Chapter

Data Sources Used in HCP Development

9 DATA SOURCES USED IN HCP DEVELOPMENT

To develop the conservation strategies and subsequently analyze the effect of the HCP in the associated Draft EIS, DNRC has designed and developed a series of models, databases, programs, and analyses using the Environmental Systems Research Institute's ArcGIS suite and the Microsoft Office suite that incorporate information from a number of agencies.

9.1 BACKGROUND AND PURPOSE

Each dataset contained in DNRC's HCP database used the most up-to-date data available at the time of development. To document dataset sources and the limitations of those datasets, DNRC has generated a complete list of metadata for each dataset used in the HCP. This information is stored in digital form as part of each dataset maintained in DNRC's HCP database. As an overview of the datasets used for the HCP, this narrative identifies types of datasets used, sources of those datasets, models developed, limitations of datasets and types, and basic analyses used to quantify environmental conditions.

9.1.1 Types of Datasets Used

A wide range of dataset types was used to estimate current conditions and the effects of the proposed HCP alternatives analyzed in the EIS. Types of datasets used in these analyses included both geospatial and tabular formats to identify a wide range of environmental conditions related to DNRC's ownership. Geospatial data types included both vector and raster data formats, such as ArcGIS coverages, shapefiles, geodatabase features, and grids, along with other spatial data types, such as tagged image files, ERDAS imagine files, and digital elevation models. Tabular data types included a wide range of file formats, such as Excel, Access, dBase, comma-separated values, tab delimited files, and Sequel Server.

9.1.2 Sources of Data

A variety of data sources were used to generate DNRC's master HCP database. These data sources included: DNRC; the USFWS; the USFS; USGS; Montana Natural Heritage Program (MNHP); MFWP; Montana NRIS; Montana Fisheries Information System (MFISH); and Mason, Bruce and Girard (MB&G).

9.1.3 Data Limitations

Data limitations of individual datasets are described in each dataset's metadata. In general, all results generated from analyses performed for the HCP are limited to the spatial and attribute accuracy of each dataset. In many cases, datasets were created at differing scales, thereby

introducing additional error. Datasets acquired from agencies other than DNRC were assumed to be complete and representative of the best available data. To DNRC's knowledge, none of the spatial data used in the HCP has been surveyed, and acreages calculated from those datasets are estimates based on the best available information.

9.2 DATA

The DNRC HCP database contains multiple GIS data layers used for or generated by HCP analyses. Many of these layers within the HCP database were acquired from agencies other than DNRC. Because of topology issues associated with many of these layers, DNRC developed a cleaning algorithm to remove all overlapping polygons, slivers, duplicate arcs, dangling nodes, etc. Additionally, all acquired GIS data layers projected in a coordinate system differing from Montana State Plane North American Datum 1983 meters were projected to that coordinate system using ArcGIS projection tools. The primary spatial data layers used by DNRC to complete the HCP analyses are listed below in Table 9-1.

TABLE 9-1. PRIMARY SOURCE GIS DATA LAYERS USED FOR HCP ANALYSES

Name	Data Type	Description	Original Source
BASE FEATURES DATASET			
City_NRIS	polygon	City boundary	NRIS
County_DNRC	polygon	County boundary	DNRC
HUC_5	polygon	Fifth-order hydrologic unit boundaries	NRIS
HUC_6	polygon	Sixth-order hydrologic unit boundaries	NRIS
Lakes_24K_100K	polygon	Lakes	DNRC
Landoffice_DNRC	polygon	DNRC land offices	DNRC
Montana_DNRC	polygon	State boundary	NRIS
Parcels_DNRC	polygon	DNRC land ownership	DNRC
Planning_ Area_DNRC	polygon	HCP planning area boundary	DNRC
Roads_DNRC	line	Roads in Montana	DNRC
SLI_MBG_2005	polygon	Forest stands within DNRC ownership	DNRC
Stream_24K_100K	line	Streams	DNRC
Units_DNRC	polygon	DNRC administrative units	DNRC
STAND-LEVEL TABLES			
Form_B	table	Regeneration component of each DNRC forested stand	DNRC
sli_data_2005_MBG	table	Stand characteristics of DNRC's forestlands	MB&G / DNRC
AQUATIC FEATURES DATASET			
Articgrayling_august2003	line	Streams with arctic grayling present	NRIS - MFISH
bull_august2003	line	Streams with bull trout present	NRIS - MFISH
Bull_core	polygon	Bull trout core habitat	USFWS

TABLE 9-1. PRIMARY SOURCE GIS DATA LAYERS USED FOR HCP ANALYSES (CONTINUED)

Name	Data Type	Description	Original Source
Bull_critical_habitat	line	Streams identified as critical habitat for bull trout	USFWS
Bull_critical_streams	line	Streams identified as critical for bull trout	USFWS
EIS_aquatic_planning_units	polygon	Aquatic analysis area boundaries	DNRC
fish_on_DNRC	line	Streams with HCP fish present	DNRC
Mfish_surveyed_no_fish	line	Streams not surveyed for fish presence	NRIS - MFISH
Redband_august2003	line	Streams with redband trout present	NRIS - MFISH
TMDL_02_Lake	polygon	Lakes listed for TMDL in 2002	NRIS
TMDL_02_Streams	line	Streams listed for TMDL in 2002	NRIS
TMDL_04_Lake	polygon	Lakes listed for TMDL in 2004	NRIS
TMDL_04_Streams	line	Streams listed for TMDL in 2004	NRIS
Westslope_august2003	line	Streams with westslope cutthroat trout present	NRIS - MFISH
Yellowstone_august2003	line	Streams with Yellowstone cutthroat trout present	NRIS - MFISH
TERRESTRIAL FEATURES DATASET			
CEM_roads	vector line	Road layer used for cumulative effects model (CEM) analysis	DNRC and USFS
Developed_sites_linkage	vector polygon	Development layer used for identifying habitat linkage	USGS / DNRC
Eagle_nests_nhp	vector points	Eagle nest locations	MNHP
Elk_winter_range	vector polygon	Elk winter range areas	NRIS
FED_LAU	vector polygon	Federal lynx analysis units (LAU)	USFS
Fed_lynx_habitat	vector polygon	Federal lynx habitat defined by USFS	USFS
griz_recovery_zones	vector polygon	Grizzly bear recovery zones	USFS / USFWS
griz_units	vector polygon	Grizzly bear management units and sub-units	USFS / USFWS
Lynx_critical_habitat	vector polygon	Critical habitat for lynx	USFS
Lynx_management_areas	vector polygon	DNRC's lynx management areas	DNRC
Moose_winter_range	vector line	Moose winter range areas	NRIS
Motorized_access_roads	vector line	Road layer used to calculate motorized road densities	DNRC / USFS

TABLE 9-1. PRIMARY SOURCE GIS DATA LAYERS USED FOR HCP ANALYSES (CONTINUED)

Name	Data Type	Description	Original Source
Terrestrial Features Dataset (continued)			
Mule_deer_winter_range	vector polygon	Mule deer winter range areas	NRIS
Stewardship_layer	vector polygon	Land ownership within Montana	NRIS
SVGBCA_linkage_zones	vector polygon	Locations of Swan Agreement linkage zones	USFS / USFWS
Transportation_Plan_zones	vector polygon	DNRC's transportation planning zones	DNRC
White_tail_deer_winter_range	vector polygon	White tail deer winter range areas	NRIS
wolf_packs_1999_2005_clean	vector	Locations of wolf pack territories from 1999-2005 (no overlapping polygons)	NRIS
wolf_packs_1999_2005_overlapping_polygons	vector	Locations of wolf pack territories from 1999-2005 (overlapping polygons)	NRIS
Wolf_recovery_zones	vector polygon	Wolf recovery zones	NRIS

9.3 ANALYSES AND MODELS

GIS-based analyses were used to estimate current resource conditions and potential impacts on those resources under the HCP alternatives. All analyses were performed using ArcGIS (versions 9.1 and 9.2), ArcGIS Spatial Analyst extension, or Microsoft Excel. The majority of analyses consisted of basic overlays and summary techniques (e.g., clip, union, intersect, identity, erase, buffer). Some analyses required the development of programmatic scripts. All scripts were written in the Python programming language, run within ArcGIS as a script, and are stored within a geo-processing toolbox named *DNRC_Tools* and toolset named *HCP*. The HCP toolset consists of four sub-toolsets named *Buffering, Cover Estimates, Density_Measures,* and *Topology*. Each script within each respective toolset provides a brief description of that script's function and requires a user specified set of input parameters to generate the desired outputs.

9.3.1 Buffering Toolset

The *Buffering* toolset contains two Python scripts that perform a large buffering routine and a multi-ring buffering routine. These scripts were developed to perform buffers on large datasets and generate a series of non-overlapping buffer rings. These scripts were used for both terrestrial and aquatic analyses.

9.3.2 Cover Estimates Toolset

For terrestrial analyses, four scripts were developed within the *Cover Estimates* toolset to separately identify potential grizzly bear cover, lynx cover, habitat linkage, and bald eagle habitat.

9.3.2.1 Grizzly Cover Script

The *Grizzly Cover* script identifies DNRC lands that provide hiding cover for grizzly bears.

9.3.2.2 Habitat Linkage Script

The *Habitat Linkage* script identifies locations that provide connectivity between large patches of forested habitat. This script was designed based on the methodologies described in Servheen et al. (2001).

9.3.2.3 Lynx Cover Script

The *Lynx Cover* script identifies lynx habitat types within DNRC lands.

9.3.2.4 Potential Bald Eagle Habitat Script

The *Potential Bald Eagle Habitat* script identifies potential nesting habitat for bald eagles.

9.3.3 Density Measures Toolset

The *Density_Measures* toolset contains three scripts that separately identify Cumulative Effects Model (CEM) outputs, lengths within a polygon, and motorized road densities.

9.3.3.1 Length within Polygon Script

The *Length within Polygon* script calculates the length of and the portion of a line feature located within each feature in a polygon layer. This script was used for both aquatic and terrestrial analyses.

9.3.3.2 Moving Windows Road Density Script

The *Moving Windows Road Density* script quantifies the percent area allocated to open road density, total road density, and security core categories based on the methodologies described in *Protocol Paper: Moving Window Motorized Access Density Analysis & Security Core Area Analysis for Grizzly Bear* (USFS 1995a).

9.3.4 Topology Toolset

The *Topology* toolset contains one script that removes duplicate arcs, overlapping polygons, and slivers from a data layer. This script was used to clean up all GIS data layers within the HCP database.