SECTION 1: Identification Information

Originator:	Minnesota DNR - Division of Forestry
Title:	GAP Land Cover - Vector
Metadata Product ID:	39000010
Abstract:	This vector dataset is a detailed (1-acre minimum), hierarchically organized vegetation cover map produced by computer classification of combined two-season pairs of early-1990s Landsat 4/5 Thematic Mapper (TM) satellite imagery, as part of the Upper Midwest Gap Analysis Program (UMGAP) of the U.S. Geological Survey. Units of analysis were Minnesota Ecological Classification System (ECS) subsections subdivided by TM scenes. GAP typology and classification protocols are closely comparable across Minnesota, Wisconsin and Michigan. For ease of use in ArcView, the cell based data was converted to vector format and tiled by 7 1/2 minute quadrangle.
Purpose:	The dataset was created for use in the Geological Survey's Gap Analysis Program (GAP) , a national project aimed at prioritizing lands for conservation action. Other uses include stratification of inventories, land use planning, and spatial analysis of landscape patterns.
Usage Tips:	Thematic maps produced by computer analysis of satellite-observed spectral reflectance values are more strongly influenced by tones and colors of objects than by their site or spatial arrangement. The particular vegetation typology employed, the choice and sequence of analysis operations, and the dates and seasons of the images may be expected to cause differences between this and other satellite-based classifications. An unaggregated version of this dataset, in which the smallest units are 30-meter (about 1/4-acre) picture elements rather than 1-acre minimum mapping units, is available through DNR Resource Assessment for those requiring greater textural detail.
Time Period of Content:	1991-1993
Currentness Reference:	Analysis and accuracy assessment took place during 1995-2000. Landsat scene dates are shown in red on this linked image: Scene Summary Map
Progress:	Complete
Maintenance Frequency:	As Needed
Spatial Extent of Data:	Statewide. Processed by units as shown at the following link: GAP Processing Unit Map
Bounding Coordinates:	E = -89 W = -97.5 N = 49.5

	S = 43
Place Keywords:	Minnesota
Theme Keywords:	Land Use, Land Cover, Forest, Vegetation, GAP, ECS Provinces, Sections, Subsections, biota
Theme Keyword Thesaurus:	None
Access Constraints:	None
Use Constraints:	Data are unrestricted.
Data Use Contact:	Contact
Sample Graphic:	Data Sample

SECTION 2: Data Quality Information

Attribute Accuracy:	*lulc_gap1apy3.pat:* Minnesota GAP vegetation information is presented at four levels, from the most detailed (Level 4) to the most highly aggregated (Level 1). In each processing unit, accuracy figures have been calculated for every type at each level of the classification hierarchy. Percentage accuracy attributes at all four levels are attached to every data element, as indicated in the Attribute Table. (Types too sparsely represented for accuracy assessment have an accuracy attribute of -1.) Class definitions and accuracy tabulations can be found, along with an explanation of accuracy assessment methods, at the following link: Minnesota GAP Accuracy Assessment.
Logical Consistency:	Not all cover types exist as mappable units in all ECS subsections of the state. Some types omitted from classification in a given subsection may be classified in an adjacent subsection. This, or other circumstances, may give rise to type mismatches across subsection boundaries.
Completeness:	The existing vegetation of the entire state, with emphasis on forests, has been mapped to a single standard by use of closely comparable satellite image sets and a consistent classification protocol. The product closely resembles GAP vegetation coverages in Wisconsin and Michigan.
Horizontal Positional Accuracy:	All imagery was precision-corrected to digital elevation models of Minnesota by the U.S. Geological Survey's EROS Data Center, Sioux Falls SD, and was analyzed in conjunction with National Wetlands Inventory and MNDoT Roads datasets. Estimated positional accuracy of the data is plus or minus 1 Landsat TM picture element, or 30 meters.
Vertical Positional Accuracy:	Not Applicable
Lineage:	Attribute Lineage:

lulc_gap1apy3.pat: Early discussion between the U.S. Fish and Wildlife Service and cooperators in a projected Gap Analysis Program covering Minnesota, Wisconsin and Michigan assumed that the desired vegetation layer would be produced by computer analysis of seven-band, 30-meter Landsat Thematic Mapper (TM) satellite images at a

minimum mapping acreage of 100 ha (250 ac), and that the classification would be correspondingly coarse--at about the second level of the U.S. Geological Survey land use/cover class system (Anderson et al. 1976). When the Wisconsin Department of Natural Resources put forward its WISCLAND classification as an alternative, it was also considered a "Level II" scheme. WISCLAND sought to map land cover across Wisconsin at the 5-acre (2 ha) level of detail by multiseason TM image analysis together with wetlands, topographic and roads data (Lillesand 1993). Later it became clear that a more detailed physiognomic and floristic typology was wanted for GAP (Jennings1993)--at the "community type" level of the UNESCO vegetation class system (Driscoll et al.1984). State remote sensing specialists responded by expanding the WISCLAND scheme to the highest level of vegetational detail they considered mappable from two well-timed scene dates together with ancillary data. The result was the typology used in Minnesota GAP.

Anderson, J.R., E.E. Hardy, J.R. Roach and R.E. Witmer. 1976. A land use and land cover classification system for use with remote sensor data. U.S. Geol. Survey Prof. Paper 964. 28p.

Driscoll, R.S., D.L. Merkel, D.L. Radloff, D.E. Snyder and J. S. Hagihara. 1984. An ecological land classification framework for the United States. USDA For. Serv. Misc. Pub. 1439, Washington DC. 56p.

Jennings, M.D. 1993. Natural terrestrial cover classification: assumptions and definitions. US Fish & Wildlife Service Idaho Coop. Res. Unit, U. of Idaho, Moscow. 28p.

Lillesand, T.M. 1993. Suggested strategies for satellite-assisted statewide land cover mapping in Wisconsin. Pres. pap., Am. Soc. for Photogramm. & Rem. Sens. Annual Meeting, New Orleans. 11p.

Cartographic Lineage:

GAP Land Cover Polygons: Landsat TM imagery was registered to Minnesota Department of Transportation road coverages, and cloud areas were masked. Dual-date (12-band) TM datasets were partitioned into Gap Processing Units (GPUs) along ECS Subsection lines, and further

partitioned into urban, upland and lowland segments by intersection with National Wetlands Inventory digital coverages and manual delineation of urban zones. Supervised classification separated the latter into high-density, low-density and non-urban classes, the last being returned for further work. Upland and lowland zones were separately classified using "guided clustering" techniques: numerous spectral signatures were developed for each GAP vegetation category represented in Minnesota DNR field inventory data, applied to the data, and then iteratively refined and combined to produce a final classification. Aerial photographs and inventory data were used to assist signature development and classification. A clump-and-sieve routine was used to eliminate groups of picture elements less than 1 acre in size, the excluded pixels being absorbed into neighboring classes.

The original raster cells have been converted to ArcInfo polygons to create a vector data-layer. Adjacent cells with the same pixel value have been dissolved together during the conversion to vector format. Polygon edges are snapped to the corners of the source pixels. The resulting data has been clipped into a 1:24,000 USGS quad tiling scheme and placed in an ArcInfo librarian data structure.

Source Scale Denominator:	Not Applicable

SECTION 3: Spatial Data Organization Information

Native Data Set Environment:	ERDAS Imagine 8.3
Geographic Reference for Tabular Data:	Not Applicable
Tiling Scheme:	q024k
Spatial Object Type:	polygon
Vendor Specific Object Types:	polygon

SECTION 4: Spatial Reference Information

Horizontal Coordinate Scheme:	UTM
Ellipsoid:	GRS1980
Horizontal Datum:	NAD83
Horizontal Units:	meters

Altitude Datum:	Not Applicable
Altitude Units:	Not Applicable
Depth Datum:	Not Applicable
Depth Units:	Not Applicable
Cell Width:	0
Cell Height:	0
Latitude Resolution:	0
Longitude Resolution:	0
UTM Zone Number:	15
SPCS Zone Identifier:	null
County Coordinate Zone Identifier:	null
Coordinate Offsets or Adjustments:	Not Applicable
Map Projection Name:	Transverse Mercator
Map Projection Parameters:	Not Applicable
Other Coordinate System Definition:	Not Applicable

SECTION 5: Entity and Attribute Information

Entity and Attribute Overview:	Polygons representing pixels aggregated into groups containing at least 4 picture elements (approximately 1 acre) are labeled with the most detailed vegetation cover classification that can reliably be mapped in the ECS subsection to which they belong.
Entity and Attribute Citation:	See *Attribute Tables* link below
Attribute Tables:	Data Table

SECTION 6: Distribution Information

Publisher:	Minnesota DNR - Division of Forestry
Publication Date:	6/6/2002
Distribution Contact	Contact
Distributor Data Set Identifier:	lulc_gap1apy3
Distribution Liability:	The Minnesota Department of Natural Resources makes no representation or warranties, express or implied, with respect to the reuse of data provided herewith, regardless of its format or the means of its transmission. There is no guarantee or representation to the user as to the accuracy, currency, suitability, or reliability of this data for any purpose. The user accepts the data 'as is', and assumes all risks associated with its use. By accepting this data, the user agrees not to transmit this data or

	provide access to it or any part of it to another party unless the user shall include with the data a copy of this disclaimer. The Minnesota Department of Natural Resources assumes no responsibility for actual or consequential damage incurred as a result of any user's reliance on this data.
Transfer Format Name:	Shapefile
Transfer Format Version:	Not Applicable
Ordering Instructions:	Visit the DNR Data Deli at the link provided.
Online Linkage:	http://deli.dnr.state.mn.us/

SECTION 7: Metadata Reference Information

Metadata Content Contact:	Contact
Metadata Standard Name:	Minnesota Geographic Metadata Guidelines
Metadata Standard Date:	4/4/2001
Metadata Standard Version:	1.2
Metadata Standard Online Linkage:	http://www.gis.state.mn.us/stds/metadata.htm

report type: full | brief | attributes | data sample | contact information

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