalculated to be equal to the predicted layer if the secondary or tertiary choices on the field form were correct. In other words, the polygon was considered correct if either the primary, secondary or tertiary choice on the field form matched the polygon label. The changes were made to the AA point GIS file and all of the calculations and statistics described for the Binary AA were re-run.

3. **Reasonable Accuracy Assessment** - To calculate the reasonable error, all of the possible choices reported on the field form were used. This included the primary, secondary, and tertiary associations along with any recorded within a 50 meter radius. If any of these options matched the corresponding polygon label it was counted as correct. Any changes were again made to the AA point GIS file and all of the calculations and statistics described for the Binary AA were re-run for a third time.

Once all of the analyses was completed, CTI evaluated by hand all of the remaining AA points that did not match to better understand the source of the error. Review involved evaluating the data sheets for GPS errors, ecotone issues, patchiness of the vegetation, and other intuitive errors. The results of the AA analyses, a brief description about the error sources, and the three draft error matrices were presented to Teton County staff for approval.

RESULTS

MAPPING AND PHOTO INTERPRETATION

CLASSIFICATION

Vegetation map units used to delineate and label polygons in the Teton County vegetation spatial layer were linked or cross-walked to exiting rUSNVC alliances and associations when possible. The rUSNVC plant alliances and associations for this project were based primarily on the alliances/associations sampled, documented, and described during the 2006 GTNP vegetation inventory project. Prior to mapping, all of the GTNP alliances and associations were reviewed by knowledgeable CTI and NRTAB ecologists and some types were removed if they did not occur within the project area.

Included in the final list of rUSNVC types for the Teton County vegetation mapping project are provisional and new alliances/associations/map units. Provisional types represent local plant communities sampled at GTNP but not currently listed in the national database. These types are indicated by [Provisional] in the name or in the element code (Elcode). Elcodes for rUSNVC associations are unique identifiers given to each association in the national vegetation classification database.

Nomenclature for the rUSNVC associations/alliances includes listing the dominant or characteristic species by strata starting with the highest level. A dash ("-") between species names indicates that the species occur in the same vegetation layer (i.e. stratum) and a slash ("/") indicates species that occur in different vegetation layers. Parentheses ("( )") in the name indicate the species may or may not be present in a given stand. All new, provisional, and existing rUSNVC alliances and associations for this project are listed in **Table 6**.

The final classification for Teton County resulted in 182 rUSNVC associations and 69 rUSNVC alliances. The classification results reflect both the high diversity of vegetation in Teton County and the degree of comprehensive vegetation classification work already completed during the GTNP vegetation inventory project. Complete reports for each plant association can be found online at the NatureServe's Explorer website: http://www.natureserve.org/explorer.

For complete descriptions of the plant associations/alliance used during this study please reference the 2006 GTNP Vegetation Inventory Report Appendices at:
http://www.usgs.gov/core_science_systems/csas/vip/parks/grte.html

Please note that as of 2013, the plant alliances are currently under review and are subject to change.

Table 6. List of Map Units and Corresponding rUSNVC Alliances and Associations.

Map UNIT CODE MAP UNIT NAME **ALLIANCE Common Name(s)** **Association Common Names**	**ALLIANCE Common Name(s)** **Association Scientific Names**	**rUSNVC Elcode**
WOODLANDS AND FORESTS		
FAP Aspen Forest		
QUAKING ASPEN FOREST ALLIANCE	*POPULUS TREMULOIDES* FOREST ALLIANCE	
Quaking Aspen / Saskatoon Serviceberry – Mountain Snowberry / California Brome Forest	*Populus tremuloides* / *Amelanchier alnifolia – Symphoricarpos oreophilus* / *Bromus carinatus* Forest	CEGL000566
Quaking Aspen / Saskatoon Serviceberry – Mountain Snowberry / Pinegrass Forest	*Populus tremuloides* / *Amelanchier alnifolia – Symphoricarpos oreophilus* / *Calamagrostis rubescens* Forest	CEGL000567
Quaking Aspen / Saskatoon Serviceberry – Mountain Snowberry / Fendler's Meadowrue Forest	*Populus tremuloides* / *Amelanchier alnifolia – Symphoricarpos oreophilus* / *Thalictrum fendleri* Forest	CEGL000569
Quaking Aspen / Saskatoon Serviceberry / Geyer's Sedge Forest	*Populus tremuloides* / *Amelanchier alnifolia* / *Carex geyeri* Forest	Provisional
Quaking Aspen / Saskatoon Serviceberry / Northern Bracken Forest	*Populus tremuloides* / *Amelanchier alnifolia* / *Pteridium aquilinum* Forest	CEGL000565
Quaking Aspen / Pinegrass Forest	*Populus tremuloides* / *Calamagrostis rubescens* Forest	CEGL000575
Quaking Aspen / Tobacco-brush Forest	*Populus tremuloides* / *Ceanothus velutinus* Forest	CEGL000581
Quaking Aspen / Scouler's Willow Forest	*Populus tremuloides* / *Salix scouleriana* Forest	CEGL000604
Quaking Aspen / Russet Buffaloberry Forest	*Populus tremuloides* / *Shepherdia canadensis* Forest	CEGL000606
Quaking Aspen / Common Snowberry Forest	*Populus tremuloides* / *Symphoricarpos albus* Forest	CEGL000609
Quaking Aspen / Mountain Snowberry / Pinegrass Forest	*Populus tremuloides* / *Symphoricarpos oreophilus* / *Calamagrostis rubescens* Forest	CEGL000612
Quaking Aspen / Mountain Snowberry / Tall Forbs Forest	*Populus tremuloides* / *Symphoricarpos oreophilus* / Tall Forbs Forest	CEGL000615
Quaking Aspen / Mountain Snowberry / Fendler's Meadowrue Forest	*Populus tremuloides* / *Symphoricarpos oreophilus* / *Thalictrum fendleri* Forest	CEGL000616
Quaking Aspen / Tall Forbs Forest	*Populus tremuloides* / Tall Forbs Forest	CEGL000618
Quaking Aspen / Timothy Semi-Natural Forest	*Populus tremuloides* / *Phleum pratense Semi-Natural* Forest	CEGL005829
Quaking Aspen / Kentucky Bluegrass Forest	*Populus tremuloides* / *Poa pratensis* Forest	CEGL003148
Quaking Aspen / Fendler's Meadowrue Forest	*Populus tremuloides* / *Thalictrum fendleri* Forest	CEGL000619

FBAC Mixed Blue Spruce - Aspen - Cottonwood Semi-natural Planted Woodland		
QUAKING ASPEN FOREST ALLIANCE	*POPULUS TREMULOIDES* FOREST ALLIANCE	
Quaking Aspen / Timothy Semi-Natural Forest	*Populus tremuloides* / *Phleum pratense* Semi-Natural Forest	CEGL005829
Quaking Aspen / Kentucky Bluegrass Forest	*Populus tremuloides* / *Poa pratensis* Forest	CEGL003148
BLUE SPRUCE FOREST ALLIANCE	*PICEA PUNGENS* FOREST ALLIANCE	
No Associations	No Associations	Provisional
NARROWLEAF COTTONWOOD TEMPORARILY FLOODED WOODLAND ALLIANCE	*POPULUS ANGUSTIFOLIA* TEMPORARILY FLOODED WOODLAND ALLIANCE	
Narrowleaf Cottonwood / Kentucky Bluegrass Woodland	*Populus angustifolia* / *Poa pratensis* Woodland	CEGL005963
FBS Blue Spruce Riparian Forest (Special Map Unit)		
BLUE SPRUCE FOREST ALLIANCE	*PICEA PUNGENS* FOREST ALLIANCE	
Blue Spruce / Common Juniper Forest	*Picea pungens* / *Juniperus communis* Forest	CEGL000392
Blue Spruce / Russet Buffaloberry Forest	*Picea pungens* / *Shepherdia canadensis* Forest	Provisional
BLUE SPRUCE TEMPORARILY FLOODED WOODLAND ALLIANCE	*PICEA PUNGENS* TEMPORARILY FLOODED WOODLAND ALLIANCE	
Blue Spruce / Speckled Alder Woodland	*Picea pungens* / *Alnus incana* Woodland	CEGL000894
Blue Spruce / Field Horsetail Woodland	*Picea pungens* / *Equisetum arvense* Woodland	CEGL000389
Blue Spruce / Red Baneberry Forest	*Picea pungens* / *Actaea rubra* Forest	Provisional
FCW Cottonwood Riparian Forest		
BLACK COTTONWOOD TEMPORARILY FLOODED FOREST ALLIANCE	*POPULUS BALSAMIFERA* TEMPORARILY FLOODED FOREST ALLIANCE	
Black Cottonwood, Balsam Poplar) / (Common Snowberry, Western Snowberry, Mountain Snowberry) Forest	*Populus balsamifera (spp. trichocarpa, ssp. balsamifera)* / *Symphoricarpos (albus, occidentalis, oreophilus)* Forest	CEGL000677
Black Cottonwood / Mixed Herbs Forest	*Populus balsamifera (ssp. trichocarpa, ssp. balsamifera)* / Mixed Herbs Forest	CEGL000675
Black Cottonwood / Chokecherry Forest	*Populus balsamifera (ssp. trichocarpa, ssp. balsamifera)* / *Prunus virginiana* Forest	Provincial
Black Cottonwood / Red-osier Dogwood Forest	*Populus balsamifera (ssp. trichocarpa, ssp. balsamifera)* / *Cornus sericea* Forest	CEGL000672
NARROWLEAF COTTONWOOD TEMPORARILY FLOODED WOODLAND ALLIANCE	*POPULUS ANGUSTIFOLIA* TEMPORARILY FLOODED WOODLAND ALLIANCE	
Narrowleaf Cottonwood / Mountain Big Sagebrush / Sulphurflower Wild Buckwheat Dry Outwash Woodland	*Populus angustifolia* / *Artemisia tridentata ssp. vaseyana* / *Eriogonum umbellatum Outwash* Woodland	CEGL002537
Narrowleaf Cottonwood / Kentucky Bluegrass Woodland	*Populus angustifolia* / *Poa pratensis* Woodland	CEGL005963
Narrowleaf Cottonwood / Russet Buffaloberry Forest	*Populus angustifolia* / *Shepherdia canadensis* Forest	Provisional

FDF - Douglas-fir Forest

DOUGLAS-FIR FOREST ALLIANCE	*PSEUDOTSUGA MENZIESII* FOREST ALLIANCE	
Douglas-fir / Western Meadowrue Forest	*Pseudotsuga menziesii* / *Thalictrum occidentale* Forest	Provisional
Douglas-fir / Rocky Mountain Maple Forest	*Pseudotsuga menziesii* / *Acer glabrum* Forest	CEGL000418
Douglas-fir / Saskatoon Serviceberry Forest	*Pseudotsuga menziesii* / *Amelanchier alnifolia* Forest	CEGL000420
Douglas-fir / Geyer's Sedge Forest	*Pseudotsuga menziesii* / *Carex geyeri* Forest	CEGL000430
Douglas-fir / Mountain Sweet-cicely Forest	*Pseudotsuga menziesii* / *Osmorhiza berteroi* Forest	CEGL000445
Douglas-fir / Shinyleaf Meadowsweet Forest	*Pseudotsuga menziesii* / *Spiraea betulifolia* Forest	CEGL000457
Douglas-fir / Common Snowberry Forest	*Pseudotsuga menziesii* / *Symphoricarpos albus* Forest	CEGL000459
Douglas-fir / Mountain Snowberry Forest	*Pseudotsuga menziesii* / *Symphoricarpos oreophilus* Forest	CEGL000462
Douglas-fir / Square-twig Blueberry Forest	*Pseudotsuga menziesii* / *Vaccinium membranaceum* Forest	CEGL000466
DOUGLAS-FIR WOODLAND ALLIANCE	*PSEUDOTSUGA MENZIESII* WOODLAND ALLIANCE	
Douglas-fir / Pinegrass Woodland	*Pseudotsuga menziesii* / *Calamagrostis rubescens* Woodland	CEGL000429

FEP - Mixed Evergreen - Aspen Forest

SUBALPINE FIR – QUAKING ASPEN FOREST ALLIANCE	*ABIES LASIOCARPA - POPULUS TREMULOIDES* FOREST ALLIANCE	
Quaking Aspen - Subalpine Fir / Geyer's Sedge - Pinegrass Forest	*Populus tremuloides - Abies lasiocarpa* / *Carex geyeri – Calamagrostis rubescens* Forest	CEGL000525
Quaking Aspen - Subalpine Fir / Tall Forbs Forest	*Populus tremuloides - Abies lasiocarpa* / Tall Forbs Forest	CEGL000533
LODGEPOLE PINE – QUAKING ASPEN FOREST ALLIANCE	*PINUS CONTORTA - POPULUS TREMULOIDES* FOREST ALLIANCE	
Quaking Aspen - Lodgepole Pine / Geyer's Sedge - Pinegrass Forest	*Populus tremuloides - Pinus contorta* / *Carex geyeri – Calamagrostis rubescens* Forest	CEGL000536
Quaking Aspen - Lodgepole Pine / Mountain Snowberry Forest	*Populus tremuloides - Pinus contorta* / *Symphoricarpos oreophilus* Forest	CEGL000538
QUAKING ASPEN – DOUGLAS-FIR FOREST ALLIANCE	*POPULUS TREMULOIDES - PSEUDOTSUGA MENZIESII* FOREST ALLIANCE	
Quaking Aspen - Douglas-fir / Saskatoon Serviceberry Forest	*Populus tremuloides - Pseudotsuga menziesii* / *Amelanchier alnifolia* Forest	CEGL000543

FJ - Rocky Mountain Juniper Woodland Stands

LIMBER PINE WOODLAND ALLIANCE	PINUS FLEXILIS WOODLAND ALLIANCE	
Limber Pine / Rocky Mountain Juniper Woodland	*Pinus flexilis* / *Juniperus scopulorum* Woodland	CEGL000809

FLM - Limber Pine Woodland		
LIMBER PINE WOODLAND ALLIANCE	PINUS FLEXILIS WOODLAND ALLIANCE	
Limber Pine / Bluebunch Wheatgrass Woodland	*Pinus flexilis* / *Pseudoroegneria spicata* Woodland	CEGL000813
Limber Pine / Rocky Mountain Juniper Woodland	Pinus flexilis / Juniperus scopulorum Woodland	CEGL000809
FLP - Lodgepole Pine Forest		
LODGEPOLE PINE FOREST ALLIANCE	*PINUS CONTORTA* FOREST ALLIANCE	
Lodgepole Pine / Bluejoint Forest	*Pinus contorta* / *Calamagrostis canadensis* Forest	CEGL000138
Lodgepole Pine / Pinegrass Forest	*Pinus contorta* / *Calamagrostis rubescens* Forest	CEGL000139
Lodgepole Pine / Geyer's Sedge Forest	*Pinus contorta* / *Carex geyeri* Forest	CEGL000141
Lodgepole Pine / Ross' Sedge Forest	*Pinus contorta* / *Carex rossii* Forest	CEGL000144
Lodgepole Pine / Tobacco-brush Forest	*Pinus contorta* / *Ceanothus velutinus* Forest	CEGL000145
Lodgepole Pine / Shrubby-cinquefoil Forest	*Pinus contorta* / *Dasiphora floribunda* Forest	Provisional
Lodgepole Pine / Northern Sweet Grass Forest	*Pinus contorta* / *Hierochloe hirta* Forest	Provisional
Lodgepole Pine / Russet Buffaloberry Forest	*Pinus contorta* / *Shepherdia canadensis* Forest	CEGL000163
Lodgepole Pine / Shinyleaf Meadowsweet Forest	*Pinus contorta* / *Spiraea betulifolia Forest*	CEGL000164
Lodgepole Pine / Square-twig Blueberry Rocky Mountain Forest	*Pinus contorta* / *Vaccinium membranaceum* Rocky Mountain Forest	CEGL000169
FMC - Mixed Conifer Forest		
BLUE SPRUCE FOREST ALLIANCE	*PICEA PUNGENS* FOREST ALLIANCE	
No Associations	No Associations	N/A
LODGEPOLE PINE FOREST ALLIANCE	*PINUS CONTORTA* FOREST ALLIANCE	
No Associations	No Associations	N/A
DOUGLAS-FIR FOREST ALLIANCE	*PSEUDOTSUGA MENZIESII* FOREST ALLIANCE	
No Associations	No Associations	N/A
SUBALPINE FIR – ENGELMANN SPRUCE FOREST ALLIANCE	ABIES LASIOCARPA - PICEA ENGELMANNII FOREST ALLIANCE	
Subalpine Fir - Engelmann Spruce – Lodgepole Pine Forest	*Abies lasiocarpa - Pseudotsuga menziesii - Pinus contorta* Forest	N/A
FOR - Mixed Ornamental and Semi-natural Woodlands (Special Map Unit)		
NO ALLIANCE	NO ALLIANCE	
No Associations	No Associations	N/A

FRM - Mixed Conifer - Cottonwood Riparian Forest

NARROWLEAF COTTONWOOD TEMPORARILY FLOODED WOODLAND ALLIANCE	*POPULUS ANGUSTIFOLIA* TEMPORARILY FLOODED WOODLAND ALLIANCE	
Narrowleaf Cottonwood - Blue Spruce / Kentucky Bluegrass Forest	*Populus angustifolia - Picea pungens* / *Poa pratensis* Forest	Provisional
Narrowleaf Cottonwood - Blue Spruce / Russet Buffaloberry Forest	*Populus angustifolia - Picea pungens* / *Shepherdia canadensis* Forest	Provisional
BLUE SPRUCE TEMPORARILY FLOODED WOODLAND ALLIANCE	*PICEA PUNGENS* TEMPORARILY FLOODED WOODLAND ALLIANCE	
Blue Spruce / Speckled Alder Woodland	*Picea pungens* / *Alnus incana* Woodland	CEGL000894
Blue Spruce / Field Horsetail Woodland	*Picea pungens* / *Equisetum arvense* Woodland	CEGL000389
Blue Spruce / Red Baneberry Forest	*Picea pungens* / *Actaea rubra* Forest	Provisional
ENGELMANN SPRUCE SEASONALLY FLOODED FOREST ALLIANCE	*PICEA ENGELMANNII* SEASONALLY FLOODED FOREST ALLIANCE	
Engelmann Spruce / Field Horsetail Forest	*Picea engelmannii* / *Equisetum arvense* Forest	CEGL005927
LODGEPOLE PINE FOREST ALLIANCE	*PINUS CONTORTA* FOREST ALLIANCE	
No Associations	No Associations	N/A

FSF - Subalpine fir - Engelmann Spruce Forest

SUBALPINE FIR – ENGELMANN SPRUCE FOREST ALLIANCE	ABIES LASIOCARPA - PICEA ENGELMANNII FOREST ALLIANCE	
Subalpine Fir - Engelmann Spruce / Rocky Mountain Maple Forest	*Abies lasiocarpa - Picea engelmannii* / *Acer glabrum* Forest	CEGL000294
Subalpine Fir - Engelmann Spruce / Red Baneberry Forest	*Abies lasiocarpa - Picea engelmannii* / *Actaea rubra* Forest	CEGL000295
Subalpine Fir - Engelmann Spruce / Heartleaf Leopardbane Forest	*Abies lasiocarpa - Picea engelmannii* / *Arnica cordifolia* Forest	CEGL000298
Subalpine Fir - Engelmann Spruce / Daffodil Leopardbane Forest	*Abies lasiocarpa - Picea engelmannii* / *Arnica latifolia* Forest	CEGL000299
Subalpine Fir - Engelmann Spruce / Pinegrass Forest	*Abies lasiocarpa - Picea engelmannii* / *Calamagrostis rubescens* Forest	CEGL000301
Subalpine Fir - Engelmann Spruce / Geyer's Sedge Forest	*Abies lasiocarpa - Picea engelmannii* / *Carex geyeri* Forest	CEGL000304
Subalpine Fir - Engelmann Spruce / Hitchcock's Smooth Woodrush Woodland	*Abies lasiocarpa - Picea engelmannii* / *Luzula glabrata var. hitchcockii* Forest	CEGL000317
Subalpine Fir - Engelmann Spruce / Fool's-huckleberry Forest	*Abies lasiocarpa - Picea engelmannii* / *Menziesia ferruginea* Forest	CEGL000319
Subalpine Fir - Engelmann Spruce / (Western Prickly Gooseberry, Bristly Black Currant, White-stem Gooseberry) Forest	Subalpine Fir - Engelmann Spruce / (Western Prickly Gooseberry, Bristly Black Currant, White-stem Gooseberry) Forest	CEGL000331
Subalpine Fir - Engelmann Spruce / Bristly Black Currant Forest	*Abies lasiocarpa - Picea engelmannii* / *Ribes lacustre* Forest	Provisional

Subalpine Fir - Engelmann Spruce / Russet Buffaloberry Forest	*Abies lasiocarpa - Picea engelmannii / Shepherdia canadensis* Forest	Provisional
Subalpine Fir - Engelmann Spruce / Common Snowberry Forest	*Abies lasiocarpa - Picea engelmannii / Symphoricarpos albus* Forest	CEGL000337
Subalpine Fir - Engelmann Spruce / Western Meadowrue Forest	*Abies lasiocarpa - Picea engelmannii / Thalictrum occidentale* Forest	CEGL000338
Subalpine Fir - Engelmann Spruce / Square-twig Blueberry / Bear-grass Forest	*Abies lasiocarpa - Picea engelmannii / Vaccinium membranaceum / Xerophyllum tenax* Forest	CEGL005917
Subalpine Fir - Engelmann Spruce / Square-twig Blueberry Rocky Mountain Forest	*Abies lasiocarpa - Picea engelmannii / Vaccinium membranaceum Rocky Mountain* Forest	CEGL000341
Subalpine Fir - Engelmann Spruce / Grouseberry Forest	*Abies lasiocarpa - Picea engelmannii / Vaccinium scoparium* Forest	CEGL000344
Engelmann Spruce / Sweet-scent Bedstraw Forest	*Picea engelmannii / Galium triflorum* Forest	CEGL002174
SUBALPINE FIR TEMPORARILY FLOODED FOREST ALLIANCE	ABIES LASIOCARPA TEMPORARILY FLOODED FOREST ALLIANCE	
Subalpine Fir - Engelmann Spruce / Clasping Twisted-stalk Forest	*Abies lasiocarpa - Picea engelmannii / Streptopus amplexifolius* Forest	CEGL000336
SUBALPINE FIR SEASONALLY FLOODED FOREST ALLIANCE	ABIES LASIOCARPA SEASONALLY FLOODED FOREST ALLIANCE	
Subalpine Fir - Engelmann Spruce / Bluejoint Forest	*Abies lasiocarpa - Picea engelmannii / Calamagrostis canadensis* Forest	CEGL000300

SHRUBLANDS

SAI - Alder Shrubland

SPECKLED ALDER TEMPORARILY FLOODED SHRUBLAND ALLIANCE	ALNUS INCANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	
Speckled Alder / Mesic Forbs Shrubland	*Alnus incana* / Mesic Forbs Shrubland	CEGL001147
Speckled Alder / Mesic Graminoids Shrubland	*Alnus incana* / Mesic Graminoids Shrubland	CEGL001148
SPECKLED ALDER SEASONALLY FLOODED SHRUBLAND ALLIANCE	ALNUS INCANA SEASONALLY FLOODED SHRUBLAND ALLIANCE	
Speckled Alder / Field Horsetail Shrubland	*Alnus incana / Equisetum arvense* Shrubland	CEGL001146
Speckled Alder / Fowl Mannagrass Shrubland	*Alnus incana / Glyceria striata* Shrubland	CEGL000228
ALDERLEAF BUCKTHORN TEMPORARILY FLOODED SHRUBLAND ALLIANCE	RHAMNUS ALNIFOLIA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	
Alderleaf Buckthorn Shrubland	*Rhamnus alnifolia* Shrubland	CEGL001132

SES - Sagebrush - Antelope Bitterbrush Mixed Shrubland

MOUNTAIN BIG SAGEBRUSH SHRUBLAND ALLIANCE	ARTEMISIA TRIDENTATA SSP. VASEYANA SHRUBLAND ALLIANCE	
Mountain Big Sagebrush - Bitterbrush / Idaho Fescue Shrubland	*Artemisia tridentata ssp. vaseyana - Purshia tridentata / Festuca idahoensis* Shrubland	Provisional
Mountain Big Sagebrush - Bitterbrush / Arrow-Leaf Balsamroot Shrubland	*Artemisia tridentata ssp. vaseyana - Purshia tridentata / Balsamorhiza sagittata* Shrubland	Provisional
Mt. Big Sagebrush - Bitterbrush / Smooth Brome - Kentucky Bluegrass Shrubland	*Artemisia tridentata ssp. vaseyana - Purshia tridentata / Bromus inermis - Poa pratensis* Shrubland	Provisional

SMR - Mixed Deciduous Shrubland		
CHOKECHERRY SHRUBLAND ALLIANCE	PRUNUS VIRGINIANA SHRUBLAND ALLIANCE	
Chokecherry - (American Plum) Shrubland	*Prunus virginiana -(Prunus americana)* Shrubland	CEGL001108
Chokecherry / Geyer's Sedge Shrubland	*Prunus virginiana* / *Carex geyeri* Shrubland	Provisional
RED-OSIER DOGWOOD TEMPORARILY FLOODED SHRUBLAND ALLIANCE	CORNUS SERICEA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	
Red-osier Dogwood Shrubland	*Cornus sericea* Shrubland	CEGL001165
MOUNTAIN SNOWBERRY SHRUBLAND ALLIANCE	SYMPHORICARPOS OREOPHILUSY SHRUBLAND ALLIANCE	
Mountain Snowberry Shrubland	*Symphoricarpos oreophilus* Shrubland	CEGL002951
SWAMP BIRCH SEASONALLY FLOODED SHRUBLAND ALLIANCE	BETULA NANA SEASONALLY FLOODED SHRUBLAND ALLIANCE	
Swamp Birch / Mesic Forbs - Mesic Graminoids Shrubland	*Betula nana* / Mesic Forbs - Mesic Graminoids Shrubland	CEGL002653
DWARF BLUEBERRY, GROUSEBERRY DRAWF-SHRUBLAND ALLIANCE	VACCINIUM (CAESPITOSUM, SCOPARIUM) DRAWF-SHRUBLAND ALLIANCE	
Dwarf Blueberry, Grouseberry Dwarf-shrubland	*Vaccinium (caespitosum, scoparium)* Dwarf-shrubland	CEGL001140
SHINYLEAF MEADOWSWEET SHRUBLAND ALLIANCE	SPIRAEA BETULIFOLIA SHRUBLAND ALLIANCE	
Shinyleaf Meadowsweet Shrubland	*Spiraea betulifolia* Shrubland	CEGL005835
NO ALLIANCE	**NO ALLIANCE**	
Rose Meadowsweet Shrubland	*Spiraea splendens* Shrubland	Provisional
Square-twig Blueberry Shrubland	*Vaccinium membranaceum* Shrubland	Provisional

SMSD - Sagebrush - Snowberry - Chokecherry - Serviceberry Mixed Shrubland (Special Map Unit)		
MOUNTAIN BIG SAGEBRUSH SHRUBLAND ALLIANCE	ARTEMISIA TRIDENTATA SSP. VASEYANA SHRUBLAND ALLIANCE	
Mountain Big Sagebrush - Mountain Snowberry / California Brome Shrubland	*Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus* / *Bromus carinatus* Shrubland	CEGL001035
Mountain Big Sagebrush - Mountain Snowberry / Idaho Fescue Shrubland	*Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus* / *Festuca idahoensis* Shrubland	CEGL001036
Mountain Big Sagebrush - Mountain Snowberry / Needle-and-Thread Shrubland	*Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus* / *Hesperostipa comata* Shrubland	CEGL001039
Mountain Big Sagebrush - Mountain Snowberry / Bluebunch Wheatgrass Shrubland	*Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus* / *Pseudoroegneria spicata* Shrubland	CEGL001038
Mountain Big Sagebrush - Mountain Snowberry / Geyer's sedge Shrubland	*Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus* / *Carex geyeri* Shrubland	Provisional

SRB - Rubber Rabbitbrush Shrubland		
RUBBER RABBITBRUSH SHRUBLAND ALLIANCE	*ERICAMERIA NAUSEOSA* SHRUBLAND ALLIANCE	
Rubber Rabbitbrush Shrubland	*Ericameria nauseosa* Shrubland	CEGL002713
SSD - Sagebrush Dry Shrubland		
MOUNTAIN BIG SAGEBRUSH SHRUBLAND ALLIANCE	ARTEMISIA TRIDENTATA SSP. VASEYANA SHRUBLAND ALLIANCE	
Mountain Big Sagebrush / California Brome Shrubland	*Artemisia tridentata ssp. vaseyana* / *Bromus carinatus* Shrubland	CEGL001021
Mountain Big Sagebrush / Smooth Brome Shrubland	*Artemisia tridentata ssp. vaseyana* / *Bromus inermis* Shrubland	Provisional
Mountain Big Sagebrush / Geyer's Sedge Shrubland	*Artemisia tridentata ssp. vaseyana* / *Carex geyeri* Shrub Herbaceous Vegetation	CEGL001532
Mountain Big Sagebrush / Needle-and-Thread Shrubland	*Artemisia tridentata ssp. vaseyana* / *Hesperostipa comata* Shrubland	CEGL002931
Mountain Big Sagebrush / Kentucky Bluegrass Sagebrush Shrubland	*Artemisia tridentata ssp. vaseyana* / *Poa pratensis* Shrubland	CEGL002528
Mountain Big Sagebrush / Bluebunch Wheatgrass Shrubland	*Artemisia tridentata ssp. vaseyana* / *Pseudoroegneria spicata* Shrubland	CEGL001030
MOUNTAIN BIG SAGEBRUSH SHRUB HERBACEOUS ALLIANCE	ARTEMISIA TRIDENTATA SSP. VASEYANA SHRUB HERBACEOUS ALLIANCE	
Mountain Big Sagebrush / Idaho Fescue Shrub Herbaceous Vegetation	*Artemisia tridentata ssp. vaseyana* / *Festuca idahoensis* Shrub Herbaceous Vegetation	CEGL001533
BOLANDER SILVER SAGEBRUSH MOUNTAIN SILVER SAGEBRUSH SHRUBLAND ALLIANCE	ARTEMISIA CANA (SSP. BOLANDERI, SSP. VISCIDULA) SHRUBLAND ALLIANCE	
Bolander Silver Sagebrush, Mountain Silver Sagebrush / Kentucky Bluegrass Semi-natural Shrubland	*Artemisia cana (ssp. bolanderi, ssp. viscidula)* / *Poa pratensis* Semi-natural Shrubland	CEGL002988
THREETIP SAGEBRUSH SHRUB HERBACEOUS ALLIANCE	ARTEMISIA TRIPARTITA SSP. TRIPARTITA SHRUB HERBACEOUS ALLIANCE	
Threetip Sagebrush / Needle-and-Thread Shrub Herbaceous Vegetation	*Artemisia tripartita ssp. tripartita* / *Hesperostipa comata* Shrub Herbaceous Vegetation	CEGL001539
SPIKED BIG SAGEBRUSH SHRUB HERBACEOUS ALLIANCE	ARTEMISIA TRIDENTATA SSP. SPICIFORMIS SHRUB HERBACEOUS ALLIANCE	
Spiked Big Sagebrush Shrub Herbaceous Vegetation	*Artemisia tridentata ssp. spiciformis* Shrub Herbaceous Vegetation	CEGL002993
SSW - Sagebrush / Shrubby Cinquefoil Mesic Shrubland		
SHRUBBY – CINQUEFOIL TEMPORARILY FLOODED SHRUBLAND ALLIANCE	DASIPHORA FLORIBUNDA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	
Shrubby-cinquefoil / Sedge species Shrubland	*Dasiphora floribunda* / *Carex* spp. Shrubland	CEGL001106
Shrubby-cinquefoil / Tufted Hairgrass Shrubland	*Dasiphora floribunda* / *Deschampsia caespitosa* Shrubland	CEGL001107

SWL - Willow Shrubland

BOOTH'S WILLOW TEMPORARILY FLOODED SHRUBLAND ALLIANCE	SALIX BOOTHII TEMPORARILY FLOODED SHRUBLAND ALLIANCE	
Booth's Willow / Beaked Sedge Shrubland	*Salix boothii* / *Carex utriculata* Shrubland	CEGL001178
Booth's Willow / Mesic Forbs Shrubland	*Salix boothii* / Mesic Forbs Shrubland	CEGL001180
Booth's Willow / Mesic Graminoids Shrubland	*Salix boothii* / Mesic Graminoids Shrubland	CEGL001181
DRUMMOND'S WILLOW TEMPORARILY FLOODED SHRUBLAND ALLIANCE	SALIX DRUMMONDIANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	
Drummond's Willow / Mesic Forbs Shrubland	*Salix drummondiana* / Mesic Forbs Shrubland	CEGL001192
Drummond's Willow / Mesic Graminoid Shrubland	*Salix drummondiana* / Mesic Graminoid Shrubland	Provisional
DRUMMOND'S WILLOW SEASONALLY FLOODED SHRUBLAND ALLIANCE	SALIX DRUMMONDIANA SEASONALLY FLOODED SHRUBLAND ALLIANCE	
Drummond's Willow / Beaked Sedge Shrubland	*Salix drummondiana* / *Carex utriculata* Shrubland	CEGL002631
SIERRAN WILLOW	SALIX EASTWOODIAE WILLOW	
Sierran Willow Shrubland	*Salix eastwoodiae* Shrubland [Provisional]	CEGL001194
GEYER'S WILLOW TEMPORARILY FLOODED SHRUBLAND ALLIANCE	SALIX GEYERIANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	
Geyer's Willow - Wolf Willow / Mesic Graminoids Shrubland	*Salix geyeriana - Salix wolfii* / Mesic Graminoid Shrubland	Provisional
Geyer's Willow / Mesic Graminoids Shrubland	*Salix geyeriana* / Mesic Graminoids Shrubland	CEGL001210
GEYER'S WILLOW SEASONALLY FLOODED SHRUBLAND ALLIANCE	SALIX GEYERIANA SEASONALLY FLOODED SHRUBLAND ALLIANCE	
Geyer's Willow / Bluejoint Shrubland	*Salix geyeriana* / *Calamagrostis canadensis* Shrubland	CEGL001205
Geyer's Willow / Northern Meadow Sedge Shrubland	*Salix geyeriana* / *Carex praticola* Shrubland	Provisional
Geyer's Willow / Beaked Sedge Shrubland	*Salix geyeriana* / *Carex utriculata* Shrubland	CEGL001207
LEMMON'S WILLOW SEASONALLY FLOODED SHRUBLAND ALLIANCE	SALIX LEMMONII SEASONALLY FLOODED SHRUBLAND ALLIANCE	
Lemmon's Willow / Woolly Sedge Shrubland	*Salix lemmonii* / *Carex pellita* Shrubland	Provisional
Lemmon's Willow / Mesic-Tall Forbs Shrubland	*Salix lemmonii* / Mesic Tall Forbs Shrubland	CEGL002771
Lemmon's Willow / Mesic Graminoids Shrubland	*Salix lemmonii* / Mesic Graminoids Shrubland	CEGL002069
YELLOW WILLOW TEMPORARILY FLOODED SHRUBLAND ALLIANCE	SALIX LUTEA TEMPORARILY FLOODED SHRUBLAND ALLIANCE	
Yellow Willow / Mesic Graminoids Shrubland	*Salix lutea* / Mesic Graminoids Shrubland	CEGL002073

PLANELEAF WILLOW SEASONALLY FLOODED SHRUBLAND ALLIANCE	SALIX PLANIFOLIA SEASONALLY FLOODED SHRUBLAND ALLIANCE	
Planeleaf Willow / Beaked Sedge Shrubland	*Salix planifolia* / Carex utriculata Shrubland	CEGL005937
Planeleaf Willow / Mesic Forbs Shrubland	*Salix planifolia* / Mesic Forbs Shrubland [Provisional]	CEGL002893
WOLF WILLOW TEMPORARILY FLOODED SHRUBLAND ALLIANCE	SALIX WOLFII TEMPORARILY FLOODED SHRUBLAND ALLIANCE	
Wolf Willow / Tufted Hairgrass Shrubland	*Salix wolfii* / *Deschampsia caespitosa* Shrubland	CEGL001238
Wolf Willow / Mesic Forbs Shrubland	*Salix wolfii* / Mesic Forbs Shrubland	CEGL001240
WOLF WILLOW SEASONALLY FLOODED SHRUBLAND ALLIANCE	SALIX WOLFII SEASONALLY FLOODED SHRUBLAND ALLIANCE	
Wolf Willow / Bluejoint Shrubland	*Salix wolfii* / *Calamagrostis canadensis* Shrubland	CEGL002064
Wolf Willow / Aquatic Sedge Shrubland	*Salix wolfii* / *Carex aquatilis* Shrubland	CEGL001234
Wolf Willow / Woolly Sedge Shrubland	*Salix wolfii* / *Carex pellita* Shrubland	Provisional
Wolf Willow / Clustered Field Sedge Shrubland	*Salix wolfii* / *Carex praegracilis* Shrubland	Provisional
Wolf Willow / Beaked Sedge Shrubland	*Salix wolfii* / *Carex utriculata* Shrubland	CEGL001237

DWARF SHRUBLAND

DSE -Low Sagebrush Dwarf Shrubland

DWARF SAGEBRUSH SHRUB HERBACEOUS ALLIANCE	ARTEMISIA ARBUSCULA SSP. ARBUSCULA SHRUB HERBACEOUS ALLIANCE	
Dwarf Sagebrush / Idaho Fescue Shrub Herbaceous Vegetation	*Artemisia arbuscula ssp. arbuscula* / *Festuca idahoensis* Shrub Herbaceous Vegetation	CEGL001409
Dwarf Sagebrush / Bluebunch Wheatgrass Shrub Herbaceous Vegetation	*Artemisia arbuscula ssp. arbuscula* / *Pseudoroegneria spicata* Shrub Herbaceous Vegetation	CEGL001412

HERBACEOUS VEGETATION

HA - Herbaceous Aquatics

WHITE MARSH-MARIGOLD SATURATED ALLIANCE	CALTHA LEPTOSEPALA SATURATED ALLIANCE	
White Marsh-marigold Herbaceous Vegetation	*Caltha leptosepala* Herbaceous Vegetation	CEGL001954
NO ALLIANCE	NO ALLIANCE	
Buckbean Herbaceous Vegetation	*Menyanthes trifoliata* Herbaceous Vegetation	CEGL003410
Yellow Pond-lily Herbaceous Vegetation	*Nuphar lutea* Floating Aquatic Vegetation	CEGL002001
(Broadleaf Cattail, Narrowleaf Cattail) Western Herbaceous Vegetation	Typha (latifolia, angustifolia) Western Herbaceous Vegetation	CEGL002010

HFD - Montane Mesic Forb Herbaceous Vegetation

FERNLEAF WILD LOVAGE HERBACEOUS ALLIANCE	LIGUSTICUM FILICINUM HERBACEOUS ALLIANCE	
Fernleaf Wild Lovage - Duncecap Larkspur Herbaceous Vegetation	*Ligusticum filicinum - Delphinium X occidentale* Herbaceous Vegetation	CEGL001941

MOUNTAIN BLUEBELLS HERBACEOUS ALLIANCE	MERTENSIA CILIATA HERBACEOUS ALLIANCE	
Mountain Bluebells Herbaceous Vegetation	*Mertensia ciliata* Herbaceous Vegetation	CEGL001944
STICKY GERANIUM HERBACEOUS ALLIANCE	GERANIUM VISCOSISSIMUM HERBACEOUS ALLIANCE	
Sticky Geranium Herbaceous Vegetation	*Geranium viscosissimum* Herbaceous Vegetation	CEGL002536
COW-PARSNIP TEMPORARILY FLOODED HERBACEOUS ALLIANCE	HERACLEUM MAXIMUM TEMPORARILY FLOODED HERBACEOUS ALLIANCE	
Cow-parsnip - Western Coneflower \ Herbaceous Vegetation	*Heracleum maximum - Rudbeckia occidentalis* Herbaceous Vegetation	CEGL001940

HFX -Montane Xeric Forb Herbaceous Vegetation

NO ALLIANCE	NO ALLIANCE	
Spreading Dogbane Herbaceous Vegetation	*Apocynum androsaemifolium* Herbaceous Vegetation	Provisional
CURLY BLUEGRASS HERBACEOUS ALLIANCE	POA SECUNDA HERBACEOUS ALLIANCE	
(Serrate Balsamroot) - Curly Bluegrass Herbaceous Vegetation	*(Balsamorhiza serrata) - Poa secunda* Herbaceous Vegetation	CEGL001782

HGL - Mixed Grassland Herbaceous Vegetation

PINEGRASS HERBACEOUS ALLIANCE	CALAMAGROSTIS RUBESCENS HERBACEOUS ALLIANCE	
Pinegrass Herbaceous Vegetation	*Calamagrostis rubescens* Herbaceous Vegetation	CEGL005862
IDAHO FESCUE HERBACEOUS ALLIANCE	FESTUCA IDAHOENSIS HERBACEOUS ALLIANCE	
Idaho Fescue - Timber Oatgrass Herbaceous Vegetation	*Festuca idahoensis - Danthonia intermedia* Herbaceous Vegetation	CEGL001612
Idaho Fescue - Sticky Geranium Herbaceous Vegetation	*Festuca idahoensis - Geranium viscosissimum* Herbaceous Vegetation	CEGL001618
Idaho Fescue - Rocky Mountain Dwarf Sunflower Herbaceous Vegetation	*Festuca idahoensis - Helianthella uniflora* Herbaceous Vegetation	Provisional
BLUEBUNCH WHEATGRASS HERBACEOUS ALLIANCE	PSEUDOROEGNERIA SPICATA HERBACEOUS ALLIANCE	
Bluebunch Wheatgrass - Arrowleaf Balsamroot - Curly Bluegrass Herbaceous Vegetation	*Pseudoroegneria spicata - Balsamorhiza sagittata - Poa secunda* Herbaceous Vegetation	
Bluebunch Wheatgrass - Curly Bluegrass Herbaceous Vegetation	*Pseudoroegneria spicata - Poa secunda* Herbaceous Vegetation	
Bluebunch Wheatgrass Herbaceous Vegetation	*Pseudoroegneria spicata* Herbaceous Vegetation	
GEYER'S SEDGE HERBACEOUS ALLIANCE	CAREX GEYERI HERBACEOUS ALLIANCE	
Geyer's Sedge Herbaceous Vegetation	*Carex geyeri* Herbaceous Vegetation	CEGL005864
NO ALLIANCE	NO ALLIANCE	
Needle and Thread Grass Herbaceous Vegetation	*Hesperostipa comata* Herbaceous Vegetation	Provisional

Hood's Sedge Herbaceous Vegetation	*Carex hoodii* Herbaceous Vegetation	Provisional
Ross' Sedge Herbaceous Vegetation	*Carex rossii* Herbaceous Vegetation	Provisional
Poverty Wild Oat Grass Herbaceous Vegetation	*Danthonia spicata* Herbaceous Vegetation	Provisional
CURLY BLUEGRASS HERBACEOUS ALLIANCE	POA SECUNDA HERBACEOUS ALLIANCE	
(Serrate Balsamroot) - Curly Bluegrass Herbaceous Vegetation	*(Balsamorhiza serrata) - Poa secunda* Herbaceous Vegetation	CEGL001782
FOWL BLUEGRASS HERBACEOUS VEGETATION	POA PALUSTRIS HERBACEOUS VEGETATION ALLIANCE	
Fowl Bluegrass Herbaceous Vegetation	*Poa palustris* Herbaceous Vegetation	CEGL001659
HGS - Flooded Wet Meadow Herbaceous Vegetation		
SEDGE (SMALL-HEAD) SEASONALLY FLOODED HERBACEOUS ALLIANCE	CAREX ILLOTA SEASONALLY FLOODED HERBACEOUS ALLIANCE	
Small-head Sedge Herbaceous Vegetation	*Carex illota* Herbaceous Vegetation	CEGL001876
SEDGE (BEAKED) SEASONALLY FLOODED HERBACEOUS ALLIANCE	CAREX UTRICULATA SEASONALLY FLOODED HERBACEOUS ALLIANCE	
Beaked Sedge Herbaceous Vegetation	*Carex utriculata* Herbaceous Vegetation	CEGL001562
AQUATIC SEDGE SEASONALLY FLOODED HERBACEOUS ALLIANCE	CAREX AQUATILIS SEASONALLY FLOODED HERBACEOUS ALLIANCE	
Aquatic Sedge Herbaceous Vegetation	*Carex aquatilis* Herbaceous Vegetation	CEGL001802
SMALL-WING SEDGE SEASONALLY FLOODED HERBACEOUS ALLIANCE	CAREX MICROPTERA SEASONALLY FLOODED HERBACEOUS ALLIANCE	
Small-wing Sedge Herbaceous Vegetation	*Carex microptera* Herbaceous Vegetation	CEGL001792
WOOLLY SEDGE SEASONALLY FLOODED HERBACEOUS ALLIANCE	CAREX PELLITA SEASONALLY FLOODED HERBACEOUS ALLIANCE	
Woolly Sedge Herbaceous Vegetation	*Carex pellita* Herbaceous Vegetation	CEGL001809
NEEDLE SPIKERUSH SEASONALLY FLOODED HERBACEOUS ALLIANCE	ELEOCHARIS ACICULARIS SEASONALLY FLOODED HERBACEOUS ALLIANCE	
Needle Spikerush Herbaceous Vegetation	*Eleocharis acicularis* Herbaceous Vegetation	CEGL001832
MARSH SPIKERUSH SEASONALLY FLOODED HERBACEOUS ALLIANCE	ELEOCHARIS PALUSTRIS SEASONALLY FLOODED HERBACEOUS ALLIANCE	
Marsh Spikerush Herbaceous Vegetation	*Eleocharis palustris* Herbaceous Vegetation	CEGL001833
BALTIC RUSH SEASONALLY FLOODED HERBACEOUS ALLIANCE	JUNCUS BALTICUS SEASONALLY FLOODED HERBACEOUS ALLIANCE	
Baltic Rush Herbaceous Vegetation	*Juncus balticus* Herbaceous Vegetation	CEGL001838
FOWL BLUEGRASS HERBACEOUS VEGETATION	POA PALUSTRIS HERBACEOUS VEGETATION	
Fowl Bluegrass Herbaceous Vegetation	*Poa palustris* Herbaceous Vegetation	CEGL001659
ARROWLEAF RAGWORT SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE	SENECIO TRIANGULARIS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE	
Arrowleaf Ragwort - Seep Monkeyflower Herbaceous Vegetation	Senecio triangularis - Mimulus guttatus Herbaceous Vegetation	CEGL001988

BLUEJOINT SEASONALLY FLOODED HERBACEOUS ALLIANCE	CALAMAGROSTIS CANADENSIS FLOODED HERBACEOUS ALLIANCE	
Bluejoint Western Herbaceous Vegetation	*Calamagrostis canadensis* Western Herbaceous Vegetation	CEGL001559
BROWN BOG SEDGE SEASONALLY FLOODED HERBACEOUS ALLIANCE	CAREX BUXBAUMII SEASONALLY FLOODED HERBACEOUS ALLIANCE	
Brown Bog Sedge Herbaceous Vegetation	*Carex buxbaumii* Herbaceous Vegetation	CEGL001806
NEBRASKA SEDGE SEASONALLY FLOODED HERBACEOUS ALLIANCE	CAREX NEBRASCENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE	
Nebraska Sedge Herbaceous Vegetation	*Carex nebrascensis* Herbaceous Vegetation	CEGL001813
INFLATED SEDGE SEASONALLY FLOODED HERBACEOUS ALLIANCE	CAREX VESICARIA SEASONALLY FLOODED HERBACEOUS ALLIANCE	
Inflated Sedge Herbaceous Vegetation	*Carex vesicaria* Herbaceous Vegetation	CEGL002661
HPG - Mixed Planted and Introduced Grassland Herbaceous Vegetation (Special Map Unit)		
KENTUCKY BLUEGRASS HERBACEOUS ALLIANCE	POA PRATENSIS HERBACEOUS ALLIANCE	
Timothy - Kentucky Bluegrass - Smooth Brome Semi-natural Herbaceous Vegetation	*Phleum pratense - Poa pratensis - Bromus inermis* Herbaceous Vegetation	CEGL005874
VCT - Cliff and Talus Sparse Vegetation		
NO ALLIANCE	NO ALLIANCE	Provincial
No Associations	No Associations	Provincial
VEH - Exposed Hillside Sparse Vegetation		
BLUEBUNCH WHEATGRASS HERBACEOUS ALLIANCE	PSEUDOROEGNERIA SPICATA HERBACEOUS ALLIANCE	
No Associations	No Associations	
IDAHO FESCUE HERBACEOUS ALLIANCE	FESTUCA IDAHOENSIS HERBACEOUS ALLIANCE	
No Associations	No Associations	
GREEN RABBITBRUSH SHRUB HERBACEOUS ALLIANCE	CHRYSOTHAMNUS VISCIDIFLORUS SHRUB HERBACEOUS ALLIANCE	
Green Rabbitbrush Shrub Herbaceous Vegetation	*Chrysothamnus viscidiflorus* Shrubland	CEGL002530
VRB - Recently Burned Sparse Vegetation		
TOBACCO-BRUSH SHRUBLAND ALLIANCE	CEANOTHUS SHRUBLAND ALLIANCE	
Tobacco-brush Shrubland	*Ceanothus velutinus* Shrubland	CEGL002167
VSL - Exposed Shore - Stream Deposit Sparse Vegetation		
NO ALLIANCE	NO ALLIANCE	
No Associations	No Associations	

MAP UNITS

A total of 54 map units were used to map the vegetation in Teton County (**Appendix C**). Of that total, 34 were vegetation related and were cross-walked or linked to the rUSNVC associations and alliances. Twenty land-cover and land-use map units were included to provide information on the non-vegetated, agricultural, or other developed areas. New map units were also created for this project representing unique vegetation or land-cover types that did not occur in the GTNP study. If possible they were linked to existing rUSNVC types or were distinguished by [Special Map Unit] in the Elcode if no comparable type could be determined. The additional map units were either suggested or approved by Teton County staff and are listed in **Table 7**.

Table 7. New Map Unit Codes, Names and Descriptions

Map Code	Map Unit Common Name New Map Unit Description
FBAC	**Mixed Blue Spruce - Aspen - Cottonwood Semi-natural Planted Woodland** Stands of native trees planted for landscaping and windbreaks
FOR	**Mixed Ornamental and Semi-natural Woodlands** Stands of non-native trees planted for landscaping and windbreaks
SMSD	**Sagebrush - Chokecherry - Serviceberry Mixed Shrubland** Various sagebrush species with mixed deciduous shrubs
HPG	**Mixed Planted and Introduced Grassland Herbaceous Vegetation** Non-native grasses in non-agricultural settings
NIPF	**Perennially Flooded Agricultural Fields** Flooded or saturated agricultural fields supporting native graminoids.

VEGETATION MAP

The final vegetation map for Teton County (**Figure 13**) included 87,547 acres (35,457 hectares) that extended from south of Hoback Junction to north of Alta and Buffalo Valley. The minimum mapping unit (MMU) size ranged from 10 to 200 square feet. The fine resolution of the 2011 CIR imagery and the ability to recognize small patches of vegetation was reflected in the high number of polygons (63,949) and the average size of the polygons for this project (1.4 acres). **Figure 14** shows an example of the detailed Teton County vegetation mapping centered on the Town of Jackson.

To create the map, unique photo signatures were determined for each map unit based on similar tones, textures, colors, shadows, and landscape positions. The map units were then cross-walked to the rUSNVC list of associations/alliances and were verified in the field. Of all the vegetation map units, the largest was the SSD-Sagebrush Dry Shrubland with 9,048 acres covering about 10% of the project area. The largest overall map unit was the NIPI-Irrigated Agricultural Field at 18,723 acres covering 21% of the project area. The most frequent map units were related to residential and commercial buildings and included 8,091 polygons for NRDS-Buildings and Driveways, 5,319 polygons for NSML-Lawns and Landscaping, and 5,180 polygons for FBAC- Mixed Blue Spruce - Aspen - Cottonwood Semi-natural Planted Woodlands. A complete list of the mapping result including the frequency (i.e. number of polygons) along with acreage per map unit are listed in **Table 8.**

Figure 13. Teton County Vegetation Map Overview (see map legend next page).

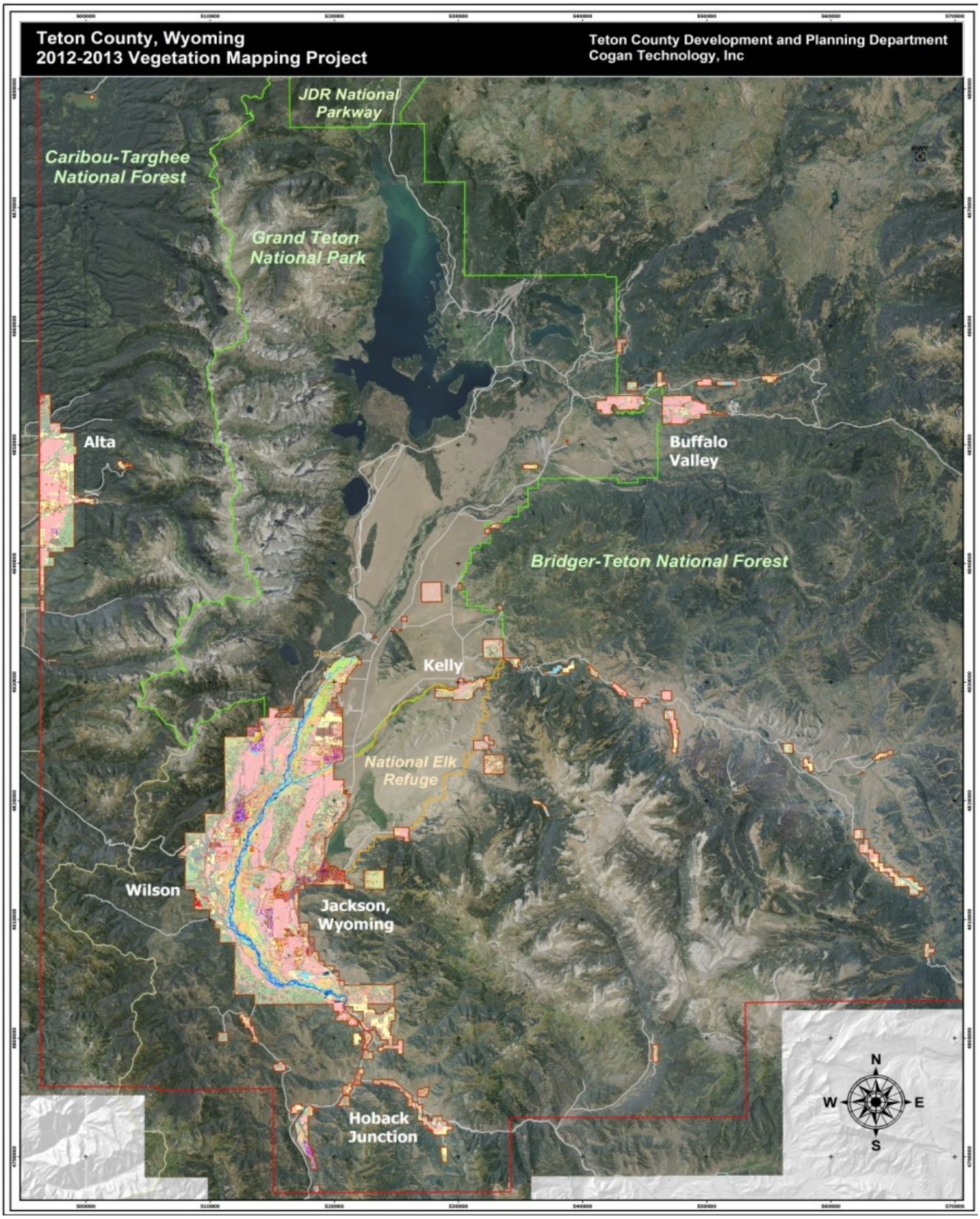


Figure 14. Examples of the Vegetation Polygons in the Town of Jackson with Outlines and the 2011 CIR Imagery (top), Polygons Coding and Density Overlays (bottom) and the Map Legend▼.

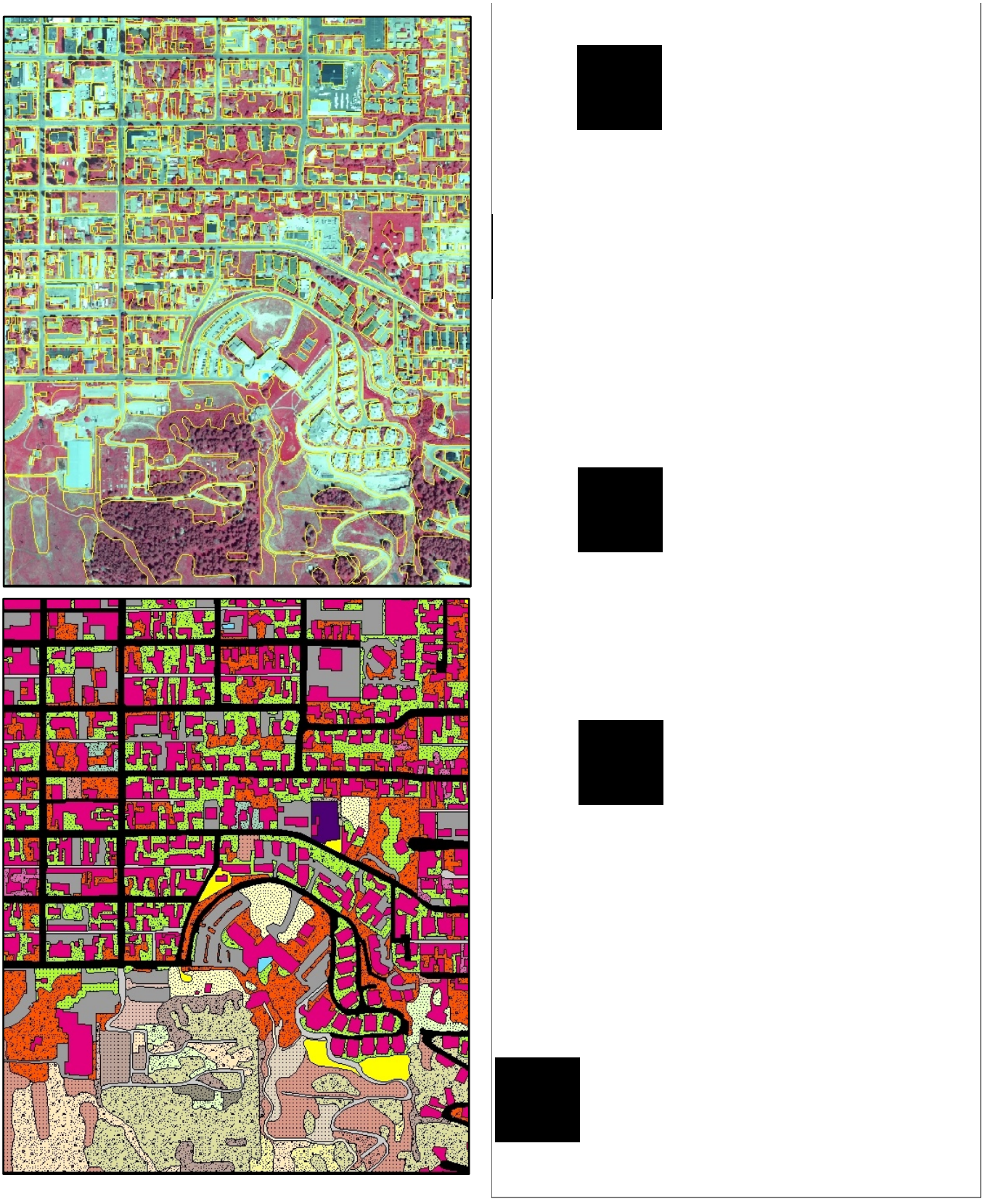


Table 8. Summary Statistics by Map Unit for the Teton County Vegetation Layer.

Map Code	Map Unit Name	# of Polygons	Acres	Hectares
	Forests and Woodlands			
FAP	Aspen Forest	4,138	6,137.6	2,485.7
FBAC	Mixed Blue Spruce - Aspen - Cottonwood Semi-natural Planted Woodland	5,189	1,077.4	436.4
FBS	Blue Spruce Riparian Forest	1,375	856.2	346.8
FCW	Cottonwood Riparian Forest	4,051	5,257.7	2,129.4
FDF	Douglas-fir Forest	708	2,449.2	991.9
FEP	Mixed Evergreen - Aspen Forest	1,400	2,458.7	995.8
FJ	Rocky Mountain Juniper Woodland Stand	73	144.9	58.7
FLM	Limber Pine Forest	30	57.9	23.4
FLP	Lodgepole Pine Forest	528	1,830.2	741.2
FMC	Mixed Conifer Forest	131	793.5	321.4
FOR	Mixed Ornamental and Semi-natural Woodlands	517	90.6	36.7
FRM	Mixed Cottonwood - Blue Spruce Riparian Forest	664	1,758.3	712.1
FSF	Subalpine Fir - Engelmann Spruce Forest	47	178.2	72.2
	Woodland Regeneration			
RAP	Aspen Woodland Regeneration	236	213.3	86.4
RLP	Lodgepole Pine Woodland Regeneration	23	72.3	29.3
	Shrublands			
SAI	Alder Shrubland	13	7.7	3.1
SES	Sagebrush - Antelope Bitterbrush Mixed Shrubland	164	722.5	292.6
SMR	Mixed Tall Deciduous Shrubland	2853	1521.0	616.0
SMSD	Sagebrush - Snowberry - Chokecherry - Serviceberry Mixed Shrubland	1336	3912.0	1584.4
SRB	Rubber Rabbitbrush Shrubland	55	31.0	12.6
SSD	Sagebrush Dry Shrubland	4230	9047.5	3664.2
SSW	Sagebrush / Shrubby Cinquefoil Mesic Shrubland	44	81.8	33.1
SWL	Willow Shrubland	3713	3160.7	1280.1

Map Code	Map Unit Name	# of Polygons	Acres	Hectares
	Dwarf Shrubland			
DSE	Low Sagebrush Dwarf Shrubland	1	2.4	1.0
	Herbaceous Vegetation			
HA	Herbaceous Aquatics	184	60.7	24.6
HFD	Montane Mesic Forb Herbaceous Vegetation	98	56.5	22.9
HFX	Montane Xeric Forb Herbaceous Vegetation	275	164.5	66.6
HGL	Mixed Grassland Herbaceous Vegetation	2119	2465.8	998.6
HGS	Flooded Wet Meadow Herbaceous Vegetation	1234	563.8	228.3
HPG	Mixed Planted and Introduced Grassland Herbaceous Vegetation	3745	2132.0	863.5
	Sparse Vegetation			
VCT	Cliff and Talus Sparse Vegetation	126	92.9	37.6
VEH	Exposed Hillside Sparse Vegetation	643	632.9	256.3
VRB	Recently Burned Sparse Vegetation	30	76.2	30.9
VSL	Exposed Shore - Stream Deposit Sparse Vegetation	775	778.2	315.2
	Land-use and Land-cover			
NID	Canals	769	293.8	119.0
NIPF	Perennially Flooded Agricultural Fields	952	746.3	302.2
NIPI	Irrigated Agricultural Fields	1006	18723.2	7582.9
NIPN	Non-Irrigated Agricultural Fields	1603	6727.9	2724.8
NLP	Lakes, Ponds, and Reservoirs	1305	1192.6	483.0
NRDG	Gravel and Dirt Roads	373	606.9	245.8
NRDL	Parking Lots	615	462.3	187.2
NRDP	Paved Paths	163	64.9	26.3
NRDR	Paved Roads	48	1067.1	432.2
NRDS	Buildings and Driveways	8091	2019.0	817.7
NRDU	Communications and Utilities	11	6.4	2.6
NRK	Rock Outcrop / Cliff	67	33.8	13.7

Map Code	Map Unit Name	# of Polygons	Acres	Hectares
NSM	Strip Mines, Quarries, and Gravel Pits	39	179.6	72.7
NSMC	Corrals, Pens, and Outdoor Riding Arenas	553	304.1	123.2
NSMG	Golf Courses	122	506.1	205.0
NSML	Lawns and Landscaping	5319	1767.2	715.7
NSMT	Horse and Ski Trails	324	184.8	74.9
NST	Streams and Rivers	600	2783.0	1127.1
NTR	Transitional Areas	639	308.7	125.0
NVS	Non-vegetated Cobble Bars	602	683.3	276.7
Total Vegetation		40,748	48,886	19,799
Total Open Water		2,674	4,269	1,729
Total Pervious Land Use / Land Cover		11,120	29,952	12,130
Total Impervious Land Use / Land Cover		9,407	4,440	1,798
Totals		**63,949**	**87,547**	**35,457**

ACCURACY ASSESSMENT

The 2013 accuracy assessment effort yielded 382 points that were distributed throughout the Teton County project area. No changes were made to the vegetation map layer after the AA analysis was completed unless it was an obvious issue dealing with a polygon not targeted during the AA process. After the analysis, the AA data point data was also reviewed and used to help verify and update the rUSNVC list of plant associations/alliances.

ACCURACY ASSESSMENT ANALYSIS

Actual analysis of the AA points involved a point-by-point review comparing the AA field calls versus the vegetation polygon labels. To begin, AA point data was imported into a GIS spatial point layer based on each AA point's X and Y coordinates. Then, in a stepwise fashion, the AA points that clearly matched a polygon were scored as correct in the binary assessment, points that matched using the field crews second or third calls were scored correct in the acceptable assessment and points that justifiably matched any of the polygons in a 50-m buffer were scored correct in the reasonable assessment. A summary of the three assessments can be found in the **Table 9**.

Table 9. Summary of Map Unit Accuracies for User's and Producer's Errors.

MAP CODE	Binary		Acceptable		Reasonable		Percent Change from Binary to Reasonable	
	User's Accuracy	Producer's Accuracy	User's Accuracy	Producer's Accuracy	User's Accuracy	Producer's Accuracy	User's Accuracy	Producer's Accuracy
DSE	100%	100%	100%	100%	100%	100%	0%	0%
FAP	75%	92%	94%	100%	94%	100%	19%	8%
FBAC	100%	90%	100%	90%	100%	90%	0%	0%
FBS	82%	90%	91%	91%	91%	91%	9%	1%
FCW	100%	79%	100%	96%	100%	96%	0%	17%
FDF	96%	90%	100%	96%	100%	96%	4%	7%
FEP	85%	100%	100%	100%	100%	100%	15%	0%
FJ	100%	94%	100%	94%	100%	100%	0%	6%
FLM	20%	100%	40%	100%	60%	100%	40%	0%
FLP	87%	87%	100%	94%	100%	94%	13%	7%
FMC	100%	65%	100%	85%	100%	85%	0%	20%
FOR	100%	100%	100%	100%	100%	100%	0%	0%
FRM	89%	89%	89%	100%	89%	100%	0%	11%
FSF	50%	100%	100%	100%	100%	100%	50%	0%
RAP	100%	60%	100%	86%	100%	86%	0%	26%
RLP	-	100%	86%	100%	86%	100%	100%	0%
SAI	-	-	-	-	-	-	-	-
SES	100%	33%	100%	50%	100%	50%	0%	17%
SMR	100%	100%	100%	100%	100%	100%	0%	0%
SMSD	56%	90%	75%	100%	81%	100%	25%	10%
SRB	27%	100%	36%	100%	36%	100%	9%	0%
SSD	86%	73%	100%	96%	100%	100%	14%	27%
SSW	100%	100%	100%	100%	100%	100%	0%	0%
SWL	79%	85%	96%	100%	96%	100%	18%	15%
HA	67%	100%	100%	100%	100%	100%	33%	0%
HFD	-	-	-	-	-	-	-	-
HFX	67%	40%	100%	64%	100%	69%	33%	29%
HGL	86%	52%	100%	78%	100%	82%	14%	30%
HGS	58%	64%	92%	85%	92%	85%	33%	21%
HPG	89%	61%	89%	68%	95%	69%	5%	9%
VCT	80%	80%	100%	83%	100%	83%	20%	3%
VEH	50%	82%	89%	94%	94%	94%	44%	13%
VRB	-	-	-	-	-	-	-	-
VSL	50%	100%	50%	100%	50%	100%	0%	0%
NIPF	-	-	25%	100%	25%	100%	100%	100%
NIPI	86%	86%	86%	86%	86%	100%	0%	14%
NIPN	86%	100%	100%	100%	100%	100%	14%	0%
Average	**80%**	**84%**	**89%**	**92%**	**90%**	**93%**	**18%**	**11%**

Binary Accuracy Assessment
The initial binary assessment revealed an overall accuracy of 79% (**Table 10**). Concentrations of error were in the herbaceous and shrub types. Obvious confusion occurred between similar types with common species. For example, the herbaceous vegetation types all contained some of the same grass and forb species that were hard to distinguish on the CIR and NAIP imagery. This was reflected in the lower than expected user's accuracy for the HA, HFX, and HGS map units.

Acceptable Accuracy Assessment
Including the second and third field choices into the analysis improved the overall accuracy to 91% (**Table 11**). Improvements in the accuracy were likely a reflection of including hard to classify sites that may have been in ecotones or on the edge of two types. In addition, some of the higher accuracies for each map unit may have been a result of having to pick between two very similar map units (e.g. FAP - Aspen Forest versus RAP Aspen Woodland Regeneration).

Reasonable Accuracy Assessment
Finally, when all possible choices were included in the analysis the final overall accuracy improved to 93% (**Table 12**). Again this was likely a result of the difficulty in initially classifying similar vegetation types, inclusions, and mixed stands.

Instructions on Using the Accuracy Assessment Contingency Tables:

The contingency tables or error matrices found on the following pages present an array of numbers set out in rows and columns corresponding to a particular vegetation map unit relative to the actual vegetation type as verified on the ground. The column headings represent the vegetation classification as determined in the field and the row headings represent the vegetation classification taken from the vegetation map. The highlighted diagonal indicates the number of points assessed in the field that agree with the map label. Conversely, the inaccuracies of each map unit are described as both errors of inclusion (user's or commission errors) and errors of exclusion (producer's or omission errors). By reading across this table (*i.e.*, rows) one can calculate the percent error of commission, or how many polygons for each map unit were incorrectly labeled when compared to the field data. By reading down the table (*i.e.*, columns) one can calculate the percent error of omission, or how many polygons for that type were left off the map. Numbers "on the diagonal" tell the user how well the map unit was interpreted and how confident they can be in using it. Numbers "off the diagonal" yield important information about the deficiencies of the map including which types were: 1) over- mapped - commission errors on the right or 2) under-mapped - omission errors on the bottom.

Table 10. Contingency table for Binary Accuracy Assessment

Predicted Map Class \ Observed AA Point (Reference AA Ground Data)	FAP	FBAC	FBS	FCW	FDF	FEP	FJ	FLM	FLP	FMC	FOR	FRM	FSF	RAP	RLP	SAI	SES	SMR	SMSD	SRB	SSD	SSW	SWL	DSE	HA	HFD	HFX	HGL	HGS	HPG	VCT	VEH	VRB	VSL	NIPF	NIPI	NIPN	Totals	User's Accuracy	90% Conf. Interval (-)	90% Conf. Interval (+)
FAP	12	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	75%	54.1%	96%
FBAC	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	100%	93.8%	100%
FBS	0	0	9	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	82%	58.1%	100%
FCW	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	100%	97.8%	100%
FDF	0	0	0	0	26	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	96%	88.5%	100%
FEP	1	0	0	0	1	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	85%	64.3%	100%
FJ	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	100%	96.9%	100%
FLM	0	0	0	0	1	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	20%	-	59%
FLP	0	0	0	0	0	0	0	0	13	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	87%	68.9%	100%
FMC	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	100%	95.5%	100%
FOR	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	100%	87.5%	100%
FRM	0	0	1	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	89%	68.1%	100%
FSF	0	0	0	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	50%	-3.6%	100%
RAP	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	100%	91.7%	100%
RLP	0	0	0	0	0	0	0	0	1	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	-	-	-
SAI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
SES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100%	50.0%	100%
SMR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	100%	95.5%	100%
SMSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	18	0	5	0	0	0	0	0	6	2	0	0	0	0	0	0	0	0	0	32	56%	40.3%	72%
SRB	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	6	0	1	0	0	0	0	0	0	11	27%	0.6%	54%
SSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	86%	72.1%	100%
SSW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100%	50.0%	100%
SWL	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	79%	64.0%	93%
DSE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100%	50.0%	100%
HA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	3	67%	5.2%	100%
HFD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
HFX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	6	2	0	0	0	0	0	0	0	0	0	9	67%	35.3%	98%
HGL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	12	0	1	0	0	0	0	0	0	0	14	86%	66.8%	100%
HGS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	6	1	0	0	0	0	0	0	0	11	58%	30.8%	86%
HPG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	17	0	0	0	0	0	1	0	19	89%	75.3%	100%
VCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	5	80%	40.8%	100%
VEH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	6	0	0	1	9	0	0	0	0	0	18	50%	27.8%	72%
VRB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-		
VSL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	2	50%	-	100%
NIPF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	4	0%	-	13%
NIPI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	6	0	7	86%	56.8%	100%
NIPN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	6	7	86%	56.8%	100%
Totals	13	10	10	29	29	11	17	1	15	17	4	9	2	10	6	0	3	11	20	3	26	1	26	1	2	0	15	23	10	28	5	11	0	1	0	7	6	79.1% Overall Accuracy			
Producer's Accuracy	92%	90%	90%	79%	90%	100%	94%	100%	87%	65%	100%	89%	100%	60%	100%	-	33%	100%	90%	100%	73%	100%	85%	100%	100%	-	40%	52%	64%	61%	80%	82%	-	100%	-	86%	100%	382 Total Points		77%	80%
90% Conf. (-)	16%	21%	21%	14%	11%	5%	12%	50%	18%	22%	13%	23%	25%	30%	8%	-	-	5%	14%	17%	16%	50%	14%	50%	25%	-	24%	19%	28%	17%	39%	24%	-	50%	-	29%	8%	303 Correct Points		Overall 90% Conf.	
Level (+)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	95%	100%	100%	100%	100%	100%	100%	100%	100%	-	56%	85%	99%	100%	100%	100%	-	100%	-	100%	100%	78% Kappa Index		Intervals	

Table 11. Contingency Table for Acceptable Accuracy Assessment

	Observed AA Point (Reference AA Ground Data)																																							
MAP CLASS (Predicted Map Class)	FAP	FBAC	FBS	FCW	FDF	FEP	FJ	FLM	FLP	FMC	FOR	FRM	FSF	RAP	RLP	SAI	SES	SMR	SMSD	SRB	SSD	SSW	SWL	DSE	HA	HFD	HFX	HGL	HGS	HPG	VCT	VEH	VRB	VSL	NIPF	NIPI	NIPN	Totals	User's Accuracy	90% Conf. Interval (-)	(+)
FAP	15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	94%	80.7%	100%
FBAC	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	100%	93.8%	100%
FBS	0	0	10	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	91%	72.1%	100%
FCW	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	100%	97.8%	100%
FDF	0	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	100%	98.1%	100%
FEP	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	100%	96.2%	100%
FJ	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	100%	96.9%	100%
FLM	0	0	0	0	0	0	1	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	40%	14%	86%
FLP	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	100%	96.7%	100%
FMC	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	100%	95.5%	100%
FOR	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	100%	87.5%	100%
FRM	0	0	1	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	89%	66.1%	100%
FSF	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	100%	87.5%	100%
RAP	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	100%	91.7%	100%
RLP	0	0	0	0	0	0	0	0	1	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	86%	57%	100%
SAI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
SES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100%	50.0%	100%
SMR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	100%	95.5%	100%
SMSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	24	0	1	0	0	0	0	0	4	2	0	0	0	0	0	0	0	0	0	32	75%	60.8%	89%
SRB	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	5	0	1	0	0	0	0	0	11	36%	8.0%	65%
SSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	100%	97.7%	100%
SSW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100%	50.0%	100%
SWL	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	96%	88.9%	100%
DSE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100%	50.0%	100%
HA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3	100%	83.3%	100%
HFD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
HFX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	9	100%	94.4%	100%
HGL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	14	100%	96.4%	100%
HGS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1	0	0	0	0	0	0	0	11	92%	74.4%	100%
HPG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	17	0	0	0	0	0	1	0	19	89%	75.3%	100%
VCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5	100%	90.0%	100%
VEH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	16	0	0	0	0	0	18	89%	73.9%	100%
VRB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
VSL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	2	50%	-	100%
NIPF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	1	0	0	4	25%	-	73%
NIPI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	6	0	7	86%	56.8%	100%
NIPN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	7	100%	92.9%	100%
Totals	15	10	11	24	28	13	17	2	16	13	4	8	4	7	6	0	2	11	24	4	23	1	27	1	3	0	14	18	12	25	6	17	0	1	1	7	7	91.4% Overall Accuracy			
Producer's Accuracy	100%	90%	91%	96%	96%	100%	94%	100%	94%	85%	100%	100%	100%	86%	100%	-	50%	100%	100%	100%	96%	100%	100%	100%	100%	-	64%	78%	85%	68%	83%	94%	-	100%	100%	86%	100%	382 Total Points		90%	92%
90% Conf. (-)	97%	54%	72%	87%	89%	96%	82%	75%	81%	64%	88%	94%	88%	57%	92%	-	-	95%	98%	88%	86%	50%	98%	50%	83%	-	40%	59%	64%	51%	50%	82%	-	50%	50%	57%	93%	350 Correct Points		Overall 90% Conf.	
Level (+)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	89%	97%	100%	85%	100%	100%	-	100%	100%	100%	100%	84% Kappa Index		Intervals	

Table 12. Contingency Table for Reasonable Accuracy Assessment

Predicted Map Class \ Observed AA Point (Reference AA Ground Data)	FAP	FBAC	FBS	FCW	FDF	FEP	FJ	FLM	FLP	FMC	FOR	FRM	FSF	RAP	RLP	SAI	SES	SMR	SMSD	SRB	SSD	SSW	SWL	DSE	HA	HFD	HFX	HGL	HGS	HPG	VCT	VEH	VRB	VSL	NIPF	NIPI	NIPN	Totals	User's Accuracy	90% Conf. Interval (-)	(+)
FAP	15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	94%	81%	100%
FBAC	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	100%	94%	100%
FBS	0	0	10	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	91%	72%	100%
FCW	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	100%	98%	100%
FDF	0	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	100%	98%	100%
FEP	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	100%	96%	100%
FJ	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	100%	97%	100%
FLM	0	0	0	0	0	0	0	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	60%	14%	100%
FLP	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	100%	97%	100%
FMC	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	100%	96%	100%
FOR	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	100%	88%	100%
FRM	0	0	1	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	89%	66%	100%
FSF	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	100%	88%	100%
RAP	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	100%	92%	100%
RLP	0	0	0	0	0	0	0	0	1	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	86%	57%	100%
SAI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
SES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100%	50%	100%
SMR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	100%	96%	100%
SMSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	26	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	32	81%	68%	94%
SRB	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	5	0	1	0	0	0	0	0	0	0	11	36%	8%	65%
SSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	100%	98%	100%
SSW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100%	50%	100%
SWL	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	96%	89%	100%
DSE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100%	50%	100%
HA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3	100%	83%	100%
HFD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
HFX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	9	100%	94%	100%
HGL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	14	100%	96%	100%
HGS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1	0	0	0	0	0	0	0	11	92%	74%	100%
HPG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	18	0	0	0	0	0	0	0	19	95%	84%	100%
VCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5	100%	90%	100%
VEH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	17	0	0	0	0	0	0	18	94%	83%	100%
VRB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
VSL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	2	50%	-	100%
NIPF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	1	0	0	4	25%	-	73%
NIPI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	6	0	7	86%	57%	100%
NIPN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	7	100%	93%	100%
Totals	15	10	11	24	28	13	16	3	16	13	4	8	4	7	6	0	2	11	26	4	22	1	27	1	3	0	13	17	12	26	6	18	0	1	1	6	7	92.7% Overall Accuracy			
Producer's Accuracy	100%	90%	91%	96%	96%	100%	100%	100%	94%	85%	100%	100%	100%	86%	100%	-	50%	100%	100%	100%	100%	100%	100%	100%	100%	-	69%	82%	86%	69%	83%	94%	-	100%	100%	100%	100%	382 Total Points		91%	93%
90% Conf. (-)	97%	54%	72%	87%	89%	96%	97%	83%	81%	64%	88%	94%	88%	57%	92%	-	-	95%	98%	88%	98%	50%	98%	50%	83%	-	44%	64%	64%	52%	50%	83%	-	50%	50%	92%	93%	355 Correct Points		Overall 90% Conf.	
Level (+)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	94%	100%	100%	86%	100%	100%	-	100%	100%	100%	100%	92% Kappa Index		Intervals	

MAPPING ERRORS

One general source of error in the Teton County vegetation map was the low AA point sample sizes (for some of the map classes) that fell below the minimum number of AA target locations as specified by the contract with CTI and the NPS standards (Lea and Curtis 2010). One apparent statistic was the lack of AA samples for the HFD, SAI, and VRB map units. These insufficiencies were due to the rarity of the map units in the project area and the inability of the crews to get to, or remotely view the polygons. Specifically, the HFD map unit only occurred in a few montane and sub-alpine areas that were off-limits due to access limitations. The SAI map unit was only found in 13 polygons covering about 8 acres that were either already verified or where inaccessible. Similarly the VRB sites were only associated with a post-burn area that could not be accessed at this time. Another example was the Low Sagebrush Drawf Shrubland (DSE) that only had one polygon and therefore only one AA sample was collected. Getting access to more polygons of these types or sampling them in GTNP (outside of the project area) would likely improve the individual map class accuracy and reduce the corresponding confidence intervals.

Of the remaining assessed map units, some had lower than expected levels of accuracy. Analyzing the reasonable contingency table shows that most of the map units had high user's accuracy of at least 80%. The map units below 80% accuracy include those that had marginal accuracy of 60% – 79% and map units that had low accuracy of < 60%. All of the map units with marginal and low accuracy were accepted by Teton County and NRTAB staff as important for natural resource management and the reasons for the lower than expected accuracy varies by type. By carefully examining these discrepancies some common issues can be found that seem to explain most of the marginal and low error rates, these include:

1. Perspective: Many of the errors occurred when a polygon was classified with a very similar, but different map unit than the one identified by the field crew. This can happen because the mapper and the field crew see the vegetation differently. For example, the mapper sees the cover of shrubs and herbaceous vegetation over a large region, while the field ecologist assesses the cover in a much smaller area. In addition, the field ecologist can thoroughly assess the understory whereas the mapper may have his view partially or completely blocked by overstory canopy. Different perspectives can lead to different estimates of cover and differing conclusions as to the correct plant association or map unit.

   Examples: The rubber rabbitbrush shrubland (SRB) and Sagebrush-Snowberry-Chokecherry-Serviceberry Mixed Shrubland (SMSD) were both confused with herbaceous vegetation types (**Figure 15**). This confusion was likely in response to calculating less shrub cover for a smaller area by the field crews than the shrub cover used by the mapper to create a larger polygon. In other words, the field crews may have been actually taking field data in a small herbaceous inclusion or in an area with less shrub cover.

2. Rare Types: Some map units only occurred in a few homogeneous stands that were large enough to map. Consequently not enough accuracy assessment points were acquired resulting in very large confidence intervals. The small sample size of these map classes produced an error that may or may not be indicative of the actual ability of the mappers to accurately delineate and label these map units.

Example: Individual limber pine trees were found in Teton County on many rocky slopes and ridges but only formed a few large enough stands to map separately. Only five AA points were taken in the Limber Pine Woodland (FLM) map unit due to access limitations and three were right and two were wrong. This resulted in 60% accuracy for the FLM map class with large confidence intervals of 14% to 100%. More sampling in this map unit may have increased the accuracy and better reflected the true ability to delineate this type.

3. Forest vs. Regeneration: The forest and regeneration map classes often contained the same tree species and were mapped based on both evidence of past disturbance (fire, thinning) and the size of the trees. Often the difference between trees big enough to be considered forest and those still in an early succession stage are subjective and can interpreted differently in the field versus on the imagery.

   Examples: The FLP and FAP map units were each confused one time with their regenerative counterparts (RAP and RLP). Due to perspective, a few large trees may have appeared to warrant a forest designation on the imagery when in fact, they were the only survivors in a larger regeneration unit. Conversely, small pockets of regeneration recognized in the field may have actually been inclusions in a larger forested polygons.

4. Physiognomic and Growth Similarities:
   To accurately photo interpret vegetation a mapper needs the ability to distinguish obvious growth characteristics for each dominant species. For example, limber and lodgepole pine trees typically have pointed or fanned crowns whereas Douglas fir and Rocky Mountain juniper trees have bushy tops. Likewise, shrubs usually appear taller on the imagery than herbaceous vegetation and trees taller than shrubs. By combining these and other photo signature characteristics a mapper can develop a model for mapping the vegetation across a landscape. In Teton County, several common species presented themselves in numerous growth and physiognomic forms that successfully mimicked other vegetation leading to confusion and mis-classification.

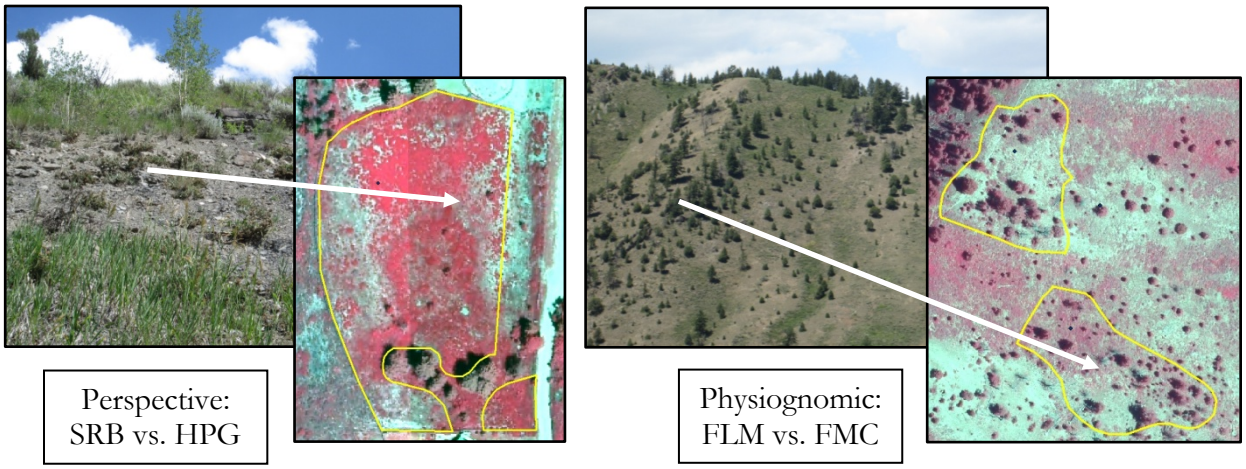
   Examples: The Limber Pine Woodland map unit (FLM) was confused with the Mixed Conifer Woodland map unit (FMC) two times. This is likely a result of some limber pine trees growing on open, rocky slopes/ridges with other conifer trees (especially Douglas-fir and Rocky Mountain Juniper trees) of similar size (**Figure 15**). In these dry environments, the other conifers actually had atypical pointed and fanned crowns similar to limber pine trees and were not recognizable on the imagery.

   Also confusing the mapping were early successional herbaceous vegetation and very young shrub sprouts and tree seedlings. This phenomenon was especially prevalent on cobblebars and shorelines in and along the Snake River. The dynamic nature of the Snake River with periodic flooding and drawdowns created new niches that were rapidly colonized by a mix of annual herbaceous species, young cottonwood trees, and thick stands of willows that all appeared the same on the imagery. In hindsight, mapping of these similar riverine types may have warranted a separate map unit that encompassed all three vegetation types occurring on this unique habitat.

5. Species Overlap: One of the largest sources of error and a constant issue across all of the map units was the overlap in common species among different map classes. Of particular note is the same gramoind species (e.g. native sedges, smooth brome and Kentucky bluegrass) occurring in agricultural fields, lawns, disturbed road right-of-ways, and more native settings. The presence of the same dominant and indicator species in both natural and manipulated habitats caused for confusion when trying to both key the vegetation on the ground and delineating discreet units on the imagery.

   Example: The Perennially Flooded Agricultural Fields (NIPF) map unit was included in the mapping to address flooded and mesic fields that contained both native wetland graminoids and non-native grasses. Since these areas were used as pastures and hay fields, they were separated from true or more natural wetlands that occurred on saturated soils in valleys, floodplains, and around ponds and lakes. The low user's accuracy for the NIPF map unit was a likely a result of similar species occurring in these different environments and the inability of the field crews to distinguish the different settings on the ground.

Figure 15. Examples of Common Mapping Errors



FINAL PROJECT REPORT AND DELIVERABLES

In the final phase of this project, CTI was responsible for compiling the final Teton County vegetation mapping report that documented the methods and results for each phase of the project. A comprehensive draft of the final report was created and distributed to Teton County and NRTAB staffs for review and comment. Based on their feedback, the report contained herein was finalized and 20 copies were compiled and submitted for use in public meetings.

In addition to the report, CTI also created electronic spatial datasets and GIS layers for the observation points, verification points, AA points, and vegetation layer. All spatial data was provided in electronic format in both Universal Transverse Mercator (UTM), North American Datum 1983 (NAD83), zone 12, meters projection and the Wyoming State Plane, UTM, feet projection. FGDC compliant metadata was produced for all of the data point shapefiles and the vegetation map layer. Digital copies of the final report, field photographs, spatial layers, and metadata were submitted on a DVD for review and approval.

DISCUSSION

Teton County represents a vibrant and dynamic community combining a near pristine mix of mountains, valleys, and plains with active ranching, commercial, and tourist-driven enterprises. Across this vast landscape, a wide array of plants and plant communities thrive in habitats typical of the Northern Rockies and the Greater Yellowstone Ecosystem. The vegetation mapping for private and BLM lands in Teton County was challenging at many levels due to access limitations, the need to respect private property, and the need to accurately classify and map both the native and semi-natural vegetation. Building off the work done at GTNP, this project was successful due to the patience and perseverance of many individuals and the project's success can be measured in part by the high overall accuracy and mapping detail. Although much work has been done, there is always room for improvement and below are a few thoughts and suggestions on how to use and improve this project.

MAPPING AND PHOTO INTERPRETATION

The acquisition of new 2011 ortho-imagery by Teton County in addition to the 2012 NAIP ortho-photography was critical to the mapping efforts. The high resolution and color infrared nature of the 2011 imagery provided the necessary photo signatures to accurately distinguish and delineate between very similar vegetation communities at a fine-scale level. Unfortunately, the 2011 imagery did not extend into some of the remote areas of the project and the 2012 NAIP imagery had to be used as a supplemental base map. In the future, Teton County should consider including these areas if new imagery is acquired again.

Since all of the mapping was based primarily and the 2011 CIR and the 2012 NAIP imagery, all of the vegetation mapping products correspond to the timing of the imagery acquisitions (i.e. snapshots in time). As the data are used, it should be remembered that fires, flooding, and other changes to the landscape since 2011/2012 are not included in vegetation map layer. For example, when the 2011 imagery was acquired, the Snake River was quite high and many of the cobble bars and riverbanks were flooded. Imagery acquired later in the year, or during drier years may not match the river as mapped in this study.

It is also important to understand that the mapping portion of this project is primarily a remotely sensed exercise and the field work was conducted on site, therefore all resulting products are scale dependent. In general, the mapping portions should be viewed as a broader overview and the field data as site-specific. An analyst can enlarge the imagery beyond the 1:12,000-scale using GIS software and see more detail, however it should be remembered that the actual interpretation/mapping was conducted at this scale. As such, any work performed with this product at a finer scale (enlarged image) could lead to some uncertainty. In contrast, the field work was conducted at individual locations at one specific time and extrapolation using these locations to represent out-lying areas or using them to determine species presence at different times/seasons is less reliable. Database users should recognize scale limitations and balance research and modeling projects accordingly.

MAP VERIFICATION AND GROUND-TRUTHING

Getting access onto private lands made the data collection portion of this project difficult. At no times did any field crews travel onto privately-owned lands without first getting permission from the landowners. Permission was granted by many individuals through considerable logistical planning by the dedicated staff at the Teton County Development and Planning office and from the NRTAB members. Even with their efforts, large portions of the county were off-limits to data collection and any future studies related to this project may want to focus their efforts in areas that were not previously visited.

MAP UNITS AND ATTRIBUTION

The classification for Teton County was based primarily on the previous work done during the 2006 GTNP Vegetation Inventory Project. CTI staff verified the associations/alliances developed for the GTNP project where possible but no new sample plot or detailed plant association data were collected as part of this project. As such, a few of the plant associations/alliances may not occur in the project area and some new plant communities may not have been recognized at this time. In the future, it might be beneficial to conduct new plant community surveys on just the private lands (if possible) to verify and expand the list of rUSNVC types.

Inherent to vegetation mapping projects is the need to produce both a consistent vegetation classification and a comprehensive set of map units. Typically, the systems are very similar, but when using a national classification such as the rUSNVC there is usually not a strict one-to-one correspondence. This is due to the remote sensing nature of imagery interpretation and its ability to only delineate map units based on complex photo signatures. Subtle vegetation characteristics that can be seen on the ground are not necessarily the same as those apparent on the imagery. Canopy closure, shadows, and timing of the imagery acquisition can also distort or obscure photo signatures. For this project, the map units were continuously reviewed and up-dated to increase the detail and accuracy levels. The new and expanded map units were sometimes difficult to discern due to species overlap and anthropogenic disturbances such as grazing, planting, and mowing. More data collection and ground-truthing may yield a better understanding of the appropriate map units to use and may warrant further expansion or consolidation of the map units.

In addition to reviewing the map units and mapping scheme, more map verification or ground-truthing could always help to improve the spatial accuracy of the mapping at site-specific locations. In some ways, this project should be viewed as an initial effort that needs to be refined and periodically updated. To do this, GPS points, mapping, surveying, or field checking the existing imagery and linework on the ground could greatly improve the quality and accuracy of this project.

ACCURACY ASSESSMENT

An important and necessary aspect of this project is the accuracy assessment since it is this stage that determines the usefulness of the vegetation map. As such, users of this product should remember that the GIS mapping and the classification portions of this project were conducted separately from the AA field data collection. Employing divisions when completing tasks created some challenges related to communication between the Teton County staff, CTI mappers, and the field crews. Communication concerns included: (1) providing timely updates to the field crews on private land-owner permission and access limitations, (2) finding and adjusting any problems with the field key and/or field equipment, (3) insuring that rare and infrequent map units were sampled, and (4) avoiding over-sampling common map units. Future field work would benefit from having a fully-tested field key, focused sampling in rare types, and creating field maps showing access areas and landowner information.

Actual errors in the Teton County mapping likely stemmed from (1) limitations or the ortho photography, (2) natural changes in the vegetation since the imagery acquisition (e.g. fluctuations in the Snake River), (3) subjectivity of the field key, (4) difficulty in establishing an overhead perspective to exactly match ground views, and (5) field access limitations due to private lands and hazardous conditions. Of particular note for this project is the lower than expected AA sample sizes and the use of binoculars to remotely view the vegetation at some AA targets. Remote sampling of AA points was employed in Teton County when points were inaccessible or too treacherous to reach, and by its nature introduces a greater risk of the wrong target area being observed. Although the accuracy for Teton County assessed high, improvements could be made by simply getting more access and by collecting more on-site AA data in general.

The accuracy assessment at Teton County consisted of three levels using fuzzy logic parameters. This range of accuracy provided not only statistics on where the error occurred but also how the accuracy improved as tolerances decreased. Future users of this product might find that one level of accuracy more useful than the others for certain projects. For example, a careful examination of how the accuracy improved among the map units could reveal similar map units that could be consolidated for coarser-scale projects (e.g. combining all of the Riparian Woodlands or Sagebrush types). On the whole, users of the Teton County vegetation layer should fully explore and understand the sources of error as presented in the error matrices

FUTURE RECOMMENDATIONS

In summary, this project represents the best efforts put forth by one group of people over a relatively short period in time. In order to create the best possible "long-term" vegetation classification for Teton County and the most accurate and detailed GIS layer, this project should be viewed as a place to start rather than an end product. In other words, present and future users should be encouraged to scrutinize this project, building from its strengths and bolstering its weaknesses. Keeping in mind that this project was only a snapshot in time, future efforts can help complete the understanding of the vegetation in Teton County and how it changes over time. Below are a few recommendations:

The high diversity of plant species and inaccessibility of large areas warrants the use of periodic and opportunistic **field surveys** to various remote locales by experienced ecologists. Both county-wide surveys for rare and invasive plants and site-specific studies for planning and conservation efforts could be used to update the map. In addition, any botanical work done in the county could help discover new plant associations or expand the knowledge about existing types.

Remote sensing does not replace on-the-ground knowledge provided by GPS linked plots, observations and ground verification. Time and access limitations curtailed the amount of **ground-truthing** done with this mapping effort. As opportunities arise, maps should be sent into the field to be verified by competent crews. In addition, GPS data and other GIS layers could be used to improve and update the spatial data.

To better understand the limitations of the map, the **accuracy assessment** data presented in contingency tables should be thoroughly reviewed by all users. Map classes with low accuracy should be examined to see if they could be improved with future studies using ground-truthing or other remote-sensing formats (e.g. hyperspectral, LIDAR, etc). In addition, landscape modeling may help to tease out the location of specific types based on specific habitat information. Finally, for some applications it may make sense to combine map classes into higher units, such as physiognomic or ecological systems to improve their accuracy**.**

For monitoring purposes, **change over time** could be addressed by similar remote sensing projects. New aerial photos or compatible digital imagery taken 5, 10, 20+ years from now could capture this change. This new imagery could then be used to create up-to-date vegetation layers and compare changes at both specific vegetation stands and across the entire County.

In the future, resource management personnel could link the habitat for **species of concern** to specific associations and map units. This would allow them to locate potential sites by using vegetation map and environmental variables (e.g. Subalpine-spruce forest on north slopes).

RESEARCH OPPORTUNITIES AND PROJECT EXPANSION

Having a detailed and accurate vegetation layer can help with many future planning and development activities and could be expanded to address other spatial issues including:

Planning and Development: Regular use of the vegetation layer could help with developing a Countywide strategy for identifying and protecting natural habitats, areas of critical importance and site-specific planning. The County-wide approach could include querying the vegetation database for rare plant communities or linking it to the height information to determine old-growth woodlands/forest stands. Site-specific studies could involve overlaying building site plans to avoid disturbing important ecosystems.

Hydrology: Water resources are important throughout the Western United States and Teton County. The vegetation layer already provides much information on mesic versus semi-arid and upland versus riparian habitats. In addition, the vegetation layer also contains detailed mapping of streams, lakes, ponds and larger irrigation canals. Combining certain vegetation and land-cover polygons from this layer with other hydrologic lines and point layers may provide the user with a comprehensive model of where and how the water flows through the County.

Fire Modeling: Linking the vegetation layer to fire fuel levels would help create a landscape model representing burn rates and fuel loads across Teton County. This digital model could be directly imported into existing fire modeling software such as FARSITE and provide a useful tool for predicting the rate, growth and spread of both prescribed and natural wildland fires.

Rare Plants: Data on the location and habitat of rare plant populations in the County could be queried in the vegetation layer to find other potential locations. On the monitoring side, links to the vegetation map layer could provides baseline acreages of rare plant habitats along with those of neighboring polygons. Similar future studies when compared to this project could yield change over time and answer questions about whether habitats are expanding or being encroached on.

Exotic Plants: The presence of noxious and exotic weeds in Teton County is a constant threat to biodiversity. It has been shown that non-native invasive plants can displace native vegetation and seriously lower diversity in plant communities. By combining this map with known locations of weedy plants researchers should be able to predict their establishment and spread, find other vulnerable areas, and prioritize eradication efforts.

Wildlife Habitat: Analysis using the vegetation polygons could determine areas that are being used by animals as grazing/browsing sites, hiding areas, nesting sites, or movement corridors. This project when combined with wildlife studies such as radio collaring or GPS tracking could also reveal important home range, feeding and migration patterns.

General Ecology: Having an existing vegetation map provides a very powerful tool for examining ecological processes. In a GIS, other layers such as geology, hydrology, elevation, and soils could be overlain and compared to the vegetation. Complex interactions between these layers could yield important information about growth rates, regeneration after disturbance, biomass distribution, human impacts, and stream morphology.

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APPENDIX A – FIELD FORMS

VERIFICATION FORM

IDENTIFIERS/LOCATORS

Polygon Code: TC____-_____. Survey Date: _____/2012. Surveyors: _____.

Verification Site Name/Location:
_____.

GPS File Name:_____. **Field UTM X:**___ ___ ___ ___ ___ ___ m E. **Field UTM Y:**___ ___ ___ ___ ___ ___ ___ m N.

Datum: NAD83. **Zone:** 12. **GPS Receiver Comments:**
_____.

Camera Name:
_____

Photo #	Saved #	Photographer	Direction/Comments

POLYGON AND MAP UNIT INFORMATION

MAP CLASS IN VERIFICATION POLYGON MAP CODE MATCH		Height, Pattern, and Density of Dominant Vegetation:
Primary Name:	☐	
Secondary Name:	☐	
Tertiary Name:	☐	
Polygon Representativeness: Good Fair Poor		
General Comments: [disturbance evidence, description of the vegetation, etc.]		

OBSERVATION POINT FORM (front and back)

SURVEY AND SITE INFORMATION

Point Code: __ __ __ Quad name: _____ BPU Code: _____ Aerial Photo #: _____

Type of Observation (Please Circle One): VEG/OBS SPRING/HANGING GARDEN OTHER (Specify) _____

Park Site Name_____ Location (Please Circle One): Park Environs

Survey Date_____ Surveyors_____Size of Area: _____

GPS file name_____ Field UTM X___ ___ ___ ___ ___ ___ m E Field UTM Y___ ___ ___ ___ ___ ___ ___ m N

☐ Coordinates from USGS NAD27 Quad Map (if checked enter coordinates under GPS comments)

Datum _____Zone: _____ GPS Unit:: _____ PDOP: _____ 3D Differential? Y / N

GPS Comments: Error: +/- _____m (Flat Garmin only)

Camera Name and Model (circle one): _____

Roll #	Frame #	Photographer	Direction/Comments

ENVIRONMENTAL DESCRIPTION

Elevation _____ m /f t From: GPS / Map (circle one) | Slope _____ Aspect_____

Topographic Position:

Landform: | Geology:

Cowardin System
____ Upland ____ Palustrine

Hydrology
___ Unknown ___Semipermanently Flooded
___Permanently Flooded ___Temporarily Flooded
___Intermittently Flooded ___Saturated
___Seasonally Flooded

Environmental Comments:

Unvegetated Surface: *(please use cover scale below)*
___ Bare soil ___ Small rocks (0.2-10cm) ___ Wood (>1cm) ___ Other (describe) _____
___ Bedrock ___ Large rocks (>10cm) ___ Litter / duff
___ Sand (0.1-2mm)

VEGETATION DESCRIPTION

Leaf phenology (of dominant stratum)	Leaf Type (of dominant stratum)	Physiognomic Class	Cover scale for strata and unvegetated surfaces:
Trees and Shrubs __Evergreen __Cold-deciduous __Mixed evergreen-cold-deciduous Herbs ___Annual ___Perennial	___Broad-leaved ___Needle-leaved ___Microphyllous ___Graminoid ___Forb ___Pteridophyte ___Non-vascular ___Mixed (describe)	___Forest ___Woodland ___Shrubland ___Wooded Shrubland ___Dwarf Shrubland ___Shrub Herbaceous ___Herbaceous ___Nonvascular ___Sparsely Vegetated ___Wooded herbaceous	01 = 0 – 10% 02 = 10 – 25% 03 = 25 – 60% 04 = 60 – 100%

Provisional Community Name:_____ Plot Code: __ __ __

	Stratum Height Class	Stratum Cover Class	Dominant Species (mark Diagnostic species with *)	% Cover
T1 Emergent				
T2 Canopy				
T3 Sub-canopy				
S1 Tall shrub (> 2 m)				
S2 Short Shrub (< 2 m)				
S3 Dwarf Shrub (< 0.5 m)				
H Herbaceous				
N Non-vascular				

Height Scale for strata:

01 = < 0.5 m	06 = 10-15m
02 = 0.5-1 m	07 = 15-20m
03 = 1-2 m	08 = 20-35 m
04 = 2-5 m	09 = 35-50 m
05 = 5-10 m	10 = >50 m

Cover scale for strata and unvegetated surfaces:

01	= 0 – 10%
02	= 10 – 25%
03	= 25 – 60%
04	= 60 – 100%

ACCURACY ASSESSMENT FORM

1. PLOT (WAYPOINT) #: - -_____ 2. DATE: 7/ /2013 3. OBSERVER Chris Lea

4. Observer (assisting) _____ 5. ACCURACY OF NAVIGATION (METERS) _____

6. UTM EASTING _____ 7. UTM NORTHING_____ (Zone 12, NAD83)

8. If above position is offset, distance _____ (meters), _____(°azimuth) to observation center, and explanation (circle below):
a. Access constraints in reaching waypoint b. Heterogeneous vegetation
c. Other (explain as needed):_____

10. VEGETATION MAP CLASS (Primary call): _____ Certainty: _____%

11. VEGETATION MAP CLASS (Secondary call): _____ Certainty: _____%

12. VEGETATION MAP CLASS (Tertiary call): _____ Certainty: _____%

13. OTHER VEGETATION MAP CLASS WITHIN 150 FEET:_____

14. Accuracy Assessment Comments:_____
_____
_____
_____
_____
_____
_____

VEGETATION DESCRIPTION

Cover Scale for Strata & Unvegetated Surface					
Tr	<1%	20	16-25%	70	66-75%
01	1-2%	30	26-35%	80	76-85%
03	3-4%	40	36-45%	90	86-95%
07	5-9%	50	46-55%	98	96-99%
12	10-15%	60	56-65%	100	>99%

Height Scale for Strata			
01	<1ft.	40	30-50 ft.
02	1-1.9 ft.	65	50-80 ft.
04	2-5 ft.	90	80-100 ft.
10	5-15 ft.	100	>100 ft.
25	15-30 ft.		

Strata	Height Class	Cover Class	Dominant species
T1 Emergent	_____	_____	_____
T2 Canopy	_____	_____	_____
T3 Sub-canopy	_____	_____	_____
S1 Tall shrub	_____	_____	_____
S2 Short shrub	_____	_____	_____
S3 Dwarf shrub	_____	_____	_____
H Herbaceous	_____	_____	_____
N Non-vascular	_____	_____	_____

APPENDIX B – MAP UNIT KEY

KEY TO UNVEGETATED AND LAND-USE/LAND-COVER MAP UNITS

(Apply in lieu of vegetation key, where applicable)

Unvegetated – Water	Lakes, Reservoirs and Ponds	NLP
	Streams	NST
	Irrigation Canals	NID
Unvegetated – Natural Land Surfaces	Bare Exposed Rock	NRK
	Non-vegetated Cobble and Sand Bars	NVS
Unvegetated – Anthropogenic	Disturbed Impervious - (Roads Gravel)	NRDG
	Disturbed Impervious - (Parking Lots)	NRDL
	Disturbed Impervious - (Paved Pathways)	NRDP
	Disturbed Impervious - (Roads Paved)	NRDR
	Disturbed Impervious - (Structures and Driveways)	NRDS
	Disturbed Impervious - (Communication and Utilities)	NRDU
	Strip Mines, Quarries, and Gravel Pits	NRD
	Transitional Areas	NTR
Cultural Vegetation – Landscaped and Recreation	Disturbed Pervious (Corrals/Riding Arenas)	NSMC
	Disturbed Pervious (Golf Courses)	NSMG
	Disturbed Pervious (Lawn and Landscaping)	NSML
	Disturbed Pervious (Horse/Ski Trails)	NSMT

MAIN KEY TO NATURAL AND SEMI-NATURAL VEGETATION MAP CLASSES

1. Regenerating native tree communities on recently disturbed, logged, burned or landslide/avalanche areas with some shrubs and/or herbaceous vegetation **2**

2. The cover of *Populus tremuloides* is equal to or exceeds the combined cover of conifer trees ..... **RAP**

2. The combined cover of conifer seedling and sapling is at least 50% of the total cover of the upper most stratum **3**

3. The combined cover of *Abies lasiocarpa* and/or *Picea engelmannii* is greater than that any other conifer species (Map class not present at this time)..... **RAM**

3. Not as above **4**

4. The dominant conifer tree species is *Pinus contorta*..... **RLP**

4. No conifer tree species is clearly dominant or multiple conifer tree species are present (Map class not present at this time) ..... **RMC**

1. Not as above..... **5**

5. Tree species, regardless of height, with 10% or more cover ...go to **Forest and Woodland Key**

5. Not as above..... **6**

6. Shrub species with 10% or more cover, or the dominant life form in depauperate stands .....go to **Shrubland Key**

6. Not as above..... **7**

7. Total vascular vegetation cover equals or exceeds 25%..... **8**

8. Recently burned areas with standing dead woody vegetation……. **VRB**

8. Not as above ..... go to **Herbaceous Vegetation Key**

7. Total vascular vegetation cover is less than 25%..... **9**

9. Recently burned areas with standing dead woody vegetation..... **VRB**

9. Not as above..... **10**

10. Sparse vascular vegetation on hillsides, with soil the dominant substrate ..... **VEH**

19. Lichen and/or sparse vascular vegetation on bedrock, boulders, sand, or gravel **11**

11. Lichen and/or sparse vascular vegetation on bedrock or colluvial (talus, scree) surfaces..... **VCT**

11. Sparse vascular vegetation on alluvial or lacustrine (cobbles, gravel, sand) surfaces (stream bars and lake or pond shores) ..... **VSL**

FORESTS AND WOODLANDS KEY

Tree species with more than 10% cover.

1. Native conifers, either as mature trees or saplings, form a distinct top tree stratum. Deciduous trees are less than 10% of the total uppermost tree stratum. 2

2. The uppermost stratum is dominated (at least 50% of the total cover) by *Pinus contorta* ..... **FLP**
2. The uppermost stratum is not dominated by *Pinus contorta*..... **4**

4. *Pinus contorta* is present in the uppermost stratum but is co-dominate with other conifer specie(s) ..... **FMC**
4. *Pinus contorta* is not present in the uppermost stratum or contributes less than 10% to the total cover..... **5**

5. The total cover of *Abies lasiocarpa* and/or *Picea engelmannii* is at least 75%..... **FSF**
5. The total cover of *Abies lasiocarpa* and/or *Picea engelmannii* is less than 75%..... **6**

6. The total cover of *Pseudotsuga menziesii* is at least 75%..... **FDF**
6. The total cover of *Pseudotsuga menziesii* is less than 75%..... **7**

7. Total cover of *Pseudotsuga menziesii* combined with other conifer tree species is at least 50% ..... **FMC**
7. *Pinus contorta, Abies lasiocarpa, Picea engelmannii,* and/or *Pseudotsuga menziesii* contribute less than 10% cover combined in the uppermost stratum. **8**

8. The uppermost stratum contains at least 25% cover **9**

9. The top stratum trees have been planted near houses, windbreaks ..... **FBAC**
9. The top stratum trees have grown from natural regeneration and is dominated by *Picea pungens*..... **FBS**

8. The uppermost stratum has 25% or less cover **10**

10. *Pinus flexilis* is the most abundant tree..... **FLM**
10. *Juniperus scopulorum* is the most abundant tree ..... **FJ**

1. Conifers are a minor component of top tree stratum, or co-dominant with deciduous trees (deciduous trees comprise at least 25% of the total uppermost tree stratum)..... 11

11. The top stratum trees have been planted **12**

12. The combined cover of all native tree species is at least equal to that of all non- native tree species ..... **FBAC**

12. The combined cover of all non-native tree species exceeds that of all native tree species ..... **FOR**

11. The top stratum trees have grown from natural regeneration **13**

13. The cover of *Populus tremuloides* in the top tree stratum exceeds the total combined cover of cottonwoods (*Populus angustifolia* and/or *Populus balsamifera*) in the top tree stratum **14**

14. The total combined cover of saplings and seedlings in canopy gaps* exceeds that of mature trees ..... **RAP**
14. The total cover of mature trees equals or exceeds the total cover of saplings and seedlings in canopy gaps* **15**

15. Conifers contribute at least 25% cover to the top tree stratum ..... **FEP**
15. Conifers contribute less than 25% cover to the top tree stratum ..... **FAP**

13. The total combined cover of cottonwoods (*Populus angustifolia* and/or *Populus balsamifera*) in the top tree stratum is equal to or exceeds that of *Populus tremuloides* **16**

16. *Picea pungens* cover is at least 25% ..... **FRM**
16. *Picea pungens* cover is less than 25% ..... **FCW**

SHRUBLANDS KEY

1. The combined cover of dry or mesic site indicator species (*Amelanchier* spp., *Artemisia* spp., *Chrysothamnus* spp., *Prunus virginiana*, *Purshia tridentata*, *Spiraea* spp., *Symphoricarpos* spp., and/or *Vaccinium membranaceum*) is greater than that of wetland indicator species (*Alnus incana*, *Betula nana*, *Cornus sericea*, *Rhamnus alnifolia*, and/or *Salix* spp.) **2**

2. Combined cover of all sagebrush species (*Artemisia* spp.) is less than 10% ..... **SMR**
2. Combined cover of all sagebrush species (*Artemisia* spp.) is greater than or equal to 10% **3**

3. The combined cover of all mesic site indicator species (*Amelanchier* spp., *Prunus virginiana*, *Spiraea* spp., *Symphoricarpos* spp., and/or *Vaccinium membranaceum*) is at least one half of the total cover of all dry site indicator species (*Artemisia* spp., *Chrysothamnus* spp., and/or *Purshia tridentata*) ..... **SMSD**
3. The combined cover of all dry site indicator species (*Artemisia* spp., *Chrysothamnus* spp., and/or *Purshia tridentata*), *Symphoricarpos* spp., and/or *Vaccinium membranaceum*) is more than twice the total cover of all mesic site indicator species (*Amelanchier* spp., *Prunus virginiana*, *Spiraea* spp., *Symphoricarpos* spp., and/or *Vaccinium membranaceum*) **4**

4. The cover of *Artemisia arbuscula* is greater than or equal to the cover of each of the following: (a) *Purshia tridentata*, (b) all *Chrysothamnus* spp. (combined) and (c) all other species of *Artemisia* (combined) ..... **DSE**
4. The cover of at least one of the following: (a) *Purshia tridentata*, (b) all *Chrysothamnus* spp. (combined) and (c) all other species of *Artemisia* (combined) exceeds the cover of *Artemisia arbuscula* **5**

5. The combined cover of all species of *Chrysothamnus* (*nauseosus* and/or *vicidiflorus*) is greater than the combined cover of all species of *Artemisia* plus *Purshia tridentata and Dasiphora floribunda* ..... **SRB**
5. The combined cover of all species of *Artemisia* plus *Purshia tridentata* and *Dasiphora floribunda* is greater than or equal to the combined cover of all species of *Chrysothamnus* (*nauseosus* and/or *vicidiflorus*) **6**

6. The cover of *Purshia tridentata* is greater than or equal to 25% ..... **SES**
6. The cover of *Purshia tridentata* is less than 25% **7**

7. The cover of *Dasiphora floribunda* greater than or equal to 25% ..... **SSW**
7. The cover of *Dasiphora floribunda* is less than 25% and the site is dominated by species of *Artemisia* ..... **SSD**

1. The combined cover of wetland indicator species (*Alnus incana*, *Betula nana*, *Cornus sericea*, *Rhamnus alnifolia*, and/or *Salix* spp.) is at least that of dry or mesic site indicator species (*Amelanchier* spp., *Artemisia* spp., *Prunus virginiana*, *Chrysothamnus viscidiflorus*, *Purshia tridentata*, *Spiraea* spp., *Symphoricarpos* spp., and/or *Vaccinium membranaceum*) **7**

8. The combined cover of *Alnus incana* along with any associated species (*Betula nana*, *Cornus sericea*, *Rhamnus alnifolia*) equals or exceeds the combined cover of all *Salix* spp. ..... **SAI**
8. The combined cover of all *Salix* spp exceeds the cover of all other shrubs ..... **SWL**

HERBACEOUS VEGETATION KEY

1. Total cover of all graminoid species equals or exceeds that of all forb species **2**

2. No native graminoid species are present or the combined cover of non-native species (e.g., *Phleum ratense, Poa pratensis, Bromus inermis, Poa compressa*) is greater than 70% compared to native grass and forb species **3**

3. Non-native species (e.g., *Phleum ratense, Poa pratensis, Bromus inermis, Poa compressa*) are dominate in non-agricultural settings such as roadsides, abandoned lots, fallow fields, seeded areas, and urban areas ..... **HPG**
3. Non-native grass species are dominate in actively managed pastures and fields **4**

4. Non-native grass species are dominate in actively managed and non-irrigated fields and pastures ..... **NIPN**
4. Non-native grass species along with various crop species (alfalfa, corn, soybeans) are dominate in actively managed and irrigated fields and pastures ..... **NIPI**

2. The combined cover of native graminoids equals 30% or exceeds that of all non-native graminoids, *i.e.* native grasslands or invaded natural grasslands **5**

5. The combined cover of dry or mesic site indicator species (*Pseudoroegneria spicata* , *Poa secunda*, *Hesperostipa comata*, *Festuca idahoensis* , *Danthonia spicata*, *Calamagrostis rubescens*, *Carex geyeri*) is

greater than that of wet site indicator species (*Calamagrostis canadensis*, *Poa palustris*, *Deschampsia caespitosa*, *Carex aquatilis*, *Carex utriculata*, *Carex nebrascensis*, *Carex vesicaria*, *Carex buxbaumii*, *Carex pellita*, *Carex microptera*, *Eleocharis* spp., *Juncus* spp. and/or *Typha* spp.)..... **HGL**
5. The combined cover of wet site indicator species (*Calamagrostis canadensis*, *Poa palustris*, *Deschampsia caespitosa*, *Carex aquatilis*, *Carex utriculata*, *Carex nebrascensis*, *Carex vesicaria*, *Carex buxbaumii*, *Carex pellita*, *Carex microptera*, *Eleocharis* spp., *Juncus* spp., *Scirpus acutus, Sparganium* spp., and/or *Typha* spp.) is greater than or equal to that of dry or mesic site indicator species (*Pseudoroegneria spicata* , *Poa secunda*, *Hesperostipa comata*, *Festuca idahoensis* , *Danthonia spicata*, *Calamagrostis rubescens*, *Carex geyeri*)..... **6**

6. The combined cover of *Calamagrostis canadensis*, *Poa palustris*, *Deschampsia caespitosa*, *Carex* spp., *Eleocharis* spp., and/or *Juncus* spp.,is greater than the combined cover of *Scirpus acutus, Sparganium* spp., and/or *Typha* spp. **7**

7. Natural wetlands occurring in and around seeps, springs and streams that are locally dominated by mesic graminoids (*Calamagrostis canadensis*, *Poa palustris*, *Deschampsia caespitosa*, *Carex* spp., *Eleocharis* spp., and/or *Juncus* spp) ..... **HGS**
7. Artificial or manipulated wetlands occurring in agricultural fields or in and around irrigation canals ..... **NIPF**

6. The combined cover of *Scirpus acutus, Sparganium* spp., *Typha* spp. is greater than or equal to that of *Calamagrostis canadensis*, *Poa palustris*, *Deschampsia caespitosa*, *Carex* spp., *Eleocharis* spp., and/or *Juncus* spp. ..... **HA**

1. The total cover of all forb species equals or exceeds that of all graminoid species..... **8**

8. *Nuphar lutea ssp. polysepala*, *Menyanthes trifoliata*, and/or or submerged aquatic vascular plants dominant, with at least 25% combined cover ..... **HA**
8. Not as above **9**

9. *Caltha leptosepala* the most abundant species, with at least 25% cover ..... **HGS**
9. *Caltha leptosepala* is not the most abundant species, or has less than least 25% cover. **10**

10. The combined cover of mesic site indicator species (*Heracleum maximum,. Rudbeckia occidentalis, Arnica mollis*, *Senecio triangularis, Mimulus guttatus, Mertensia ciliata* , *Ligusticum filicinum, Delphinium × occidentale, Eucephalus engelmannii* , and/or *Symphyotrichum ascendens*) equals or exceeds that of dry site indicator species (*Helianthella uniflora*, *Geranium viscosissimum*, *Apocynum androsaemifolium*, and/or *Balsamorhiza sagittata*) ..... **HFD**
10. The combined cover of mesic site indicator species (*Heracleum maximum,. Rudbeckia occidentalis, Arnica mollis*, *Senecio triangularis, Mimulus guttatus, Mertensia ciliata* , *Ligusticum filicinum, Delphinium × occidentale, Eucephalus engelmannii* , and/or *Symphyotrichum ascendens*) is less than that of dry site indicator species (*Helianthella uniflora*, *Geranium viscosissimum Apocynum androsaemifolium*, and/or *Balsamorhiza sagittata*) ..... **HFX**

APPENDIX C – MAPPING CONVENTIONS AND VISUAL KEY

This section describes the map units for the Teton County Vegetation Mapping Project. Its purpose is to:

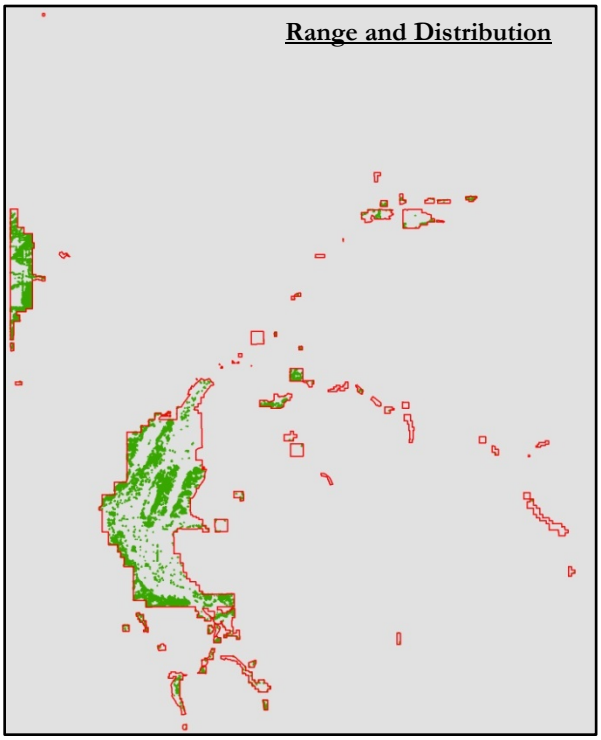
- Describe the vegetation of each map unit;
- Provide a ground photo image(s) for each map unit;
- Describe the link between each map unit and the revised U.S. National Vegetation Classification (rUSNVC);
- Provide visual examples of each map unit with aerial photographs and delineated overlays;
- Describe the spatial characteristics of each map unit;
- Provide an area report for each map unit.

The map units for the Teton County vegetation mapping project were based on a combination of the rUSNVC plant alliances/associations described in the 2006 GTNP vegetation inventory project, special map units requested or approved by Teton County's Planning and Development Department, the limitations of the 2011 Teton County or 2012 NAIP imagery, and the land-use/land-cover classes. The vegetation described in this section reflects the classification designed specifically for this project. Comparisons across a more regional scale may be achieved by using the Anderson Land Cover (1976) classification or the ecological and physiognomic categories provided in the GIS layer. Non-vegetated map units are self-explanatory and are not described herein.

Each map unit is described by a variety of characteristics and features. These include vegetation descriptions, a ground photograph(s), spatial characteristics, and typical imagery signatures taken from primarily the 2011 color infrared (CIR) or the 2012 NAIP true-color imagery. Each map unit is typically made up off several vegetation alliances/associations and these are listed. The sample ground photographs are from a variety of sources including ground photos taken during the verification or accuracy assessment stages. The spatial characteristics are derived from the final GIS spatial layer provided on the project DVD.

FAP Aspen Forest (*Populus tremuloides* Forest)

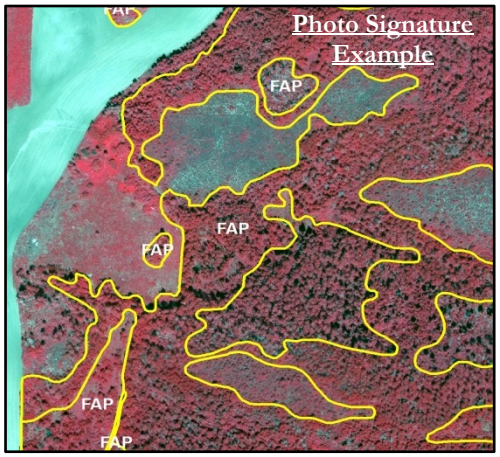
Range and Distribution



rUSNVC Alliance:
Populus tremuloides Forest Alliance

rUSNVC Associations:
Populus tremuloides / *Amelanchier alnifolia - Symphoricarpos oreophilus* / *Bromus carinatus* Forest
Populus tremuloides / *Amelanchier alnifolia - Symphoricarpos oreophilus* / *Calamagrostis rubescens* Forest
Populus tremuloides / *Amelanchier alnifolia - Symphoricarpos oreophilus* / *Thalictrum fendleri* Forest
Populus tremuloides / *Amelanchier alnifolia* / *Carex geyeri* Forest
Populus tremuloides / *Amelanchier alnifolia* / *Pteridium aquilinum* Forest
Populus tremuloides / *Calamagrostis rubescens* Forest
Populus tremuloides / *Ceanothus velutinus* Forest
Populus tremuloides / *Salix scouleriana* Forest
Populus tremuloides / *Shepherdia canadensis* Forest
Populus tremuloides / *Symphoricarpos albus* Forest
Populus tremuloides / *Symphoricarpos oreophilus* / Calamagrostis rubescens Forest
Populus tremuloides / *Symphoricarpos oreophilus* / Tall Forbs Forest
Populus tremuloides / *Symphoricarpos oreophilus* / Thalictrum fendleri Forest
Populus tremuloides / Tall Forbs Forest
Populus tremuloides / *Phleum pratense* Semi-Natural Forest
Populus tremuloides / *Poa pratensis* Forest
Populus tremuloides / *Thalictrum fendleri* Forest

Photo Signature Example



Common Species:
Populus tremuloides, Carex geyeri, Symphoricarpos oreophilus, Amelanchier alnifolia, Thalictrum fendleri, Pteridium aquilinum, Symphoricarpos oreophilus, Poa pratensis

Map Unit Statistics:

Frequency: 4,138 polygons	Average Aspect: 198°
Average Slope: 8°	Minimum Elevation: 5,801 feet
Maximum Elevation: 8,268 feet	Average Elevation: 6,434 ft.
Average Size: 1.5 acres	Total Size: 6,137.6 acres

Ground Photos

Description:
Aspen woodlands and forests were found throughout all areas of Teton County including floodplains, mesic basins, foothills, and toe slopes. Aspen stands can range in age from over-mature and decadent to young saplings. The FAP map unit was used to map monotypic aspen stands that contained few conifer trees. In contrast, the RAP map unit was used to map post-burn and regenerating aspen and the FBAC map unit was used to map obvious planted/landscaped aspen stands. On the 2011 CIR imagery, aspen trees were characterized by a bright red signature that contrasted with darker red for conifers. In older and disturbed stands, the white bark of the trees could be seen on the imagery. Young immature stands had a smooth texture and older, open stands had a bushy appearance.

FBAC Mixed Blue Spruce - Aspen - Cottonwood Semi-natural Planted Woodland

(Mixed *Picea pungens* - *Populus tremuloides* - *Populus* spp. Semi-natural Planted Woodland)

rUSNVC Alliances:
Populus tremuloides Forest Alliance
Picea pungens forest Alliance
Populus angustifolia Temporarily Flooded Woodland Alliance

rUSNVC Associations:
Populus tremuloides / *Phleum pratense* Semi-Natural Forest
Populus tremuloides / *Poa pratensis* Forest
Populus angustifolia / *Poa pratensis* Woodland

Range and Distribution

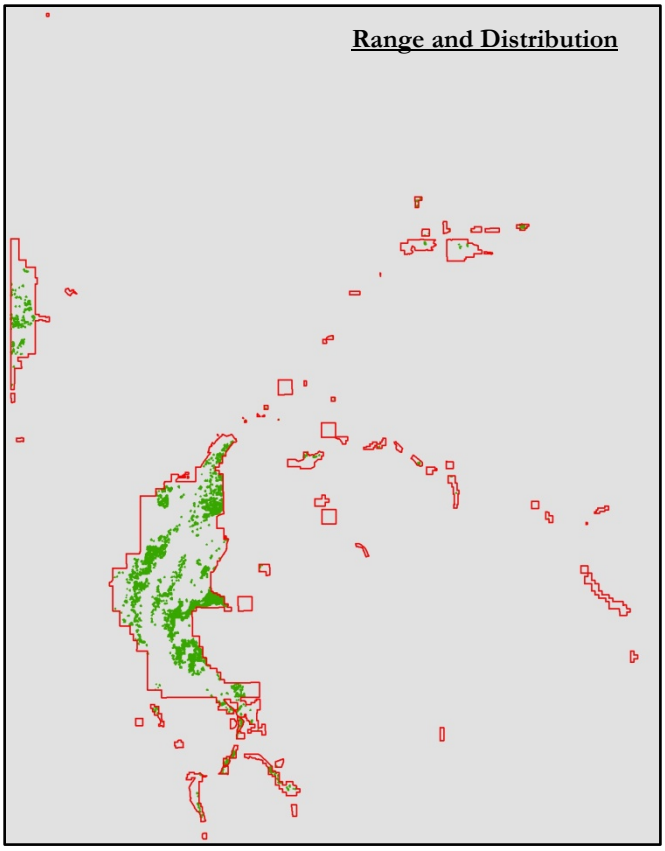
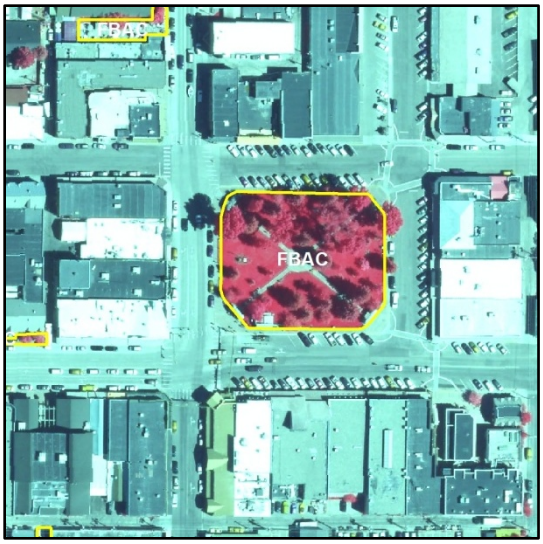


Photo Signature Example



Common Species:
Populus tremuloides, Picea pungens, Populus angustifolia, Poa pratensis

Ground Photos

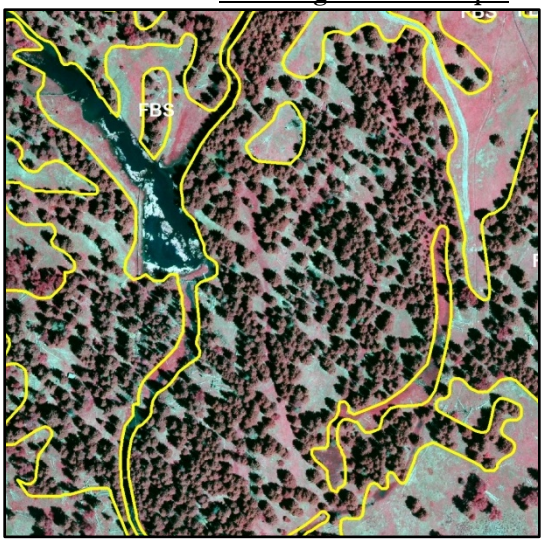
Map Unit Statistics:
Frequency: 5,189 polygons
Average Aspect: 208°
Average Slope: 2°
Minimum Elevation: 5,830 feet
Maximum Elevation: 7,589 feet
Average Elevation: 6,234 feet
Average Size: 0.2 acres
Total Size: 1,077.4 acres

Description:
Native trees have been planted throughout Teton County around residential and commercial buildings and as agricultural windbreaks. The native plantings typically included monotypic or mixed stands of either aspen, blue spruce, and/or cottonwood trees although Douglas fir and lodgepole pine trees may also be present to lesser degrees. Some of the larger plantings included multi-aged trees and a mixture of species. The understory for native tree plantings was usually manicured, sparse, or lawn-like. Mapping of the FBAC map unit relied in part on the location of the stand next to buildings, lawns, parks, and parking lots. On the 2011 CIR imagery, native planted trees varied in color from light red (aspen) to dark red/black (conifers) and usually varied in size and shape depending on when the stand was planted.

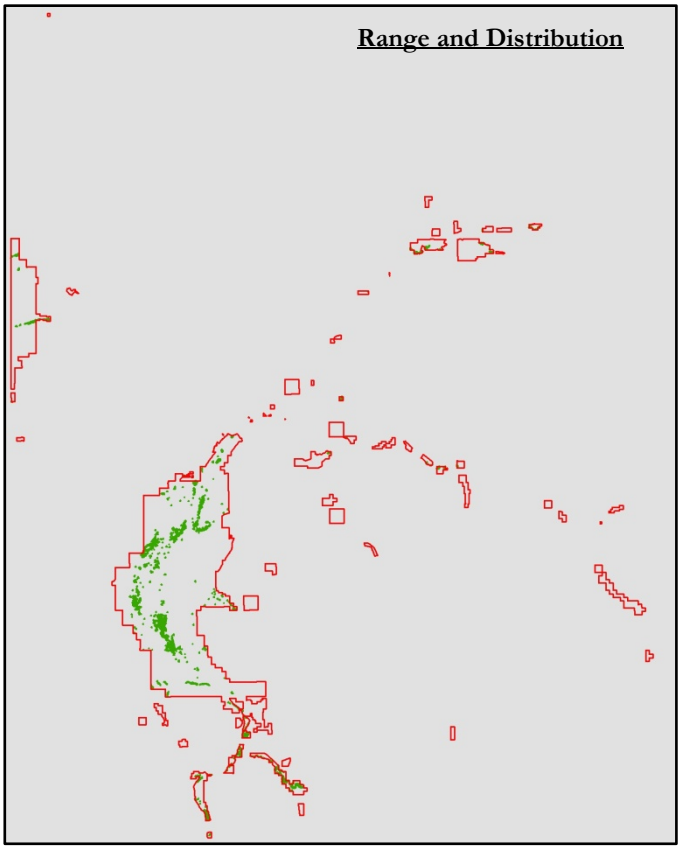
FBS Blue Spruce Riparian Forest
(*Picea pungens* Riparian Forest)

rUSNVC Alliances:
Picea pungens Forest Alliance
Picea pungens Temporarily Flooded Woodland Alliance
rUSNVC Associations:
Picea pungens / *Actea rubra* Forest
Picea pungens / *Alnus incana* Woodland
Picea pungens / *Equisetum arvense* Woodland
Picea pungens / *Juniperus communis* Forest
Picea pungens / *Shepherdia canadensis* Forest

Photo Signature Example



Range and Distribution



Common Species:
Picea pungens, Actea rubra
Alnus incana, Equisetum arvense,
Juniperus communis, Poa pratensis

Ground Photos

Map Unit Statistics:
Frequency: 1,375 polygons
Average Aspect: 189 °
Average Slope: 3°
Minimum Elevation: 5,794 feet
Maximum Elevation: 7,112 feet
Average Elevation: 6,186 feet
Average Size: 0.6 acres
Total Size: 856.2 acres

Description:
Blue spruce was common in the lower floodplains of the Gros Ventre, Snake, and Hoback Rivers and their tributaries and along the lower reaches of the major streams in Alta. Blue spruce usually occurred with or adjacent to other cottonwood trees and lodgepole pine and Engelmann spruce trees may also be present. Short and immature blue spruce tree were also common in the understory of cottonwood woodlands that may have been mapped using the FRM or FCW map units. On the 2011 CIR imagery, blue spruce stands typically contained light brown, mature trees. Most of the blue spruce trees appeared rather pointy and had large base crowns. The location of the trees on the floodplain along with their color and shape formed the basis for their delineation and mapping.

FCW Cottonwood Riparian Forest
(*Populus angustifolia* - *P. balsamifera* Riparian Forest)

rUSNVC Alliances:
Populus balsamifera Temporarily Flooded Forest Alliance
Populus angustifolia Temporarily Flooded Woodland Alliance

rUSNVC Associations:
Populus angustifolia / Artemisia tridentata var. vasyana / Eriogonium umbellatum Outwash Woodland
Populus angustifolia / Poa pratensis Woodland
Populus angustifolia / Shepherdia canadensis Forest
Populus angustifolia / Symphoricarpos (albus, occidentalis, oreophilus) Forest
Populus balsamifera (spp. trichocarpa, ssp. balsamifera) / Symphoricarpos (albus, occidentalis, oreophyllus) Forest
Populus balsamifera (ssp. trichocarpa, ssp. balsamifera) / Mixed Herbs Forest
Populus balsamifera (ssp. trichocarpa, ssp. balsamifera) / Prunus virginiana Forest
Populus balsamifera (ssp. trichocarpa, ssp. balsamifera) / Cornus sericea Forest

Range and Distribution

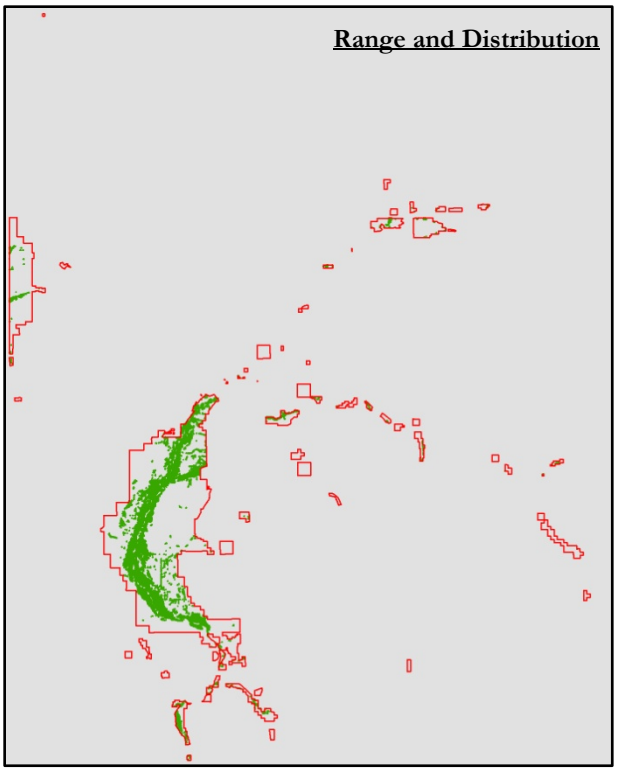
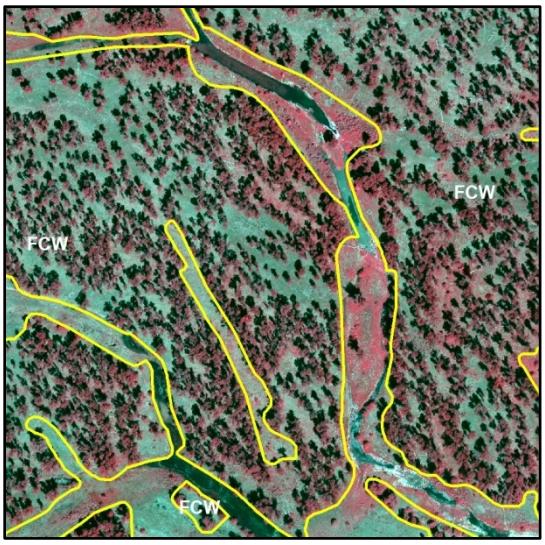


Photo Signature Example



Common Species:
Populus angustifolia, Populus balsamifera (spp. trichocarpa, ssp. balsamifera), Salix spp., Artemisia tridentata var. vasyana, Poa pratensis, Eleagnus commutata, Symphoricarpos ssp., Prunus virginiana

Ground Photos

Map Unit Statistics

Frequency: 4,051 polygons	Average Aspect: 190°
Average Slope: 1°	Minimum Elevation: 5,794 feet
Maximum Elevation: 7,550 feet	Average Elevation: 6,185 feet
Average Size: 1.3 acres	Total Size: 5,257.7 acres

Description:
Cottonwoods trees were common in the lower floodplains of the Gros Ventre, Snake, and Hoback Rivers and their tributaries and along the lower reaches of the major streams in Alta and Buffalo Valley. Cottonwoods often mixed with other riparian tree and shrub species and cottonwood seedlings/saplings often occurred on cobblebars in the Snake River with young willows forming dense stands. On the 2011 CIR imagery, older cottonwoods appeared as red spots with long shadows and young and medium trees had a darker red appearance. Younger and decadent cottonwoods had a feathery signature whereas mature cottonwoods appeared as regular spaced clumps.

FDF Douglas-fir Forest
(*Pseudotsuga menziesii* Forest)

rUSNVC Alliances:
Pseudotsuga menziesii Forest Alliance
Pseudotsuga menziesii Woodland Alliance

rUSNVC Associations:
Pseudotsuga menziesii / Thalictrum occidentale Forest
Pseudotsuga menziesii / Acer glabrum Forest
Pseudotsuga menziesii / Amelanchier alnifolia Forest
Pseudotsuga menziesii / Calamagrostis rubescens Forest
Pseudotsuga menziesii / Carex geyeri Forest
Pseudotsuga menziesii / Osmorhiza berteroi Forest
Pseudotsuga menziesii / Spiraea betulifolia Forest
Pseudotsuga menziesii / Symphoricarpos albus Forest
Pseudotsuga menziesii / Symphoricarpos oreophilus Forest
Pseudotsuga menziesii / Vaccinium membranaceum Forest

Range and Distribution

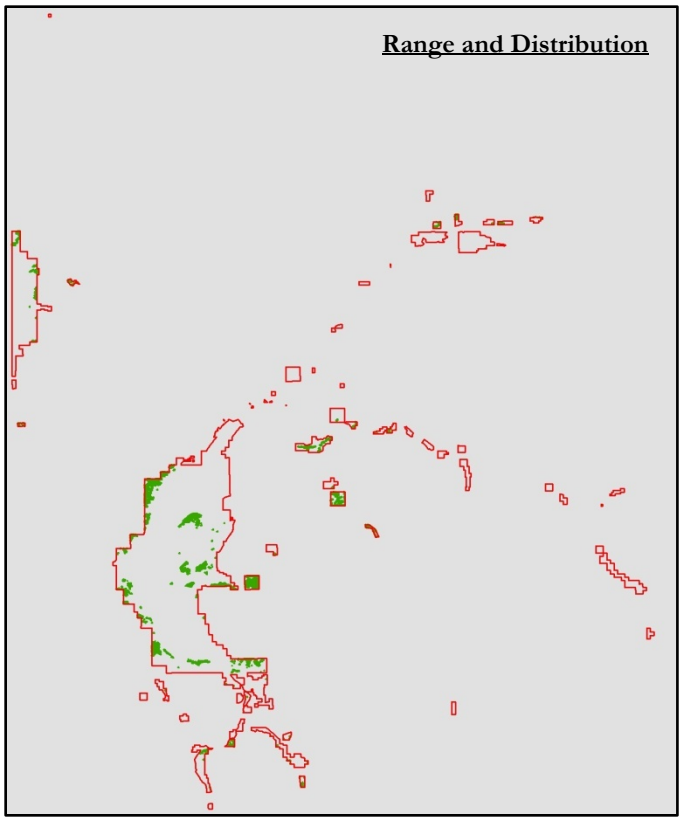
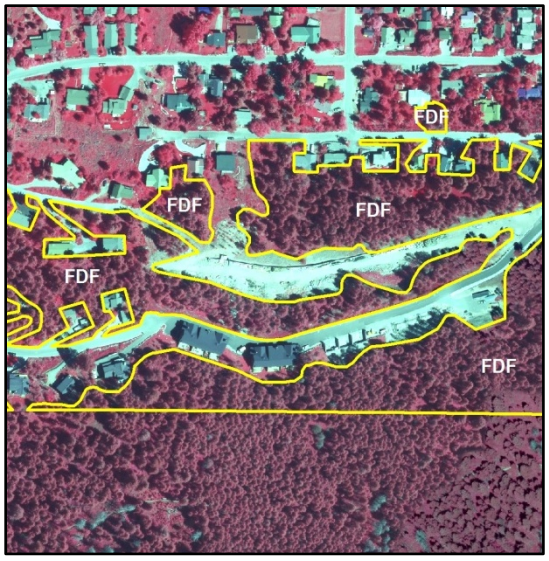


Photo Signature Example



Common Species:
Pseudotsuga menziesii,
Thalictrum occidentale,
Acer glabrum, Amelanchier alnifolia, Calamagrostis rubescens,
Carex geyeri,
Spiraea betulifolia,
Symphoricarpos spp.
Vaccinium membranaceum

Map Unit Statistics:
Frequency: 708 polygons
Average Aspect: 185 °
Average Slope: 15 °
Minimum Elevation: 5,857 feet
Maximum Elevation: 8,504 feet
Average Elevation: 6,724 feet
Average Size: 3.5 acres
Total Size: 2,449.2acres

Ground Photos

Description:
The Douglas-fir Forest map unit occurred on primarily north-facing slopes and in valley bottoms throughout the montane and lower sub-alpine areas of Teton County. Stands of FDF formed large stands east of Jackson, on central butte slopes, and along the western and southern montane portions of the County. Douglas-fir stands may be mixed with aspen and other conifers trees. Stands were highly variable ranging from dense stands on mesic sites, to sparse stands on drier sites. The composition and structure of the overstory was likely dependent on soil, moisture, and temperature characteristics and Douglas-fir is likely more shade tolerant than lodgepole pine and aspen but less tolerant than spruce-fir. The FBS map unit was mapped from the 2011 imagery by identifying the blue spruce bushy crowns, site location, and its dark, brown/red color.

FEP Mixed Evergreen - Aspen Forest

(Mixed Evergreen – (*Populus tremuloides*) Forest)

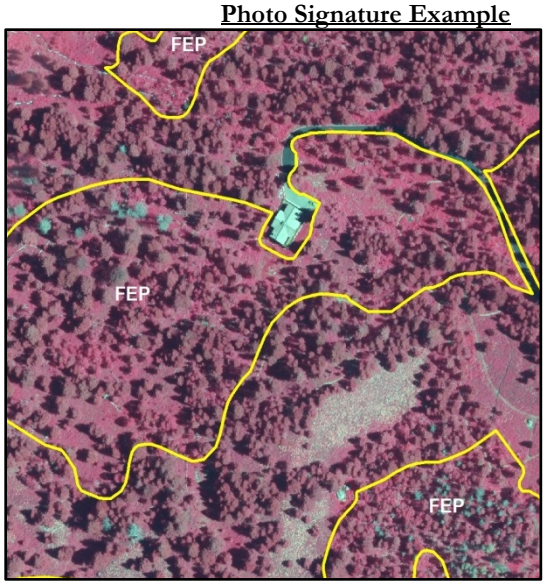
rUSNVC Alliances:

Abies lasiocarpa - Populus tremuloides Forest Alliance
Pinus contorta - Populus tremuloides Forest Alliance
Populus tremuloides - Pseudotsuga menziesii Forest Alliance

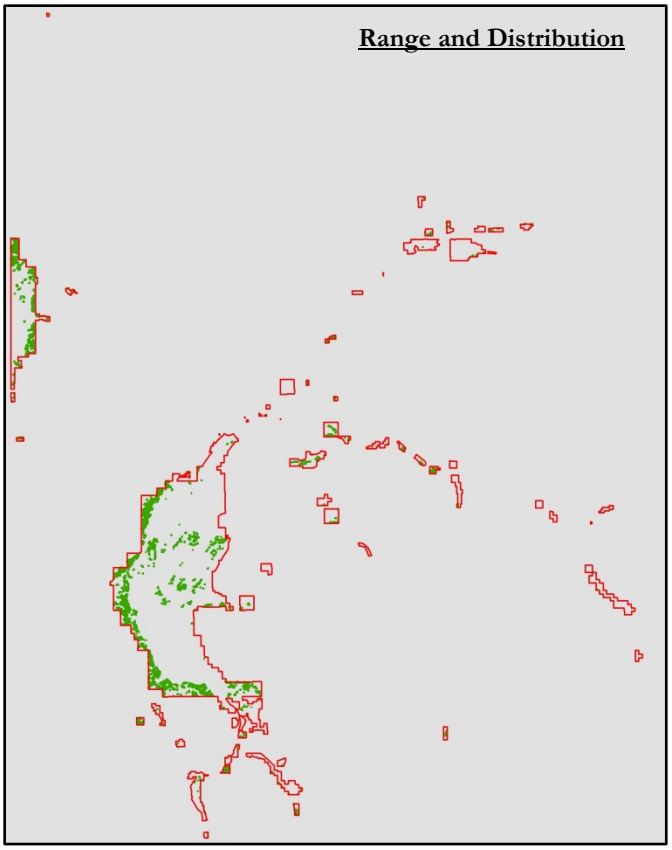
rUSNVC Associations:

Populus tremuloides - Abies lasiocarpa / Carex geyeri – Calamagrostis rubescens Forest
Populus tremuloides - Abies lasiocarpa / Tall Forbs Forest
Populus tremuloides - Pinus contorta / Carex geyeri – Calamagrostis rubescens Forest
Populus tremuloides - Pinus contorta / Symphoricarpos oreophilus Forest
Populus tremuloides - Pseudotsuga menziesii / Amelanchier alnifolia Forest

Photo Signature Example



Range and Distribution



Common Species:

Populus tremuloides,
Abies lasiocarpa,
Pinus contorta,
Pseudotsuga menziesii

Ground Photos

Map Unit Statistics:

Frequency: 1,400 polygons	Average Aspect: 180°
Average Slope: 11°	Minimum Elevation: 5,807 feet
Max. Elevation: 8,206 feet	Average Elevation: 6,480 feet
Average Size: 1.8 acres	Total Size: 2,458.7 acres

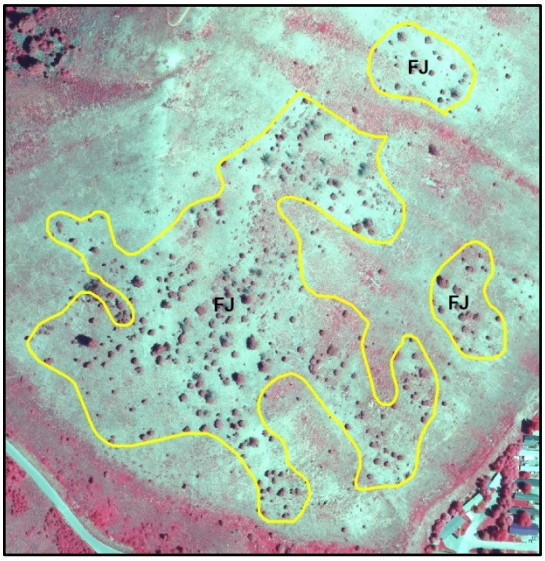
Description:

This map class represents very evenly mixed upland woodland stands comprised primarily of lodgepole pine, aspen, Douglas-fir, and sub-alpine fir found throughout the montane portions of Teton County. The FEP map unit has many species in common with other woodland types and may be confused with other mixed forest and riparian types such as FRM, FAP, FLP, and FDF. This map unit differed from the FRM type in that it included aspen rather than cottonwoods, and occurred mainly in upland areas. On the 2011 CIR imagery, the FEP map unit appeared as an even mix between dark brown conifers and light red deciduous aspen trees.

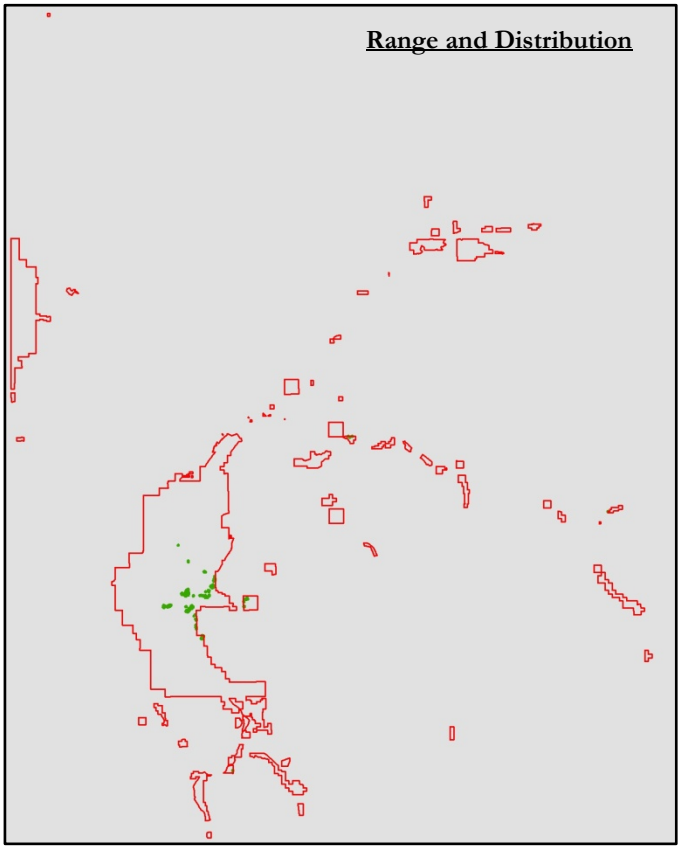
FJ Rocky Mountain Juniper Woodland Stand
(*Juniperus scopulorum* Woodland Stand)

rUSNVC Alliances:
Pinus flexilis Woodland Alliance
rUSNVC Associations:
Pinus flexilis / Juniperus scopulorum Woodland

Photo Signature Example



Range and Distribution



Common species:
Juniperus scopulorum,
Pinus flexilis,
Pseudoroegneria spicata

Project Specifics:
Frequency: 73 polygons
Average Aspect: 193°
Average Slope: 29°
Minimum Elevation: 6,178feet
Maximum Elevation: 8,192 feet
Average Elevation: 6,664 feet
Average Size: 2.0acres
Total Size: 144.9 acres

Ground Photos

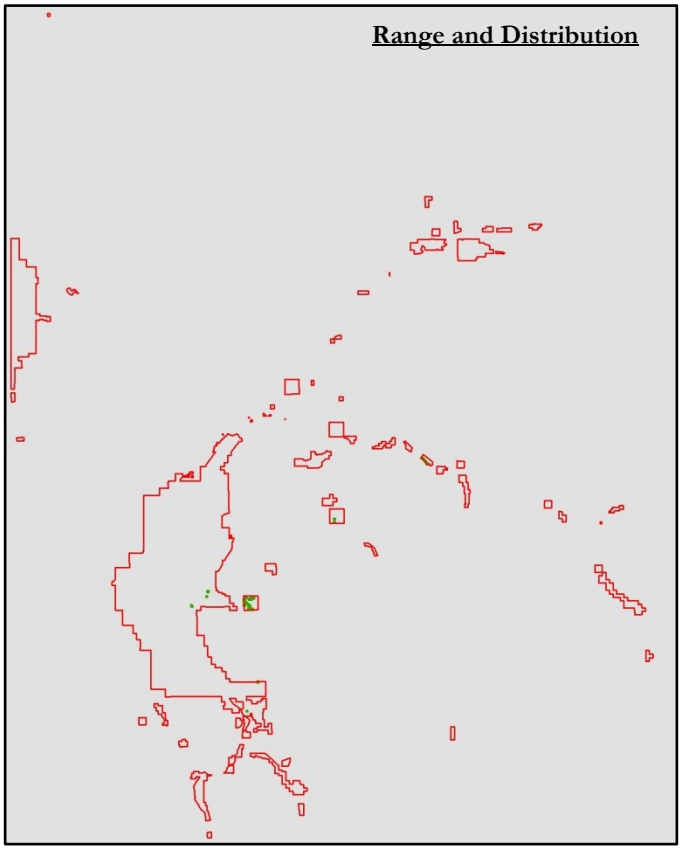
Description:
The FJ map unit was only found on east and south facing slopes on dry buttes and lower toeslopes around the Town of Jackson. Stands of Rocky Mountain juniper were characterized by open stands with stunted trees. Some limber pine and Douglas-fir trees were often co-located but at a much lower density. The understory of this map unit typically contained sparse sagebrush and a thick herbaceous-grass layer. On the 2011 CIR imagery, the FJ map unit appeared as small, dark brown/red trees occurring on light colored soils.

FLM Limber Pine Forest (*Pinus flexilis* Forest)

rUSNVC Alliances:
Pinus flexilis Woodland Alliance
rUSNVC Associations:
Pinus flexilis / *Pseudoroegneria spicata* Woodland

Photo Signature Example

Range and Distribution



Common Species:
Pinus flexilis,
Pseudoroegneria spicata,
Pinus contorta

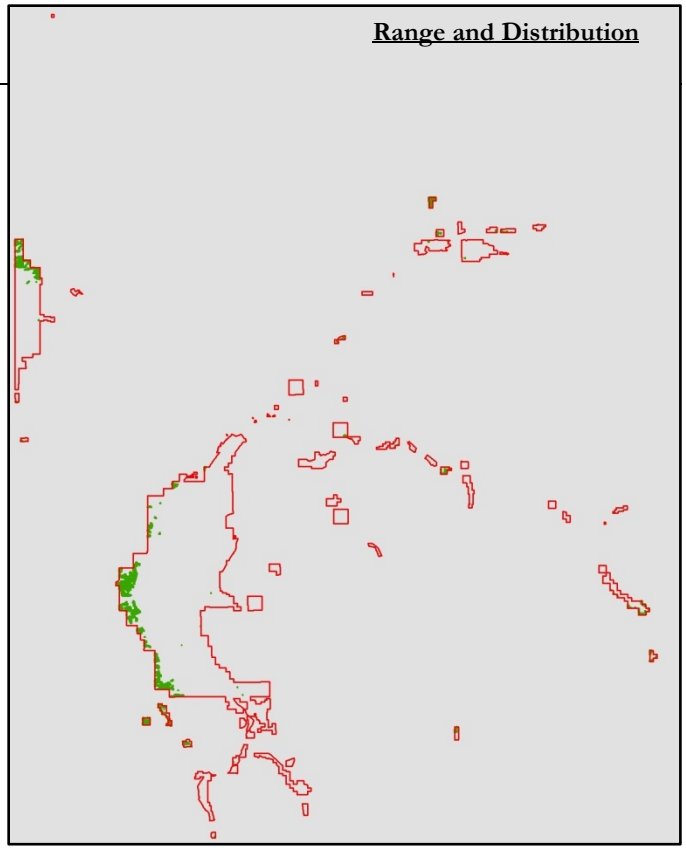
Ground Photo

Map Unit Statistics:
Frequency: 30 polygons
Average Aspect: 190°
Average Slope: 25°
Minimum Elevation: 6,398 feet
Maximum Elevation: 8,058 feet
Average Elevation: 7,273 feet
Average Size: 1.9 acres
Total Size: 57.9 acres

Description:
The FLM map unit was rare in Teton County with only a few homogenous limber pine stands greater than 1-acre identified. The mapped limber pine stands occurred primarily on east and southeast dry slope and ridges. Although limber pine stands are uncommon in Teton County, limber pine trees were a common associate species in other conifer map units such as FJ, FLP, FDF, and FSF. The understory of this map unit typically contained sparse sagebrush and a thick herbaceous-grass layer. On 2011 CIR imagery, this type appeared as sparse dark brown trees, slightly larger in size than Rocky Mountain juniper trees, on light colored soils. On the 2012 NAIP imagery (shown above) the FLM stands were dark green and smaller in size than other nearby conifer tree species.

FLP Lodgepole Pine Forest
(*Pinus contorta* Forest)

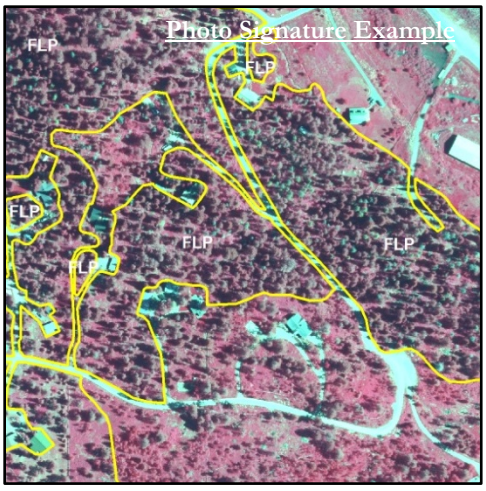
Range and Distribution



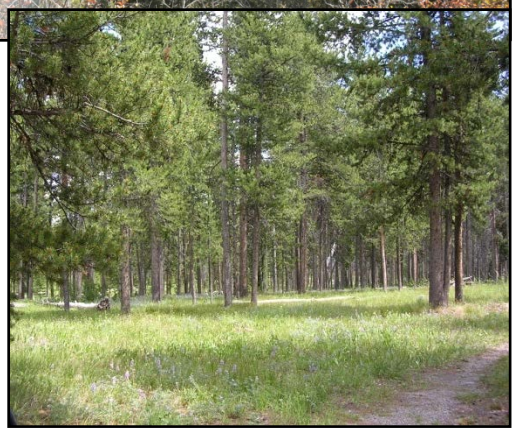
rUSNVC Alliances:
Pinus contorta Forest Alliance

rUSNVC Associations:
Pinus contorta / *Calamagrostis canadensis* Forest
Pinus contorta / *Calamagrostis rubescens* Forest
Pinus contorta / *Carex geyeri* Forest
Pinus contorta / *Carex rossii* Forest
Pinus contorta / *Ceanothus velutinus* Forest
Pinus contorta / *Dasiphora floribunda* Forest
Pinus contorta / *Hierochloe hirta* Forest
Pinus contorta / *Shepherdia canadensis* Forest
Pinus contorta / *Spiraea betulifolia* Forest
Pinus contorta / *Vaccinium membranaceum* Rocky Mountain Forest
Pinus contorta / *Vaccinium scoparium* Forest

Photo Signature Example



Ground Photos



Common Species:
Pinus contorta, Calamagrostis canadensis, Calamagrostis rubescens, Carex geyeri, Carex rossii, Ceanothus velutinus, Dasiphora floribunda, Vaccinium membranaceum, Vaccinium scoparium

Map Unit Statistics:

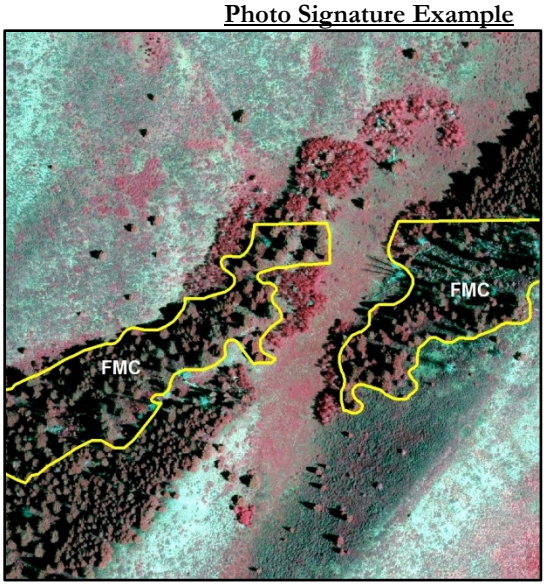
Frequency: 528 polygons	Average Aspect: 155°
Average Slope: 8°	Minimum Elevation: 5,814 feet
Maximum Elevation: 8,317 feet	Average Elevation: 6,642 feet
Average Size: 3.5 acres	Total Size: 1,830.2 acres

Description:
The FLP map unit was a common woodland/forest component along the western and northern portions of the study area. Mature lodgepole pine stands were even-aged and often contained a sparse understory cover with low species diversity. Other conifer species such as limber pine and Douglas-fir tree were often intermixed at low levels. Open canopy lodgepole pine trees were bushy in appearance with a herbaceous-grass understory and looked similar to Douglas-fir trees. On the 2011 CIR imagery, this map class appeared as a pebbled-textured, dark brown signature on a pink background. A characteristic of this map unit was the presence of dead trees (grey/blue in color) scattered throughout the canopy.

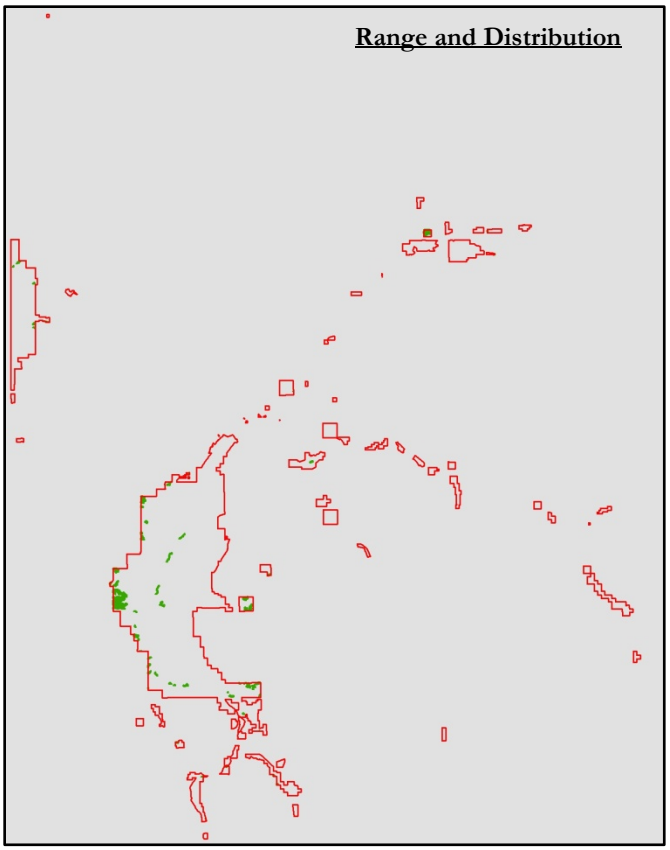
FMC Mixed Conifer Forest

rUSNVC Alliances:
Picea pungens Forest Alliance
Pinus contorta Forest Alliance
Pseudotsuga menziesii Forest Alliance
Abies lasiocarpa - Picea engelmannii Forest Alliance
rUSNVC Association:
Abies lasiocarpa - Pseudotsuga menziesii - Pinus contorta Forest

Photo Signature Example



Range and Distribution



Common Species:
Abies lasiocarpa, Picea engelmannii,
Pinus contorta, Pseudotsuga menziesii,
Pinus flexilis

Ground Photo

Map Unit Statistics:
Frequency: 131 polygons
Average Aspect: 172 °
Average Slope: 15°
Minimum Elevation: 5,847 feet
Maximum Elevation: 8,403 feet
Average Elevation: 6,613 feet
Average Size: 6.1 acres
Total Size: 793.5 acres

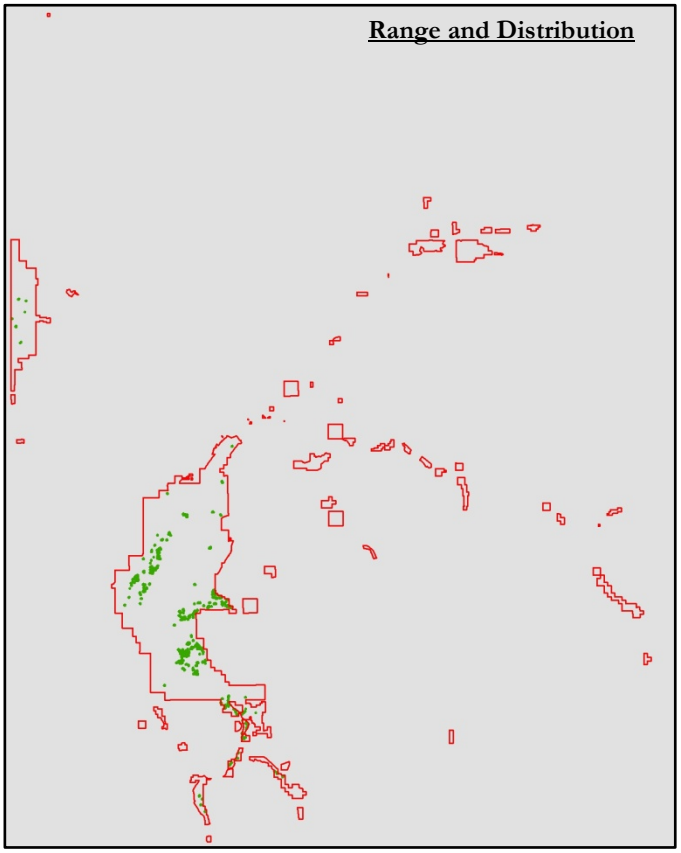
Description:
This map class was primarily used to describe evenly-mixed stands of primarily lodgepole pine, Douglas-fir, and blue spruce trees found throughout project area. The FMC map unit was also used to map other rare mixed types containing spruce-fir and limber pine trees. By default, the FMC map unit was only used when no clear dominant tree species could be determined. It was also used to map successional stands that contained a mix of older lodgepole and younger Douglas-fir or spruce-fir in the understory. The mixed conifer type could easily be confused with lodgepole pine and Douglas-fir map units since these species tend to mix in varying degrees. On the 2011 CIR imagery, this map unit was characterized by having both sharp, pointy crowns typical of blue spruce and spruce-fir trees and large bushy lodgepole, limber pine, or Douglas-fir trees. The photo signature was a mixture of dark and light browns with different sized trees.

FOR Mixed Ornamental and Semi-natural Woodlands

rUSNVC Alliance:
No Alliance - Special Map Unit
rUSNVC Association:
No Association - Special Map Unit

Photo Signature Example

Range and Distribution



Common Species:
Syringa spp., Salix alba ssp.vitellina
Larix decidua, Acer spp.

Project Specifics:
Frequency: 517 polygons
Average Aspect: 181°
Average Slope: 24°
Minimum Elevation: 5,834 feet
Maximum Elevation: 6,559 feet
Average Elevation: 6,130 feet
Average Size: 0.2 acres
Total Size: 90.6 acres

Ground Photo

Description:
Non-native and ornamental trees were common in and around residential and commercial areas and were planted for windbreaks in rural and agricultural settings. Non-native trees were oftentimes in close proximity to native planted trees and some confusion in the mapping likely occurred between the FOR and the FBAC map units. Understories for the FOR map unit varied by location and ranged from manicured lawns and landscaped plant beds to non-native grasses in rural locations. On the 2011 CIR imagery, non-native trees usually exhibited a characteristic puffy, light pink color and tree size varied from large bushy stands to small bands of immature and sapling trees.

FRM Mixed Cottonwood - Blue Spruce Riparian Forest
(Mixed *Populus* spp. - *Picea pungens* Riparian Forest)

rUSNVC Alliances:
Populus angustifolia Temporarily Flooded Woodland Alliance
Picea pungens Temporarily Flooded Woodland Alliance
Engelmann spruce Seasonally Flooded Forest Alliance

rUSNVC Associations:
Populus angustifolia - Picea pungens / Poa pratensis Forest
Populus angustifolia - Picea pungens / Shepherdia canadensis Forest
Picea pungens / Alnus incana Woodland
Picea pungens / Equisetum arvense Woodland
Picea pungens / Actaea rubra Forest
Picea engelmannii / Equisetum arvense Forest

Range and Distribution

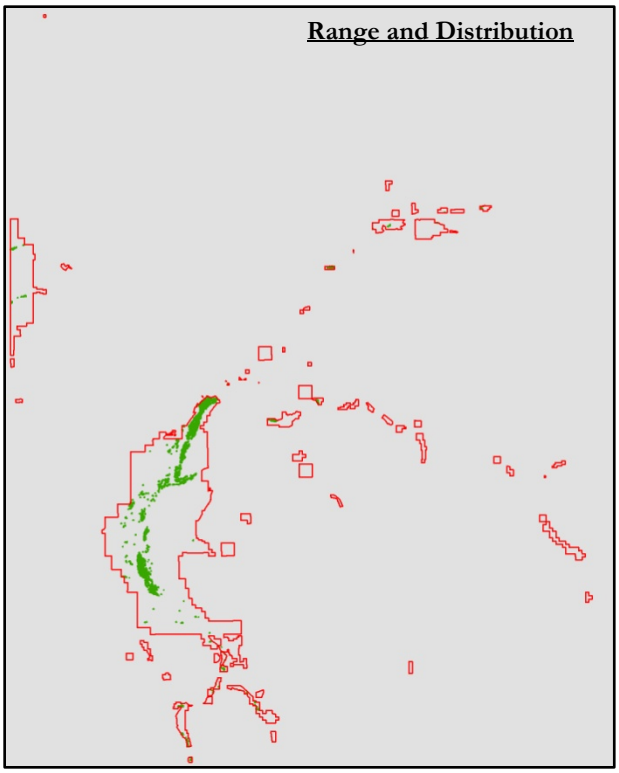
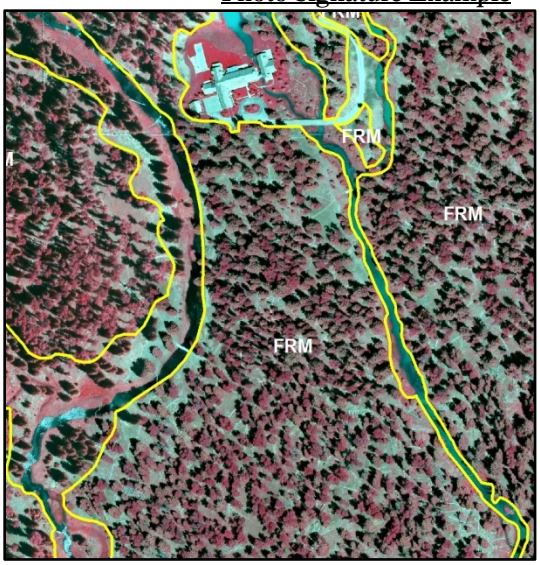


Photo Signature Example



Ground Photos

Common Species:
Populus angustifolia, Picea pungens,
Populus balsamifera (ssp. trichocarpa, ssp. balsamifera),
Poa pratensis, Symphoricarpos spp.

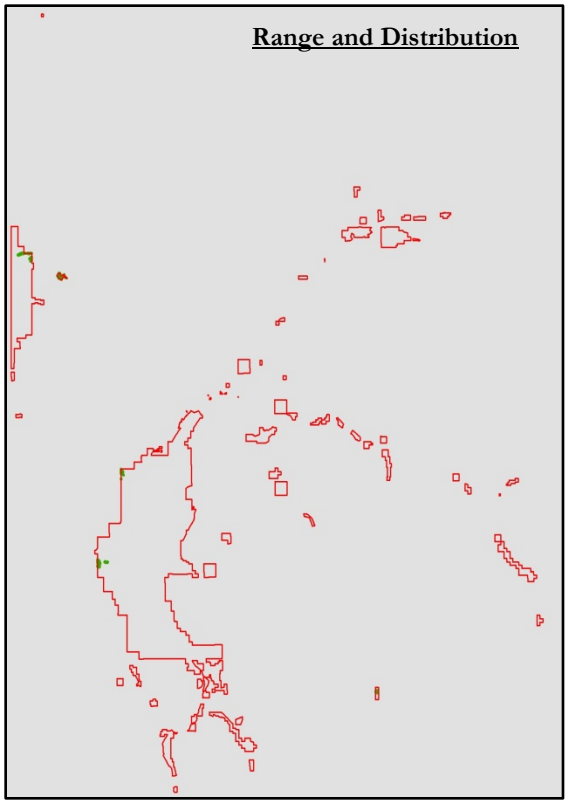
Map Unit Statistics:

Frequency: 664 polygons	Average Aspect: 199°
Average Slope: 1°	Minimum Elevation: 5,794 feet
Maximum Elevation: 6,991 feet	Average Elevation: 6,230 feet
Average Size: 2.6 acres	Total Size: 1,758.3 acres

Description:
The FRM map unit was used to delineate even stands of riparian conifer and deciduous trees found along the Snake River, its tributaries and major streams in the Alta and Buffalo Valley areas. Primary species included in this type are blue spruce and cottonwood. Other trees such as aspen, lodgepole, and Douglas-fir may have also been included in this type. The FRM map unit was only used to map truly mixed riparian stands and thus this type had species overlap with other riparian and mixed types such as FCW and FBS. On the 2011 CIR imagery, this type appeared as an even mix between dark brown conifers and dark red deciduous trees. Often these types were successional and the conifers appeared to be growing up through the cottonwoods.

FSF Subalpine Fir - Engelmann Spruce Forest (*Abies lasiocarpa - Picea engelmannii* Forest)

Range and Distribution



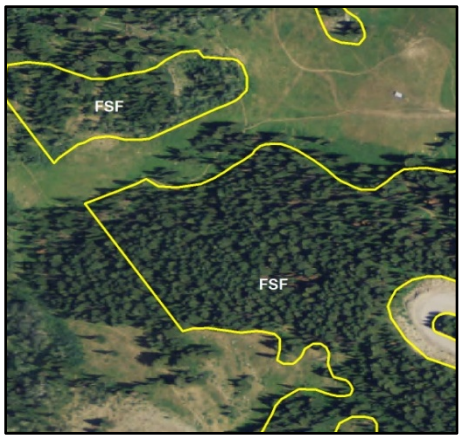
rUSNVC Alliances:

Abies lasiocarpa - Picea engelmannii Forest Alliance
Abies lasiocarpa Temporarily Flooded Forest Alliance

rUSNVC Associations:

Abies lasiocarpa - Picea engelmannii / Acer glabrum Forest
Abies lasiocarpa - Picea engelmannii / Actaea rubra Forest
Abies lasiocarpa - Picea engelmannii / Arnica cordifolia Forest
Abies lasiocarpa - Picea engelmannii / Arnica latifolia Forest
Abies lasiocarpa - Picea engelmannii / Calamagrostis canadensis Forest
Abies lasiocarpa - Picea engelmannii / Calamagrostis rubescens Forest
Abies lasiocarpa - Picea engelmannii / Carex geyeri Forest
Abies lasiocarpa - Picea engelmannii / Luzula glabrata var. hitchcockii Forest
Abies lasiocarpa - Picea engelmannii / Menziesia ferruginea Forest
Abies lasiocarpa - Picea engelmannii / Ribes (montigenum, lacustre, inerme) Forest
Abies lasiocarpa - Picea engelmannii / Ribes lacustre Forest
Abies lasiocarpa - Picea engelmannii / Shepherdia canadensis Forest
Abies lasiocarpa - Picea engelmannii / Streptopus amplexifolius Forest
Abies lasiocarpa - Picea engelmannii / Symphoricarpos albus Forest
Abies lasiocarpa - Picea engelmannii / Thalictrum occidentale Forest
Abies lasiocarpa - Picea engelmannii / Vaccinium membranaceum / Xerophyllum tenax Forest
Abies lasiocarpa - Picea engelmannii / Vaccinium membranaceum Rocky Mountain Forest
Abies lasiocarpa - Picea engelmannii / Vaccinium scoparium Forest
Abies lasiocarpa - Pinus albicaulis / Vaccinium scoparium Woodland
Abies lasiocarpa - Pseudotsuga menziesii - Pinus contorta Forest
Picea engelmannii / Equisetum arvense Forest
Picea engelmannii / Galium triflorum Forest

Photo Signature Example



Ground Photos

Common species:

Abies lasiocarpa, Picea engelmannii, Acer glabrum, Arnica spp., *Calamagrostis* spp. *Carex geyeri, Menziesia ferruginea, Ribes* spp., *Streptopus amplexifolius, Symphoricarpos albus, Thalictrum occidentale, Vaccinium membranaceum, Vaccinium scoparium*

Map Unit Statistics:

Frequency: 47 polygons	Average Aspect: 195°	Average Slope: 9°	Minimum Elevation: 6,296 feet
Maximum Elevation: 8,495 feet	Average Elevation: 7,091 feet	Average Size: 3.8 acres	Total Size: 178.2acres

Description:

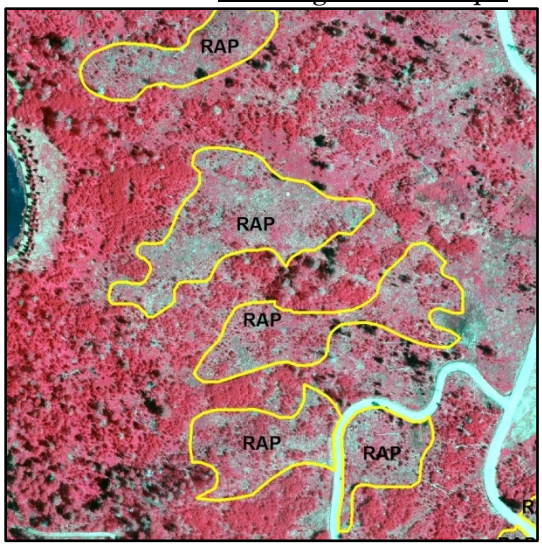
The FSF map unit was a rare type found in the western portion of the project area in the highest sub-alpine zone elevations. Stands of spruce-fir where characterized by even-aged stands with a limited and sparse understory consisting mainly of short shrubs. Both spruce and fir species were usually present along with individual limber pine, lodgepole pine, and Douglas-fir trees. Some Engelmann spruce trees were also found in the riparian areas but where not the dominant species. On the 2012 NAIP imagery, the FSF was recognized by its very dark green color and pointed crowns. On the 2011 CIR imagery, the FSF stands exhibited a more brown to red color.

REGENERATION

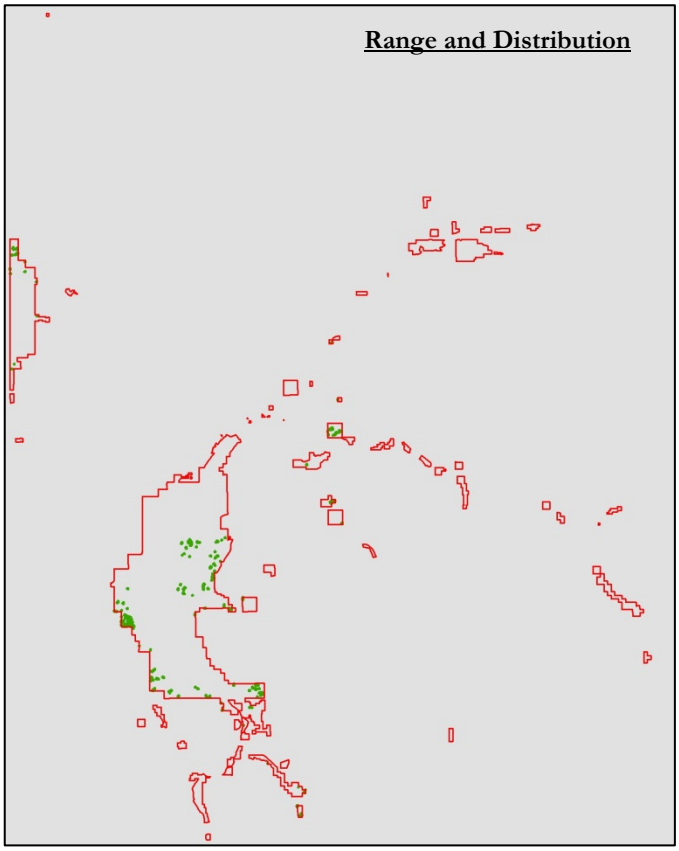
RAP Aspen Woodland Regeneration
(*Populus tremuloides* Woodland Regeneration)

rUSNVC Alliances:
Populus tremuloides Forest Alliance
rUSNVC Associations:
(Similar to the Associations listed for FAP)

Photo Signature Example



Range and Distribution



Common Species:
Populus tremuloides, Carex geyeri, Pinus contorta
Symphoricarpos oreophilus, Amelanchier alnifolia
Thalictrum fendleri, Pteridium aquilinum,
Symphoricarpos oreophilus, Poa pratensis

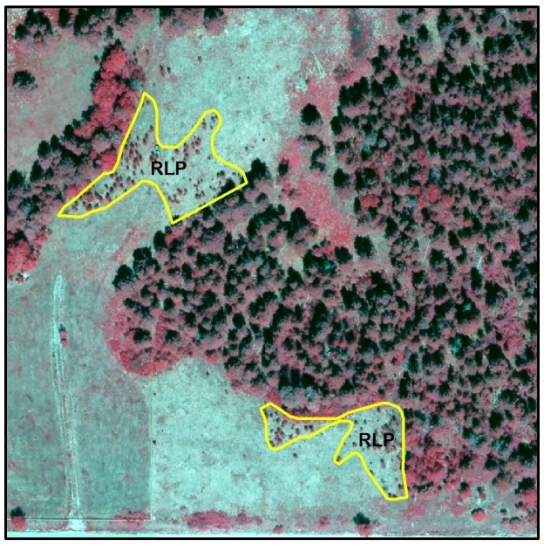
Ground Photos

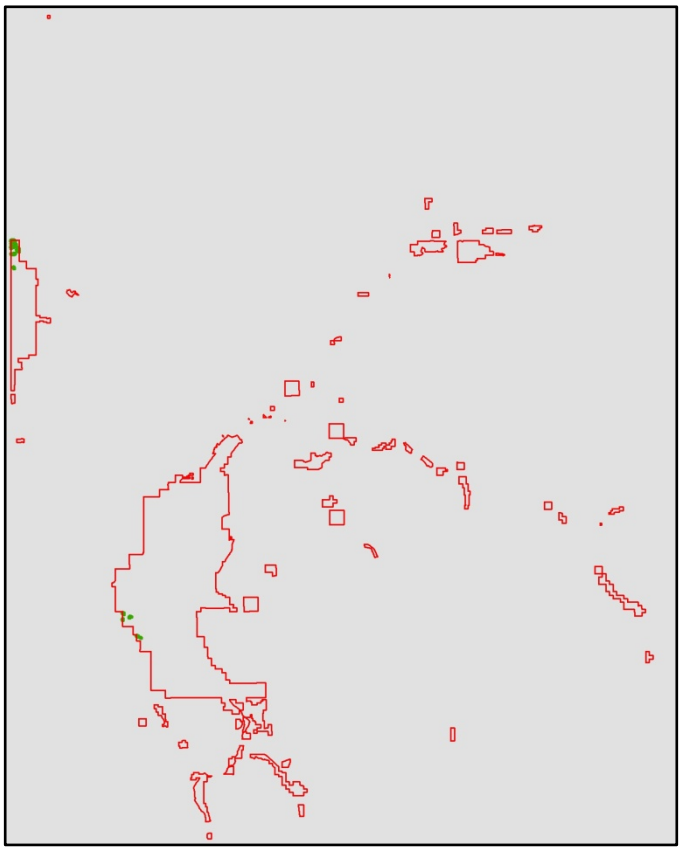
Map Unit Statistics:
Frequency: 236 polygons
Average Aspect: 139 °
Average Slope: 13°
Minimum Elevation: 6,034 feet
Maximum Elevation: 7,899 feet
Average Elevation: 6,582 feet
Average Size: 0.9 acres
Total Size: 213.3 acres

Description:
This regeneration type is common in aspen areas that have recently burned, been logged, or have expanded into new areas. The RAP map unit is similar to the mature aspen map unit, FAP but contains only seedling or shrub form aspen trees. The understory of this map unit has a similar species composition to the FAP and SMR map units and often contains a thick herbaceous-forb/grass layer, possibly with non-native thistles (*Cirsium* spp.) and other early successional species. On the 2011 CIR imagery, polygons of the RAP map unit had a distinctive photo signature consisting of a bright red color intermixed with white speckles (i.e. dead and down aspen logs), pink patches (forbs/grasses), and a blue undertone (bare ground).

RLP Lodgepole Pine Woodland Regeneration
(*Pinus contorta* Woodland Regeneration)

rUSNVC Alliances:
Pinus contorta Forest Alliance
Pinus contorta Seasonally Flooded Forest Alliance
rUSNVC Associations:
(Similar to the Associations listed for FAP)





Common Species:
Pinus contorta, Vaccinium membranaceum
Vaccinium scoparium, Thalictrum fendleri,
Pteridium aquilinum, Symphoricarpos oreophilus,
Poa pratensis

Ground Photos

Map Unit Statistics:
Frequency: 23 polygons
Average Aspect: 183°
Average Slope: 8°
Minimum Elevation: 6,185 feet
Maximum Elevation: 6,785 feet
Average Elevation: 6,565 feet
Average Size: 3.1 acres
Total Size: 72.3 acres

Description:
The lodgepole pine regeneration map unit is a rare type in the Teton County project area and was only found near a recent fire near the Town of Wilson and in the northern portions of Alta. The RLP map unit was comprised of seedling and sapling trees with sparse shrub cover. The understory was primarily grasses and forbs and may have contained weedy annuals and invasive plants such as Canada thistle (*Cirsuim arvense*). On the 2011 CIR imagery, polygons of the FLP map unit appeared as a spotty, dark red signature on a blue/white background representing bare soil and herbaceous vegetation. Trees in this map class looked very small on the imagery and often individual trees could not be distinguished from one another.

SHRUBLAND

SAI Alder Shrubland
(*Alnus incana* Shrubland)

rUSNVC Alliances:
Alnus incana temporarily Flooded Shrubland Alliance
Alnus incana seasonally Flooded Shrubland Alliance
Rhamnus alnifolia temporarily Flooded Shrubland Alliance

rUSNVC Associations:
Alnus incana / *Equisetum arvense* Shrubland
Alnus incana / *Glyceria striata* Shrubland
Alnus incana / Mesic Forbs Shrubland
Alnus incana / Mesic Graminoids Shrubland
Rhamnus alnifolia Shrubland

Range and Distribution

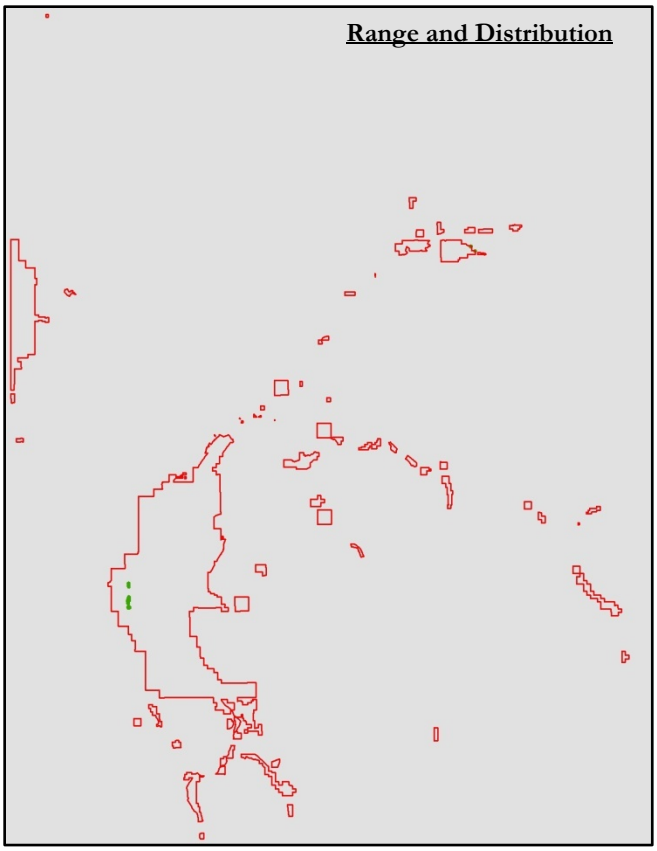
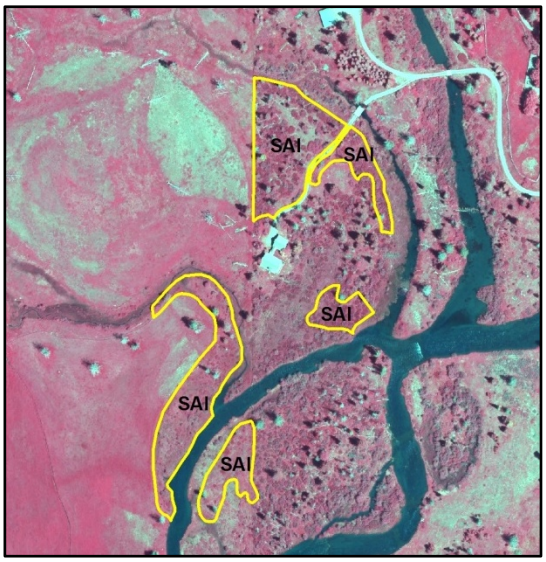


Photo Signature Example



Ground Photo

Common Species:
Alnus incana, Rhamnus alnifolia,
Equisetum arvense, Glyceria striata

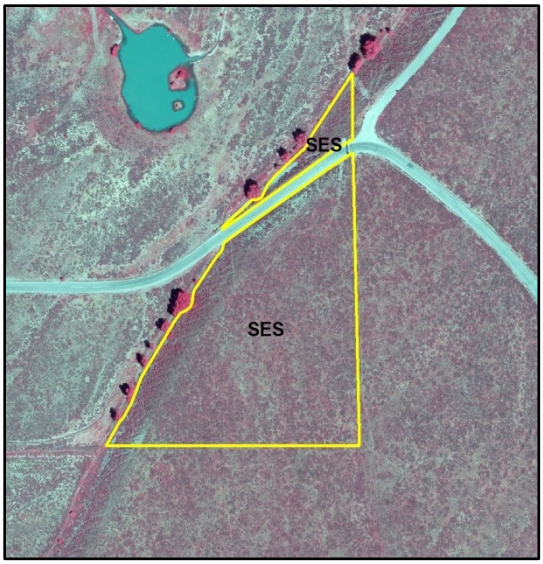
Map Unit Statistics:
Frequency: 13 polygons Average Aspect: 179°
Average Slope: 1°
Minimum Elevation: 6,116 feet
Maximum Elevation: 6,824 feet
Average Elevation: 6.232 feet
Average Size: 0.6 acres Total Size: 7.7 acres

Description:
The SAI map unit was a rare type occurring near the town of Wilson and in the Buffalo Valley area. Individual and scattered alder shrubs were common throughout the project area, growing in riparian and wetland settings, but were found to be only casual associates of the more dominant willow (SWL) and cottonwood (FCW) map units. The SAI map unit was also very similar to the mixed tall deciduous shrubland (SMR) type and some confusion likely occurred during the mapping of these types. The understory of this map unit contained mesic graminoids and forbs similar to ones present in the HGS map unit. On the 2011 CIR imagery, the SAI map unit had a patchy, brick red color, occurred next to perennial streams, and often contained dead or dying trees.

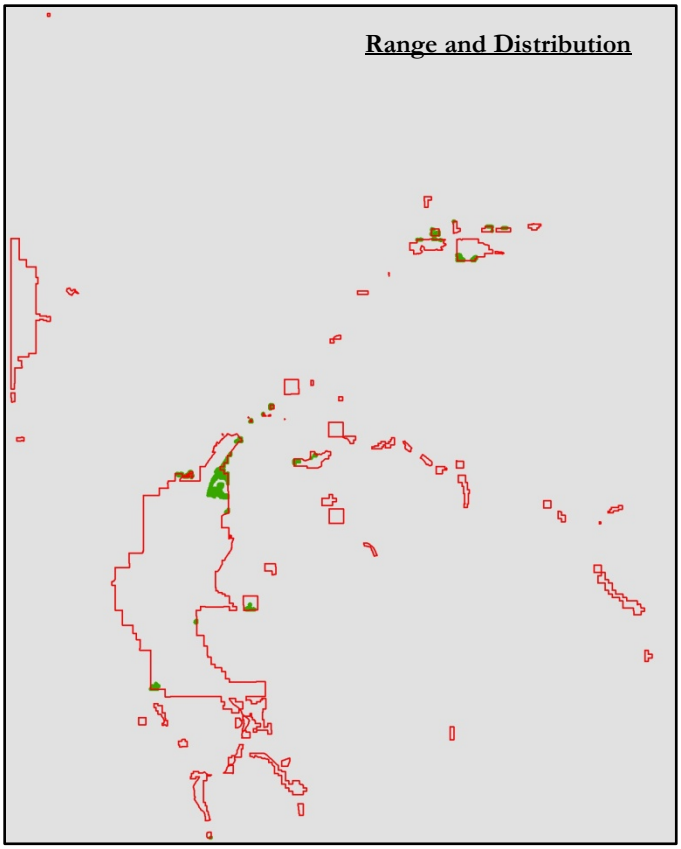
SES Sagebrush - Antelope Bitterbrush Mixed Shrubland
(*Artemisia* spp. - *Purshia tridentata* Mixed Shrubland)

rUSNVC Alliances:
Artemisia tridentata ssp. *vaseyana* Shrubland Alliance
rUSNVC Associations:
Artemisia tridentata ssp. vaseyana - Purshia tridentata / Festuca idahoensis Shrubland
Artemisia tridentata ssp. vaseyana - Purshia tridentata / Balsamorhiza sagittata Shrubland
Artemisia tridentata ssp. vaseyana - Purshia tridentata / Bromus inermis - Poa pratensis Shrubland

Photo Signature Example



Range and Distribution



Common Species:
Artemisia tridentata ssp. vaseyana, Purshia tridentate, Festuca idahoensis, Balsamorhiza sagittata, Bromus inermis

Ground Photos

Map Unit Statistics:
Frequency: 164 polygons
Average Aspect: 206°
Average Slope: 6°
Minimum Elevation: 5,807 feet
Maximum Elevation: 7,566 feet
Average Elevation: 6,631 feet
Average Size: 4.4 acres
Total Size: 722.5 acres

Description:
The big sagebrush with antelope bitterbrush map unit primarily occurred on upper Snake River terraces north of the Town of Jackson and on some slightly mesic slopes throughout the project area. Antelope bitterbrush in this map unit was usually more than 10% but less than 50% of the shrub cover and the two dominant shrubs were often close to even in density. The understory mostly consisted of sparse grasses and forbs. The SES map unit contained many of the same species found in the other big sagebrush map units (SSD, SSW, SMSD) and some confusion may have occurred in the mapping of these types. On the 2011 CIR imagery, this map unit had a very distinct mottled signature alternating between gray spots for big sagebrush and pink for the antelope bitterbrush shrubs.

SMR Mixed Tall Deciduous Shrubland

rUSNVC Alliances:
Prunus virginiana Shrubland Alliance
Cornus sericea Temporarily Flooded Shrubland Alliance
Symphoricarpos oreophilus Shrubland Alliance
Betula nana Seasonally Flooded Shrubland Alliance
Vaccinium (caespitosum, scoparium) Drawf-shrubland Alliance
Spiraea betulifolia Shrubland Alliance

rUSNVC Associations:
Betula nana / Mesic Forbs - Mesic Graminoids Shrubland
Cornus sericea Shrubland
Prunus virginiana - (Prunus americana) Shrubland
Prunus virginiana / *Carex geyeri* Shrubland
Spiraea betulifolia Shrubland
Spiraea splendens Shrubland
Symphoricarpos oreophilus Shrubland
Vaccinium (caespitosum, scoparium) Dwarf-shrubland
Vaccinium membranaceum Shrubland

Range and Distribution

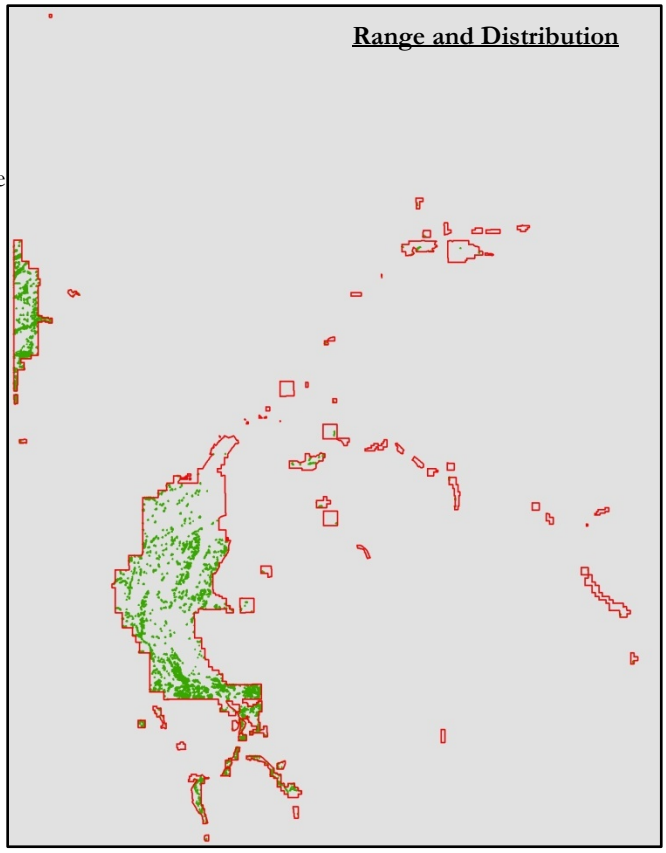
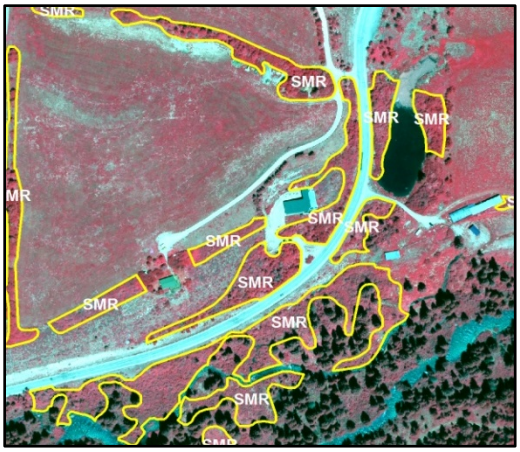


Photo Signature Example



Ground Photos

Common Species:
Prunus virginiana, Symphoricarpos oreophilus, Vaccinium spp., Acer glabrum, Cornus sericea, Betula nana, Carex geyeri, Spiraea betulifolia, Spiraea splendens

Map Unit Statistics:

Frequency: 2,853 polygons	Average Aspect: 191°
Average Slope: 10°	Minimum Elevation: 5,794 feet
Maximum Elevation: 8,189 feet	Average Elevation: 6,366 feet
Average Size: 0.5 acres	Total Size: 1,521.0 acres

Description:
The SMR map unit was fairly common throughout Teton County, occurring as small stands with tall deciduous shrubs on mesic sites. This type was similar in composition with lush understories of short deciduous shrubs, grasses, and forbs to the aspen (FAP) and the sagebrush with deciduous shrub (SMSD) map units but lacked the aspen and sagebrush components. On 2011 CIR imagery, this map unit exhibited a characteristic very dark red color intermixed with a lighter bright reds (herbaceous layer). This mottled signature of SMR polygons corresponded to the large clumps of shrubs with a contrasting the lush understory. The deciduous shrubs often had a very rough texture due to the height of the shrubs.

SMSD Sagebrush - Snowberry - Chokecherry - Serviceberry Mixed Shrubland
(*Artemisia* spp. - *Symphoricarpos oreophilus* - *Prunus virginiana* - *Amelanchier alnifolia* Mixed Shrubland)

rUSNVC Alliances:
Artemisia tridentata ssp. *vaseyana* Shrubland Alliance

rUSNVC Associations:
Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus / Bromus carinatus Shrubland
Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus / Festuca idahoensis Shrubland
Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus / Hesperostipa comata Shrubland
Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus / Pseudoroegneria spicata Shrubland
Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus / Carex geyeri Shrubland

Range and Distribution

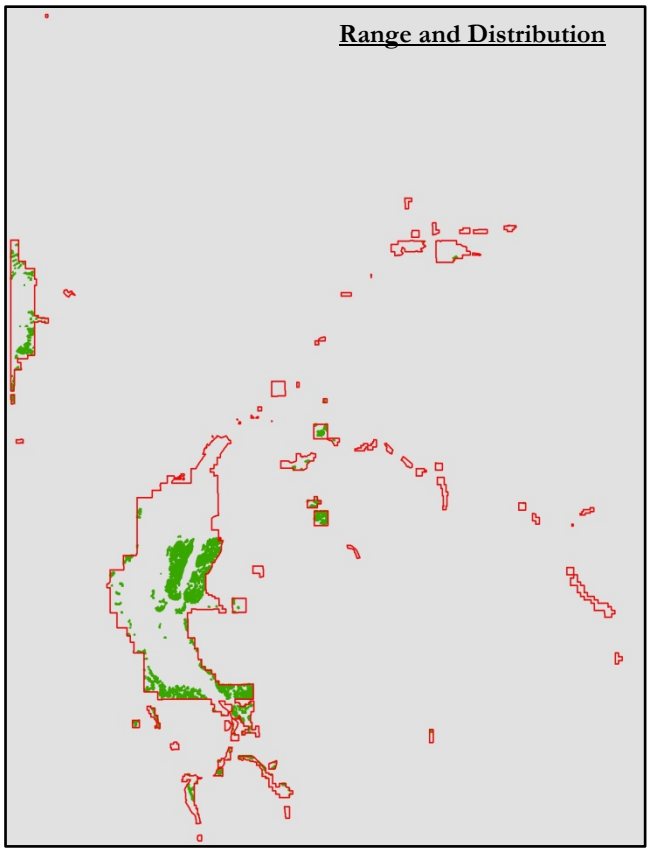
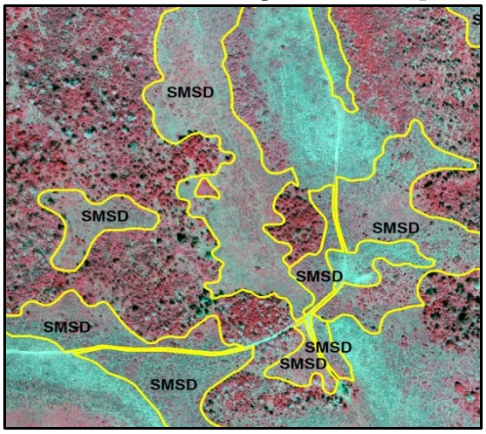


Photo Signature Example



Common Species:
Artemisia tridentata ssp. vaseyana,
Prunus virginiana, Acer glabrum, Amelanchier alnifolia
Cornus sericea, Symphoricarpos oreophilus,
Rosa woodsii, Achnatherum lettermanii

Ground Photos

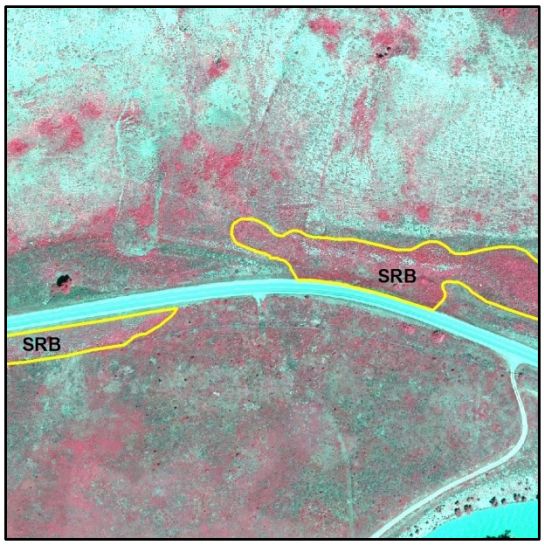
Map Unit Statistics:
Frequency: 1336 polygons
Average Aspect: 208°
Average Slope: 16°
Minimum Elevation: 5,880 feet
Maximum Elevation: 8,035 feet
Average Elevation: 6,525 feet
Average Size: 2.9 acres
Total Size: 3,912.0 acres

Description:
The SMSD map unit was added to the project to account for mixed sagebrush stands on mesic sites that had a variety of deciduous shrubs as associated species. Understories of this map unit contained thick layers of short deciduous shrubs, grasses, and forbs. The SMSD map unit was very similar to the dry sagebrush (SSD), sagebrush-bitterbrush (SES), and sagebrush-shrubby cinquefoil (SSW) map units and some confusion in the mapping of these types likely occurred. On the 2011 CIR imagery, the SMSD map unit had a faint blue/gray hue with a mixture of dark blue stipples (sagebrush) and pink spots (deciduous shrubs). Often patches of tall deciduous shrubs (SMR) or mesic herbaceous vegetation were located adjacent to, or included as inclusions in polygons of this map unit.

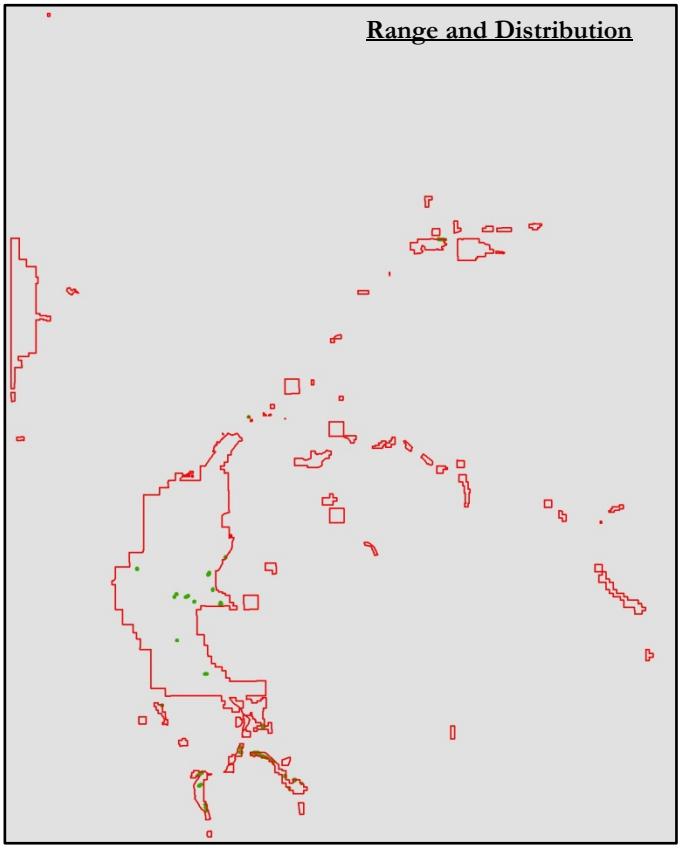
SRB Rubber Rabbitbrush Shrubland

rUSNVC Alliances:
Ericameria nauseosa Shrubland Alliance
rUSNVC Associations:
Ericameria nauseosa Shrubland

Photo Signature Example



Range and Distribution



Common Species:
Ericameria nauseosa, *Artemisia tridentata ssp. vaseyana, Bromus inermis, Phleum pratense, Poa pratensis, Agropyron cristatum, Taraxacum officinale, Thinopyrum intermedium*

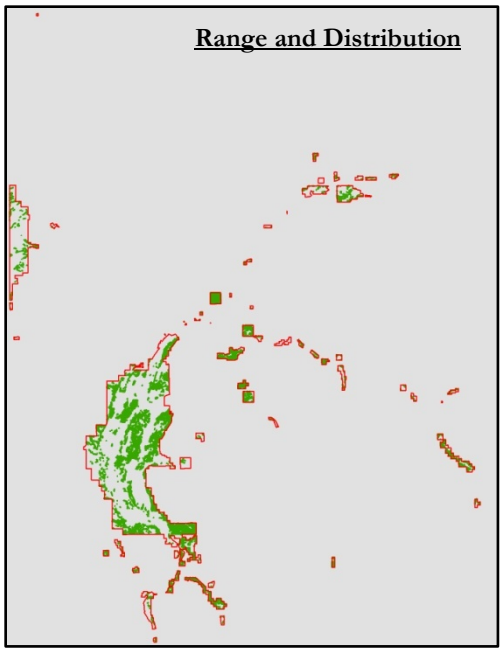
Ground Photo

Map Unit Statistics:
Frequency: 55 polygons
Average Aspect: 197°
Average Slope: 8°
Minimum Elevation: 5,850 feet
Maximum Elevation: 6,900 feet
Average Elevation: 6,177 feet
Average Size: 0.6 acres
Total Size: 31.0 acres

Description:
Polygons of SRB were rare in Teton County and only found along roadways and other disturbed sites. Polygons of SRB were dominated by rubber rabbitbrush but often contained mountain big sagebrush and thick understories of mostly non-native grasses. On the 2011 CIR imagery, the SRB map unit had a characteristic coarse light red signature with white areas representing bare soil. Other early successional map units like VEH and HPG likely intermixed and shared similar species with this type.

SSD Sagebrush Dry Shrubland
(*Artemisia* spp. Dry Shrubland)

Range and Distribution



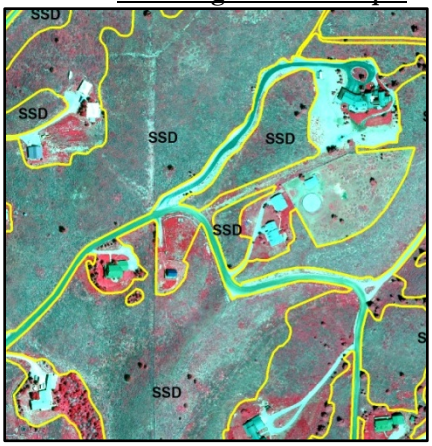
rUSNVC Alliances:

Artemisia tridentata ssp. *vaseyana* Shrubland Alliance
Artemisia tridentata ssp. *vaseyana* Shrub Herbaceous Alliance
Artemisia cana (ssp. *bolanderi*, ssp. *viscidula*) Shrubland Alliance
Artemisia tripartita ssp. *tripartita* Shrub Herbaceous Alliance
Artemisia tridentata ssp. *spiciformis* Shrub Herbaceous Alliance

rUSNVC Associations:

Artemisia cana (ssp. bolanderi, ssp. viscidula) / Poa pratensis Semi-natural Shrubland
Artemisia tridentata ssp. vaseyana / Bromus carinatus Shrubland
Artemisia tridentata ssp. vaseyana / Bromus inermis Shrubland
Artemisia tridentata ssp. vaseyana / Carex geyeri Shrub Herbaceous Vegetation
Artemisia tridentata ssp. vaseyana / Festuca idahoensis Shrub Herbaceous Vegetation
Artemisia tridentata ssp. vaseyana / Hesperostipa comata Shrubland
Artemisia tridentata ssp. vaseyana / Poa pratensis Shrubland
Artemisia tridentata ssp. vaseyana / Pseudoroegneria spicata Shrubland
Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus / Carex geyeri Shrubland
Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus / Bromus carinatus Shrubland
Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus / Festuca idahoensis Shrubland
Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus / Hesperostipa comata Shrubland
Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus / Pseudoroegneria spicata Shrubland
Artemisia tridentata ssp. spiciformis Shrub Herbaceous Vegetation [Provisional]
Artemisia tripartita ssp. tripartita / Hesperostipa comata Shrub Herbaceous Vegetation

Photo Signature Example



Ground Photos

Map Unit Statistics:

Frequency: 4,230 polygons
Average Aspect: 201 °
Average Slope: 9°
Minimum Elevation: 5,794 feet
Maximum Elevation: 8,239 feet
Average Elevation: 6,470 feet
Average Size: 2.1 acres
Total Size: 9,047.5 acres

Common species:

Artemisia cana (ssp. bolanderi, ssp. viscidula), Artemisia tridentata ssp. vaseyana, Artemisia tripartita ssp. tripartite, Poa pratensis, Artemisia tridentata ssp. tridentata, Pseudoroegneria spicata, Symphoricarpos oreophilus, Carex geyeri, Festuca idahoensis, Hesperostipa comata, Bromus inermis

Description:

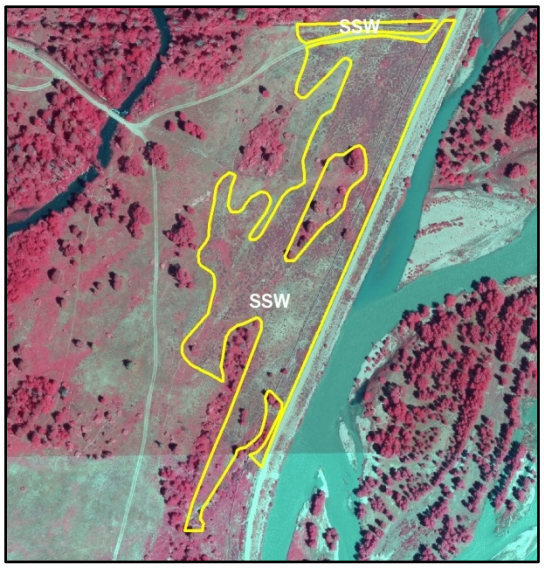
Sagebrush shrubs on dry floodplains, mountain slopes, and hillsides were one of the most common map units found in the project area. Polygons of dry sagebrush were characterized by having little to no antelope bitterbrush or deciduous shrubs and having a sparse to medium cover of grasses and forbs in the understory. Individual sites mostly contained mountain big sagebrush but other sagebrush species such as silver, threetip, or big spiked also occurred in various locations. In addition, basin big sagebrush (*Artemisia tridentata ssp. tridentata*) was found on some roadsides near the town of Jackson; possibly a result of past reclamation projects. The SSD map unit had a very similar signature to the grassland (HPG, HGL), sagebrush-bitterbrush (SES), and the low sagebrush (DSE) map units and some confusion may have occurred during the mapping of these types. On the 2011 CIR imagery, the dry sagebrush map unit had a very mottled signature consisting of grey/blue shrubs with very little pink (mesic-herbaceous) or white colors (bare ground) in the background. The overall texture of this map unit was rough and semi-coarse.

SSW Sagebrush / Shrubby Cinquefoil Mesic Shrubland
(*Artemisia* spp. / *Dasiphora floribunda* Mesic Shrubland)

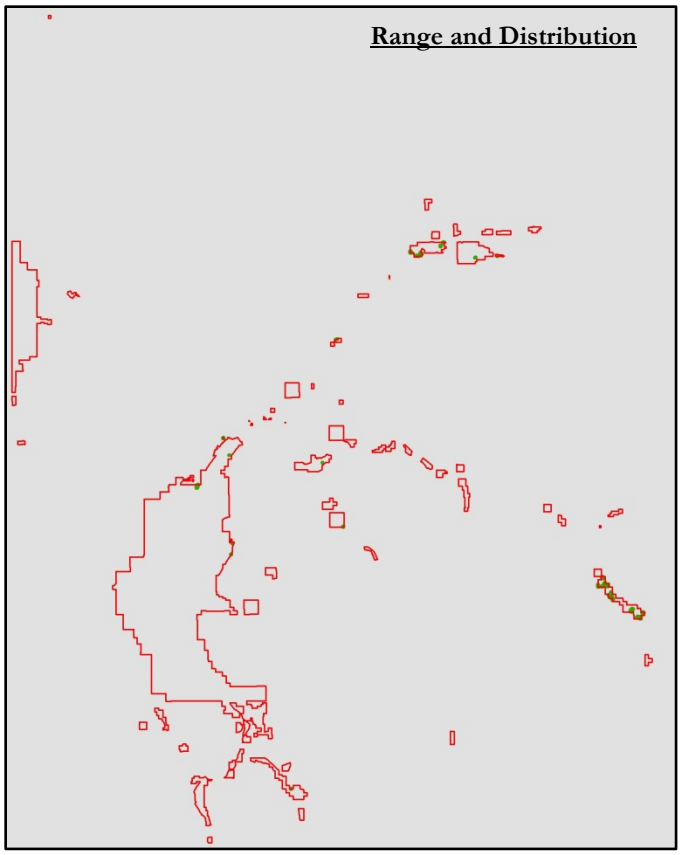
rUSNVC Alliances:
Dasiphora floribunda Temporarily Flooded Shrubland Alliance

rUSNVC Associations:
Dasiphora floribunda / Carex spp. Shrubland
Dasiphora floribunda / Deschampsia caespitosa Shrubland

Photo Signature Example

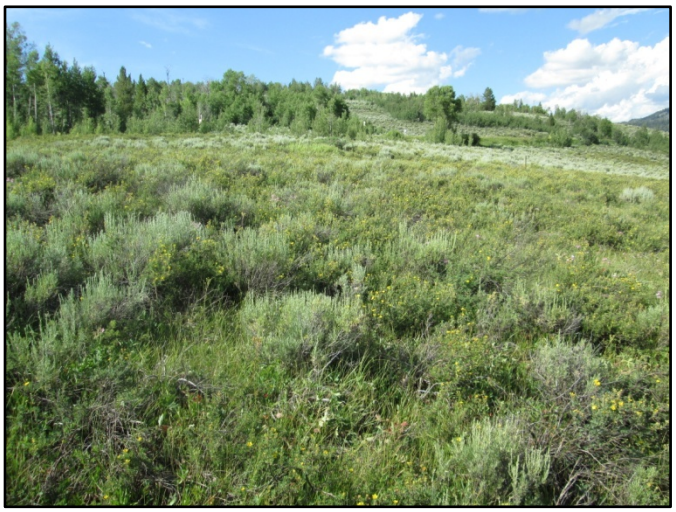


Range and Distribution



Common Species:
Artemisia tridentata ssp. vaseyana, Dasiphora floribunda, Carex spp., Deschampsia caespitosa

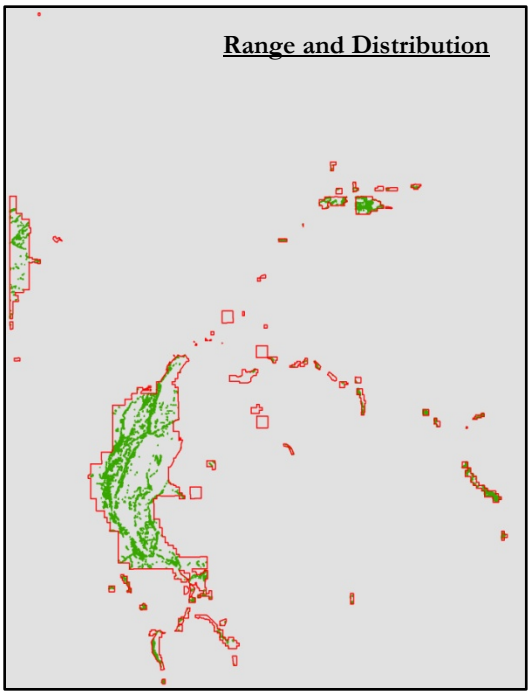
Ground Photo



Map Unit Statistics:
Frequency: 44 polygons
Average Aspect: 147 °
Average Slope: 2°
Minimum Elevation: 6,053 feet
Maximum Elevation: 7,842 feet
Average Elevation: 7,110 feet
Average Size: 1.9 acres
Total Size: 81.8 acres

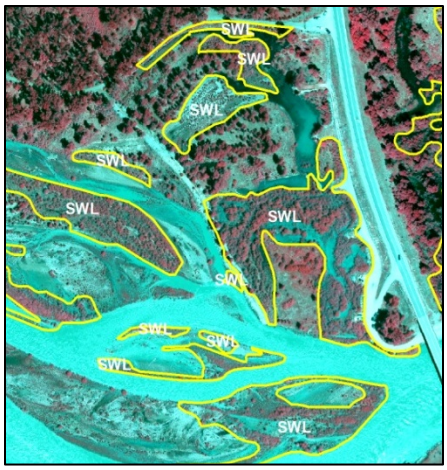
Description:
The SSW map unit was rare in the project area and was restricted to more mesic areas in the Buffalo Valley, Gros Ventre River, and in the northern portions of the Snake River floodplains. The SSW map unit was characterized by having fairly equal amounts of mountain big sagebrush and shrubby-cinquefoil. Understories of this map unit were lush and composed of mixed forbs and grasses, with species varying by location. The SSW map unit was similar to the sagebrush-bitterbrush (SES), sagebrush (SSD) and the low sagebrush (DSE) map units. On the 2011 CIR imagery, this type exhibited a very distinct signature consisting of a grey stipples (sagebrush) with pink patches (shrubby-cinquefoil) against a blue and white background caused by bare ground, grassland, and forb inclusions.

SWL Willow Shrubland
(*Salix spp.* Shrubland)



rUSNVC Alliances:
Salix booth Temporarily Flooded Shrubland Alliance
Salix drummondiana Temporarily Flooded Shrubland Alliance
Salix drummondiana Seasonally Flooded Shrubland Alliance
Salix geyeriana Temporarily Flooded Shrubland Alliance
Salix geyeriana Seasonally Flooded Shrubland Alliance
Salix lemmonii Seasonally Flooded Shrubland Alliance
Salix lutea Temporarily Flooded Shrubland Alliance
Salix planifolia Seasonally Flooded Shrubland Alliance
Salix wolfii Temporarily Flooded Shrubland Alliance
Salix wolfii Seasonally Flooded Shrubland Alliance

rUSNVC Associations:
Salix lemmonii / Mesic Tall Forbs Shrubland,
Salix lemmonii / Mesic Graminoids Shrubland,
Salix lemmonii / *Carex pellita* Shrubland, *Salix lutea* / *Mesic Graminoids* Shrubland,
Salix planifolia / *Carex utriculata* Shrubland, *Salix planifolia* / Mesic Forbs Shrubland,
Salix wolfii / *Calamagrostis canadensis* Shrubland, *Salix wolfii* / *Carex aquatilis* Shrubland,
Salix wolfii / *Carex pellita* Shrubland, *Salix wolfii* / *Carex pragracilis* Shrubland,
Salix wolfii / *Carex utriculata* Shrubland, *Salix wolfii* / *Deschampsia caespitosa* Shrubland,
Salix wolfii / Mesic Forbs Shrubland, *Salix boothii* / *Carex utriculata* Shrubland,
Salix boothii / Mesic Forbs Shrubland, *Salix boothii* / *Mesic Graminoids* Shrubland,
Salix drummondiana / *Carex utriculata* Shrubland,
Salix drummondiana / Mesic Forbs Shrubland, *Salix drummondiana* / Mesic Graminoid Shrubland,
Salix eastwoodiae Shrubland, *Salix geyeriana - Salix wolfii* / Mesic Graminoid Shrubland ,
Salix geyeriana / *Calamagrostis canadensis* Shrubland, *Salix geyeriana, / Carex praticola* Shrubland,
Salix geyeriana / *Carex utriculata* Shrubland, *Salix geyeriana* / Mesic Graminoids Shrubland



Common Species:
Salix lemmonii, Salix lutea,
Salix planifolia, Salix wolfii,
Salix booth,
Salix drummondiana
Salix eastwoodiae, Salix geyeriana

Map Unit Statistics:
Frequency: 3,713 polygons
Average Aspect: 185°
Average Slope: 2°
Minimum Elevation: 5,794 feet
Maximum Elevation: 8,199 feet
Average Elevation: 6,320 feet
Average Size: 0.9 acres
Total Size: 3,160.7 acres

Ground Photos

Description:
Willows occurred throughout the project area along canals, ponds, streams, seeps, and springs. Patch size varied from large, broad floodplains large, mature willow shrubs to very small clumps and young stands on Snake River cobble bars. The SWL map unit was distinct but may have been partially confused with the tall deciduous map unit (SMR), young cottonwoods (FCW) along streams, and with short aspen trees (FAP). Willows appeared on the 2011 CIR imagery, as mixed bright pink clumps on a blue background. Solid stands appeared to have a mottled and coarse texture.

DWARF-SHRUBLAND

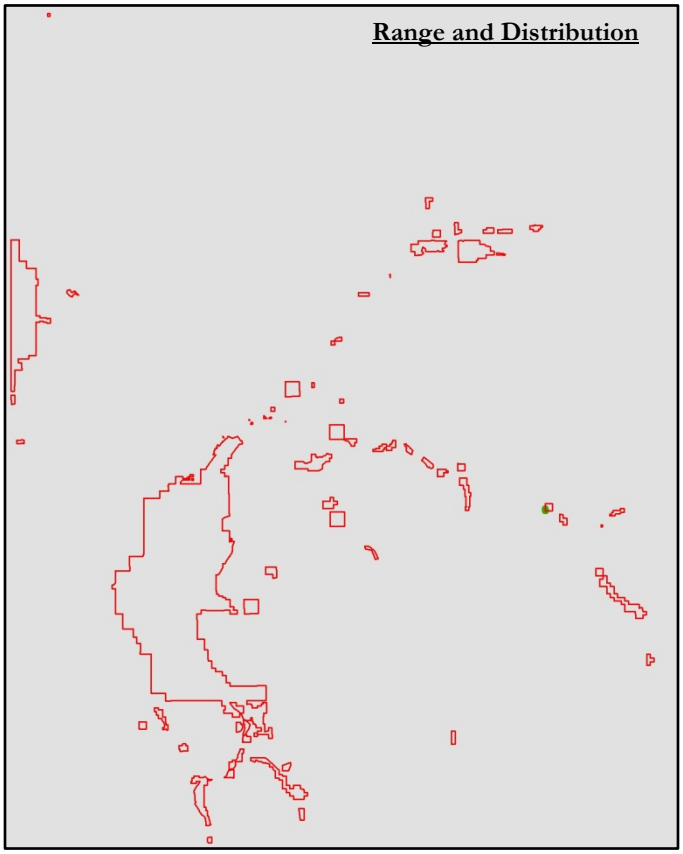
DSE Low Sagebrush Dwarf Shrubland
(*Artemisia arbuscula* Dwarf Shrubland)

rUSNVC Alliances:
Artemisia arbuscula ssp. arbuscula Shrub Herbaceous Alliance

rUSNVC Associations:
Artemisia arbuscula ssp. arbuscula / Festuca idahoensis Shrub Herbaceous Vegetation
Artemisia arbuscula ssp. arbuscula / Pseudoroegneria spicata Shrub Herbaceous Vegetation

Photo Signature Example

Range and Distribution



Common Species:
Artemisia arbuscula ssp. arbuscula, Festuca idahoensis,, Pseudoroegneria spicata

Ground Photo

Map Unit Statistics:
Frequency: 1 polygon
Average Aspect: 72°
Average Slope: 4°
Minimum Elevation: 7,366 feet
Maximum Elevation: 7,366 feet
Average Elevation: 7,366 feet
Average Size: 2.4 acres
Total Size: 2.4 acres

Description:
Low or dwarf sagebrush only occurred in the project area on a rocky slope along the Gros Ventre River. Other patches of this type likely occur in Teton County. For example, large areas were documented during the GTNP vegetation inventory project occurring directly north of the Jackson Hole Airport. In addition to the one polygon of this type, low sagebrush was often found with big sagebrush and bitterbrush and some confusion likely occurred between the mapping of DSE, SES, and SSD map units. DSE may also have occurred in sparse enough patches to be confused with grassland (HGL) or dry herbaceous (HFX) map units. Low sagebrush had a similar signature to herbaceous grassland types, a grayish-brown smooth signature with a slight mottled texture on the 2012 NAIP imagery.

HERBACEOUS VEGETATION

HA Herbaceous Aquatics

rUSNVC Alliances:
Caltha leptosepala Saturated Alliance
rUSNVC Associations:
Caltha leptosepala Herbaceous Vegetation
Menyanthes trifoliata Herbaceous Vegetation
Nuphar lutea Floating Aquatic Vegetation
Typha (*latifolia, angustifolia*) Western Herbaceous Vegetation

Range and Distribution

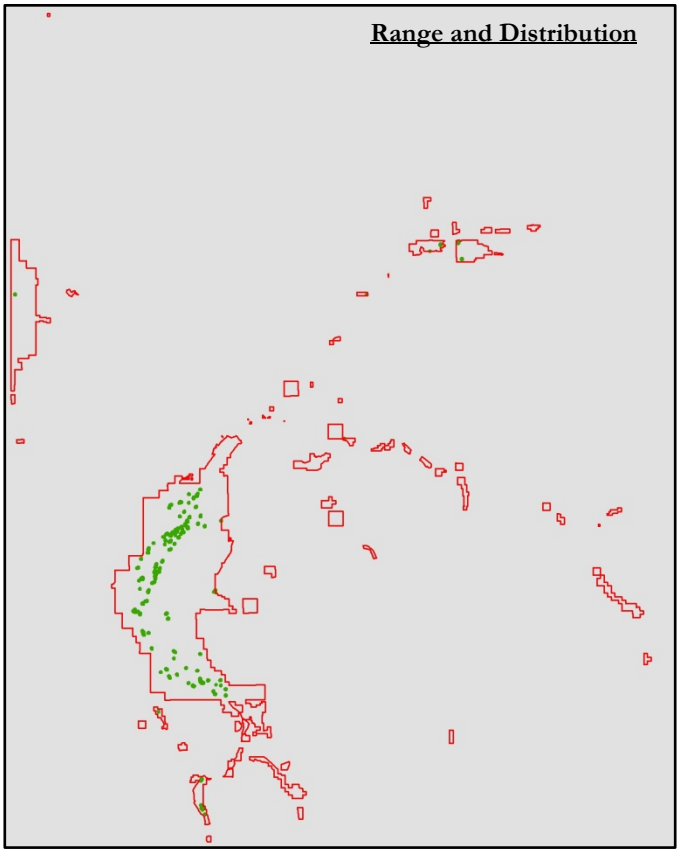
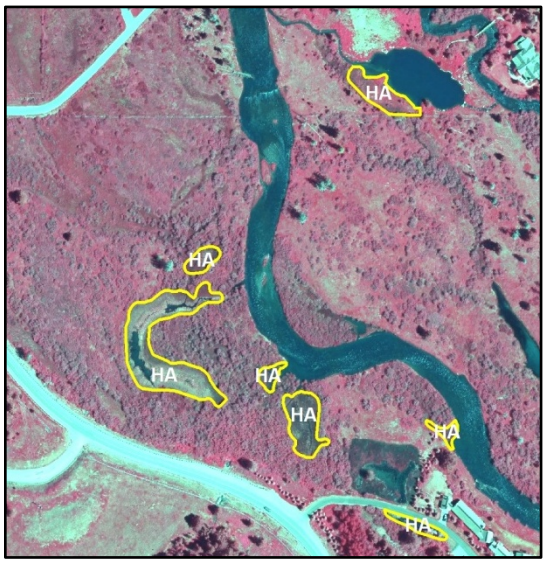


Photo Signature Example



Common Species:
Typha spp., Caltha leptosepala, Menyanthes trifoliate, Nuphar lutea

Ground Photo

Map Unit Statistics:
Frequency: 184 polygons
Average Aspect: 182°
Average Slope: 1°
Minimum Elevation: 5,830 feet
Maximum Elevation: 7,141 feet
Average Elevation: 6,158 feet
Average Size: 0.3 acres
Total Size: 60.7 acres

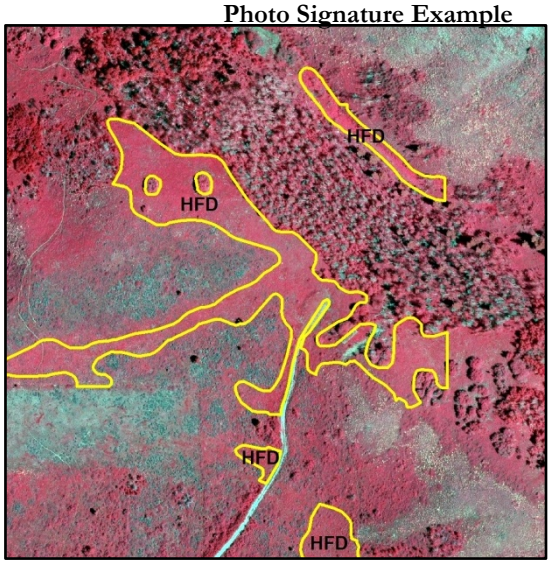
Description:
The HA map unit was restricted to cat-tail, lily pads, and other submerged and floating aquatic plants found on standing water. Herbaceous aquatics were primarily found in and along the edges of ponds and small lakes. Herbaceous aquatics were mapped based on the presence of water but some stands may have been confused with the HGS and HFD map units. On the 2011 CIR imagery, this type was identified by the presence of standing water and light pink and white patterns on the water. Often pockets or ribbons of dark open water were associated with this map unit.

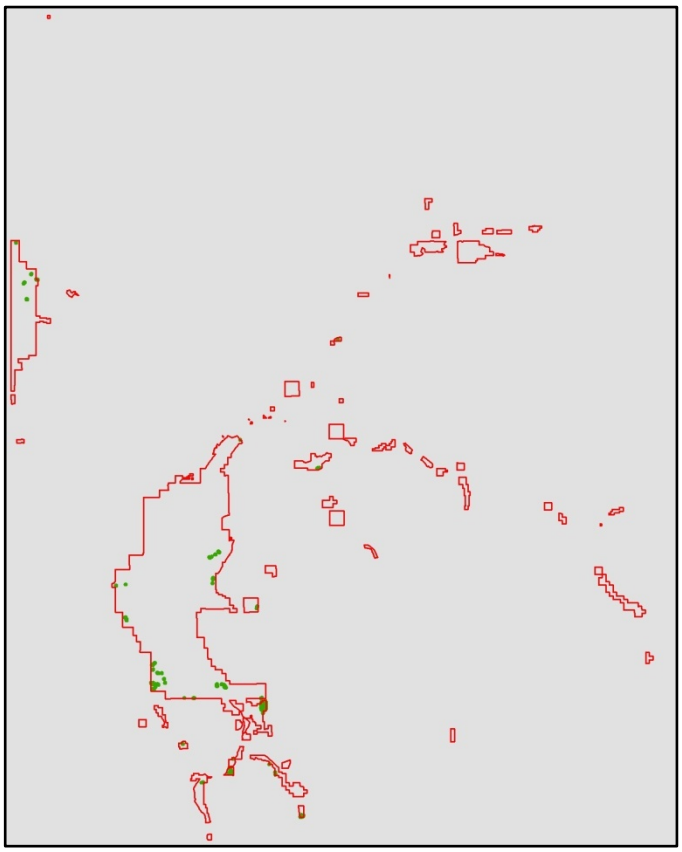
HFD Montane Mesic Forb Herbaceous Vegetation

rUSNVC Alliances:
Ligusticum filicinum Herbaceous Alliance
Mertensia ciliata Herbaceous Alliance
Geranium viscosissimum Herbaceous Alliance
Heracleum maximum Temporarily Flooded Herbaceous Alliance

rUSNVC Associations:
Ligusticum filicinum - Delphinium X occidentale Herbaceous Vegetation
Geranium viscosissimum Herbaceous Vegetation
Heracleum maximum - Rudbeckia occidentalis Herbaceous Vegetation
Mertensia ciliata Herbaceous Vegetation

Photo Signature Example





Ground Photo

Common Species:
Mertensia ciliata, Ligusticum filicinum, Delphinium X occidentale, Heracleum maximum, Rudbeckia occidentalis, Geranium viscosissimum

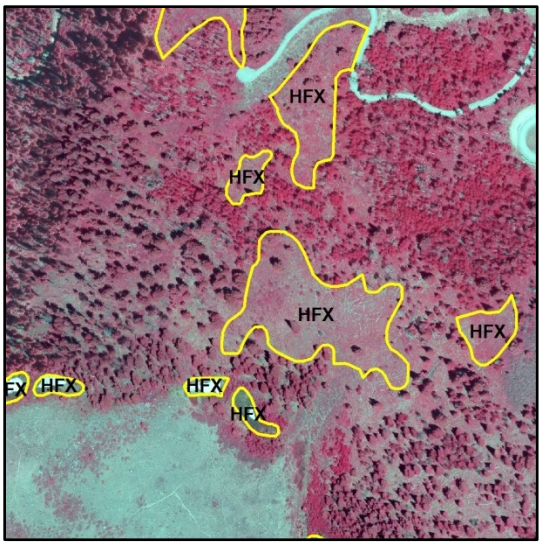
Project Specifics:
Frequency: 98 polygons
Average Aspect: 197°
Average Slope: 11°
Minimum Elevation: 5,955 feet
Maximum Elevation: 8,268 feet
Average Elevation: 6,518 feet
Average Size: 0.6 acres
Total Size: 56.5 acres

Description:
The HFD map unit was a rare type present in mesic uplands, on north and west-facing slopes, and in woodland/forest openings. HFD sites were dominated by a high diversity and density of forbs with little grass or shrubs present. The HFD map unit was similar to the dry xeric forb (HFX) and grassland (HGL) map units and may have similar species but at greater concentrations. On the 2011 CIR imagery, this type was smooth with a bright pink color and often occurred in, or near forested types.

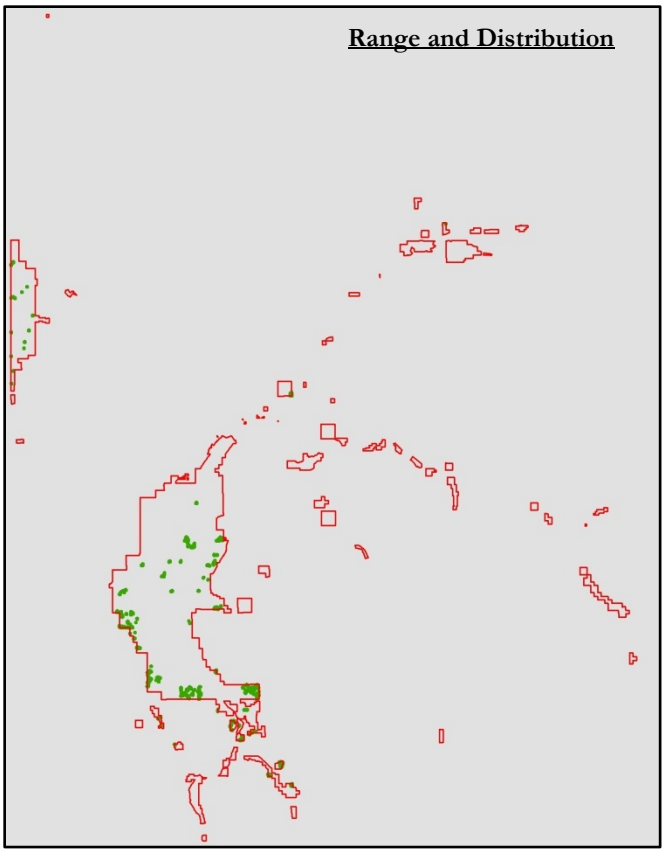
HFX Montane Xeric Forb Herbaceous Vegetation

rUSNVC Alliances:
Poa secunda Herbaceous Alliance
rUSNVC Associations:
(Balsamorhiza serrata) - Poa secunda Herbaceous Vegetation
Apocynum androsaemifolium Herbaceous Vegetation

Photo Signature Example



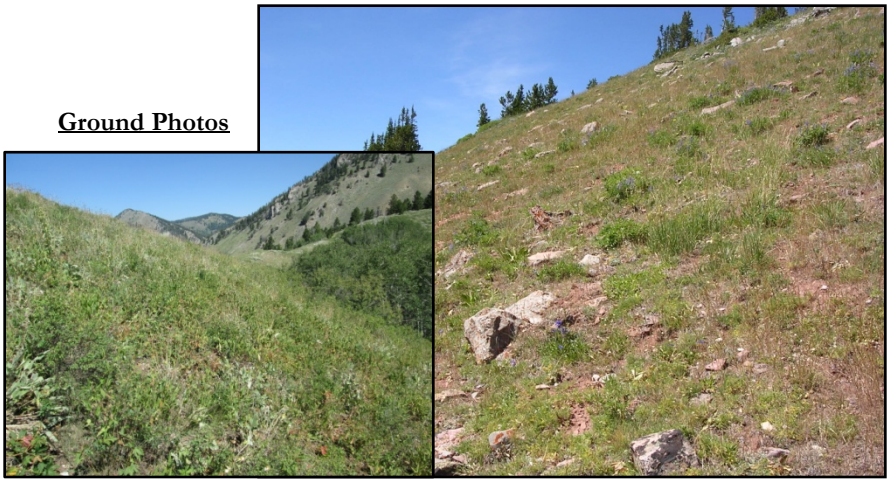
Range and Distribution



Common Species:
Balsamorhiza serrata, Poa secunda, Phleum pretense, Poa palustris, Pseudoroegneria spicata, Various forb species

Project Specifics:
Frequency: 275 polygons
Average Aspect: 156°
Average Slope: 12°
Minimum Elevation: 6,040 feet
Maximum Elevation: 7,441 feet
Average Elevation: 6,522 feet
Average Size: 0.6 acres
Total Size: 164.5 acres

Ground Photos



Description:
The HFX was a rare map unit found primarily on dry east and south-facing mountain foothills and toeslopes throughout the project area. The HFX map unit was used to map herbaceous sites that were dominated by various forb species, lacked a significant grass component, and did not contain very many shrubs. The HFX map unit was very similar to the grassland (HGL) and sparse hillside (VEH) map units and may have some of the same species present. On the 2011 CIR imagery, this type had a characteristic smooth, pink mottled signature against a grey or blue background (bare soil) and often occurred in forest or woodland openings or on nearby slopes.

HGL Mixed Grassland Herbaceous Vegetation

rUSNVC Alliances:
Calamagrostis rubescens Herbaceous Alliance
Festuca idahoensis herbaceous alliance
Pseudoroegneria spicata herbaceous alliance
Carex geyeri herbaceous alliance

rUSNVC Associations:
Calamagrostis rubescens Herbaceous Vegetation
Carex hoodii Herbaceous Vegetation
Carex rossii Herbaceous Vegetation
Danthonia spicata Herbaceous Vegetation
Festuca idahoensis - Danthonia intermedia Herbaceous Vegetation
Festuca idahoensis - Geranium viscosissimum Herbaceous Vegetation
Festuca idahoensis - Helianthella uniflora Herbaceous Vegetation
Hesperostipa comata Herbaceous Vegetation
Poa palustris Herbaceous Vegetation
Pseudoroegneria spicata - Balsamorhiza sagittata - Poa secunda Herbaceous Vegetation
Pseudoroegneria spicata - Poa secunda Herbaceous Vegetation
Pseudoroegneria spicata Herbaceous Vegetation

Range and Distribution

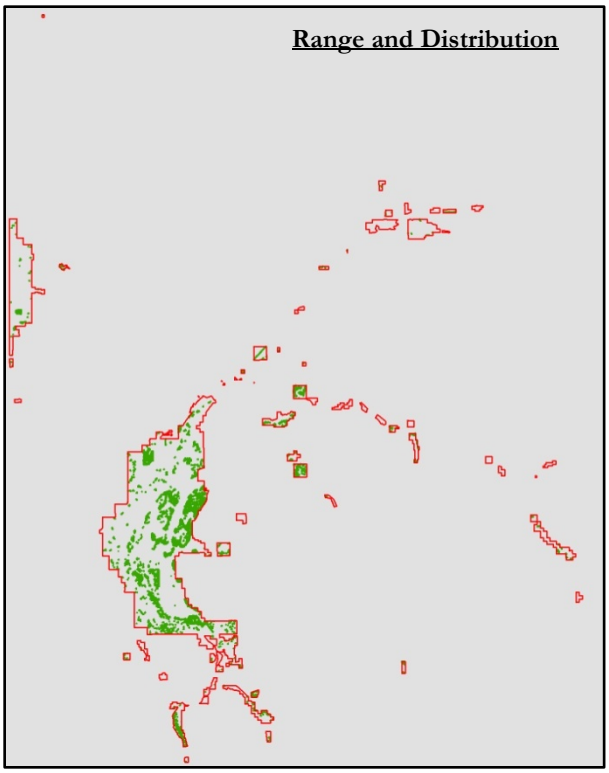
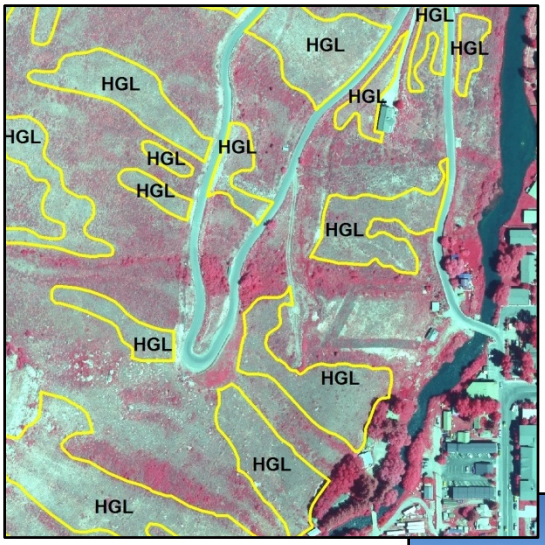


Photo Signature Example



Common Species:
Calamagrostis canadensis,
Calamagrostis rubescens,
Danthonia spicata,
Deschampsia caespitosa,
Eleocharis palustris,
Festuca idahoensis,
Hesperostipa comata,
Poa palustris,
Pseudoroegneria spicata

Map Unit Statistics:
Frequency: 2,119 polygons
Average Aspect: 196°
Average Slope: 8°
Minimum Elevation: 5,794 feet
Maximum Elevation: 8,390 feet
Average Elevation: 6,377 feet
Average Size: 1.2 acres
Total Size: 2,465.8 acres

Ground Photos

Description:
Native grasslands occur throughout the project area found on dry floodplains, eastern and southern slopes, and in large openings in sagebrush and woodland/forest stands. Native grass species composition varied among sites and usually contained a mixture of sod-forming grasses and bunchgrasses. Some sparse shrubs may have been present but were typically at a low percentage of the vegetation cover. The HGL map unit was used to map grasslands that were mostly devoid of forbs and non-native grasses. The low growing nature of this map unit was represented on the 2011 CIR imagery as a smooth grey (dominant -dry sites) or smooth light pink (growing and more mesic) color. Some sites may have been confused with the HPG, HFX, and HFD map units and very sparse sagebrush types may have been inadvertently labeled as grasslands.

HGS Flooded Wet Meadow Herbaceous Vegetation

rUSNVC Alliances:
Calamagrostis canadensis Flooded Herbaceous Alliance
Carex aquatilis Seasonally Flooded Herbaceous Alliance
Carex buxbaumii Seasonally Flooded Herbaceous Alliance
Carex illota Seasonally Flooded Herbaceous Alliance
Carex microptera Seasonally Flooded Herbaceous Alliance
Carex nebrascensis Seasonally Flooded Herbaceous Alliance
Carex pellita Seasonally Flooded Herbaceous Alliance
Carex utriculata Seasonally Flooded Herbaceous Alliance
Carex vesicaria Seasonally Flooded Herbaceous Alliance
Eleocharis acicularis Seasonally Flooded Herbaceous Alliance
Eleocharis palustris Seasonally Flooded Herbaceous Alliance
Juncus balticus Seasonally Flooded Herbaceous Alliance
Poa palustris Herbaceous Vegetation Alliance
Senecio triangularis Semipermanently Flooded Herbaceous Alliance

rUSNVC Associations:
14 Herbaceous Vegetation Associations Dominated by:
Calamagrostis canadensi, Carex aquatilis, *Carex buxbaumii*, *Carex nebrascensis*, *Carex illota*, *Carex microptera*, *Carex pellita*, *Carex utriculata*, *Carex vesicaria*, *Eleocharis acicularis, Eleocharis palustris*, *Juncus balticus*, *Senecio triangularis - Mimulus guttatus*, *Poa palustris*

Range and Distribution

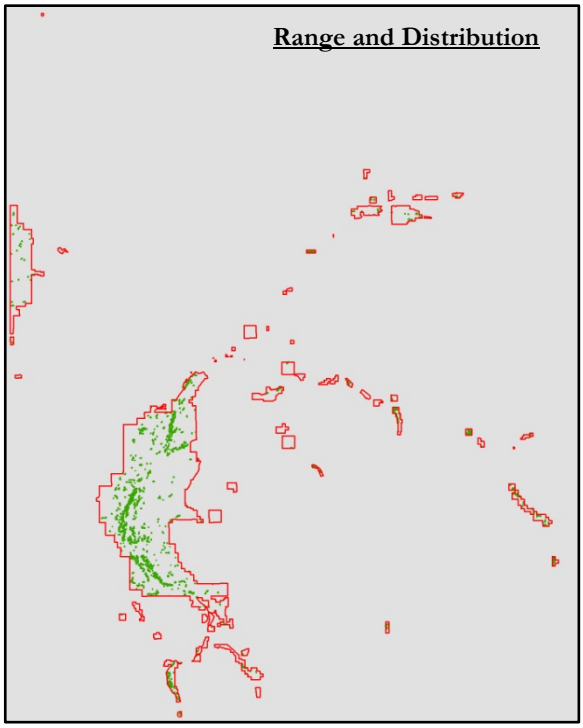
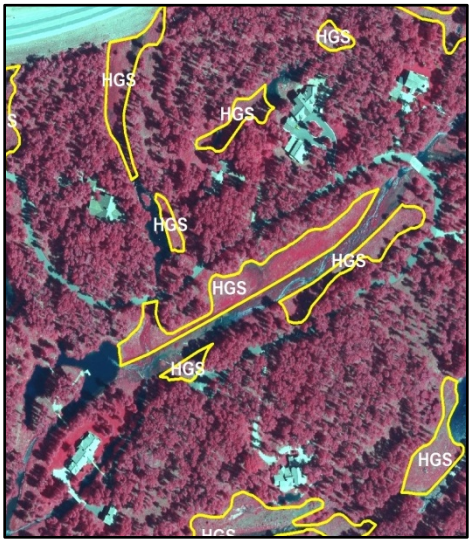


Photo Signature Example



Common Species:
Carex spp., *Juncus* spp., *Eleocharis* spp.

Map Unit Statistics:
Frequency: 1,234 polygons
Average Aspect: 180°
Average Slope: 2°
Minimum Elevation: 5,794 feet
Maximum Elevation: 8,242 feet
Average Elevation: 6,258 feet
Average Size: 0.5 acres
Total Size: 563.8 acres

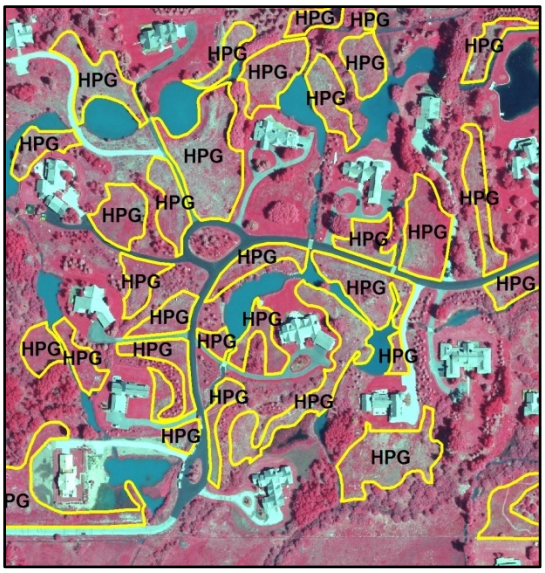
Ground Photos

Description:
The HGS map unit was found throughout the project area in mesic lowland settings on saturated soils, especially along the Snake River and its tributaries. Species composition between stands of HGS varied dramatically ranging from monotypic patches of short sedges and rushes to tall mixed grass associations not currently indentified by the rUSNVC. Flooded wet meadows may have been confused during the mapping with similar map units such as HA, HFD, and HPG and some species overlap likely exists among the dominant grasses in these types. On the 2011 CIR imagery, this type ranged from light pink where the vegetation had dried out to bright red where it was actively growing. Pockets of open water and small streams were usually located in or near polygons of this map unit.

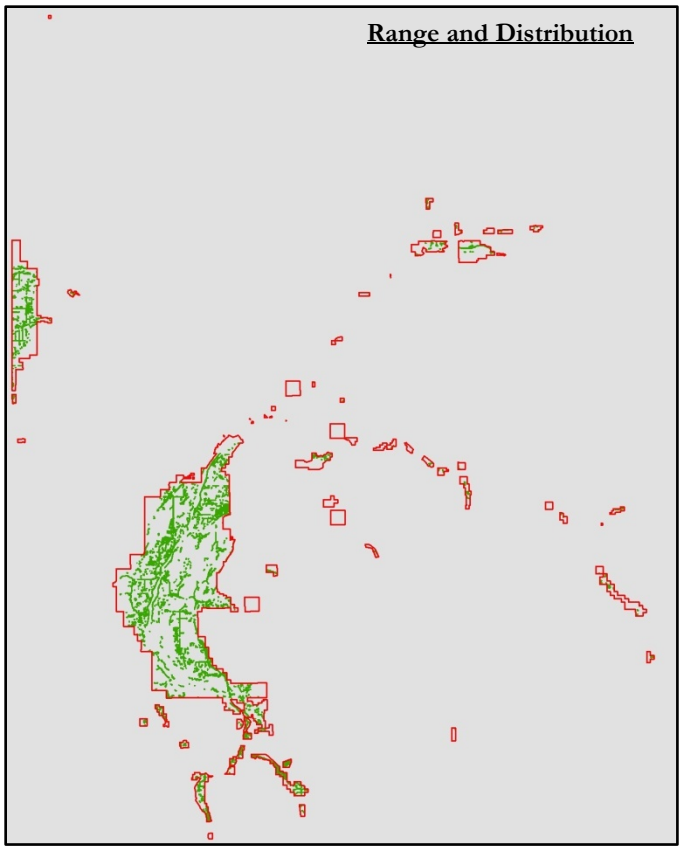
HPG - Mixed Planted and Introduced Grassland Herbaceous Vegetation

rUSNVC Alliances:
Poa pratensis Herbaceous Alliance
rUSNVC Associations:
Phleum pratense - Poa pratensis - Bromus inermis Herbaceous Vegetation

Photo Signature Example



Range and Distribution



Common Species:
Bromus inermis, Phleum pratense, Poa pratensis, Agropyron cristatum, Taraxacum officinale, Thinopyrum intermedium

Ground Photos

Map Unit Statistics:
Frequency: 3,745 polygons
Average Aspect: 203°
Average Slope: 3°
Minimum Elevation: 5,824 feet
Maximum Elevation: 8,288 feet
Average Elevation: 6,287 feet
Average Size: 0.6 acres
Total Size: 2,132.0 acres

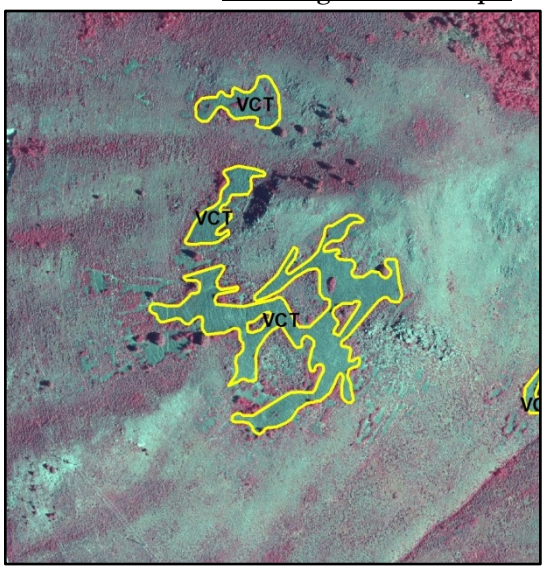
Description:
The HPG map unit was a new type added to the project to distinguish between non-native grasslands that were actively being used as pastures and hay field (NIPI, NIPN) and non-native grasses that occurred on abandoned lots, fallow fields, and transitional areas that were not maintained. Non-native grasses in the HPG map unit polygons either were likely planted at one time or represent encroachments from nearby areas. The HPG map unit was common throughout the study area near residential, commercial, and agricultural sites and along road right-of-ways. On the 2011 CIR imagery, this type had a characteristic smooth grey/blue color with red streaks likely representing dominant and dead grasses and areas actively growing, respectively.

SPARSE VEGETATION

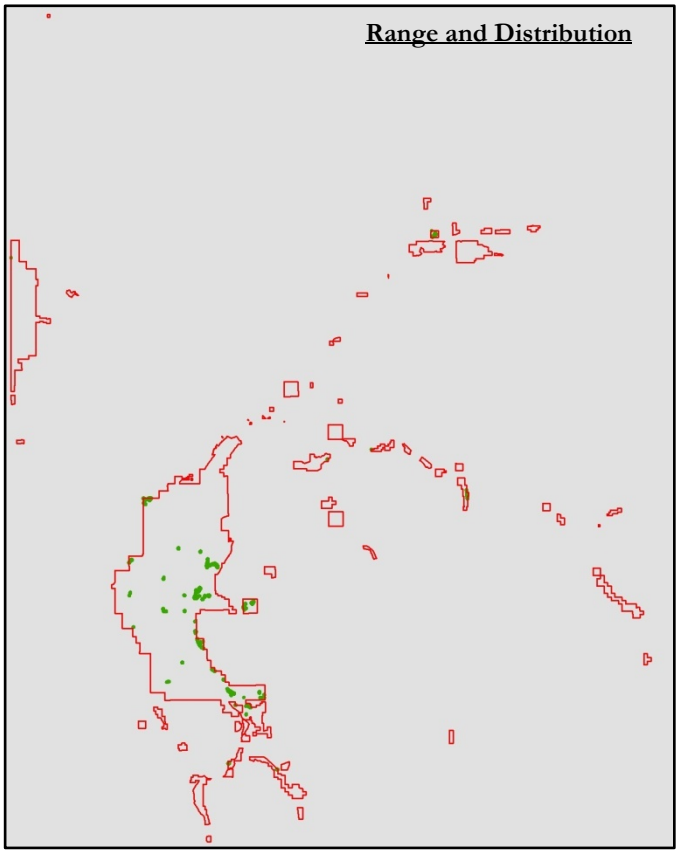
VCT Cliff and Talus Sparse Vegetation

rUSNVC Alliances:
No Alliance - Special Map Unit
rUSNVC Associations:
No Alliance - Special Map Unit

Photo Signature Example



Range and Distribution



Common Species:
Pseudoroegneria spicata, *Festuca idahoensis*, *Chrysothamnus viscidiflorus*, *Artemisia* spp. *Purshia tridentata*

Ground Photo

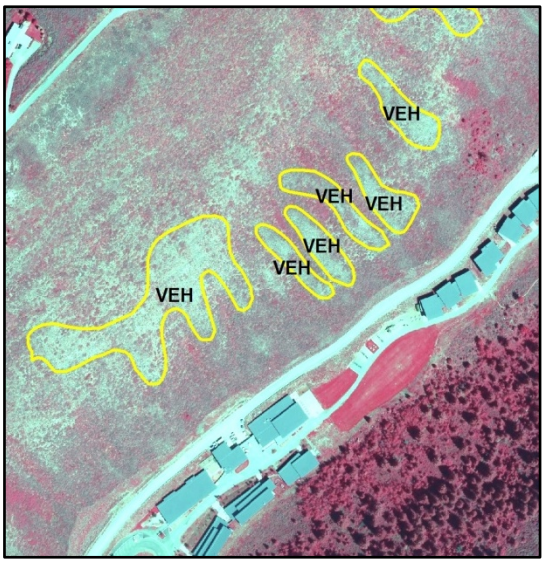
Map Unit Statistics:
Frequency: 126 polygons
Average Aspect: 204°
Average Slope: 24°
Minimum Elevation: 6,037 feet
Maximum Elevation: 8,137 feet
Average Elevation: 6,661 feet
Average Size: 0.7 acres
Total Size: 92.9 acres

Description:
Sparsely vegetated rock and talus outcroppings were rare in the project area and only occurred on some of the buttes, ridges, and mountain slopes. The VCT map unit was used to map rock formations that contained some vegetation consisting of grasses and forbs tucked into the cracks and crevices. Overall vegetation cover was usually very sparse and did not occur in discreet stands. On the 2011 CIR imagery, the VCT map unit appeared grey to blue and demonstrated a pebbly signature. Most polygons contained large individual boulders and or rock outcrops that were visible on the imagery.

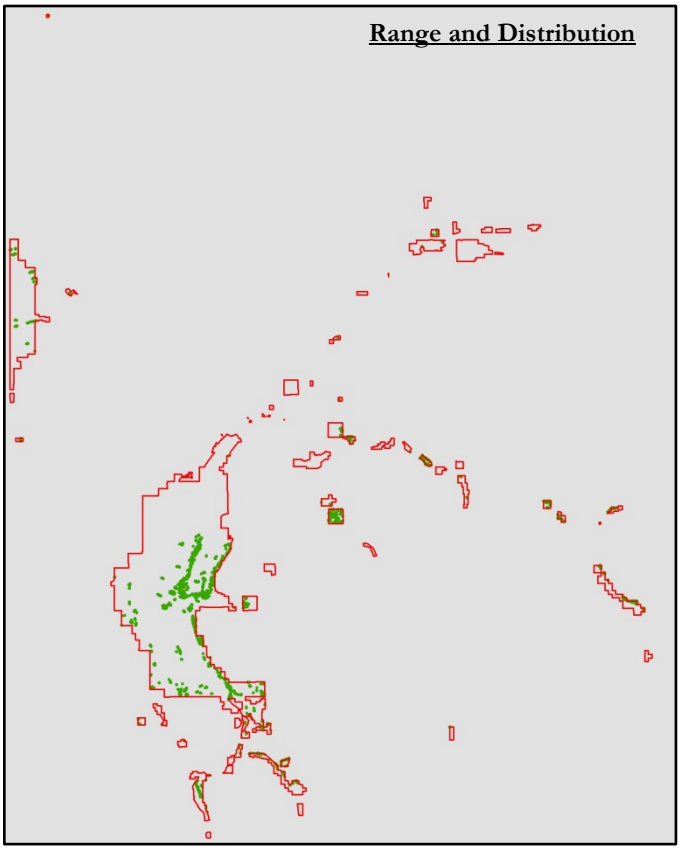
VEH Exposed Hillside Sparse Vegetation

rUSNVC Alliances:
Pseudoroegneria spicata Herbaceous alliance
Festuca idahoensis Herbaceous Alliance
Chrysothamnus viscidiflorus Shrub Herbaceous Alliance
rUSNVC Associations:
Chrysothamnus viscidiflorus Shrubland

Photo Signature Example



Range and Distribution



Common Species;
Pseudoroegneria spicata, *Festuca idahoensis*, *Chrysothamnus viscidiflorus*, *Artemisia* spp. *Purshia tridentata*

Ground Photo

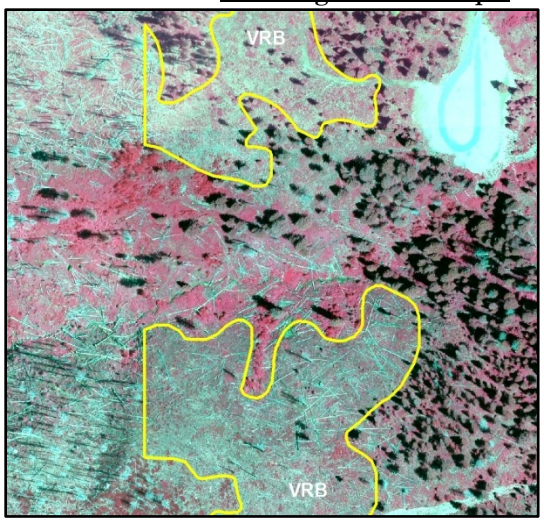
Map Unit Statistics:
Frequency: 643 polygons
Average Aspect: 184°
Average Slope: 18°
Minimum Elevation: 5,866 feet
Maximum Elevation: 8,192 feet
Average Elevation: 6,611 feet
Average Size: 1.0 acres
Total Size: 632.9 acres

Description:
The VEH map unit was found throughout the foothills, basin, and montane areas of the project area on eroding hillside slopes and roadside cuts. Vegetation was sparse and limited to small stands of grasses, forbs, and short shrubs. The VEH map unit was similar to the other sparsely vegetated map units and may have some of the same grass and forb species as the SSD, SES, and HGL map units. On the 2011 CIR imagery, this type often reflected the white or grey substrates and the vegetation appeared as small pink spots.

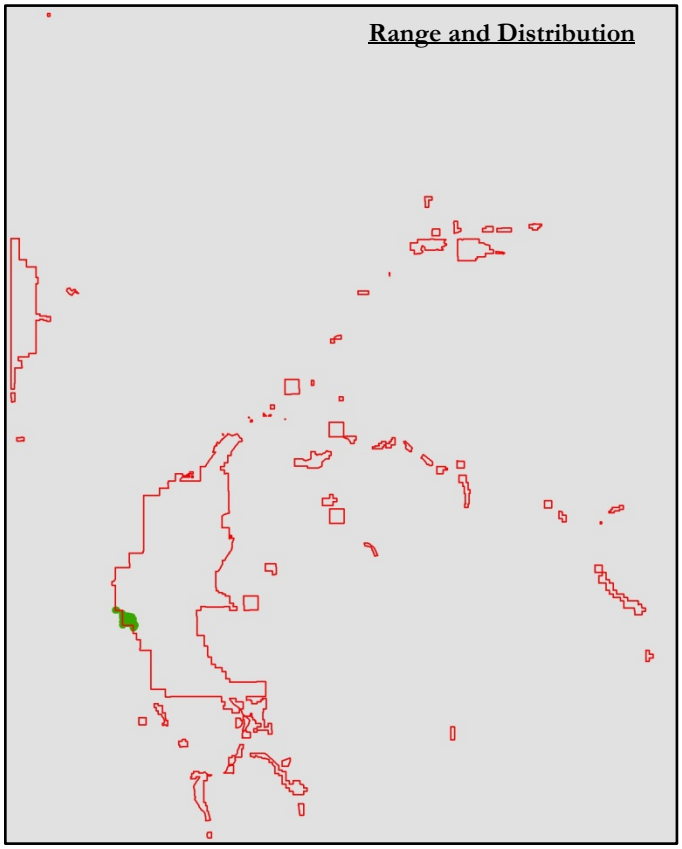
VRB Recently Burned Sparse Vegetation

rUSNVC Alliances:
Ceanothus Shrubland Alliance
rUSNVC Associations:
Ceanothus velutinus Shrubland

Photo Signature Example



Range and Distribution



Common Species:
Cirsium arvensis, Ceanothus velutinus, Bromus inermis, Phleum pratense, Poa pratensis, Agropyron cristatum, Thinopyrum intermedium

Map Unit Statistics:
Frequency: 30 polygons
Average Aspect: 89°
Average Slope: 11°
Minimum Elevation: 6,165 feet
Maximum Elevation: 6,962 feet
Average Elevation: 6,458 feet
Average Size: 2.5 acres
Total Size: 76.2 acres

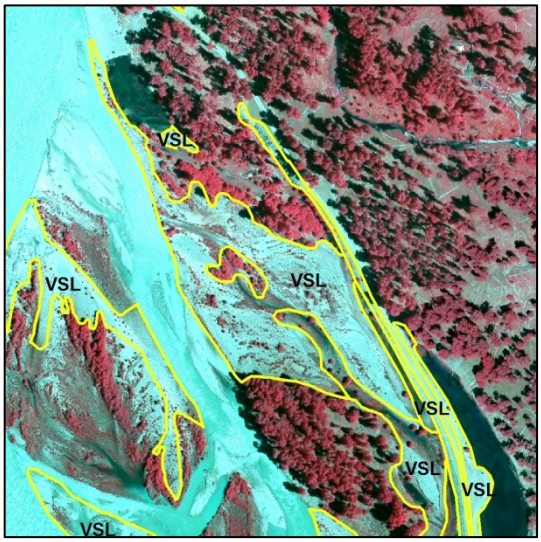
Ground Photo

Description:
Only one recently burned area was found in the proejct area near the town of Wilson. In the is area the fire consumed large swaths of forest leaving behind a mosaic of down logs, regenerating aspen and conifer trees, early successional plants, and patches of bare ground. The VRB map unit was used to delineate post-burned bare ground and herbaceous vegetated areas occurring on this site. On the 2011 CIR imagery, the VRB map unit appeared as smooth light blue and white with color with some patches of pink representing the new vegetation. Dead and down trees were also apparent in many polygons if this type. Significant amounts of regenerating trees may have re-established since the time of the fire and when the imagery was acquired.

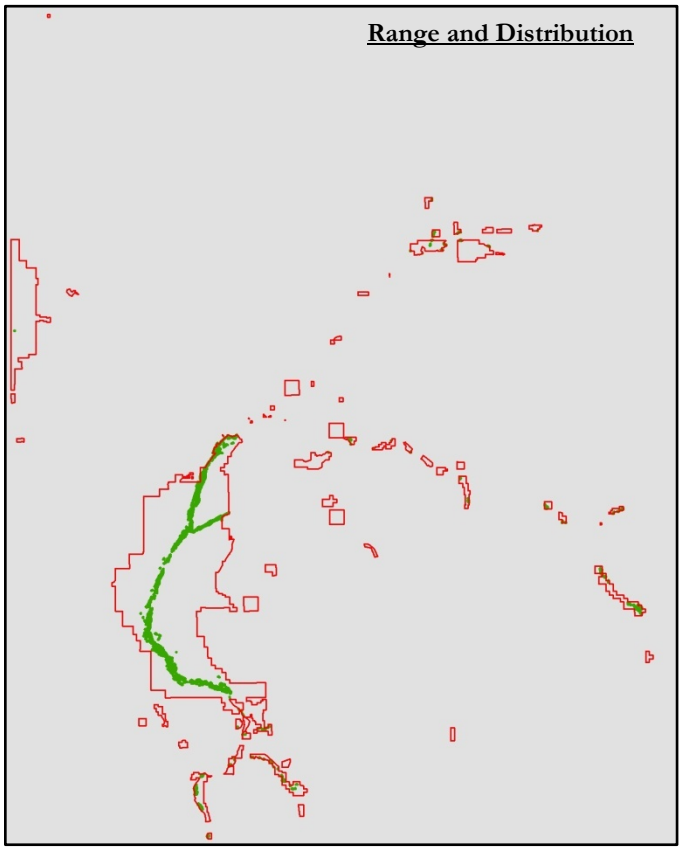
VSL Exposed Lake Shoreline – Stream Deposit Sparse Vegetation

rUSNVC Alliances:
No Alliance - Special Map Unit
rUSNVC Associations:
No Alliance - Special Map Unit

Photo Signature Example



Range and Distribution



Map Unit Statistics:
Frequency: 775 polygons
Average Aspect: 180°
Average Slope: 1°
Minimum Elevation: 5,794 feet
Maximum Elevation: 7,792 feet
Average Elevation: 6,272 feet
Average Size: 1.0 acres
Total Size: 778.2 acres

Ground Photo

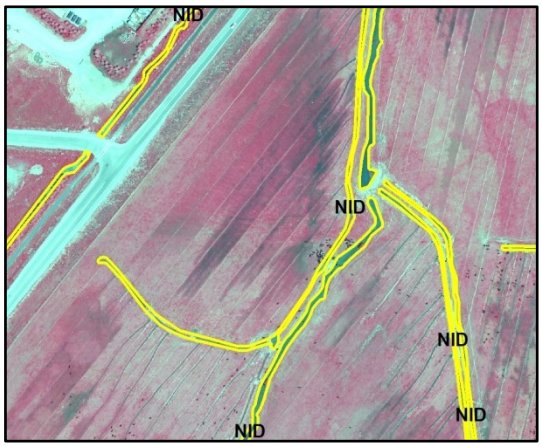
Description:
The VSL map unit was used to map the transitional areas adjacent to the streams, lakes, and ponds found throughout the study area. This type was also used to map the sparse annual herbaceous vegetation and seedling cottonwoods and willow that occur on cobble bars and shores primarily in the Snake River. This map unit differed from the NVS map unit due to the presence at least 10% cover of low growing vegetation. On 2011 CIR imagery, this type was usually restricted to the white and blue cobble bars and white shorelines adjacent to the major streams. The photo-signature was smooth and often contained different hues of reds and pinks representing early successional vegetation. Due to variable stream currents and fluctuating water levels, VSL polygons are highly dynamic and new areas may appear or be flooded out depending on the year.

NON-VEGETATED MAP CLASSES

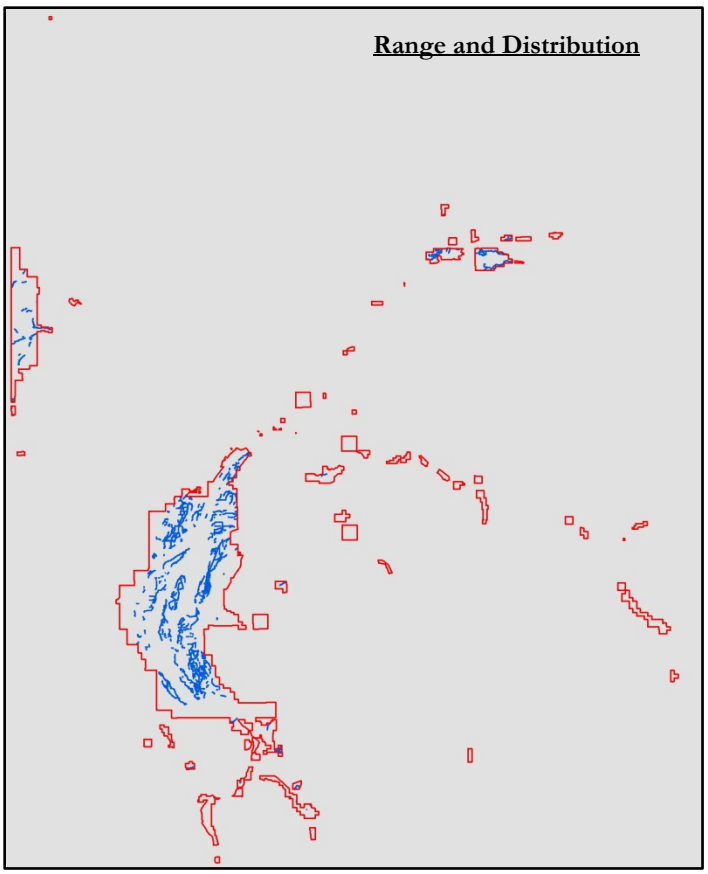
NID Canals

Map Unit Statistics:
Frequency: 769 polygons
Average Aspect: 201°
Average Slope: 1°
Minimum Elevation: 5,866 feet
Maximum Elevation: 6,946 feet
Average Elevation: 6,244 feet
Average Size: 0.4 acres
Total Size: 293.8 acres

Photo Signature Example



Range and Distribution

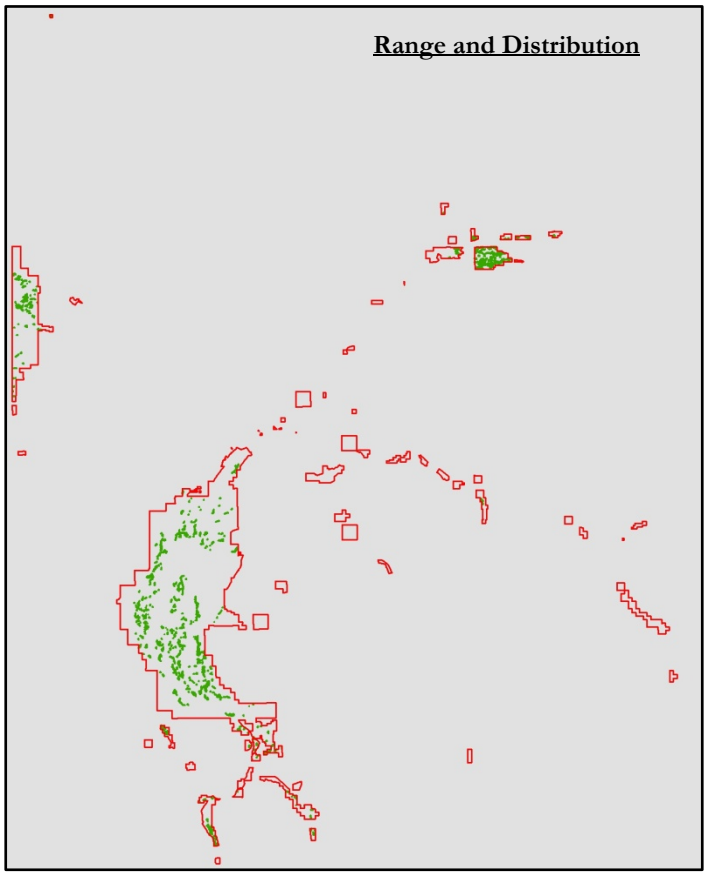


NIPF Perennially Flooded Agricultural Fields

Map Unit Statistics:
Frequency: 952 polygons
Average Aspect: 193°
Average Slope: 2°
Minimum Elevation: 5,824 feet
Maximum Elevation: 7,154 feet
Average Elevation: 6,282 feet
Average Size: 0.8 acres
Total Size: 746.3 acres

Photo Signature Example

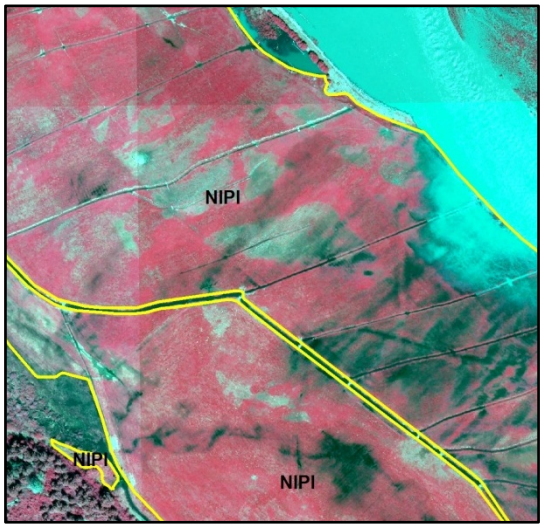
Range and Distribution



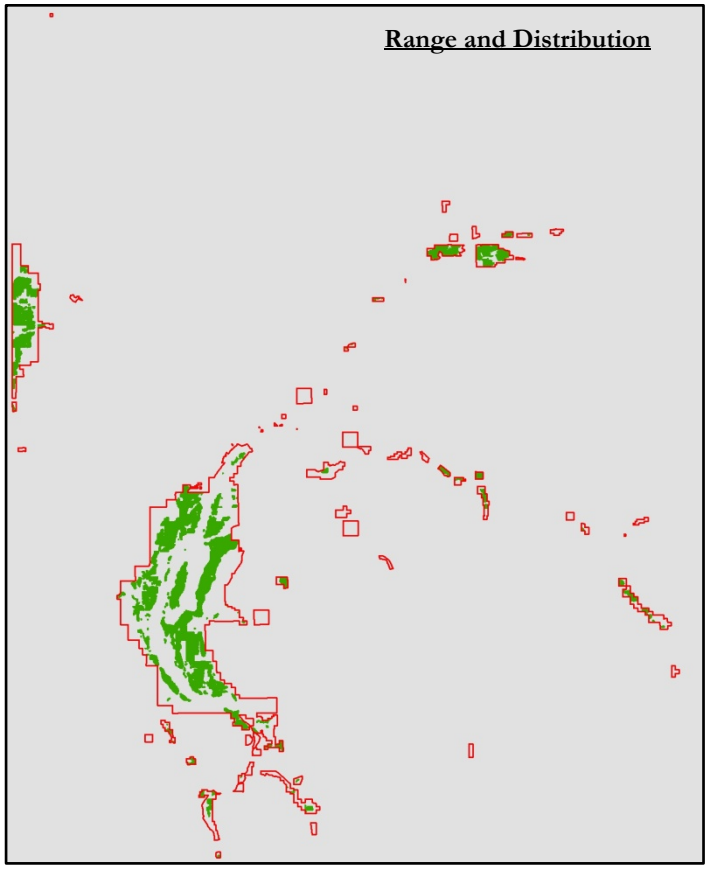
NIPI Irrigated Agricultural Fields

Map Unit Statistics:
Frequency: 1,006 polygons
Average Aspect: 196°
Average Slope: 2°
Minimum Elevation: 5,794 feet
Maximum Elevation: 7,714 feet
Average Elevation: 6,269 feet
Average Size: 18.6 acres
Total Size: 18,723.2 acres

Photo Signature Example



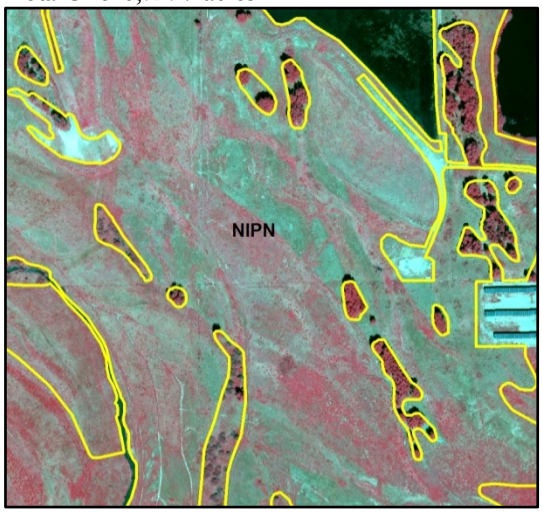
Range and Distribution



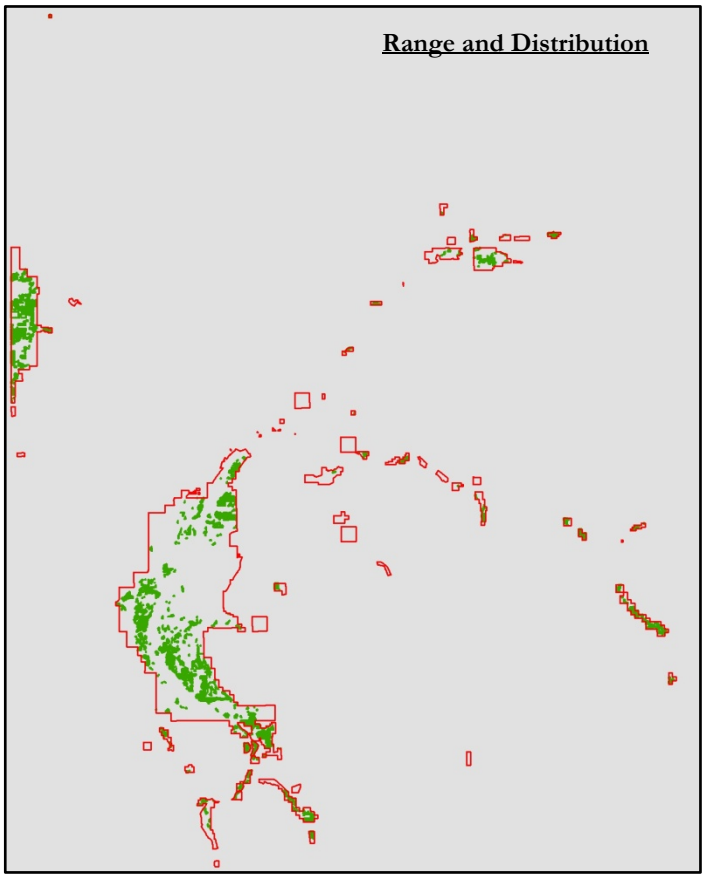
NIPN Non-Irrigated Agricultural Fields

Map Unit Statistics:
Frequency: 1,603 polygons
Average Aspect: 191°
Average Slope: 2°
Minimum Elevation: 5,840 feet
Maximum Elevation: 8,196 feet
Average Elevation: 6,308 feet
Average Size: 4.2 acres
Total Size: 6,727.9 acres

Photo Signature Example



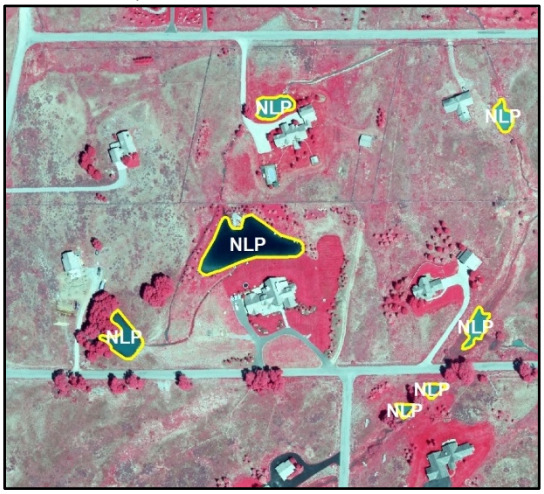
Range and Distribution



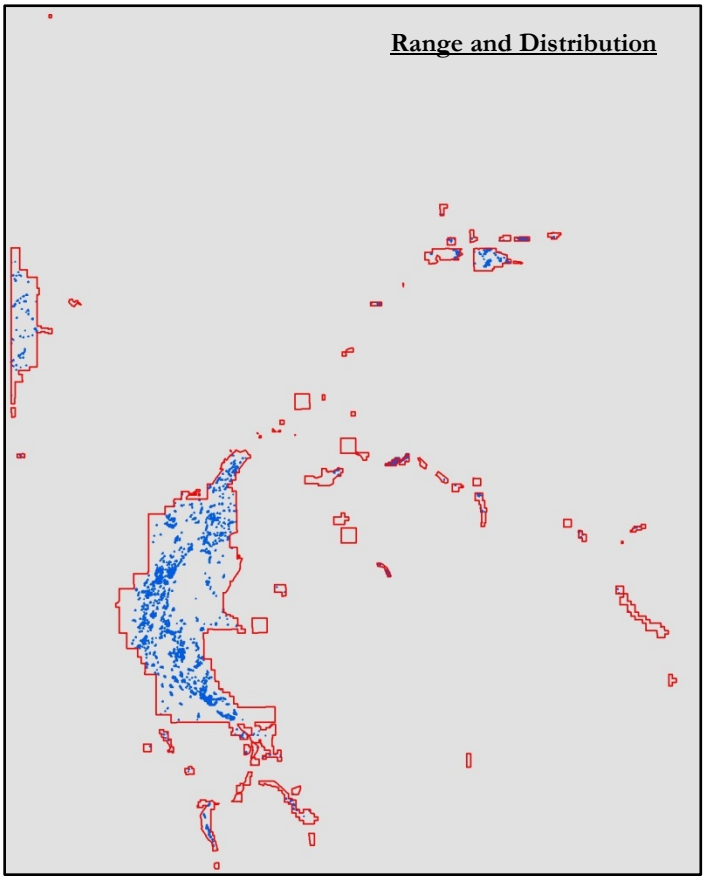
NLP Lakes, Ponds, and Reservoirs

Map Unit Statistics:
Frequency: 1,305 polygons
Average Aspect: 192°
Average Slope: 1°
Minimum Elevation: 5,830 feet
Maximum Elevation: 7,605 feet
Average Elevation: 6,264 feet
Average Size: 0.9 acres
Total Size: 1,192.6 acres

Photo Signature Example



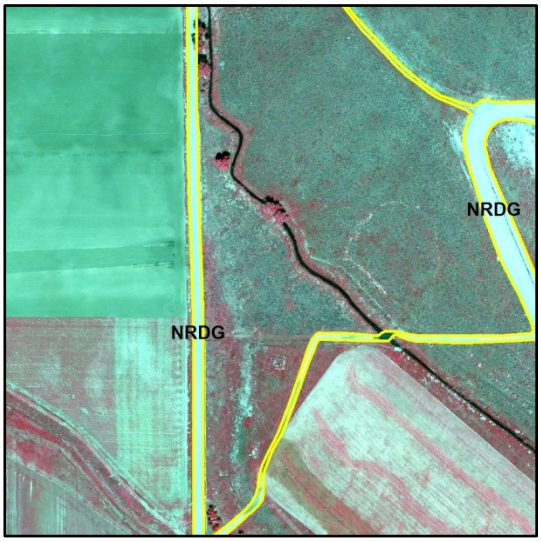
Range and Distribution



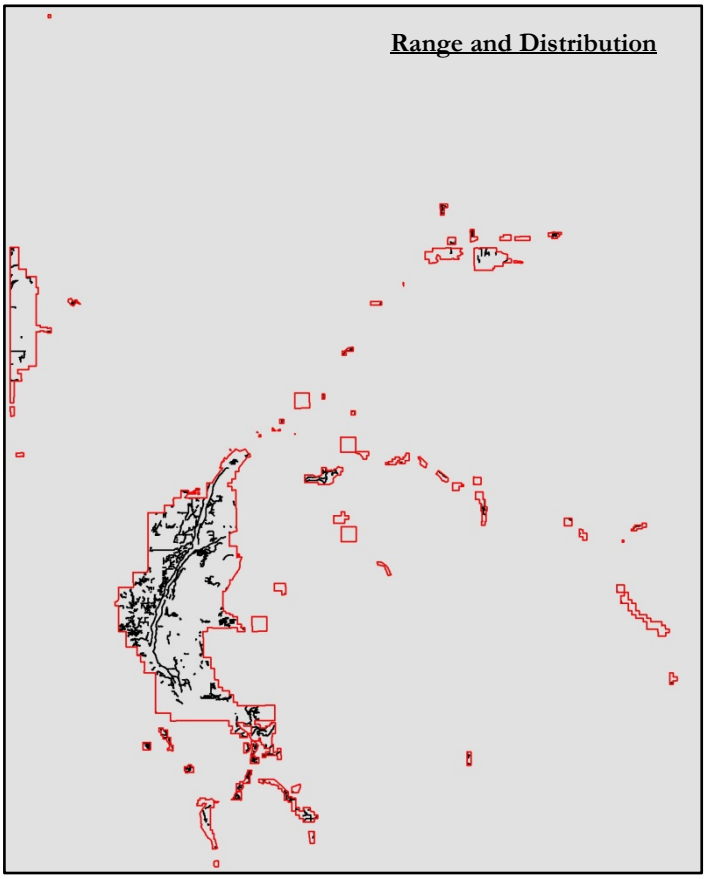
NRDG Gravel and Dirt Roads

Map Unit Statistics:
Frequency: 373 polygons
Average Aspect: 205°
Average Slope: 4°
Minimum Elevation: 5,827 feet
Maximum Elevation: 8,219 feet
Average Elevation: 6,336 feet
Average Size: 1.6 acres
Total Size: 606.9 acres

Photo Signature Example



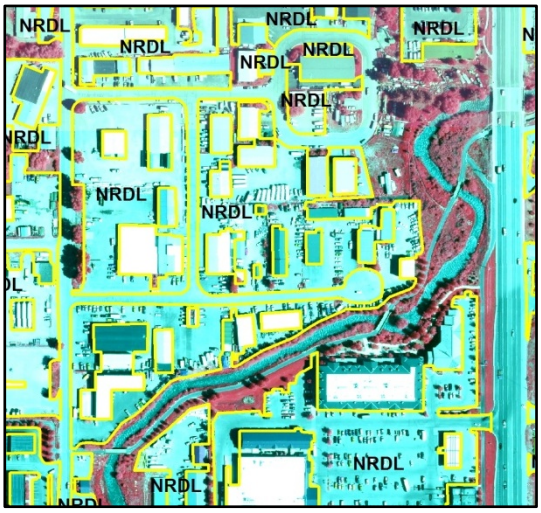
Range and Distribution



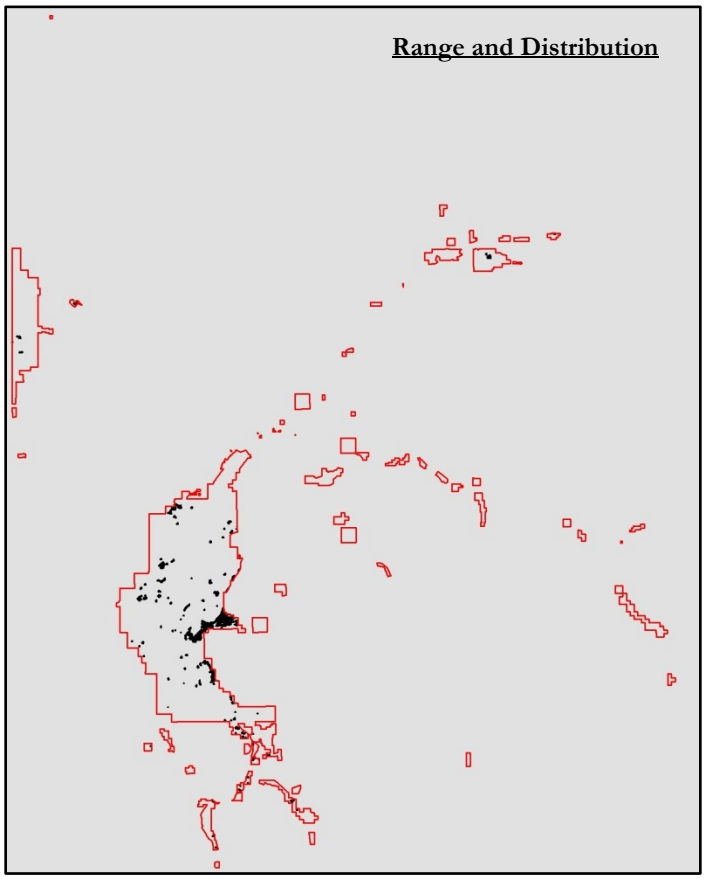
NRDL Parking Lots

Map Unit Statistics:
Frequency: 615 polygons
Average Aspect: 226°
Average Slope: 3°
Minimum Elevation: 5,827 feet
Maximum Elevation: 8,219 feet
Average Elevation: 6,235 feet
Average Size: 0.8 acres
Total Size: 462.3 acres

Photo Signature Example



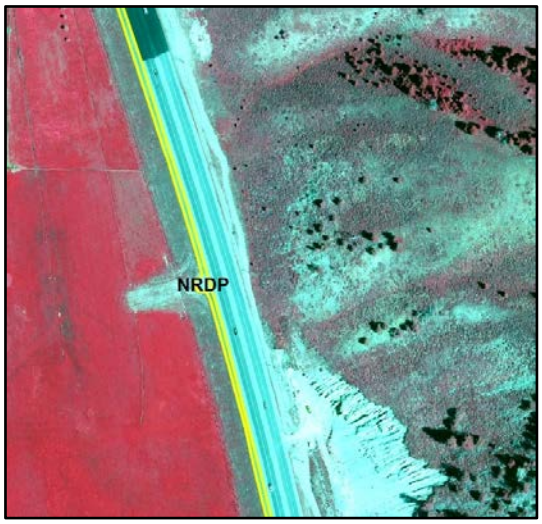
Range and Distribution



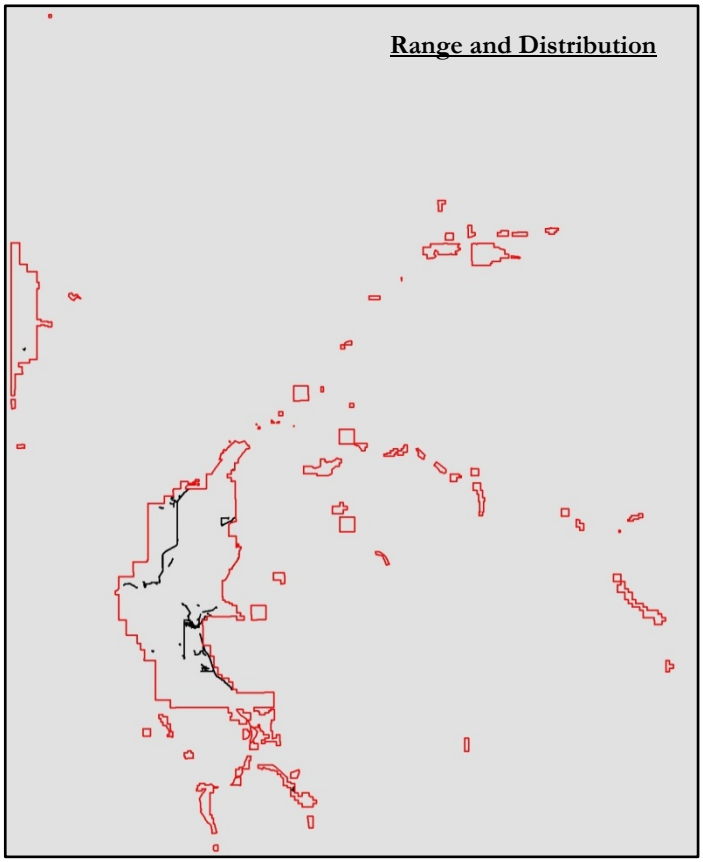
NRDP Paved Paths

Map Unit Statistics:
Frequency: 163 polygons
Average Aspect: 194°
Average Slope: 2°
Minimum Elevation: 6,034 feet
Maximum Elevation: 6,483 feet
Average Elevation: 6,173 feet
Average Size: 0.4 acres
Total Size: 64.9 acres

Photo Signature Example



Range and Distribution

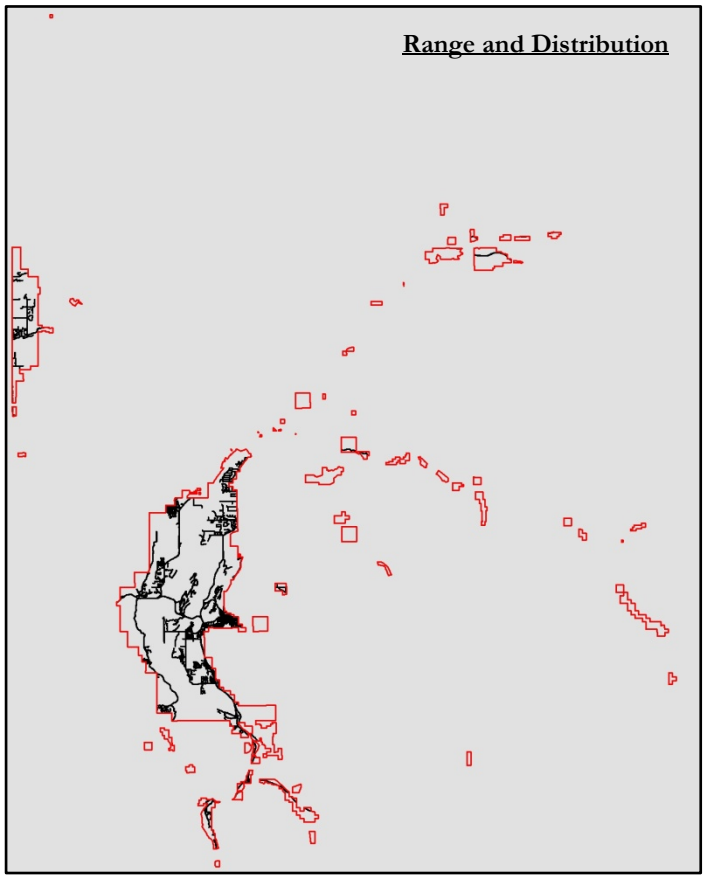


NRDR Paved Roads

Map Unit Statistics:
Frequency: 48 polygons
Average Aspect: 191°
Average Slope: 3°
Minimum Elevation: 5,853 feet
Maximum Elevation: 6,916 feet
Average Elevation: 6,428 feet
Average Size: 22.2 acres
Total Size: 1,067.1 acres

Photo Signature Example

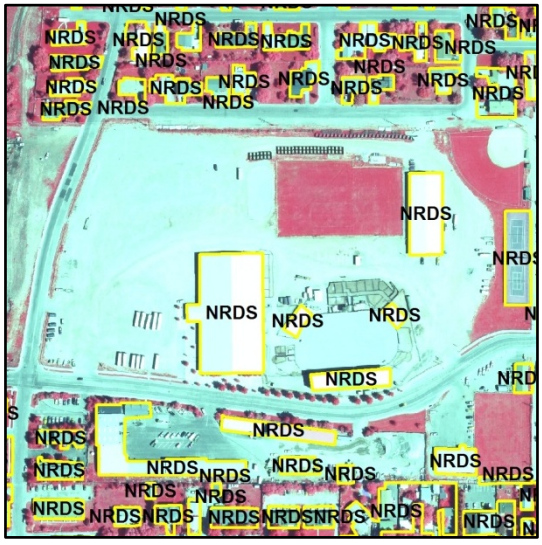
Range and Distribution



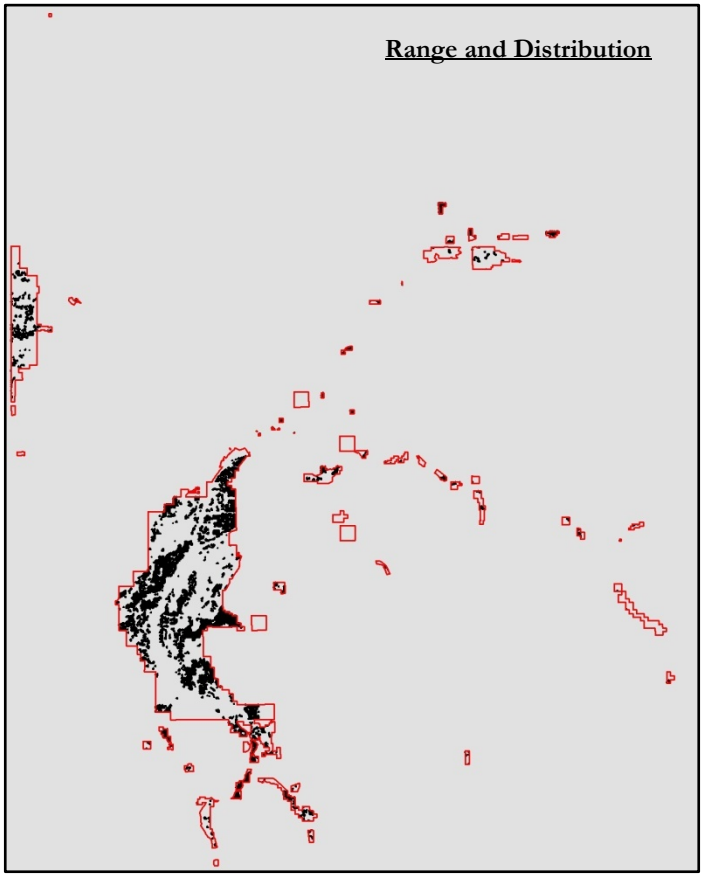
NRDS Buildings and Driveways

Map Unit Statistics:
Frequency: 8,091 polygons
Average Aspect: 206°
Average Slope: 3°
Minimum Elevation: 5,817 feet
Maximum Elevation: 8,203 feet
Average Elevation: 6,271 feet
Average Size: 0.2 acres
Total Size: 2,019.0 acres

Photo Signature Example



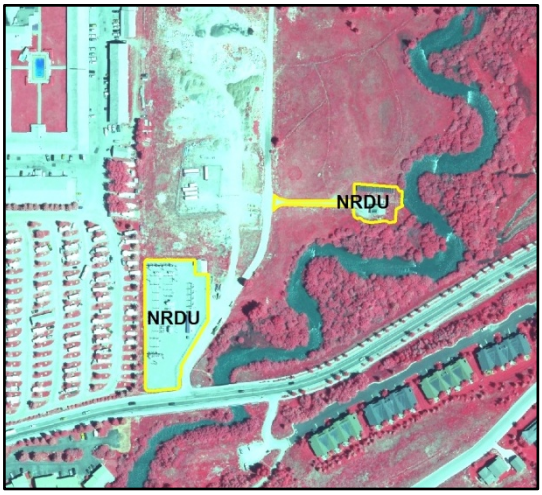
Range and Distribution



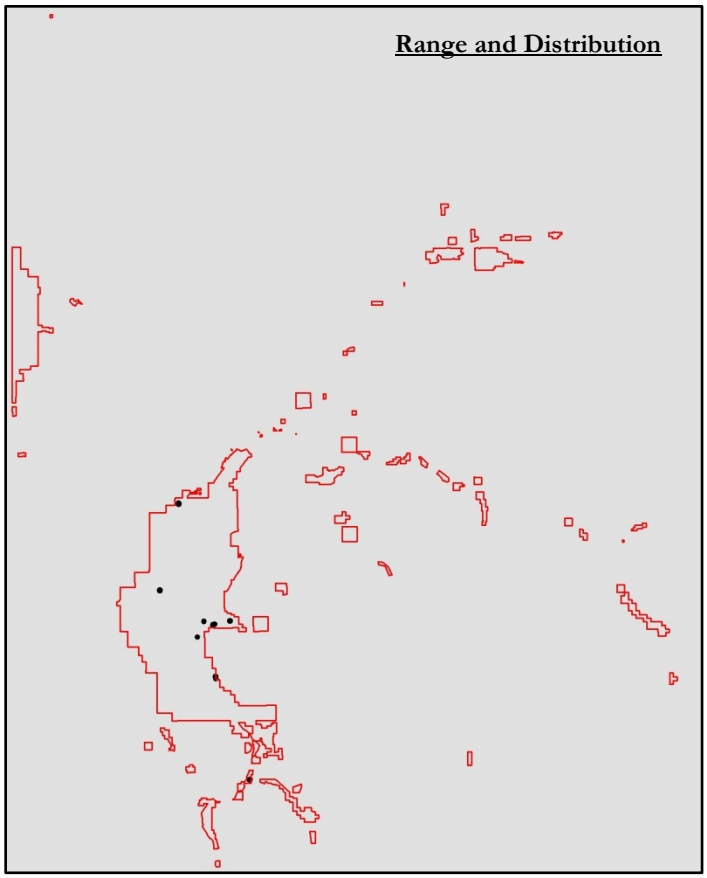
NRDU Communications and Utilities

Map Unit Statistics:
Frequency: 11 polygons
Average Aspect: 197°
Average Slope: 3°
Minimum Elevation: 5,952 feet
Maximum Elevation: 6,368 feet
Average Elevation: 6,190 feet
Average Size: 0.6 acres
Total Size: 6.4 acres

Photo Signature Example



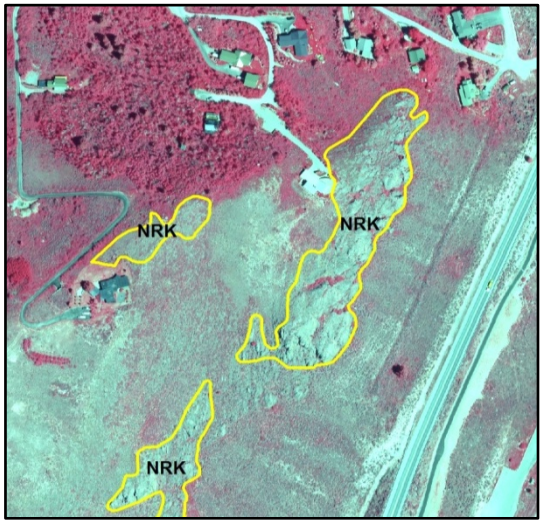
Range and Distribution



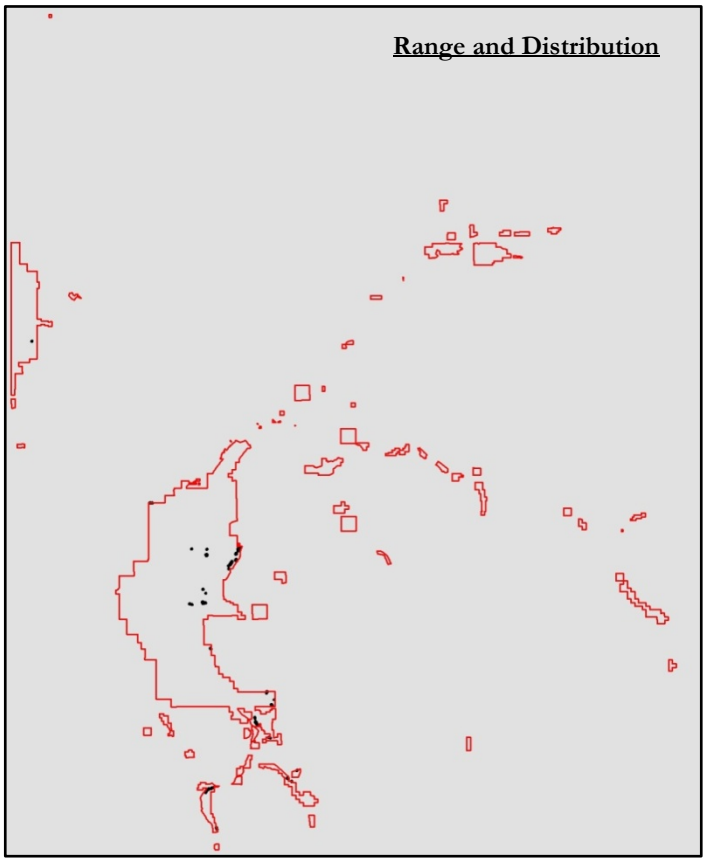
NRK Rock Outcrop / Cliff

Map Unit Statistics:
Frequency: 67 polygons
Average Aspect: 193°
Average Slope: 27°
Minimum Elevation: 5,840feet
Maximum Elevation: 7,902 feet
Average Elevation: 6,568 feet
Average Size: 0.5 acres
Total Size: 33.8 acres

Photo Signature Example



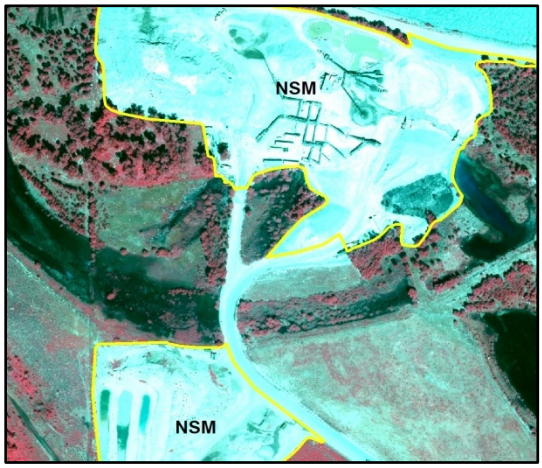
Range and Distribution



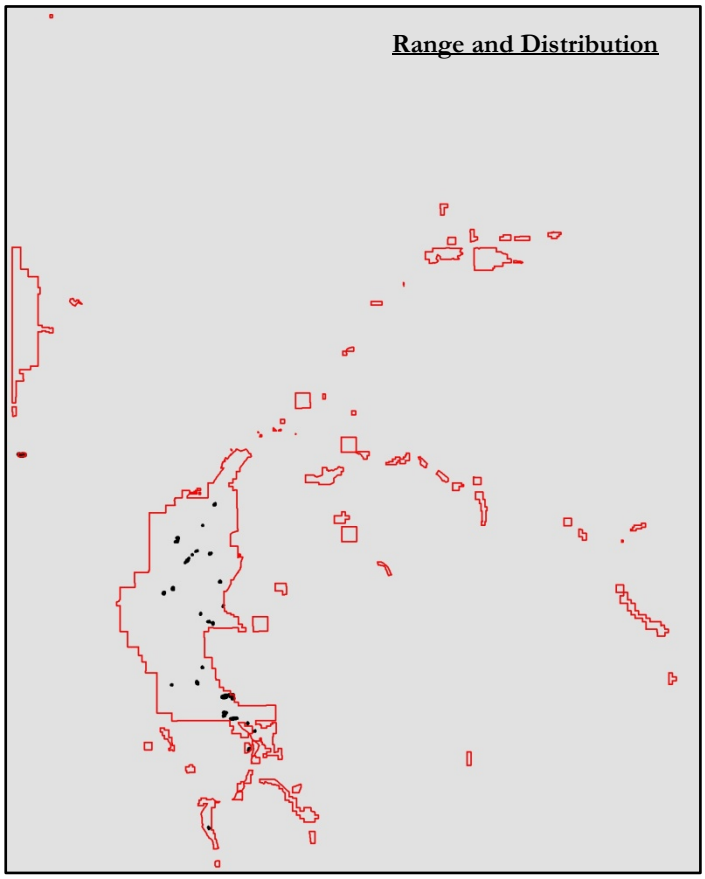
NSM Strip Mines, Quarries, and Gravel Pits

Map Unit Statistics:
Frequency: 39 polygons
Average Aspect: 210°
Average Slope: 9°
Minimum Elevation: 5,834 feet
Maximum Elevation: 7,107feet
Average Elevation: 6,248 feet
Average Size: 4.6 acres
Total Size: 179.6 acres

Photo Signature Example



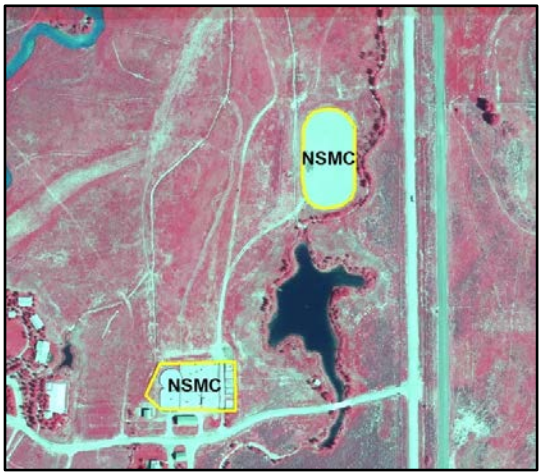
Range and Distribution



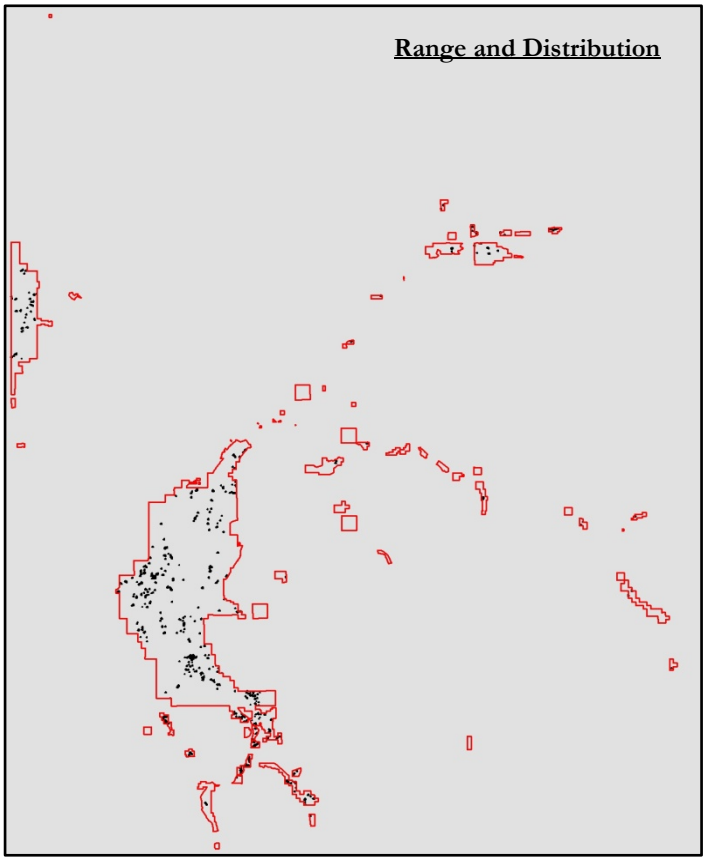
NSMC Corrals, Pens, and Outdoor Riding Arenas

Map Unit Statistics:
Frequency: 553 polygons
Average Aspect: 197°
Average Slope: 3°
Minimum Elevation: 5,840 feet
Maximum Elevation: 8,183 feet
Average Elevation: 6,271 feet
Average Size: 0.5 acres
Total Size: 304.1 acres

Photo Signature Example



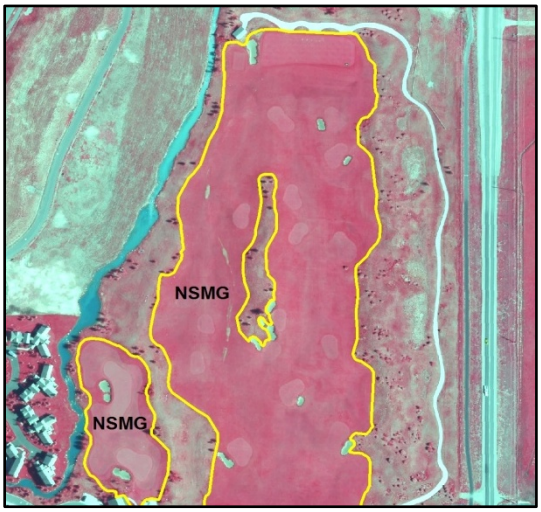
Range and Distribution



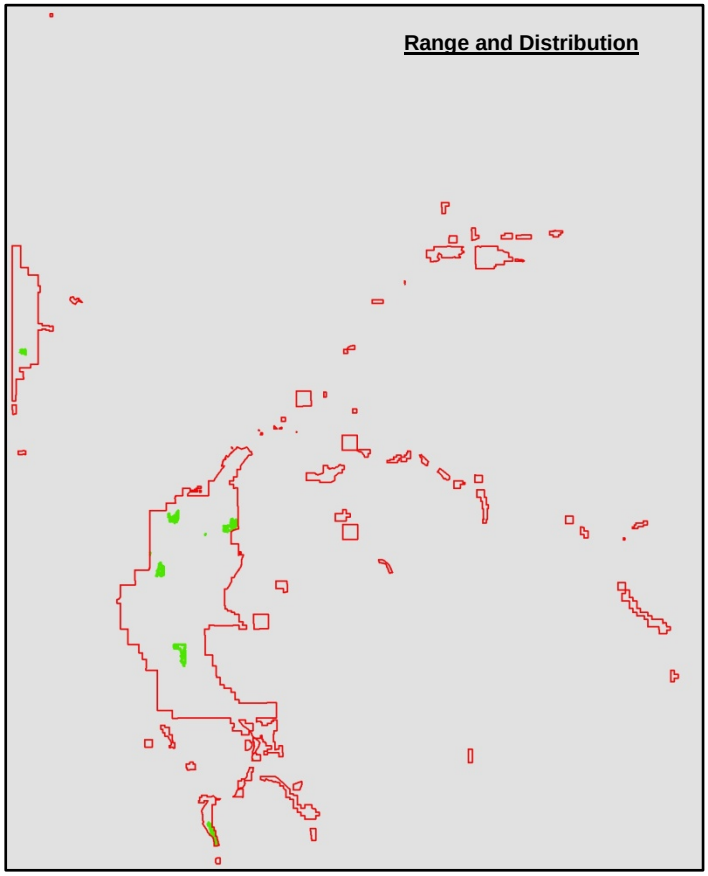
NSMG Golf Courses

Map Unit Statistics:
Frequency: 122 polygons
Average Aspect: 222°
Average Slope: 1°
Minimum Elevation: 5,830 feet
Maximum Elevation: 6,739 feet
Average Elevation: 6,275 feet
Average Size: 4.1 acres
Total Size: 506.1 acres

Photo Signature Example



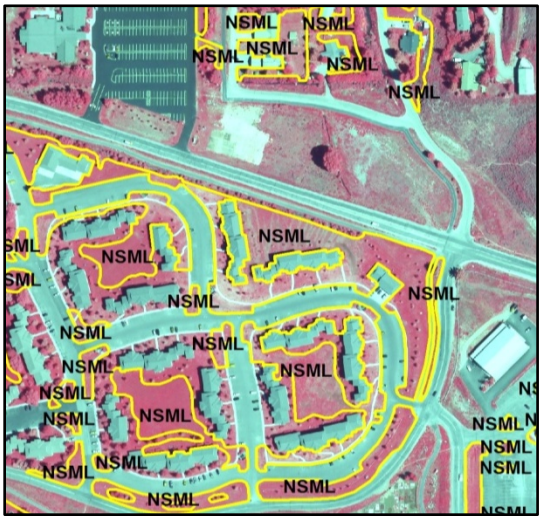
Range and Distribution



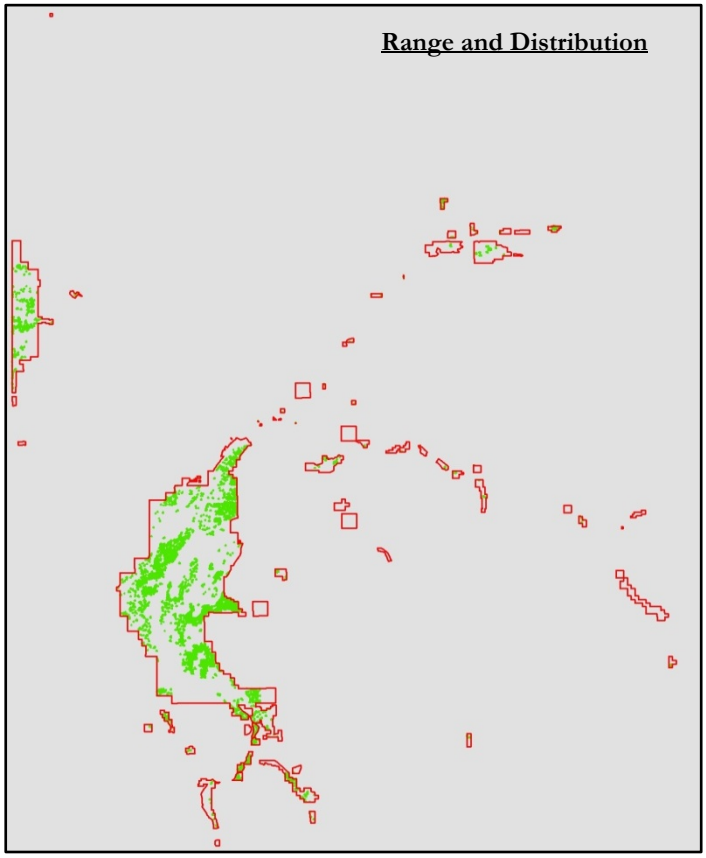
NSML Lawns and Landscaping

Map Unit Statistics:
Frequency: 5,319 polygons
Average Aspect: 203°
Average Slope: 3°
Minimum Elevation: 5,824 feet
Maximum Elevation: 8,186 feet
Average Elevation: 6,250 feet
Average Size: 0.3 acres
Total Size: 1,767.2 acres

Photo Signature Example



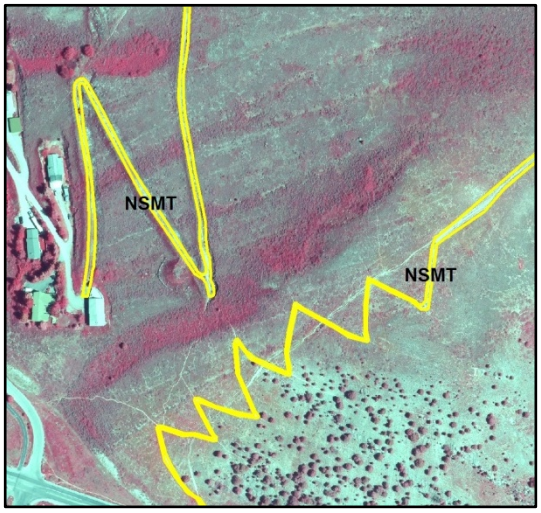
Range and Distribution



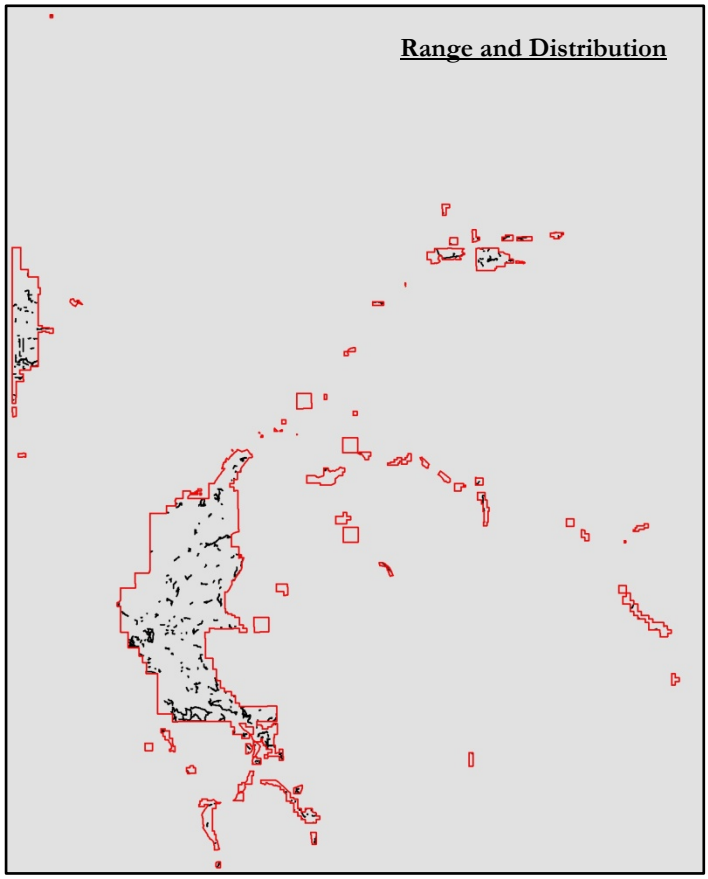
NSMT Horse and Ski Trails

Map Unit Statistics:
Frequency: 324 polygons
Average Aspect: 188°
Average Slope: 2°
Minimum Elevation: 5,794 feet
Maximum Elevation: 8,042 feet
Average Elevation: 6,395 feet
Average Size: 0.6 acres
Total Size: 184.8 acres

Photo Signature Example



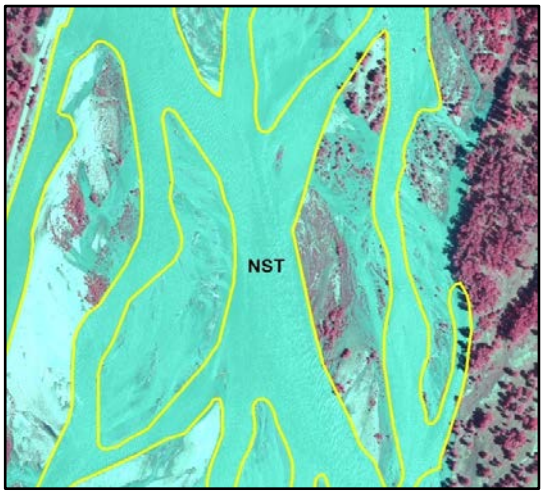
Range and Distribution



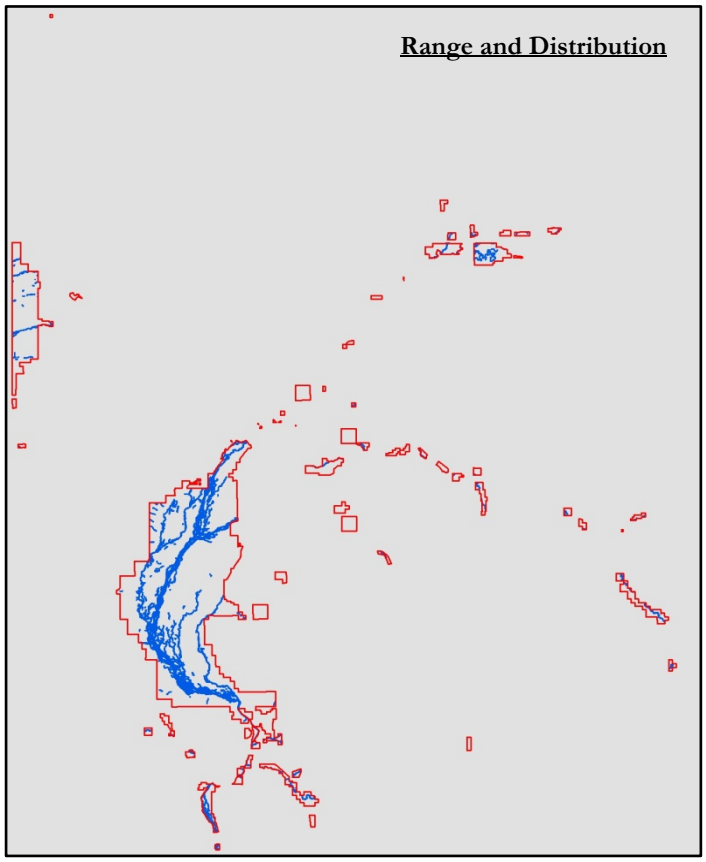
NST Streams and Rivers

Map Unit Statistics:
Frequency: 600 polygons
Average Aspect: 188°
Average Slope: 2°
Minimum Elevation: 5,794 feet
Maximum Elevation: 8,170 feet
Average Elevation: 6,338 feet
Average Size: 4.6 acres
Total Size: 2,783.0 acres

Photo Signature Example



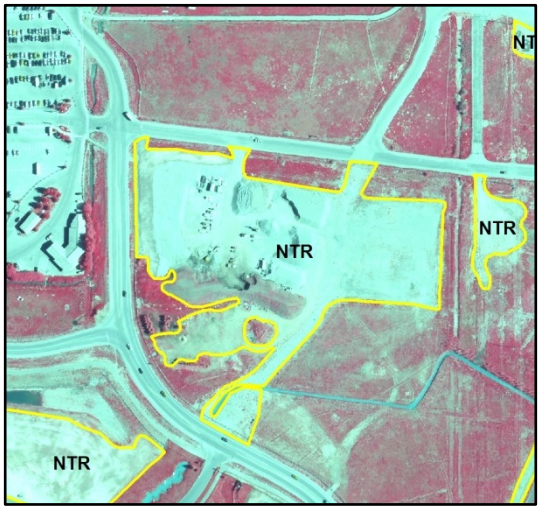
Range and Distribution



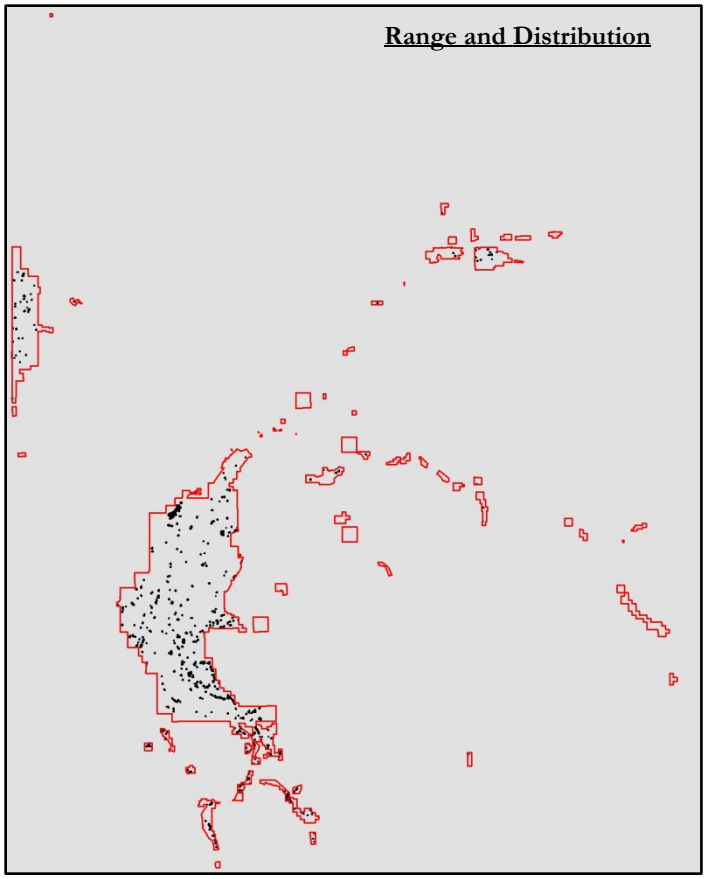
NTR Transitional Areas

Map Unit Statistics:
Frequency: 639
Average Aspect: 191°
Average Slope: 4°
Minimum Elevation: 5,827 feet
Maximum Elevation: 7,878 feet
Average Elevation: 6,273 feet
Average Size: 0.5 acres
Total Size: 308.7 acres

Photo Signature Example



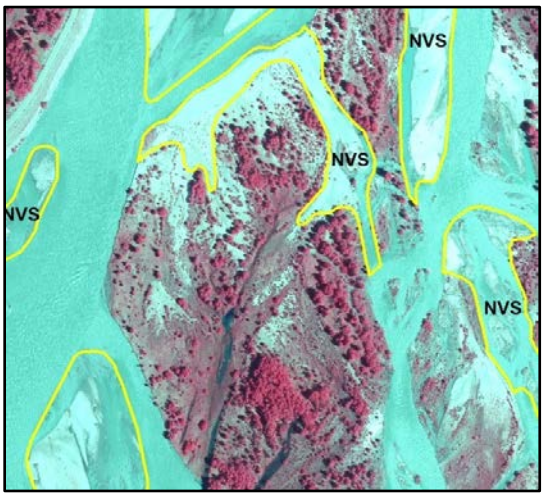
Range and Distribution



NVS Non-vegetated Cobble Bars

Map Unit Statistics:
Frequency: 602 Polygons
Average Aspect: 180°
Average Slope: 1°
Minimum Elevation: 5,794 feet
Maximum Elevation: 8,173 feet
Average Elevation: 6,405 feet
Average Size: 1.1 acres
Total Size: 683.3 acres

Photo Signature Example



Range and Distribution