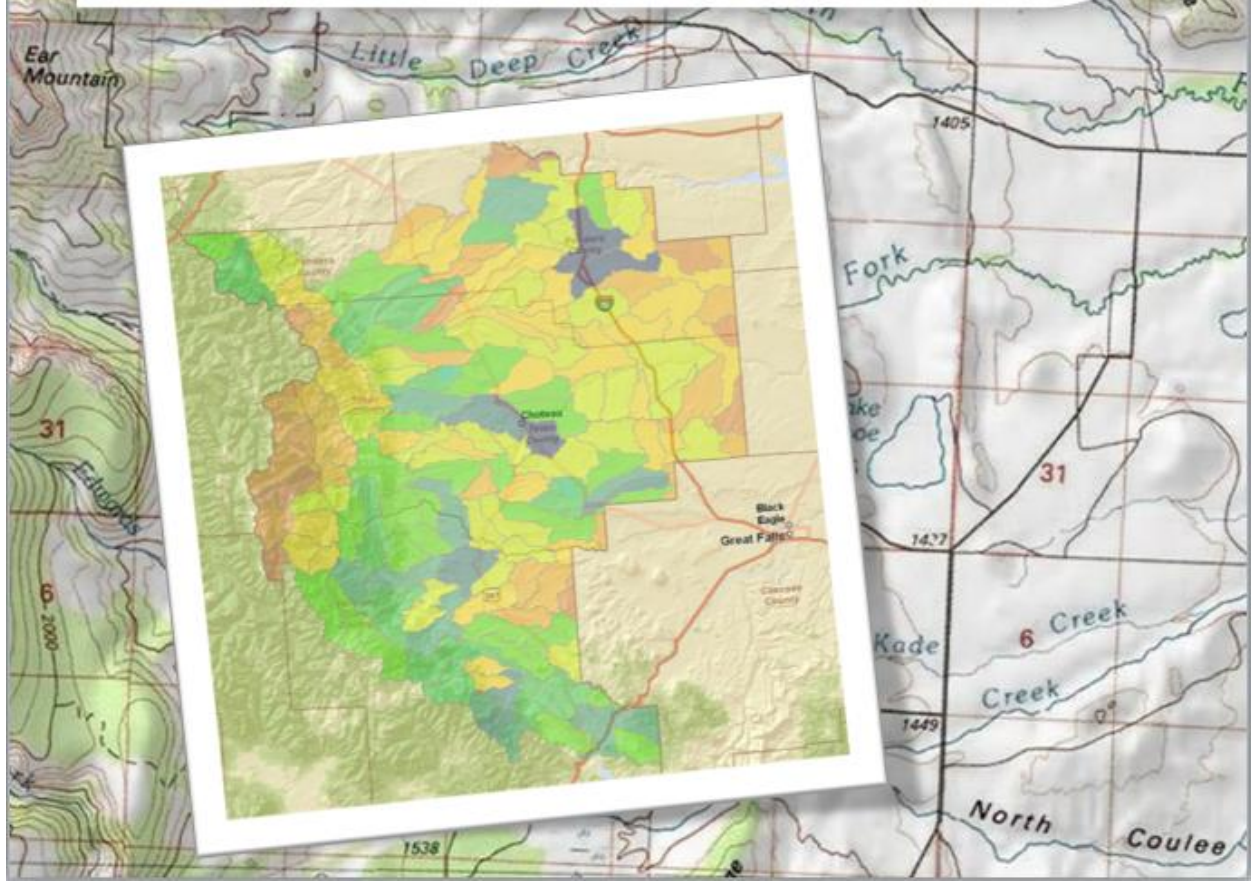




**Rocky Mountain Front
GIS Collaboration Project**



Contents

Preface 5

Introduction..... 6

GIS Map Layers 8

 ENVIRONMENT FACTORS 8

 N1: NATURAL SYSTEMS 8

 Forest Insect-Bark Beetle Probability 8

 Wildlife-Aquatic 8

 Wildlife- Terrestrial 8

 Conservation Easements 9

 Wildfire- Crown Fire Probability 9

 Wildfire- Hazard Areas 9

 Forested Lands 9

 Lakes 9

 Forest Insect - Mountain Pine Beetle 10

 Forest Insect - Other 10

 Streams & Rivers 10

 Wildfire- Surface Fire Probability 10

 N2: PLANNING & DESIGN 11

 Block Management Area Program (MDFWP) 11

 Farm Land 11

 Fishing Access Sites (MDFWP) 11

 MDFWP Lands 11

 Protected areas 11

 Public Land 12

 Road Density 12

 Residential Density 12

 Wells 12

 ECONOMY FACTORS 13

 E1: COMMERCE 13

 Accommodations 13

 Median Household Income 13

 Per Capita Income 13

 Agricultural Soil Quality 13

 Broadband Internet (Greater than 6 mbps) 14

 Broadband Internet (Mobile wireless) 14

 Broadband Internet (Areas not served) 14

 Broadband Internet (All types) 15

 Businesses 15

 Civilian Employed Population 15

 Food Services and Drinking Places 15

 Food Stores 16

MDFWP Lands.....	16
Gas Stations	16
Grazing Lands.....	16
Hunter and Angler Areas.....	16
Impervious Surfaces	17
Irrigation Ditches	17
Irrigated Lands	17
Oil and Gas Leases	17
Railroad Lines	17
Recreation Points.....	18
Recreational Trails	18
Wind Power Potential.....	18
Wind Speed	18
E2: PUBLIC INFRASTRUCTURE.....	18
Road Density	18
Roads.....	19
COMMUNITY FACTORS	19
C1: EDUCATION	19
Population Age 0-4	19
Population Age 5-9	19
Population Age10-14	19
Population Age 15-19.....	20
Schools	20
C2: HEALTH.....	20
Health Care Facilities.....	20
Population 75 or Older	20
C3: SAFETY	21
Ambulance Facilities	21
Wildfire- Crown Fire Probability.....	21
Fire Hazard Areas.....	21
Fire Stations.....	21
Hazardous Sites.....	21
Surface Fire Probability.....	22
C4: SOCIAL SITUATION.....	22
Median Household Income Annual Growth Rate	22
Per Capita Income	22
Median Household Income	22
Residential Structures.....	23
Unemployed Population	23
C5: ARTS & CULTURE	23
Libraries	23

Reference Layers	24
RMF GIS Collaboration Project Area	24
Counties Forming the Project Area	24
BLM Geographic Coordinate Data Base Public Land Survey System Townships	24
BLM Geographic Coordinate Data Base Public Land Survey System Sections.....	24
BLM Geographic Coordinate Data Base Public Land Survey System Quarter/Quarter Sections	24
Cadastral Map.....	25
ESRI Business Analyst Reported Business Counts by Section	25
ESRI Business Analyst Business Summaries of Number of Reported Employees by Section	25
ESRI Business Analyst Business Summaries of Reported Sales by Section.....	25
Shaded relief	25
Public Land Ownership	25
Suitability Model Unique Data Attributes	27
Contents of the Accompanying DVD	29
Web browser based mapping software	29
Desktop mapping software	29
Getting Started with RMF GIS Collaboration Data and ArcGIS Explorer	30
Tips and Tricks to Use the ArcGIS Explorer Maps	31
Index.....	32

Rocky Mountain Front GIS Collaboration Project

Preface

A team of Geographic Information System (GIS) specialists working with the Teton County Planning Department has produced this DVD which includes over 60 maps depicting many important natural, cultural and economic resources of Teton County and surrounding areas. The primary goal of this project was to assist county officials and residents in transforming important local values like safe communities, vibrant economies, and healthy landscapes, into information that can be used to make better development and land use decisions. The project was funded by a competitive state grant from the Montana Land Information Act that was awarded to Teton County in 2010. A multidisciplinary team including Corlene Martin, consultant, EcoLogic, environmental research consulting, Future West, a non-profit consulting group, and Geodata Services, a GIS consulting firm, joined together to submit the proposal that was chosen by Teton County to complete this project.

One of the first project activities was to send a questionnaire to over 300 Teton County and Rocky Mountain Front residents soliciting their thoughts on what they consider to be important local values, threats to these values, and information needed to address and resolve these issues. The results of this survey helped determine which of the many hundreds of possible data layers and maps would be most relevant to the community.

The final set of maps included on this DVD is divided into three categories: 1). Community, 2). Economy, and 3). Natural Systems. Diverse topics covered in the maps and data layers range from, for example, *Rates of Growth, Median Income, Broadband Internet Coverage, Residential Structures, Numbers of Businesses, Farmland and Land Use, Wildfire Hazard Areas, and Terrestrial Wildlife*, and many others.

In addition to the maps, the project also produced a "Community Viz Scenario Planning Model" for use by local government to evaluate specific development projects and compare alternative scenarios with maps, charts and reports.

During the course of this project, several workshops and public meetings were conducted to introduce local officials, public land managers, and the general public to the project and its products and provide hands-on assistance in learning how to access and utilize data bases and GIS tools. Project coordinators hope to be able to continue to provide technical support to insure that project tools are effectively utilized by decision makers and interested citizens.

Someone described this project as a "digital barn raising." Project coordinators are thankful to the many people who supported this effort and participated in project activities such as the on line survey, orientation workshops, and trainings. Foremost among collaborators were the Teton County Government and especially the Teton County Commissioners and the Teton County Planning Department. The project team is deeply grateful for their enthusiastic participation in the project. In addition, dozens of other entities ranging from various public service agencies, public land management agencies, non-profit organizations, businesses, and landowners provided valuable input and involvement in project presentations and capacity building workshops. Without all of this much appreciated support the project would not have been possible. The project team hopes that the interests and suggestions of participants are reflected in the final product, and that this "digital barn raising" will benefit us all.

The Rocky Mountain Front GIS Collaborative Project Team:
Corlene Martin, Consultant
John DiBari, EcoLogic
Dennis Glick, Future West
Ken Wall, Geodata Services, Inc.

Community

- Education
- Health
- Safety
- Social situation
- Arts & culture

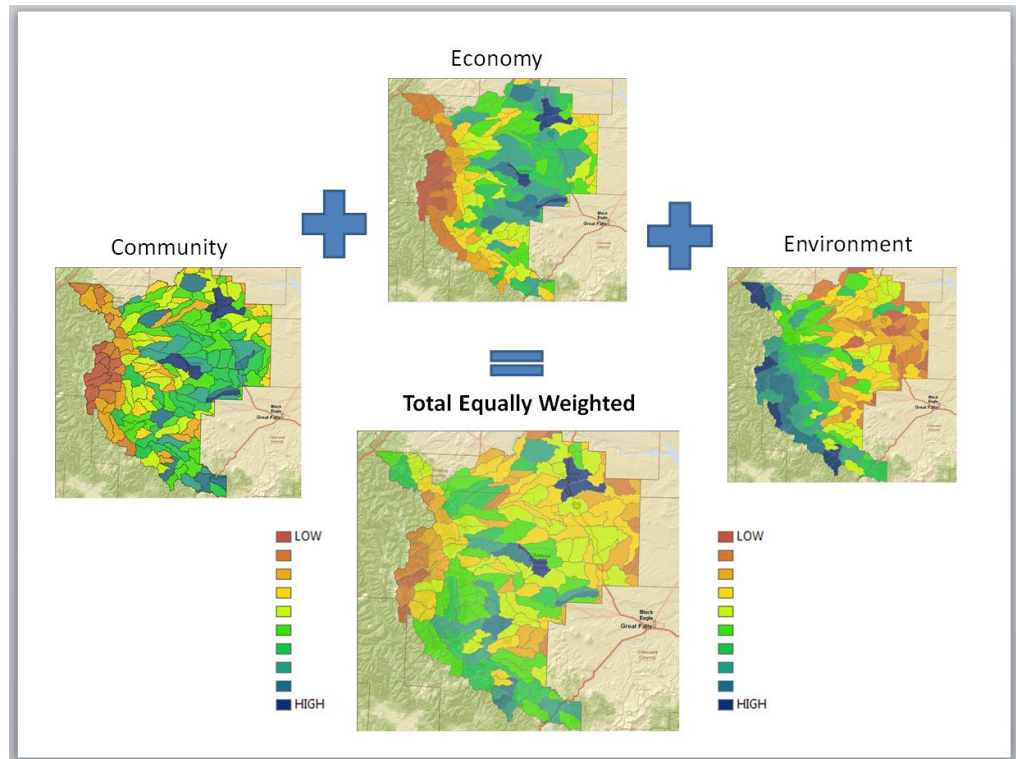
Economy

- Commerce
- Public Infrastructure

Environment

- Natural systems
- Planning & Design

Some GIS layers were applied to more than one factor. The overall concept of the suitability model was



modeled after a statewide assessment of forest resources developed by Geodata Services, Inc. for the Montana Department of Natural Resources and Conservation. The content and map layers determined to be included in the Rocky Mountain Front GIS Collaboration suitability model were developed by Dr. John Dibari. Additional layers, listed as reference layers following this section were not included in the model, but were included for general reference.

All data layers in the suitability model were aggregated and or summarized into two units of analysis, two versions of the model: watersheds (6th code); and townships. In both instances, the data attributes for each layer use the same naming convention as the map layers (shown directly above each thumbnail image in the list below). The base layers and analysis methods were identical for each version, watersheds and townships. Using the CommunityViz suitability model requires a license for ArcView version 10, and a license for the CommunityViz extension to ArcView. Teton County has the software and a working version of the models. Any organization that has these software licensed can use the fully functional models, which are stored on the accompanying DVD.

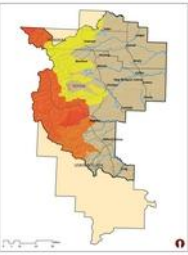
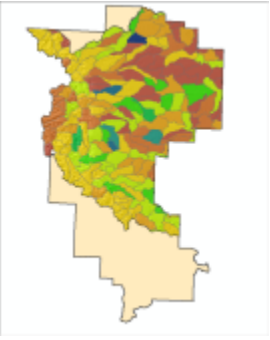
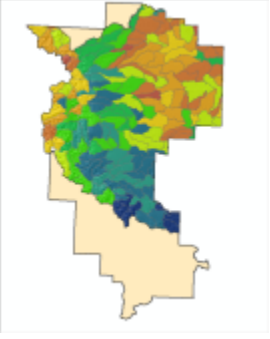
This section also serves as a description of the GIS layer packages that are available on the accompanying DVD and available to be viewed with free mapping programs in addition to the commercial licensing. Brief summaries and sources are listed later in this report to access and use the free mapping tools. For each map layer in the model, plus reference layers, there are one or more map layers in Esri layer package format. These map layers use the same map layer name (shown directly above each thumbnail image in the list below). When there are more than one GIS layer package for a map layer, the file names are sequentially numbered. In some instances, the data layer used in the suitability model varied from the final layer package included on the DVD. For instance, Dr. Dibari used a combined data set for protected areas. The layer package for protected areas is derived from the USGS Protected Areas Database (PAD), since this data recently became available.






The advantage of the layer package format is that each map layer is a standalone compressed file and can be instantly added to the commercial Esri GIS software or the free ArcGIS Explorer software. The file includes the base data, and the labels, symbols and data that represent the data.




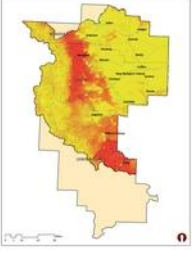
GIS Map Layers

ENVIRONMENT FACTORS

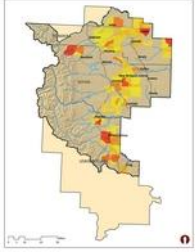




N1: NATURAL SYSTEMS


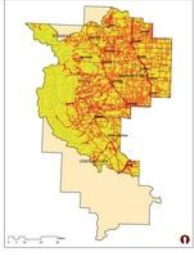
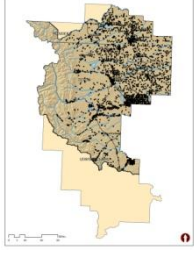
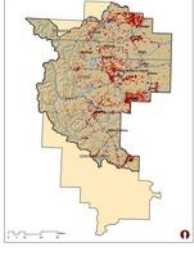
<p>BARKBEETLEPROB</p> 	<p>Forest Insect-Bark Beetle Probability</p> <p>This layer represents probabilities for the occurrence of bark beetle species. Data are based on a model developed by the US Forest Service Region 1. Values were weighted for Douglas fir, ponderosa pine, and lodge pole pine beetles and combined with mountain pine beetles. Western spruce beetles were not included in this analysis. The area covered by this model only included National Forest lands.</p> <p>CommunityViz suitability model was calculated as the average value of the study unit for this map layer.</p>
<p>CAPSAQTC</p> 	<p>Wildlife-Aquatic</p> <p>This layer represents the aquatic portion of the Montana Fish, Wildlife & Parks (FWP) Crucial Areas Planning System which was developed in part to act as “a new FWP mapping service aimed at future planning for a variety of development and conservation purposes so fish, wildlife, and recreational resources can be considered earlier.”</p> <p>“In 2008, Montana Fish, Wildlife & Parks (FWP) took the lead in conducting a Crucial Areas Assessment. The Assessment evaluated the fish, wildlife and recreational resources of Montana in order to identify crucial areas and fish and wildlife corridors. The Assessment is part of a larger conservation effort that recognizes the importance of landscape scale management of species and habitats by fish and wildlife agencies.”</p> <p>CommunityViz suitability model was calculated as the average value of the study unit for this map layer, based on an equal weighted overlay of .aquatic connectivity, native fish species richness and game fish quality. Details on the processing are available in the background documents subdirectory on the DVD.</p> <p>This layer is only available aggregated to watersheds and townships in the accompanying GIS files on the DVD.</p>
<p>CAPSTRSTL</p> 	<p>Wildlife- Terrestrial</p> <p>This layer represents the terrestrial portion of the Montana Fish, Wildlife & Parks (FWP) Crucial Areas Planning System which was developed in part to act as “a new FWP mapping service aimed at future planning for a variety of development and conservation purposes so fish, wildlife, and recreational resources can be considered earlier.”</p> <p>“In 2008, Montana Fish, Wildlife & Parks (FWP) took the lead in conducting a Crucial Areas Assessment. The Assessment evaluated the fish, wildlife and recreational resources of Montana in order to identify crucial areas and fish and wildlife corridors. The Assessment is part of a larger conservation effort that recognizes the importance of landscape scale management of species and habitats by fish and wildlife agencies.”</p> <p>CommunityViz suitability model was calculated as the average value of the study unit for this map layer, based on an equal weighted overlay of terrestrial conservation species, game quality and species richness. Details on the processing are available in the background documents subdirectory on the DVD.</p> <p>This layer is only available aggregated to watersheds and townships in the accompanying GIS files on the DVD.</p>

<p>CONSEASE</p> 	<p>Conservation Easements</p> <p>This layer depicts conservation easements. It contains data found in the Montana Stewardship database and additional easements provided by Dave Hanna with The Nature Conservancy.</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p> <p>The layer provided in the accompanying GIS files on the DVD included all easements in the Montana Stewardship database.</p>
<p>CROWNFIRE</p> 	<p>Wildfire- Crown Fire Probability</p> <p>This layer represents crown fire probability. The map and model were prepared by the US Forest Service and are based on a mapping effort by Mark Finney and Laurie Kurth at the Fire Lab in Missoula. This process focused on crown fires. Analysis methods included Monte Carlo runs for problem fires, and took into account the last 20 years of actual fires history and behavior. This map was run for about two thirds of the total area of Montana in and around National Forest lands. It included all lands, not just federal land.</p> <p>CommunityViz suitability model was calculated as the summed probability values of the study unit for this map layer.</p>
<p>FHRPPDF</p> 	<p>Wildfire- Hazard Areas</p> <p>This layer serves as a surrogate for areas not covered by US Forest Service burned area probability maps. The data were used to identify ponderosa pine and Douglas fir vegetation types and were derived from LANDFIRE products.</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p>
<p>FOREST</p> 	<p>Forested Lands</p> <p>This layer represents information associated with types of agricultural land uses. The forest layer reflects the following types of agricultural land use: commercial and non-commercial forest.</p> <p>This layer is derived from the Department of Revenue (DOR) Final Land Unit Classification (FLU) data set, which is a classification of private agricultural land into one of six uses, fallow, hay, grazing, irrigated, continuously cropped and forest, with forest additionally classified as commercial or non-commercial and irrigated land classified as being flood, pivot, or sprinkler. The data is used in property valuation for agriculture and forest land on private properties. The data is maintained continually as use changes are picked up or noticed by DOR county offices.</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p>
<p>LAKES</p> 	<p>Lakes</p> <p>This layer represents lakes and is a subset of the NHDWaterbody data set. NHDWaterbody: Basic water bodies such as lake/pond features are represented here. They portray the spatial geometry and the attributes of the feature. These water polygons may contain NHDFlowline artificial paths to allow the representation of water flow. Other NHDWaterbody features are swamp/marsh, reservoir, playa, estuary, and ice mass. Selected FCODE attributes equal to 39001 (LakePond), 39004 (LakePond), and 46600 (SwampMarsh) to be represented in the analysis. FCODE = 37800 (Ice mass) was omitted.</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p>

<p>MPBDISEASE</p> 	<p>Forest Insect - Mountain Pine Beetle</p> <p>This layer represents acres of all insect and disease species (bark beetles) using a composite of all 2000-2009 data. The data are based on the Forest Health Protection (FHP) Aviation Program in the US Forest Service Region 1 annual insect and disease detection surveys, primarily using fixed-wing aircraft.</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p>
<p>NON_MPBDISEASE</p> 	<p>Forest Insect - Other</p> <p>This layer represents acres of all insect and disease species other than bark beetles using composite of all 2000-2009 data. The data are based on the Forest Health Protection (FHP) Aviation Program in the US Forest Service Region 1 annual insect and disease detection surveys, primarily using fixed-wing aircraft.</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p>
<p>STREAMS</p> 	<p>Streams & Rivers</p> <p>This layer represents perennial and intermittent streams and is a subset of the NHDflowline data set.</p> <p>NHDFlowline: This is the fundamental flow network consisting predominantly of stream/river and artificial path vector features. It represents the spatial geometry, carries the attributes, models the water flow, and contains linear referencing measures for locating events on the network. Additional NHDFlowline features are canal/ditch, pipeline, connector, underground conduit, and coastline. Selected FCODE attribute equal to 46003 and 46006.</p> <p>CommunityViz suitability model was calculated as the miles of streams and rivers within the study unit for this map layer.</p>
<p>SURFACEFIRE</p> 	<p>Wildfire- Surface Fire Probability</p> <p>This simulation research was conducted in order to develop a large-fire risk assessment system for the contiguous land area of the United States. The modeling system was applied to each of 134 Fire Planning Units (FPUs) to estimate burn probabilities and fire size distributions. To obtain stable estimates of these quantities, fire ignition and growth was simulated for 10,000 to 50,000 “years” of artificial weather. The fire growth simulations, when run repeatedly with different weather and ignition locations, produce burn probabilities and fire behavior distributions at each landscape location (e.g. number of times a “cell” burns at a given intensity divided by the total years).</p> <p>A Simulation of Probabilistic Wildfire Risk Components for the Continental United States. Mark A. Finney, Charles W. McHugh, Isaac C. Grenfell, Karin L. Riley, Karen C. Short, USDA Forest Service, Missoula Fire Sciences Laboratory 5775 Highway 10 West, Missoula, MT 59808</p> <p>CommunityViz suitability model was calculated as the summed probability values of the study unit for this map layer.</p>

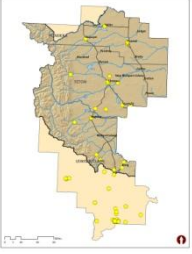
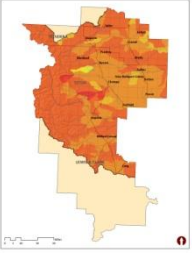
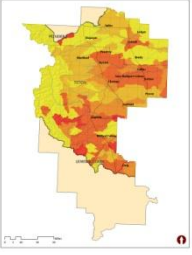

N2: PLANNING & DESIGN

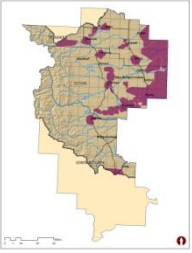
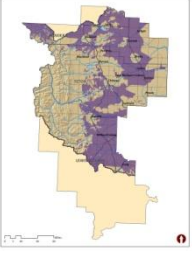
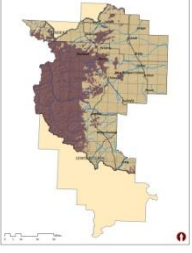
<p>BMA</p> 	<p>Block Management Area Program (MDFWP)</p> <p>This layer is built from a data provided by Bob Cochran (bcochran@mt.gov) at the Montana Fish, Wildlife & Parks (FWP) office in Helena, MT -- 406-444-4688. It contains the attribute "acres" for each unit of analysis associated with Block Management Areas (BMA) from the year 2010.</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p>
<p>FARMLAND</p> 	<p>Farm Land</p> <p>This layer represents information associated with types of agricultural land uses. The farmland layer reflects the following types of agricultural land use: summer fallow, irrigated and non-irrigated hay land.</p> <p>This layer is derived from the Department of Revenue (DOR) Final Land Unit Classification (FLU) data set, which is a classification of private agricultural land into one of six uses, fallow, hay, grazing, irrigated, continuously cropped and forest, with forest additionally classified as commercial or non-commercial and irrigated land classified as being flood, pivot, or sprinkler. The data is used in property valuation for agriculture and forest land on private properties. The data is maintained continually as use changes are picked up or noticed by DOR county offices.</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p>
<p>FASCD</p> 	<p>Fishing Access Sites (MDFWP)</p> <p>This layer represents point locations for fishing access sites owned and/or managed by the Montana Department of Fish, Wildlife and Parks.</p> <p>Cost associated with traveling from any point on the landscape to a fishing access site (see Road Cost layer for more information).</p> <p>CommunityViz suitability model was calculated as the average distance of the study unit to fishing access sites using an average speed by road type cost surface to calculate the relative distance.</p>
<p>FWPLANDCD</p> 	<p>MDFWP Lands</p> <p>This layer represents parcels of land owned or managed by the Montana Department of Fish, Wildlife and Parks. Lands managed by FWP do not necessarily imply public access.</p> <p>Cost associated with traveling from any point on the landscape to the centroid of a block of FWP land (see Road Cost layer for more information).</p> <p>CommunityViz suitability model was calculated as the average distance of the study unit to MDFWP lands using an average speed by road type cost surface to calculate the relative distance.</p>
<p>PROTAREA</p> 	<p>Protected areas</p> <p>Selected areas from Protected Areas Database of the United States (PADUS) version 1.1. From US Geological Survey (USGS) Gap Analysis Program (GAP).</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p>


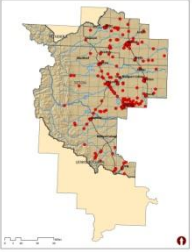
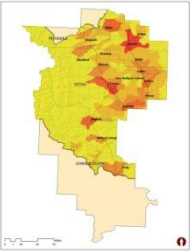

<p>PUBLAND</p> 	<p>Public Land</p> <p>This layer represents public land ownership status. It incorporates federal, state, and local public lands. Data from this layer are part of the Montana Stewardship database.</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p>
<p>RDDENSITY</p> 	<p>Road Density</p> <p>This layer represents roads. The density layer is calculated in number of miles of road per square mile of area.</p> <p>Roads within the study area were selected from the Montana Transportation Framework personal geodatabase. Data was obtained from the Base Map Service Center, State of Montana Dept. of Administration.</p> <p>CommunityViz suitability model was calculated as average value of study unit for this map layer for miles per square mile of all roads.</p>
<p>STRDENSITY</p> 	<p>Residential Density</p> <p>This layer represents structures. The density layer is calculated in number of structures per square mile of area.</p> <p>The Montana Structures Framework (formerly the Critical Infrastructure and Structures Framework) is a statewide spatial database of primary structures/buildings in the State of Montana. The Montana Structures Framework is one of thirteen Montana Spatial Data Infrastructure (MSDI) Framework themes. The goal of the Montana Structures Framework is to have a routinely updated statewide database of structures with addresses and the functions, or structure type, associated with the structures.</p> <p>Through a federated approach, the project integrates structures data from local, state, federal and private data providers into the standardized Montana Structures Database.</p> <p>CommunityViz suitability model was calculated as average value of study unit for this map layer for number of structures per square mile of all residential structures.</p>
<p>WELLS</p> 	<p>Wells</p> <p>This layer contains point locations and selected attributes for water wells within Montana abstracted from databases maintained at the Ground-Water Information Center (GWIC) at the Montana Bureau of Mines and Geology. Original data sources include water rights filings, water well logs, visits to water wells, and publications of the Montana Bureau of Mines and Geology, the U.S. Geological Survey, and others. The databases are maintained at the Ground-Water Information Center. Ground-water site locations and selected fields are forwarded quarterly to NRIS.</p> <p>Fields provided in this data set are a subset of the fields available in the database at the GWIC. Additional data for ground-water resources in Montana can be obtained from the GWIC website at http://mbmggwic.mtech.edu</p> <p>CommunityViz suitability model was calculated as total count per study unit.</p>





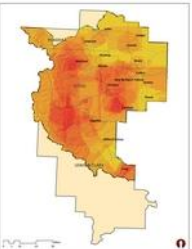
ECONOMY FACTORS



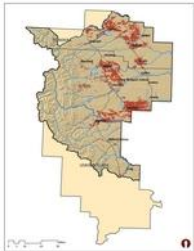


E1: COMMERCE





<p>ACCOMMCD</p> 	<p>Accommodations</p> <p>This layer represents point locations for accommodations including hotels, motels, guest ranches, and B&Bs from NAICS code beginning with 721. Data was obtained from Esri's Business Analyst. Esri's business locations data was extracted from a comprehensive list of businesses licensed from InfoUSA's Infogroup®. The business list contains data for more than 12 million US businesses. Commercial licensing prevents distributing data accompanying the data location. Summary sales and employee information from the InfoUSA businesses were summarized by PLSS section for all major NAICS industrial codes in a separate layer.</p> <p>Cost associated with traveling from any point on the landscape to an accommodation (see Road Cost layer for more information)</p> <p>CommunityViz suitability model was calculated as total count per study unit..</p>
<p>AGRMHINCOME</p> 	<p>Median Household Income</p> <p>This layer represents the average annual growth rate for median household income from 2000 to 2010. Data was obtained from Esri's Business Analyst, 2010/2015 updated demographics data which offers more than 2,000 data variables derived from the US Census Bureau and commercial demographic and economic sources. U.S. Block Groups were the source geography, representing the Census block groups of United States. See http://www.esri.com/data/esri_data/demographic.html for more information on the data source.</p> <p>Caution should be applied in interpreting this data with small local polygons such as the watersheds and townships used in this project since they are smaller than typical census block groups, the data source. See http://www.esri.com/news/arcuser/1008/polygons.html for an excellent article on this.</p> <p>CommunityViz suitability model was calculated as average value per study unit.</p> <p>This layer is only available aggregated to watersheds and townships in the accompanying GIS files on the DVD.</p>
<p>AGRPCINCOME</p> 	<p>Per Capita Income</p> <p>This layer represents the average annual growth rate per capita income from 2000 to 2010. Data was obtained from Esri's Business Analyst, 2010/2015 updated demographics data which offers more than 2,000 data variables derived from the US Census Bureau and commercial demographic and economic sources. U.S. Block Groups were the source geography, representing the Census block groups of United States. See http://www.esri.com/data/esri_data/demographic.html for more information on the data source.</p> <p>Caution should be applied in interpreting this data with small local polygons such as the watersheds and townships used in this project since they are smaller than typical census block groups, the data source. See http://www.esri.com/news/arcuser/1008/polygons.html for an excellent article on this.</p> <p>CommunityViz suitability model was calculated as average value per study unit.</p> <p>This layer is only available aggregated to watersheds and townships in the accompanying GIS files on the DVD.</p>
<p>AGSOILS</p> 	<p>Agricultural Soil Quality</p> <p>This layer represents an index of agricultural soil "quality." Index values are associated with soils classified as prime, prime if irrigated, statewide importance, and local importance and were reclassified to the following values: prime = 100, prime if irrigated = 75, statewide = 50, local = 25, else = 0. The reclassified data sets were added together to derive the agricultural soil index layer.</p> <p>CommunityViz suitability model was calculated as the average value of the study unit for this map layer.</p>

<p>BBGT6MBPS</p> 	<p>Broadband Internet (Greater than 6 mbps) This layer represents areas with broadband internet speeds greater than or equal to 6 mbps.</p> <p>The broadband availability data provided by the US Dept. of Commerce, National Telecommunication and Information Administration, State Broadband Initiative (June 30, 2010). Data was originally processed in a file geodatabase, however, the version released as GIS data by the FCC and included on the DVD shows entire census blocks with broadband coverage. Census blocks larger than 2 square miles can extend on to large areas of public land, and portions of these large census blocks may not be covered by broadband. As a result the GIS data may look different than how it is displayed on the BroadbandMap.gov. and MTBroadband.org . For a complete description of how the data was collected, please refer the NOFA, Technical Appendix, and NOFA clarification, which can be found here: http://www2.ntia.doc.gov/notices#mapping .</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p> <p>This layer is only available in the accompanying GIS files on the DVD as coverage by census blocks larger and smaller than 2 square miles for wired coverage. It requires the ability to process the data and subset by speed, so will only be useful with a commercial license of ArcView.</p>
<p>BBMWONLY</p> 	<p>Broadband Internet (Mobile wireless) This layer represents areas with mobile wireless (cellular) broadband service only.</p> <p>The broadband availability data provided by the US Dept. of Commerce, National Telecommunication and Information Administration, State Broadband Initiative (June 30, 2010). Data was originally processed in a file geodatabase, however, the version released as GIS data by the FCC and included on the DVD shows entire census blocks with broadband coverage. Census blocks larger than 2 square miles can extend on to large areas of public land, and portions of these large census blocks may not be covered by broadband. As a result the GIS data may look different than how it is displayed on the BroadbandMap.gov. and MTBroadband.org . For a complete description of how the data was collected, please refer the NOFA, Technical Appendix, and NOFA clarification, which can be found here: http://www2.ntia.doc.gov/notices#mapping .</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p> <p>This layer was only available in public form as a stand alone GIS layer by census blocks for wireless. Since it exaggerates the coverage dramatically and shows virtually all the census blocks that have some wireless coverage somewhere within them, we did not include the layer.</p>
<p>BBNS</p> 	<p>Broadband Internet (Areas not served) This layer represents areas that are not served by broadband internet (defined as downstream speeds of greater than or equal to 768 kbps).</p> <p>The broadband availability data provided by the US Dept. of Commerce, National Telecommunication and Information Administration, State Broadband Initiative (June 30, 2010). Data was originally processed in a file geodatabase, however, the version released as GIS data by the FCC and included on the DVD shows entire census blocks with broadband coverage. Census blocks larger than 2 square miles can extend on to large areas of public land, and portions of these large census blocks may not be covered by broadband. As a result the GIS data may look different than how it is displayed on the BroadbandMap.gov. and MTBroadband.org . For a complete description of how the data was collected, please refer the NOFA, Technical Appendix, and NOFA clarification, which can be found here: http://www2.ntia.doc.gov/notices#mapping .</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p> <p>This layer is only available in the accompanying GIS files on the DVD as areas not shown as coverage by census blocks larger and smaller than 2 square miles (BBSV1 and BBSV2) for wired coverage.</p>

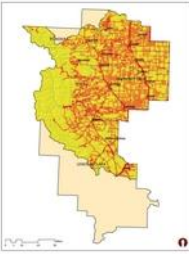
<p>BBSV</p> 	<p>Broadband Internet (All types)</p> <p>This layer represents areas that are served by broadband internet (defined as downstream speeds of greater than or equal to 768 kbps).</p> <p>The broadband availability data provided by the US Dept. of Commerce, National Telecommunication and Information Administration, State Broadband Initiative (June 30, 2010). Data was originally processed in a file geodatabase, however, the version released as GIS data by the FCC and included on the DVD shows entire census blocks with broadband coverage. Census blocks larger than 2 square miles can extend on to large areas of public land, and portions of these large census blocks may not be covered by broadband. As a result the GIS data may look different than how it is displayed on the BroadbandMap.gov. and MTBroadband.org . For a complete description of how the data was collected, please refer the NOFA, Technical Appendix, and NOFA clarification, which can be found here: http://www2.ntia.doc.gov/notices#mapping .</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p> <p>This layer is only available in the accompanying GIS files on the DVD as areas shown as coverage by census blocks larger (BBSV2) and smaller (BBSV1) than 2 square miles for wired coverage.</p>
<p>BUSINESS</p> 	<p>Businesses</p> <p>This layer represents point locations all businesses. Data was obtained from Esri's Business Analyst. Esri's business locations data was extracted from a comprehensive list of businesses licensed from InfoUSA's Infogroup®. The business list contains data for more than 12 million US businesses. Commercial licensing prevents distributing data accompanying the data location. Summary sales and employee information from the InfoUSA businesses were summarized by PLSS section for all major NAICS industrial codes in a separate layer.</p> <p>CommunityViz suitability model was calculated as total count per study unit.</p>
<p>EMPLOYEES</p> 	<p>Civilian Employed Population</p> <p>This layer represents the total employed population greater than 16 years of age for the year 2010. Data was obtained from Esri's Business Analyst, 2010/2015 updated demographics data which offers more than 2,000 data variables derived from the US Census Bureau and commercial demographic and economic sources. U.S. Block Groups were the source geography, representing the Census block groups of United States. See http://www.esri.com/data/esri_data/demographic.html for more information on the data source.</p> <p>Caution should be applied in interpreting this data with small local polygons such as the watersheds and townships used in this project since they are smaller than typical census block groups, the data source. See http://www.esri.com/news/arcuser/1008/polygons.html for an excellent article on this.</p> <p>CommunityViz suitability model was calculated as average value per study unit.</p> <p>This layer is only available aggregated to watersheds and townships in the accompanying GIS files on the DVD.</p>
<p>FOODDRINKCD</p> 	<p>Food Services and Drinking Places</p> <p>This layer represents restaurants. Data was obtained from Esri's Business Analyst. This layer represents point locations for NAICS code beginning with 722. Esri's business locations data was extracted from a comprehensive list of businesses licensed from InfoUSA's Infogroup®. The business list contains data for more than 12 million US businesses. Commercial licensing prevents distributing data accompanying the data location. Summary sales and employee information from the InfoUSA businesses were summarized by PLSS section for all major NAICS industrial codes in a separate layer.</p> <p>CommunityViz suitability model was calculated as the average distance of the study unit to food services and drinking places using an average speed by road type cost surface to calculate the relative distance.</p>


<p>FOODSTORECD</p> 	<p>Food Stores</p> <p>This layer represents point locations for food stores from NAICS code beginning with 445. Data was obtained from Esri's Business Analyst. Esri's business locations data was extracted from a comprehensive list of businesses licensed from InfoUSA's Infogroup®. The business list contains data for more than 12 million US businesses. Commercial licensing prevents distributing data accompanying the data location. Summary sales and employee information from the InfoUSA businesses were summarized by PLSS section for all major NAICS industrial codes in a separate layer.</p> <p>CommunityViz suitability model was calculated as the average distance of the study unit to food stores using an average speed by road type cost surface to calculate the relative distance.</p>
<p>FWPLANDCD</p> 	<p>MDFWP Lands</p> <p>This layer represents parcels of land owned or managed by the Montana Department of Fish, Wildlife and Parks (FWP). Lands managed by FWP do not necessarily imply public access.</p> <p>CommunityViz suitability model was calculated as the average distance of the study unit to MDFWP lands using an average speed by road type cost surface to calculate the relative distance.</p>
<p>GASSTATIONCD</p> 	<p>Gas Stations</p> <p>This layer represents point locations for gas stations from NAICS code beginning with 55410. Data was obtained from Esri's Business Analyst. Esri's business locations data was extracted from a comprehensive list of businesses licensed from InfoUSA's Infogroup®. The business list contains data for more than 12 million US businesses. Commercial licensing prevents distributing data accompanying the data location. Summary sales and employee information from the InfoUSA businesses were summarized by PLSS section for all major NAICS industrial codes in a separate layer.</p> <p>CommunityViz suitability model was calculated as the average distance of the study unit to gas stations using an average speed by road type cost surface to calculate the relative distance.</p>
<p>GRAZING</p> 	<p>Grazing Lands</p> <p>This layer represents information associated with types of agricultural land uses. The grazing land layer reflects the following types of agricultural land use: grazing land.</p> <p>This layer is derived from the Department of Revenue (DOR) Final Land Unit Classification (FLU) data set, which is a classification of private agricultural land into one of six uses, fallow, hay, grazing, irrigated, continuously cropped and forest, with forest additionally classified as commercial or non-commercial and irrigated land classified as being flood, pivot, or sprinkler. The data is used in property valuation for agriculture and forest land on private properties. The data is maintained continually as use changes are picked up or noticed by DOR county offices.</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p>
<p>HUNTFISH</p> 	<p>Hunter and Angler Areas</p> <p>This layer represents hunter and angler valued areas. The data were developed by Bill Geer of the Theodore Roosevelt Conservation Partnership. The map includes a count of the number of hunter and angler groups interested in specific areas identified by the hunter and angler groups.</p> <p>CommunityViz suitability model was calculated as the maximum value of the study unit for this map layer.</p>

<p>IMPERVIOUS</p> 	<p>Impervious Surfaces</p> <p>This layer represents impervious surfaces. Data were derived from a US Geological Survey data set using LANDSAT satellite imagery with a 30 meter resolution, meaning the smallest feature visible would be the size of a softball diamond. Most tree crowns are smaller than a softball diamond and when viewed from a satellite, measuring a portion of the visible light spectrum, there is often a mixed value where trees overlap concrete or asphalt. The result has mixed accuracy in urban areas.</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p>
<p>IRRGDITCH</p> 	<p>Irrigation Ditches</p> <p>This layer represents irrigation ditches. These data were acquired during 12/10 from Elizabeth Murray, GIS Specialist, Montana DNRC, Water Resources Division, (406) 444 5926, emurray@mt.gov. See link below for information associated with surveys from which these data originated. http://www.dnrc.mt.gov/wrd/water_rts/survey_books/default.asp</p> <p>CommunityViz suitability model was calculated as the miles of irrigation ditches within the study unit for this map layer.</p>
<p>IRRGLAND</p> 	<p>Irrigated Lands</p> <p>This layer represents irrigated lands. These data were acquired during 12/10 from Elizabeth Murray, GIS Specialist, Montana DNRC, Water Resources Division, (406) 444 5926, emurray@mt.gov. See link below for information associated with surveys from which these data originated. http://www.dnrc.mt.gov/wrd/water_rts/survey_books/default.asp</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p>
<p>OILGAS</p> 	<p>Oil and Gas Leases</p> <p>This layer was derived from data provided by Randy Schardt (schardt@blm.gov) at the BLM office in Billings, MT -- 406-896-5141. It contains oil and gas leases for Teton, Pondera, and Lewis and Clark counties.</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p>
<p>RAILROADCD</p> 	<p>Railroad Lines</p> <p>This layer represents railroads. The Burlington Northern Santa Fe rail line was GPSed by BNSF, the remaining railroads were taken from the rail network data set created by the Bureau of Transportation Statistics.</p> <p>CommunityViz suitability model was calculated as the average distance of the study unit to railroad lines using an average speed by road type cost surface to calculate the relative distance.</p>

<p>RECPTSCD</p> 	<p>Recreation Points</p> <p>Recreation sites including: campgrounds (public and private), recreation sites, fishing access sites, historic districts, historic sites, picnic areas, and ski resorts. Sources for this point layer included Montana Fish, Wildlife, and Parks, US Forest Service, Montana State Historic Preservation Office, and Esri's Business Analyst.</p> <p>CommunityViz suitability model was calculated as the average distance of the study unit to recreation points using an average speed by road type cost surface to calculate the relative distance.</p>
<p>RECTRAIL</p> 	<p>Recreational Trails</p> <p>This layer represents National Forest System trails. Many trails exist in the project area outside of public lands, but we were unable to identify publicly available GIS layers for those on private lands.</p> <p>CommunityViz suitability model was calculated as the miles of recreational trails within the study unit for this map layer.</p>
<p>WINDPOTEN</p> 	<p>Wind Power Potential</p> <p>This layer represents estimated wind power distribution. This is a raster data set in which each 400-meter pixel represents the average power of the wind in watts per square meter at an elevation of 50 meters above the ground. These wind power resource estimates were produced by TrueWind Solutions using their Mesomap system and historical weather data. This map has been validated with available surface data by the National Renewable Energy Laboratory and wind energy meteorological consultants. The estimates tend to be more accurate for the plains than for mountainous areas. For more information, see http://www.windpowermaps.org.</p> <p>CommunityViz suitability model was calculated as the average value of the study unit for this map layer.</p>
<p>WINDSPEED</p> 	<p>Wind Speed</p> <p>This layer represents estimated wind speed. This is a raster data set in which each 400-meter pixel represents the average speed of the wind in meters per second at an elevation of 50 meters above the ground. These wind speed estimates were produced by TrueWind Solutions using their Mesomap system and historical weather data. This map has been validated with available surface data by the National Renewable Energy Laboratory and wind energy meteorological consultants. The estimates tend to be more accurate for the plains than for mountainous areas. For more information, see http://www.windpowermaps.org.</p> <p>CommunityViz suitability model was calculated as the average value of the study unit for this map layer.</p>

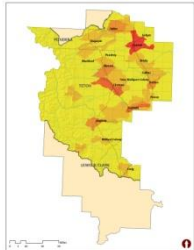
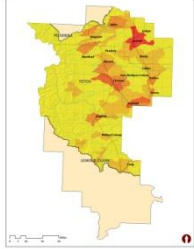
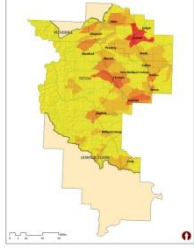
E2: PUBLIC INFRASTRUCTURE

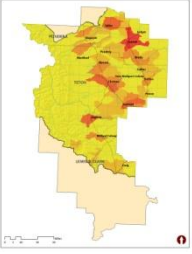

<p>RDDENSITY</p> 	<p>Road Density</p> <p>This layer represents road density. The density layer is calculated in number of miles of road per square mile of area.</p> <p>Roads within the study area were selected from the Montana Transportation Framework personal geodatabase. Data was obtained from the Base Map Service Center, State of Montana Dept. of Administration.</p> <p>CommunityViz suitability model was calculated as average value of study unit for this map layer for miles per square mile of all roads.</p>
--	---

<p>ROADMILE</p> 	<p>Road Miles</p> <p>This layer represents miles of road.</p> <p>Roads within the study area were selected from the Montana Transportation Framework personal geodatabase. Data was obtained from the Base Map Service Center, State of Montana Dept. of Administration.</p> <p>CommunityViz suitability model was calculated as the miles of roads within the study unit for this map layer.</p>
--	--


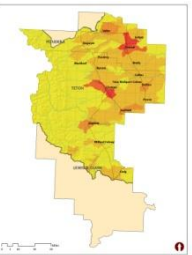
COMMUNITY FACTORS

C1: EDUCATION






<p>POP0TO4</p> 	<p>Population Age 0-4</p> <p>This layer represents the total population ages 0 to 4 for the year 2010. Data was obtained from Esri's Business Analyst, 2010/2015 updated demographics data which offers more than 2,000 data variables derived from the US Census Bureau and commercial demographic and economic sources. U.S. Block Groups were the source geography, representing the Census block groups of United States. See http://www.esri.com/data/esri_data/demographic.html for more information on the data source.</p> <p>Caution should be applied in interpreting this data with small local polygons such as the watersheds and townships used in this project since they are smaller than typical census block groups, the data source. See http://www.esri.com/news/arcuser/1008/polygons.html for an excellent article on this.</p> <p>CommunityViz suitability model was calculated as average value per study unit.</p> <p>This layer is only available aggregated to watersheds and townships in the accompanying GIS files on the DVD.</p>
<p>POP5TO9</p> 	<p>Population Age 5-9</p> <p>This layer represents the total population ages 5 to 9 for the year 2010. Data was obtained from Esri's Business Analyst, 2010/2015 updated demographics data which offers more than 2,000 data variables derived from the US Census Bureau and commercial demographic and economic sources. U.S. Block Groups were the source geography, representing the Census block groups of United States. See http://www.esri.com/data/esri_data/demographic.html for more information on the data source.</p> <p>Caution should be applied in interpreting this data with small local polygons such as the watersheds and townships used in this project since they are smaller than typical census block groups, the data source. See http://www.esri.com/news/arcuser/1008/polygons.html for an excellent article on this.</p> <p>CommunityViz suitability model was calculated as average value per study unit.</p> <p>This layer is only available aggregated to watersheds and townships in the accompanying GIS files on the DVD.</p>
<p>POP10TO14</p> 	<p>Population Age 10-14</p> <p>This layer represents the total population ages 10 to 14 for the year 2010. Data was obtained from Esri's Business Analyst, 2010/2015 updated demographics data which offers more than 2,000 data variables derived from the US Census Bureau and commercial demographic and economic sources. U.S. Block Groups were the source geography, representing the Census block groups of United States. See http://www.esri.com/data/esri_data/demographic.html for more information on the data source.</p> <p>Caution should be applied in interpreting this data with small local polygons such as the watersheds and townships used in this project since they are smaller than typical census block groups, the data source. See http://www.esri.com/news/arcuser/1008/polygons.html for an excellent article on this.</p> <p>CommunityViz suitability model was calculated as average value per study unit.</p> <p>This layer is only available aggregated to watersheds and townships in the accompanying GIS files on the DVD.</p>

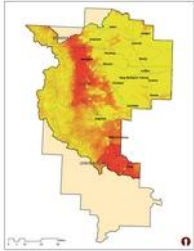
	files on the DVD.
<p>POP15TO19</p> 	<p>Population Age 15-19</p> <p>This layer represents the total population ages 15 to 19 for the year 2010. Data was obtained from Esri's Business Analyst, 2010/2015 updated demographics data which offers more than 2,000 data variables derived from the US Census Bureau and commercial demographic and economic sources. U.S. Block Groups were the source geography, representing the Census block groups of United States. See http://www.esri.com/data/esri_data/demographic.html for more information on the data source.</p> <p>Caution should be applied in interpreting this data with small local polygons such as the watersheds and townships used in this project since they are smaller than typical census block groups, the data source. See http://www.esri.com/news/arcuser/1008/polygons.html for an excellent article on this.</p> <p>CommunityViz suitability model was calculated as average value per study unit.</p> <p>This layer is only available aggregated to watersheds and townships in the accompanying GIS files on the DVD.</p>
<p>SCHOOLSCD</p> 	<p>Schools</p> <p>This layer represents schools. The Montana Schools database is comprised of public and private schools within the state of Montana. This includes colleges & universities. The overall source for the school information came from the Directory of Montana Schools 2003-2004, published by the Montana Office of Public Instruction (OPI) and other sources.</p> <p>CommunityViz suitability model was calculated as the average distance of the study unit to schools using an average speed by road type cost surface to calculate the relative distance.</p>

C2: HEALTH

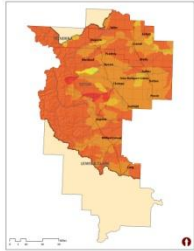
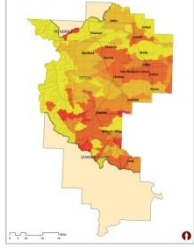
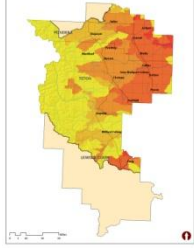
<p>HEALTHCD</p> 	<p>Health Care Facilities</p> <p>This layer represents point locations for food stores from NAICS code beginning with 621 and 622. Data was obtained from Esri's Business Analyst. Esri's business locations data was extracted from a comprehensive list of businesses licensed from InfoUSA's Infogroup®. The business list contains data for more than 12 million US businesses. Commercial licensing prevents distributing data accompanying the data location. Summary sales and employee information from the InfoUSA businesses were summarized by PLSS section for all major NAICS industrial codes in a separate layer.</p> <p>CommunityViz suitability model was calculated as the average distance of the study unit to health care facilities using an average speed by road type cost surface to calculate the relative distance.</p>
<p>POPGT75</p> 	<p>Population 75 or Older</p> <p>This layer represents the total population greater than 75 years of age for the year 2010. Data was obtained from ESRI's Business Analyst, 2010/2015 updated demographics data which offers more than 2,000 data variables derived from the US Census Bureau and commercial demographic and economic sources. U.S. Block Groups were the source geography, representing the Census block groups of United States. See http://www.esri.com/data/esri_data/demographic.html for more information on the data source.</p> <p>Caution should be applied in interpreting this data with small local polygons such as the watersheds and townships used in this project since they are smaller than typical census block groups, the data source. See http://www.esri.com/news/arcuser/1008/polygons.html for an excellent article on this.</p> <p>CommunityViz suitability model was calculated as average value per study unit.</p> <p>This layer is only available aggregated to watersheds and townships in the accompanying GIS files on the DVD.</p>

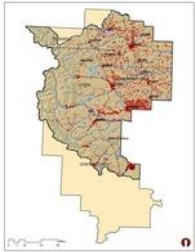
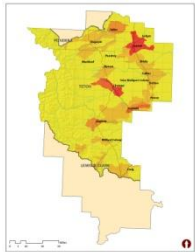
C3: SAFETY

<p>AMBULANCECD</p> 	<p>Ambulance Facilities</p> <p>This layer represents ambulance services extracted from the Montana Structures Framework, a statewide spatial database of primary structures/buildings in the State of Montana. The Montana Structures Framework is one of thirteen Montana Spatial Data Infrastructure (MSDI) Framework themes. The goal of the Montana Structures Framework is to have a routinely updated statewide database of structures with addresses and the functions, or structure type, associated with the structures. Through a federated approach, the project integrates structures data from local, state, federal and private data providers into the standardized Montana Structures Database.</p> <p>CommunityViz suitability model was calculated as the average distance of the study unit to ambulance home stations using an average speed by road type cost surface to calculate the relative distance.</p>
<p>CROWNFIRE</p> 	<p>Wildfire- Crown Fire Probability</p> <p>This layer represents crown fire probability. The map and model were prepared by the US Forest Service and are based on a mapping effort by Mark Finney and Laurie Kurth at the Fire Lab in Missoula. This process focuses on crown fires. Analysis methods include Monte Carlo runs for problem fires, and took into account the last 20 years of actual fires history and behavior. This map was run for about two thirds of the total area of Montana in and around National Forest lands. It included all lands, not just federal land.</p> <p>CommunityViz suitability model was calculated as the summed probability values of the study unit for this map layer.</p>
<p>FHRPPDF</p> 	<p>Fire Hazard Areas</p> <p>This layer serves as a surrogate for areas not covered by US Forest Service burned area probability maps. The data were used to identify ponderosa pine and Douglas fir vegetation types and were derived from LANDFIRE products.</p> <p>The CommunityViz suitability model was calculated as percent of study unit for this map layer.</p>
<p>FIRESTATIONCD</p> 	<p>Fire Stations</p> <p>This layer represents fire stations extracted from the Montana Structures Framework, a statewide spatial database of primary structures/buildings in the State of Montana. The Montana Structures Framework is one of thirteen Montana Spatial Data Infrastructure (MSDI) Framework themes. The goal of the Montana Structures Framework is to have a routinely updated statewide database of structures with addresses and the functions, or structure type, associated with the structures. Through a federated approach, the project integrates structures data from local, state, federal and private data providers into the standardized Montana Structures Database.</p> <p>CommunityViz suitability model was calculated as the average distance of the study unit to fire stations using an average speed by road type cost surface to calculate the relative distance.</p>
<p>HAZSITESCD</p> 	<p>Hazardous Sites</p> <p>This layer represents hazardous waste sites. It was created by combining data associated with the following layers downloaded from NRIS in February 2011:</p> <ul style="list-style-type: none"> • DEQ Hazardous Waste Handlers (points) • DEQ Non-Facility Petroleum Leak Sites (points) • DEQ Underground Storage Tank Facilities (points) • DEQ Underground Storage Tank Facility Leak Sites (points) • EPA Toxic Release Inventory (TRI) sites (points) • Landfills (1996) (points) <p>CommunityViz suitability model was calculated as the average distance of the study unit to hazardous sites using an average speed by road type cost surface to calculate the relative distance. Unlike all other cost distance values, for these sites the CommunityViz model was inverted, so the farther away from the hazardous site the higher the suitability.</p>


<p>SURFACEFIRE</p> 	<p>Surface Fire Probability</p> <p>This simulation research was conducted in order to develop a large-fire risk assessment system for the contiguous land area of the United States. The modeling system was applied to each of 134 Fire Planning Units (FPU) to estimate burn probabilities and fire size distributions. To obtain stable estimates of these quantities, fire ignition and growth was simulated for 10,000 to 50,000 “years” of artificial weather. The fire growth simulations, when run repeatedly with different weather and ignition locations, produce burn probabilities and fire behavior distributions at each landscape location (e.g. number of times a “cell” burns at a given intensity divided by the total years).</p> <p>A Simulation of Probabilistic Wildfire Risk Components for the Continental United States. Mark A. Finney, Charles W. McHugh, Isaac C. Grenfell, Karin L. Riley, Karen C. Short USDA Forest Service, Missoula Fire Sciences Laboratory 5775 Highway 10 West, Missoula, MT 59808</p> <p>CommunityViz suitability model was calculated as the summed probability values of the study unit for this map layer.</p>
---	--

C4: SOCIAL SITUATION

<p>AGRMHINCOME</p> 	<p>Median Household Income Annual Growth Rate</p> <p>This layer represents the average annual growth rate for median household income from 2000 to 2010. Data was obtained from Esri’s Business Analyst, 2010/2015 updated demographics data which offers more than 2,000 data variables derived from the US Census Bureau and commercial demographic and economic sources. U.S. Block Groups were the source geography, representing the Census block groups of United States. See http://www.esri.com/data/esri_data/demographic.html for more information on the data source.</p> <p>Caution should be applied in interpreting this data with small local polygons such as the watersheds and townships used in this project since they are smaller than typical census block groups, the data source. See http://www.esri.com/news/arcuser/1008/polygons.html for an excellent article on this.</p> <p>CommunityViz suitability model was calculated as average value per study unit.</p> <p>This layer is only available aggregated to watersheds and townships in the accompanying GIS files on the DVD.</p>
<p>AGRPCINCOME</p> 	<p>Per Capita Income</p> <p>This layer represents the average annual growth rate per capita income from 2000 to 2010. Data was obtained from Esri’s Business Analyst, 2010/2015 updated demographics data which offers more than 2,000 data variables derived from the US Census Bureau and commercial demographic and economic sources. U.S. Block Groups were the source geography, representing the Census block groups of United States. See http://www.esri.com/data/esri_data/demographic.html for more information on the data source.</p> <p>Caution should be applied in interpreting this data with small local polygons such as the watersheds and townships used in this project since they are smaller than typical census block groups, the data source. See http://www.esri.com/news/arcuser/1008/polygons.html for an excellent article on this.</p> <p>CommunityViz suitability model was calculated as average value per study unit.</p> <p>This layer is only available aggregated to watersheds and townships in the accompanying GIS files on the DVD.</p>
<p>MEDHHINC</p> 	<p>Median Household Income</p> <p>This layer represents the median household income annual growth rate from 2000 to 2010. Data was obtained from Esri’s Business Analyst, 2010/2015 updated demographics data which offers more than 2,000 data variables derived from the US Census Bureau and commercial demographic and economic sources. U.S. Block Groups were the source geography, representing the Census block groups of United States. See http://www.esri.com/data/esri_data/demographic.html for more information on the data source.</p> <p>Caution should be applied in interpreting this data with small local polygons such as the watersheds and townships used in this project since they are smaller than typical census block groups, the data source. See http://www.esri.com/news/arcuser/1008/polygons.html for an excellent article on this.</p> <p>CommunityViz suitability model was calculated as average value per study unit.</p>





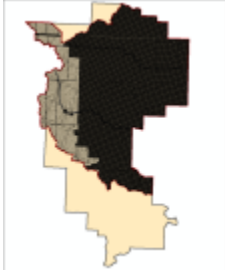
	<p>This layer is only available aggregated to watersheds and townships in the accompanying GIS files on the DVD.</p>
<p>STRUCTURES</p> 	<p>Residential Structures This layer represents structures.</p> <p>The Montana Structures Framework (formerly the Critical Infrastructure and Structures Framework) is a statewide spatial database of primary structures/buildings in the State of Montana. The Montana Structures Framework is one of thirteen Montana Spatial Data Infrastructure (MSDI) Framework themes. The goal of the Montana Structures Framework is to have a routinely updated statewide database of structures with addresses and the functions, or structure type, associated with the structures.</p> <p>Through a federated approach, the project integrates structures data from local, state, federal and private data providers into the standardized Montana Structures Database.</p> <p>CommunityViz suitability model was calculated as total count per study unit.</p>
<p>UNEMPLOYED</p> 	<p>Unemployed Population This layer represents the total unemployed population greater than 16 years of age for the year 2010. Data was obtained from Esri's Business Analyst, 2010/2015 updated demographics data which offers more than 2,000 data variables derived from the US Census Bureau and commercial demographic and economic sources. U.S. Block Groups were the source geography, representing the Census block groups of United States. See http://www.esri.com/data/esri_data/demographic.html for more information on the data source.</p> <p>Caution should be applied in interpreting this data with small local polygons such as the watersheds and townships used in this project since they are smaller than typical census block groups, the data source. See http://www.esri.com/news/arcuser/1008/polygons.html for an excellent article on this.</p> <p>CommunityViz suitability model was calculated as average value per study unit.</p> <p>This layer is only available aggregated to watersheds and townships in the accompanying GIS files on the DVD.</p>

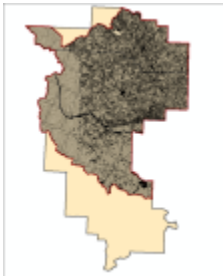
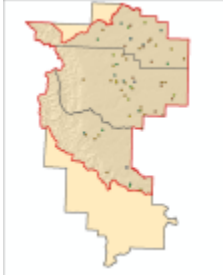
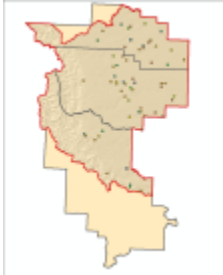
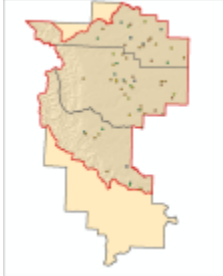

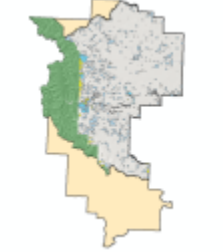
C5: ARTS & CULTURE

<p>LIBRARYCD</p> 	<p>Libraries This layer represents public libraries in Montana cities and towns from NRIS.</p> <p>CommunityViz suitability model was calculated as the average distance of the study unit to libraries using an average speed by road type cost surface to calculate the relative distance.</p>
---	---

Reference Layers

The following layers are not included in the CommunityViz suitability model. They are provided as stand alone reference map layers to use with GIS software and map viewing software.

<p>PROJAREA</p> 	<p>RMF GIS Collaboration Project Area This layer represents the project area. It includes all of Teton County and portions of Pondera and Lewis and Clark counties in Montana.</p>
<p>COUNTIES</p> 	<p>Counties Forming the Project Area This layer includes the three counties forming the project area. Portions of Pondera and Lewis and Clark were not included. Data source was the Montana State Library.</p>
<p>PLSS_TWN</p> 	<p>BLM Geographic Coordinate Data Base Public Land Survey System Townships This layer includes the townships from the BLM GCDB with polygon resolution down to the quarter/quarter section. It is useful to view or create map layers with a reference system including aliquot parts.</p>
<p>PLSS_SEC</p> 	<p>BLM Geographic Coordinate Data Base Public Land Survey System Sections This layer includes the sections from the BLM GCDB with polygon resolution down to the quarter/quarter section. It is useful to view or create map layers with a reference system including aliquot parts.</p>
<p>PLSS_QQ</p> 	<p>BLM Geographic Coordinate Data Base Public Land Survey System Quarter/Quarter Sections This layer includes the quarter/quarter sections or ladesec from the BLM GCDB with polygon resolution down to the quarter/quarter section. It is useful to view or create map layers with a reference system including aliquot parts.</p>

<p>MTCADASTRAL</p> 	<p>Cadastral Map This layer includes the 2011 version of the Montana cadastral map, including property tax data on every parcel in the project area.</p>
<p>BIZSQMI</p> 	<p>ESRI Business Analyst Reported Business Counts by Section Data was processed and derived from Esri's Business Analyst. Esri's business locations data was extracted from a comprehensive list of businesses licensed from InfoUSA's Infogroup®. The business list contains data for more than 12 million US businesses. Summary sales and employee information from the InfoUSA businesses were summarized by PLSS section for all major NAICS industrial codes for those businesses that participated in InfoUSA's annual phone surveys and related research.</p>
<p>EMPSQMI</p> 	<p>ESRI Business Analyst Business Summaries of Number of Reported Employees by Section Data was processed and derived from Esri's Business Analyst. Esri's business locations data was extracted from a comprehensive list of businesses licensed from InfoUSA's Infogroup®. The business list contains data for more than 12 million US businesses. Summary sales and employee information from the InfoUSA businesses were summarized by PLSS section for all major NAICS industrial codes for those businesses that participated in InfoUSA's annual phone surveys and related research.</p>
<p>SALESSQMI</p> 	<p>ESRI Business Analyst Business Summaries of Reported Sales by Section Data was processed and derived from Esri's Business Analyst. Esri's business locations data was extracted from a comprehensive list of businesses licensed from InfoUSA's Infogroup®. The business list contains data for more than 12 million US businesses. Summary sales and employee information from the InfoUSA businesses were summarized by PLSS section for all major NAICS industrial codes for those businesses that participated in InfoUSA's annual phone surveys and related research.</p>
<p>SA_HILLSHADE30</p> 	<p>Shaded relief This layer was derived as a shaded relief map from the Montana digital elevation model at 30 meter cell size resolution. Simulating the sun angle shining on the earth, the layer provides an accurate depiction of the topographic relief. It is useful as a base map layer if the ArcGIS Online base maps are not available in instances when you do not have an Internet connection.</p>
<p>PUBLANDOWN</p> 	<p>Public Land Ownership This layer shows an approximation of public land ownership colored by owner or administrator for all public lands. Ownership is colored similar to a National Forest map. Ownership changes annually, and is not always reflected in the latest ownership map, but this layer is useful as a base map layer when you do not have an Internet connection.</p>

ROADS



Roads

This layer represents roads.

Roads within the study area were selected from the Montana Transportation Framework personal geodatabase. Data was obtained from the Base Map Service Center, State of Montana Dept. of Administration.

Suitability Model Unique Data Attributes

The following table summarizes the subset of the data that was used in the suitability model ("20,000 ft. View"). Specifics are provided in the data summary, along with a short description of the type of measurement used in the model for each layer.

ATTRIBUTE_NAME	SUMMARY
ACCOMMCD	Average distance to accommodations (hotels, motels, etc.)
AGRMHINCOME	Average annual growth rate Median Household Income 2000-2010
AGRPCINCOME	Average annual growth rate Per Capita Income 2000-2010
AGSOILS	Mean value of an agricultural soil index
AMBULANCECD	Average distance to ambulance facilities per study unit
BARKBEETLEPROB	Average bark beetle probability
BBGT6MBPS	Percent of study area served by broadband internet greater than 6 mbps
BBMWONLY	Percent of study area identified as being served only by mobile wireless broadband internet
BBNS	Percent of study area identified as not served by broadband internet
BBSV	Percent of study area identified as having some form of broadband internet
BMA	Percent of study area in the FWP Block Management Area program
BUSINESS	Number of businesses
CAPSAQTC	Aquatic wildlife
CAPSTRSTL	Terrestrial wildlife
CONSEASE	Percent of conservation easements per study unit
CROWNFIRE	Crown fire probability
EMPLOYEES	Number of employed civilian population 16+
FARMLAND	Percent of farmland
FASCD	Average distance to an FWP fishing access site
FHRPPDF	Percent of fire hazard areas
FIRESTATIONCD	Average distance to a fire station per study unit
FOODDRINKCD	Average distance to food services and drinking places per study unit
FOODSTORECD	Average distance to food stores per study unit
FOREST	Percent of forested lands per study unit
FWPLANDCD	Average distance to FWP lands per study area
GASSTATIONCD	Average distance to gas stations per study unit
GRAZING	Percent of grazing lands per study unit
HAZSITESCD	Average distance to a hazardous site
HEALTHCD	Average distance to health care facilities per study unit
HUNTFISH	Maximum number of hunter and angler valued areas
IMPERVIOUS	Percent of study area in impervious surfaces
IRRGDITCH	Miles of irrigation ditches per study unit
IRRGLAND	Percentage of irrigated lands per study unit
LAKES	Percent of lakes per study unit
LIBRARYCD	Average distance to a public library
MEDHHINC	Median Household Income 2010
MPBDISEASE	Percent of study area infected by disease - Mountain pine beetle
NON_MPBDISEASE	Percent of study area infected by disease - other sources
OILGAS	Percent of study area in BLM oil and gas leases

POP0TO4	Number of population 0-4 in 2010
POP5TO9	Number of population 5-9 in 2010
POP10TO14	Number of population 10-14 in 2010
POP15TO19	Number of population 15-19 in 2010
POPGT75	Number of population >= 75 in 2010
POPMEDIANAGE	Median Age 2010
PROTAREA	Percent of protected areas
PUBLAND	Percent of public land per study unit
RAILROADCD	Average distance to a railroad per study unit
RDDENSITY	Density of roads (mi/sq mi)
RECPTSCD	Average distance to a recreation point per study area
RECTRAIL	Miles of recreational trails per study unit
ROADMILE	Miles of road per study unit
SCHOOLSCD	Average distance to a school per study area
STREAMS	Miles of perennial and intermittent streams
STRDENSITY	Average residential density per study unit
STRUCTURES	Total number of residential structures
SURFACEFIRE	Surface fire probability
UNEMPLOYED	Number of unemployed population 16+
WELLS	Number of wells
WINDPOTEN	Average wind power potential per study unit
WINDSPEED	Average wind speed per study unit

Contents of the Accompanying DVD

Background Documents: Reference documents, white papers, project documents

CommunityViz Models : Two zip files are included in this subdirectory. They contain the “20,000 foot model” decision support CommunityViz projects. Use of this data requires the commercial version of ArcView GIS and the CommunityViz extension from Placeways. These will not work well with ArcGISExplorer. For more information see <http://www.esri.com> and <http://placeways.com>. The data sets and content used in both are identical, as is the structure. They differ only in their units of analysis. CV_TetonHUC uses 6th code watersheds as the unit of analysis, and CV_TetonTR uses public land survey system townships as the units of analysis. To use them unzip the files into your c:\CVFiles subdirectory.

Documentation: In addition to the short descriptions of each layer included in this document, more extensive documentation is available for the layers, including the processing steps for most of the layers. In GIS jargon these are called metadata documents. If you are an experienced GIS user and need assistance in understanding a map layer, or need to update it, this folder includes the details.

GIS Map Layers: This folder includes the layer packages, ready to be imported into ArcGIS or ArcGISExplorer and viewed on a windows based computer.

Images: Miscellaneous images, including many of the map images used as thumbnails in this project.

Web browser based mapping software

Web based mapping software packages run within web browser software such as Internet Explorer, Firefox, or Chrome, etc. You need an Internet connection to run them. There is typically no additional software to install on your computer, though some require installing add on programs for your browser, such as Adobe Flash, or Microsoft Silverlight. Normally the mapping application notifies you of what you need and where to download it. One advantage of these online mapping tools is they can be accessed with a variety of computers and platforms. Requirements vary, but map layers can be viewed, edited and printed from Apple Macintosh computers and a variety of mobile platforms such as tablets and smartphones in addition to Microsoft Windows based computers.

The other major distinction is some are general mapping programs that have flexibility to add additional map layers (for instance, the online version of ArcGIS Explorer). Many web mapping applications are dedicated to a single purpose such as providing property data, wildlife data, or water rights, etc. These are built by government agencies, universities, and private companies. In most cases all the data used in any web browser mapping program resides on servers and not on your local computer or smartphone device. Another way to say that is the data resides "on the cloud", or is a "cloud based service". Many of the data layers developed for this project may be hosted by Lewis and Clark County's GIS server in the future. Details were being worked out at the time of publishing this final report, check with Teton County officials for further details.

Esri maintains a cloud based service called ArcGIS Online, located at <http://arcgis.com>. A group has been formed for the Rocky Mountain Front GIS Collaboration and all partners and community members are welcome to join. A starter set of maps are available, and a diverse core group of approximately 20 community members are participating and sharing maps. You can establish an account and join at no cost on this service hosted by ESRI. Check it out online and request to join the group. More information can be found at <http://geodata.squarespace.com/rmfgis>.

Desktop mapping software

This software is downloaded and installed locally and runs on a Windows based personal computer. Examples below include ArcGIS Explorer from Esri, and Google Earth from Google. ArcGIS Explorer can work with data on a local hard drive, independent of the Internet. These also benefit from an Internet connection, particularly for providing base maps for the other layers, but can be used on a stand alone computer. We recommend loading the shaded relief image, roads and streams as a base layer if you are not connected to the Internet.

ArcGIS Explorer Desktop

ArcGIS Explorer Desktop is a free GIS viewer that gives you an easy way to explore, visualize, and share GIS information. ArcGIS Explorer adds value to any GIS because it helps you deliver your authoritative data to a broad audience.

With ArcGIS Explorer, you can:

- Access ready-to-use ArcGIS Online basemaps and layers.
- Fuse your local data with map services to create custom maps.
- Add photos, reports, videos, and other information to your maps.
- Perform spatial analysis (e.g., visibility, modeling, proximity search)

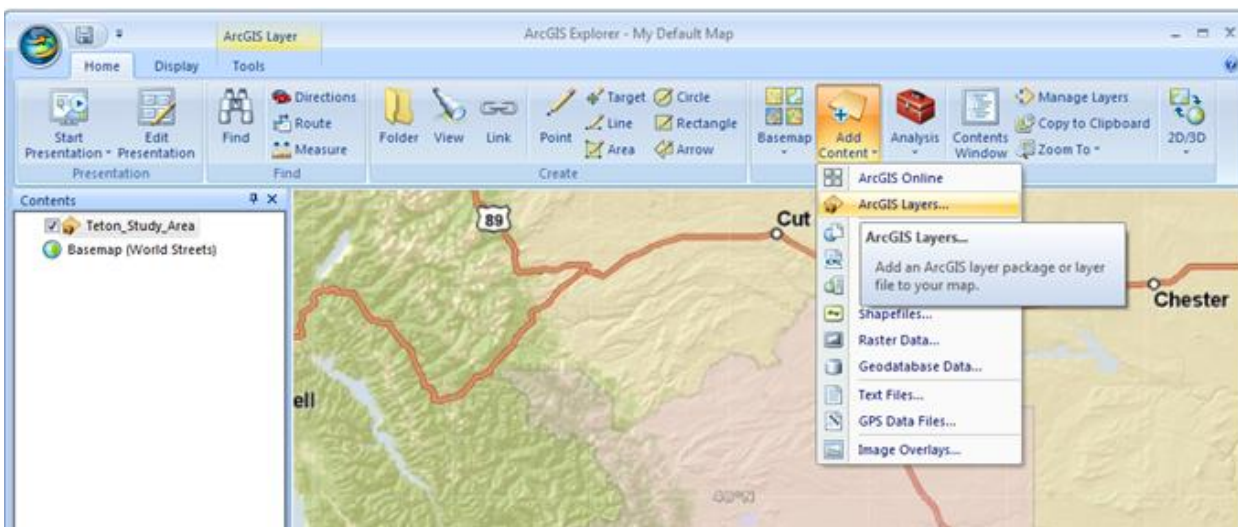
Download and Install on your PC: <http://www.esri.com/software/arcgis/explorer/download.html>

Tutorial for ArcGIS Explorer: ArcGIS Explorer Quick Start Tutorial. Check out the description at http://training.esri.com/acb2000/showdetl.cfm?DID=6&Product_ID=961

Introduction to ArcGIS Explorer - Introduction to ArcGIS Explorer Online. Check out the description at http://training.esri.com/acb2000/showdetl.cfm?DID=6&Product_ID=973

Getting Started with RMF GIS Collaboration Data and ArcGIS Explorer

After successfully installing the software, copy the data from the DVD to your local hard drive for better performance and faster map refresh times. Each layer is a stand alone file (in ESRI layer package format), so you can organize the data layers as you wish and name your folders and subdirectories with your own preference. After starting ArcGIS Explorer select the “Add Content” button with the Home tab selected then add “ArcGIS Layers”, selecting any of the layer packages from the location where you saved them on your hard drive (layer packages end in a *.lpk extension). If you want to add several layers, hold down the shift key to load multiple layer packages.



Teton County has the same data in Esri shapefile format. As you get more experienced and comfortable with ArcGIS Explorer, you may wish to obtain the layers in this format. Moving the data from one directory to another and other aspects of the software can be a little more complicated with shapefiles or geodatabase format data, but you also have more flexibility in displaying these layers, changing the colors and symbols and pop-up information.

Tips and Tricks to Use the ArcGIS Explorer Maps

- The first time you access a map, it will take a little longer to download the base map content if you are accessing Internet content. As you move and pan around an area at multiple scales, more data will be cached locally on your machine, and the map viewing in the area will get faster. The same principle will hold true when you switch base maps.
- We recommend starting out with the "World Streets" base map. This is the simplest base map. You will also find value switching the base map to the "World Topography" base map or the shaded relief topographic map at multiple scales. You also might want to try the image base maps for aerial and satellite images. A more detailed US version of all the USGS style topographic maps at multiple scales can be loaded from ArcGIS Online, along with hundreds of other base maps.
- You can add other GIS data in multiple ESRI formats, or in Google KML format.
- If you add a shapefile, often data group layers will have a white triangle beside the legend item. Click the triangle to expand the legend group and see all the layers in the group. By default we have all the layers visible. You can toggle on and off a layer by clicking the check box next to the layer name.
- A zoom in/out tool is available in the lower left of the screen, or you can use your mouse wheel, if you have one. As you zoom in the base map content will get more detailed, and zooming out drops detail.
- The maps are in 2D mode by default, but you can switch to 3D mode and back and forth. It is easier to start in 2D mode.
- To identify the information attached to any element on a map move your mouse over it and click once (left mouse click). A pop-up box will come up and list information about that area.
- Hold the left mouse button down and move the mouse to pan around the map. Alternatively, you can use the zoom and pan tool in the lower left of the map window.
- If you want to see through the solid colored layers to the base map or other map layers below them, adjust the transparency on the "Tools" tab. To get the tools tab to show up at the top of the map, click on the map legend item, and access the "Appearances" tab tools. The other way to view the base map under a polygon is to use the "swipe tool", also on the tools tab, and click the map and move your mouse up or down, it is like raising and lowering a curtain.
- To provide review comments on the map locations, create map notes. On the "Home" tab, click the "Area" option in the "Notes" section of the top ribbon bar. Then click and create a polygon note on the map. When you finish the polygon, double click and the red outline of the note will fill with a solid red polygon and a pop-up window will come up to enter text. You can email the comment by clicking the email symbol in the pop up box. Alternately, you can save the comment as a layer file, or in different formats. In addition to polygon comments you can create line and point comments and share those with others. Those to whom you send comments can click on the attached comment file (these end in a *.nmc extension) and the comment will open in their version of ArcGIS Explorer or ArcView.

Index

- Accommodations, 13
- Agricultural Soil Quality, 14
- Ambulance Facilities, 22
- BLM Geographic Coordinate Data Base Public Land Survey System Quarter/Quarter Sections, 26
- BLM Geographic Coordinate Data Base Public Land Survey System Townships, 25
- Block Management Area Program (MDFWP), 11
- Broadband Internet (Areas not served), 15
- Broadband Internet (Greater than 6 mbps), 14
- Broadband Internet (Mobile wireless), 15
- Businesses, 16
- Cadastral Map, 26
- Civilian Employed Population, 16
- Conservation Easements, 9
- Counties Forming the Project Area, 25
- ESRI Business Analyst Business Summaries of Number of Reported Employees by Section, 26
- ESRI Business Analyst Reported Business Counts by Section, 26
- Farm Land, 11
- Fire Hazard Areas, 22
- Fire Stations, 22
- Fishing Access Site (MDFWP), 11
- Food Stores, 16
- Forest Insect - Mountain Pine Beetle, 10
- Forest Insect - Other, 10
- Forest Insect-Bark Beetle Probability, 8
- Forested Lands, 10
- Gas Stations, 17
- Grazing Lands, 17
- Hazardous Sites, 23
- Health Care Facilities, 21
- Hunter and Angler Areas, 17
- Impervious Surfaces, 17
- Irrigated lands, 18
- Irrigation Ditches, 18
- Lakes, 10
- Libraries, 25
- MDFWP Lands, 12, 17
- Median Household Income, 13, 24
- Median Household Income Annual Growth Rate, 23
- Oil and Gas Leases, 18
- Per Capita Income, 14, 23
- Population 75 or older, 21
- Population Age 0-4, 20
- Population Age 15-19, 21
- Population Age 5-9, 20
- Population Age10-14, 20
- Protected areas, 12
- Public Land, 12
- Public Land Ownership, 27
- Railroad Lines, 18
- Recreation Points, 18
- Recreational Trails, 19
- Residential Density, 13
- Residential Structures, 24
- Restaurants and Bars, 16
- RMF GIS Collaboration Project Area, 25
- Road Density, 19
- Roads, 19
- Schools, 21
- Shaded relief, 26
- Streams & Rivers, 10
- Surface Fire Probability, 23
- Unemployed Population, 24
- Wells, 13
- Wildfire- Crown Fire Probability, 9, 22
- Wildfire- Hazard Areas, 9
- Wildfire- Surface Fire Probability, 11
- Wildlife- Terrestrial, 9
- Wildlife-Aquatic, 8
- Wind Power Potential, 19
- Wind Speed, 19