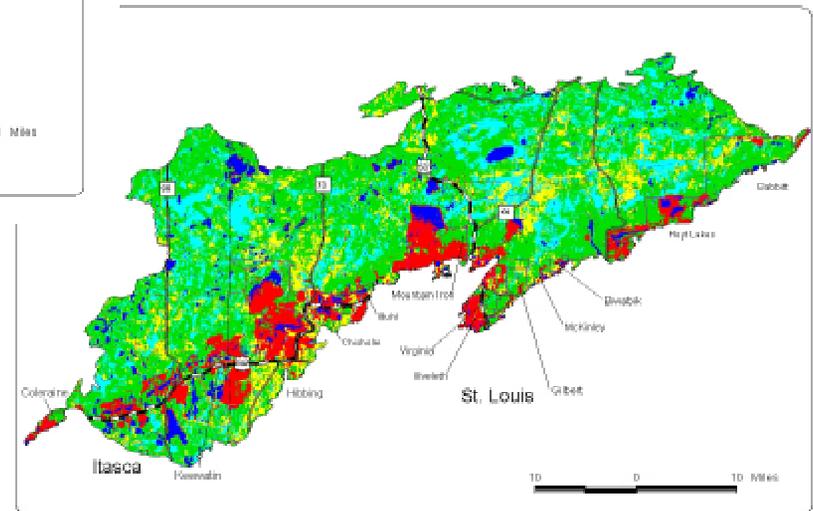
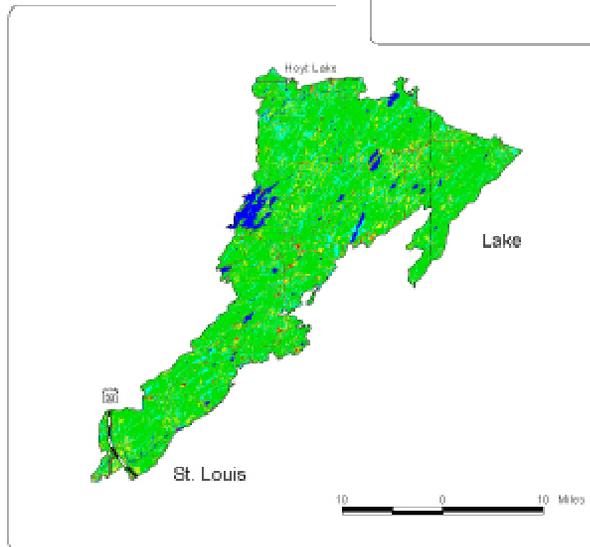
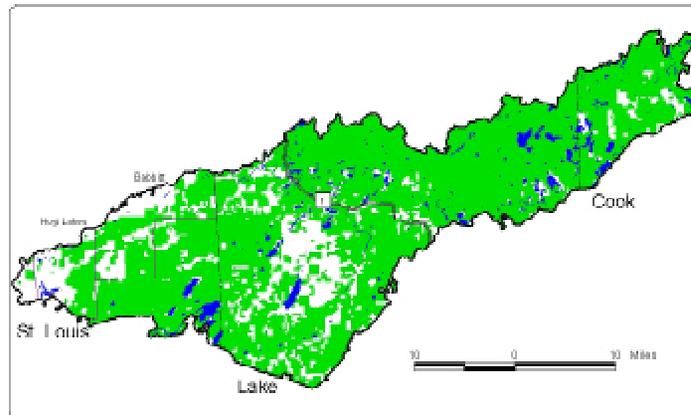
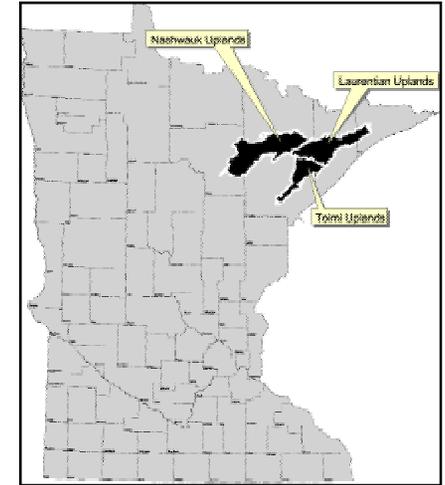


# An Educational Guide Comparing different Geographic Information Systems (GIS) data for 3 Neighboring Subsections (Laurentian, Nashwauk, and Toimi Uplands)



*Minnesota Forest Resources Council  
Landscape Program Report*

Minnesota Forest Resources Council  
Landscape Technical Document, March 2001 (LT-0301b)  
©Copyright 2001, Minnesota Forest Resources Council

This document is on the Internet at **<http://www.iic.state.mn.us/finfo/luse/harvest.htm>**

Information about the Minnesota Forest Resources Council and landscape program can be found on the Internet at **[www.frc.state.mn.us](http://www.frc.state.mn.us)**. Additional information on the landscape program can be found at: **[www.iic.state.mn.us/finfo/landscap/landscap.html](http://www.iic.state.mn.us/finfo/landscap/landscap.html)**

Equal opportunity to participate in and benefit from Minnesota Forest Resources Council programs is available to all individuals regardless of race, color, creed, religion, national origin, sex, marital status, status with regard to public assistance, age, sexual orientation, or disability. Discrimination inquiries should be sent to the Minnesota Forest Resources Council, 2003 Upper Buford Circle, St. Paul, MN 55108; or the Equal Opportunity Office, Department of the Interior, Washington, D.C. 20240.

This information is available in an alternative format upon request.

This report was created by Chad Skally, with assistance from Jan and John Green.

# Table of Contents

|                                      |           |
|--------------------------------------|-----------|
| <b>Acronyms</b> .....                | <b>4</b>  |
| <b>Introduction</b> .....            | <b>5</b>  |
| <b>Location of Subsections</b> ..... | <b>5</b>  |
| <b>Findings and Summary</b> .....    | <b>6</b>  |
| <b>Spatial Characteristics</b> ..... | <b>6</b>  |
| <b>GIS Data Differences</b> .....    | <b>6</b>  |
| <b>Data Pointers</b> .....           | <b>7</b>  |
| <b>Data</b> .....                    | <b>8</b>  |
| <b>Laurentian Uplands</b> .....      | <b>8</b>  |
| Ownership - Charts .....             | 8         |
| GAP Ownership - Map .....            | 9         |
| Land Cover - Table .....             | 10        |
| GAP LC - Map .....                   | 11        |
| Manitoba LC - Map .....              | 12        |
| NRRI LC - Map .....                  | 13        |
| <b>Nashwauk Uplands</b> .....        | <b>14</b> |
| Ownership - Charts .....             | 14        |
| GAP Ownership - Map .....            | 15        |
| Land Cover - Table .....             | 16        |
| GAP LC - Map .....                   | 17        |
| Manitoba LC - Map .....              | 18        |
| NRRI LC - Map .....                  | 19        |

|   |           |
|---|-----------|
| <b>Toimi Uplands .....</b>                                  | <b>20</b> |
| <b>Ownership - Charts .....</b>                             | <b>20</b> |
| <b>GAP Ownership - Map .....</b>                            | <b>21</b> |
| <b>Land Cover - Table .....</b>                             | <b>22</b> |
| <b>GAP LC - Map .....</b>                                   | <b>23</b> |
| <b>Manitoba LC - Map .....</b>                              | <b>24</b> |
| <b>NRRI LC - Map .....</b>                                  | <b>25</b> |
| <b>Appendix A - Simplified Code Transition Tables .....</b> | <b>26</b> |
| <b>1990 FIA Simplified Coding .....</b>                     | <b>26</b> |
| <b>1995 GAP Land Cover Simplified Coding .....</b>          | <b>27</b> |
| <b>1995 Manitoba Land Cover Simplified Coding .....</b>     | <b>28</b> |
| <b>1990 NRRI Land Cover Simplified Coding .....</b>         | <b>30</b> |
| <b>Appendix B - FIA Summary of Accuracy .....</b>           | <b>31</b> |
| <b>Appendix C - Metadata .....</b>                          | <b>32</b> |
| <b>Appendix D - Example Metadata .....</b>                  | <b>33</b> |

---

## Acronyms

DNR - Minnesota Department of Natural Resources  
 FIA - Forest Inventory and Analysis data created by the USFS and DNR  
 GAP - GAP Analysis Program  
 GIS - Geographic Information System  
 IIC - Minnesota Interagency Information Cooperative  
 LC - Land Cover  
 LMIC - Minnesota Land Management Information Center  
 Manitoba - Manitoba Remote Sensing Centre  
 NRRI - University of Minnesota Natural Resources Research Institute  
 PLS - Public Land Survey  
 USFS - United States Forest Service

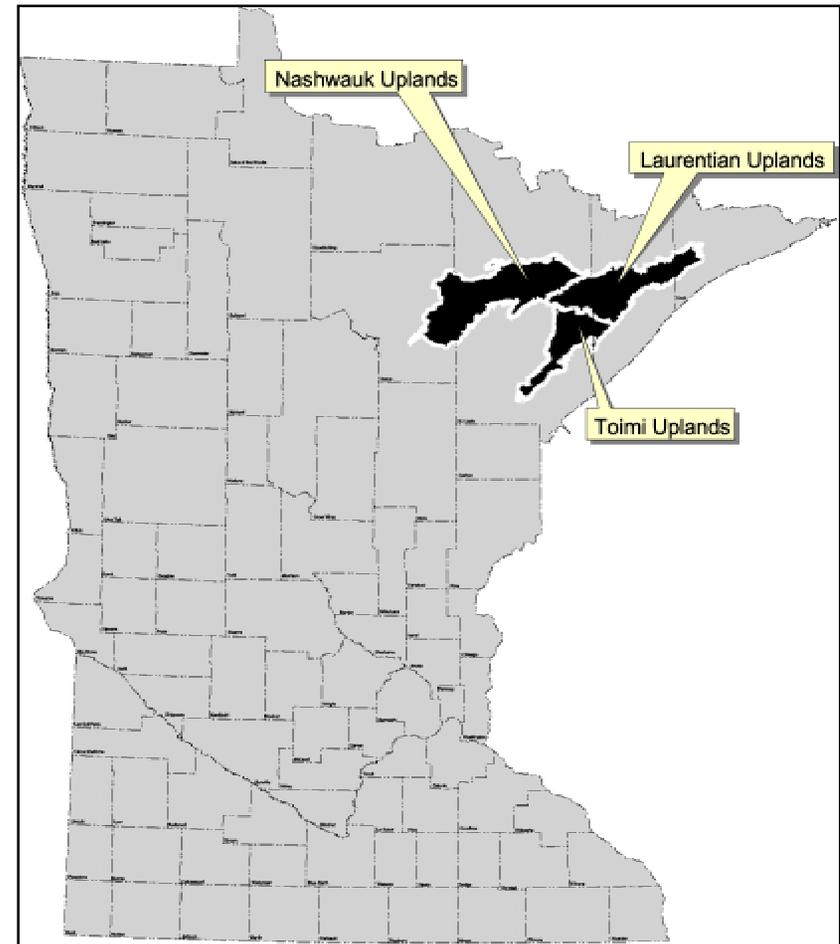
---

# Introduction

This document shows ownership and land cover characteristics of northeastern Minnesota. Different geographic information system (GIS) datasets are displayed to show these characteristics for each subsection.

There are three sections in this document the Introduction, Findings, and Data. The Introduction provides the purpose of this document. The Findings section highlights key differences with what the data shows for the three bordering subsections. Secondly the Findings section discusses differences between the GIS data sources. Lastly some pointers are mentioned that are useful when looking at GIS data. The last section, Data, shows different GIS data representing ownership and land cover information for the 3 subsections.

The three ecological subsections that this document describes are the Laurentian, Nashwauk, and Toimi Uplands. These three subsections are located in northeastern Minnesota (see Location of Subsections map).



## Location of Subsections

# Findings and Summary

## Spatial Characteristics

Even though these three subsections border each other they are not similar in ownership patterns (Charts on pages 8, 14, and 20) nor cover type (Tables on pages 10, 16, and 22).

- The Laurentian and Toimi Uplands subsections contain a high proportion of public land while the Nashwauk upland contains a high proportion of private land
- The Laurentian and Toimi Uplands subsections have very little upland shrubs, grass, and crops compared to the Nashwauk Uplands.
- The Laurentian and Toimi Uplands subsections also contain more forest than the Nashwauk uplands.
- The Toimi Uplands subsection has less water than the Laurentian and Nashwauk Uplands.
- The Nashwauk Uplands contains more barren and developed land than the other two subsections, mostly due to the mining operations in this area.

## GIS Data Differences

When looking at these data there are several differences highlighted in detail in Appendix C – Metadata. The source is the main differences between the ownership data. The

FIA data come from a statistical sample of field plots, while the gap analysis program (GAP) ownership data are summarized from land records. Also another important difference is the time reference of the data. Forest inventory and analysis (FIA) data were collected around 1990 plus or minus a couple of years. On the other hand the GAP data represents information from 1976 to the 1998 with the majority coming from 1983 to 1985.

There are several differences between the land cover data. One important difference, again, is the date of the source. Both the GAP and Manitoba land cover information come from 1995, while the NRRI and FIA data comes from 1990. Again the FIA data differs because it is from a statistical survey while the other three datasets are from satellite (Landsat) images. Even though three datasets came from the same place there is a key difference on how the Landsat image was translated (classified) into different land cover types (Appendix A – simplified code transition tables). The main difference is how bog forests were classified. In the NRRI and GAP datasets these areas were classified as specific forest types while the Manitoba data classified these as non-forest wetlands.

## Data Pointers

When looking at the data in this document, or any document it is important to note several things:

- who collected the data (a university, a federal or state program, a private company)
- when were the data collected (date, length of time)
- how were the data collected, source and methods (plots, records, photos, etc)
- how are the data meant to be used (for large areas, small sites, detailed analysis, etc)

Appendix C – Metadata summarizes this information for the data used in this report. The summary was made from detailed metadata records for each data source.

Appendix D – Example Metadata contains an example of a detailed metadata record for the GAP ownership data. Metadata is a standard way for people collecting data to describe it. With more and more data becoming available people creating the data are also writing metadata to make it easier for others to understand their data.

There are thousands of places on the Internet that provide public access to data and metadata. Some sites specific to Minnesota include:

<http://deli.dnr.state.mn.us>

GIS data and metadata provided by the Minnesota Department of Natural Resources (DNR)

<http://www.iic.state.mn.us>

metadata provided by the Minnesota Interagency Information Cooperative (IIC)

<http://www.lmic.state.mn.us>

a variety of metadata references provided by the Minnesota Land Management and Information Center (LMIC)

<http://geogateway.state.mn.us/documents/index.html>

a metadata search engine provided by LMIC

<http://www.srsfia.usfs.msstate.edu/ewdata/ewrec.htm>

access to the FIA data provided by the United States Forest Service (USFS)

The next section, Data, goes through each subsection showing and comparing the different ownership and land cover data. Please note the above pointers when looking at this data. And if you are looking for more information, try browsing the Internet sites listed above.

# Data

## Laurentian Uplands

### Ownership - Charts

#### SOURCES :

-USFS FIA

-DNR GAP Ownership

(Appendices B and C have more information)

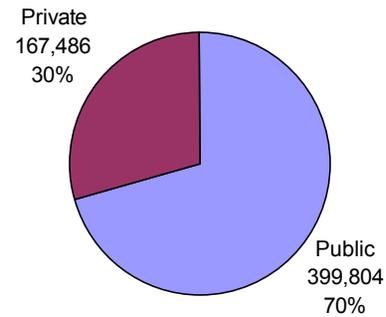
#### NOTES:

In the Laurentian Uplands there were 420 FIA sample plots.

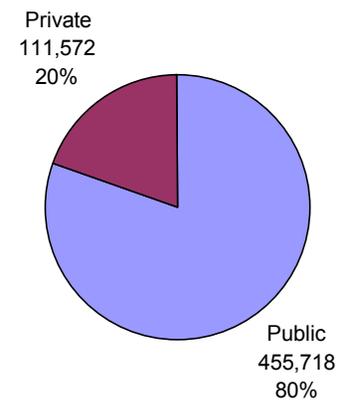
#### Location



Laurentian Uplands - FIA Ownership (acres)

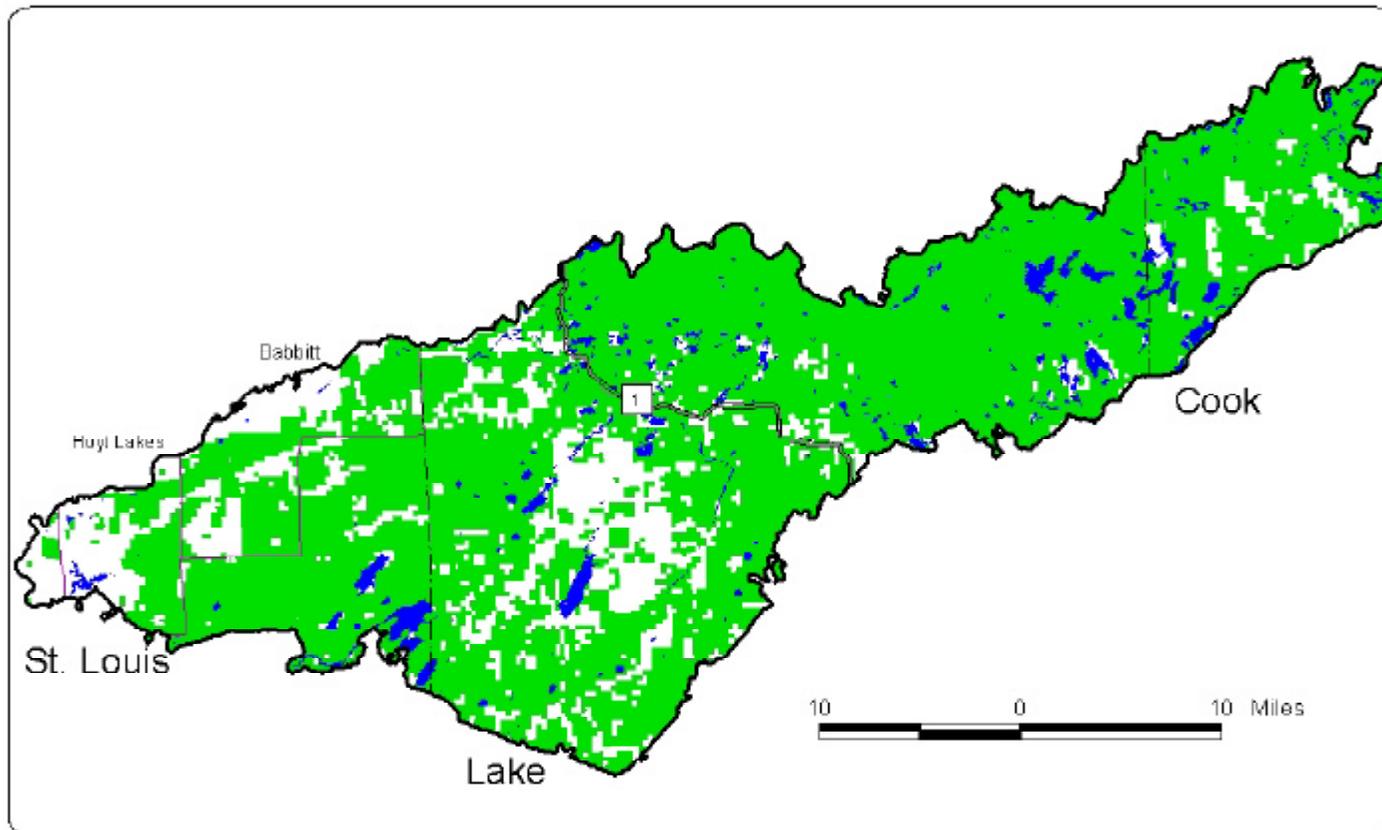


Laurentian Uplands - GAP Ownership (acres)



# Laurentian Uplands

## GAP Ownership - Map



SOURCES:  
-DNR GAP Ownership  
(Appendix C has more information)

Location



# Laurentian Uplands

## Land Cover - Table

*SOURCES :*

-DNR GAP LC

-USFS FIA

-Manitoba LC

-NRRI LC

(Appendices A and C have more information)

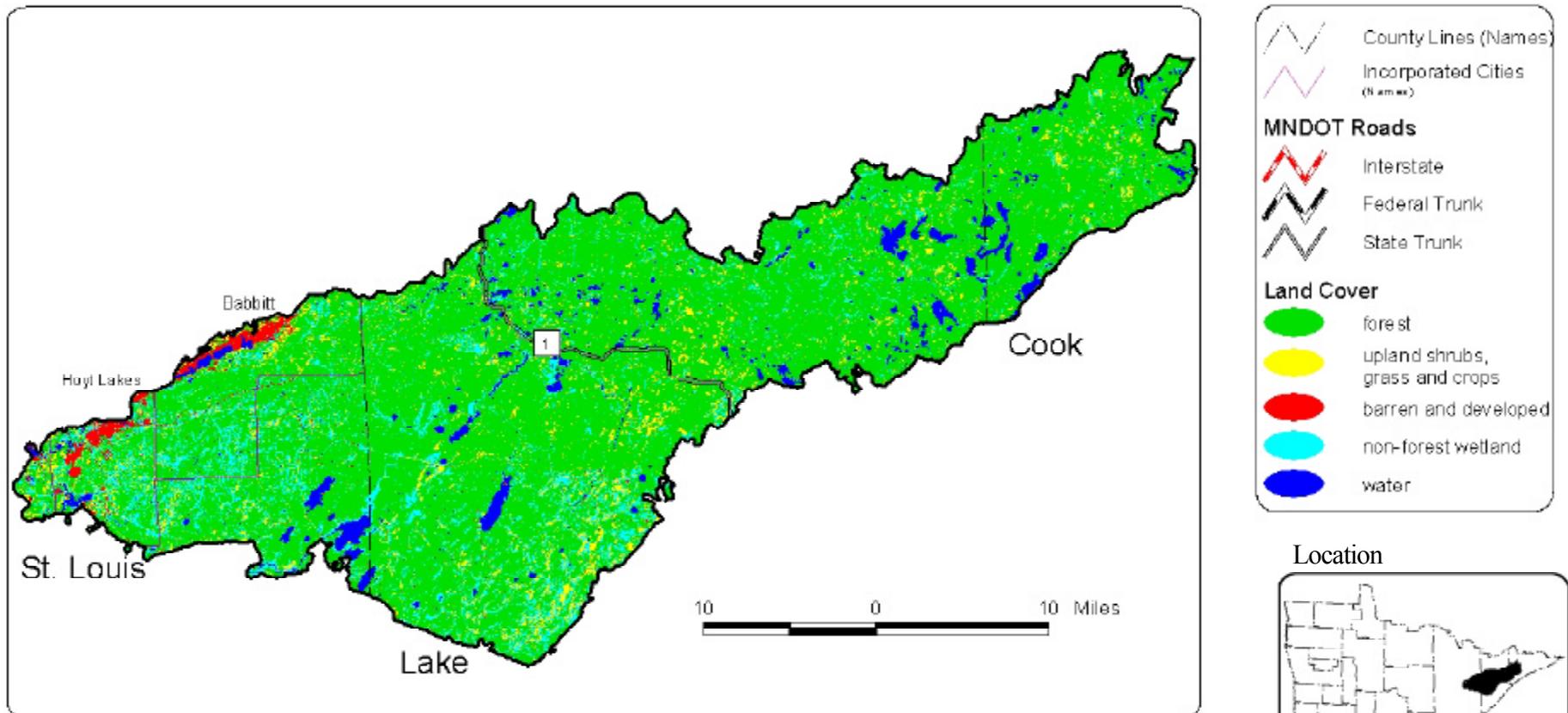
|             | forest | shrubs, grass, and crops | barren and developed | non-forest wetland | water |
|-------------|--------|--------------------------|----------------------|--------------------|-------|
| NRRI LC     | 77%    | 5%                       | 3%                   | 10%                | 5%    |
| Manitoba LC | 67%    | 2%                       | 2%                   | 25%                | 5%    |
| GAP LC      | 78%    | 6%                       | 1%                   | 10%                | 4%    |
| FIA         | 85%    | 7%                       |                      | 4%                 | 5%    |

Location



# Laurentian Uplands

## GAP LC - Map



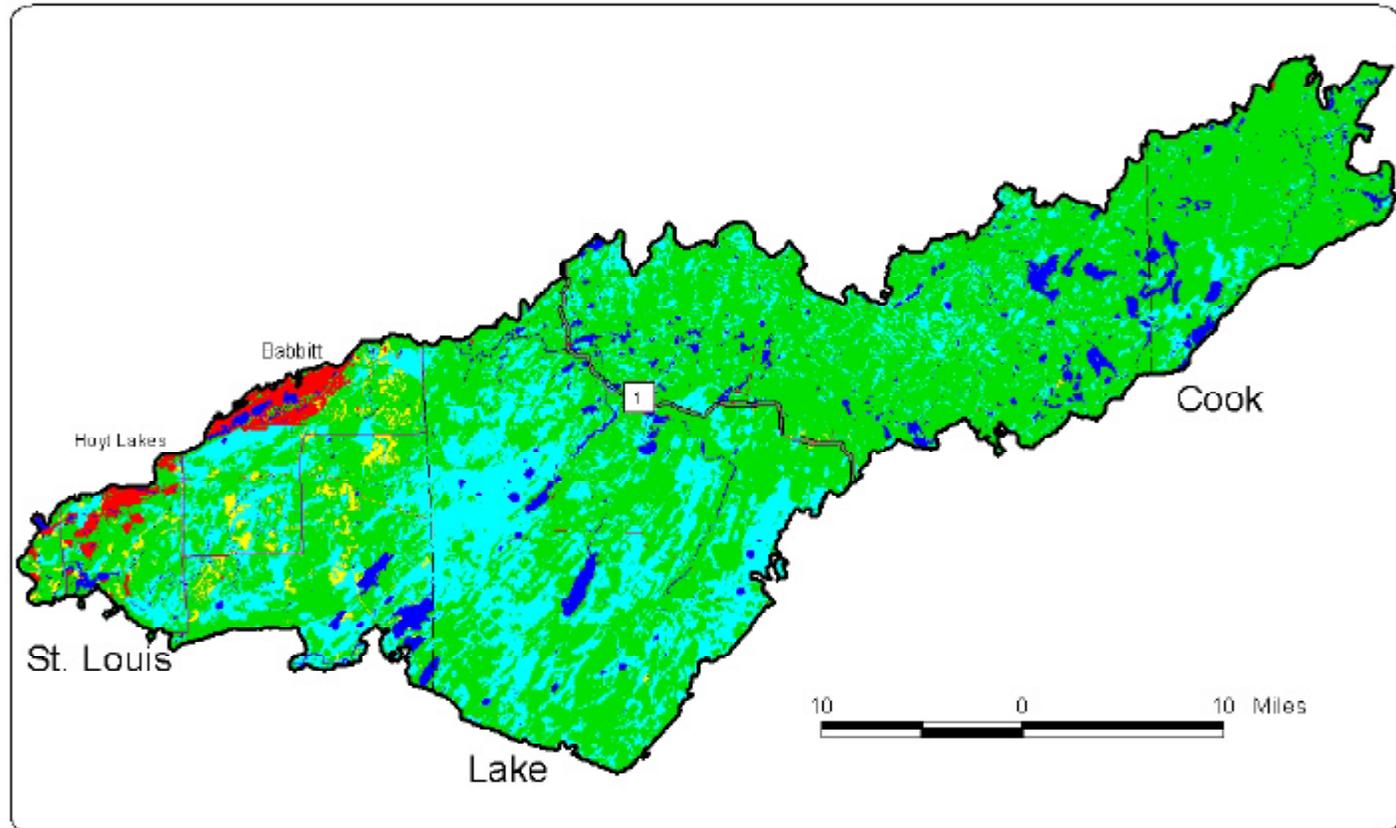
SOURCE:  
-DNR GAP LC  
(Appendices A and C have more information)

# Laurentian Uplands

## Manitoba LC - Map



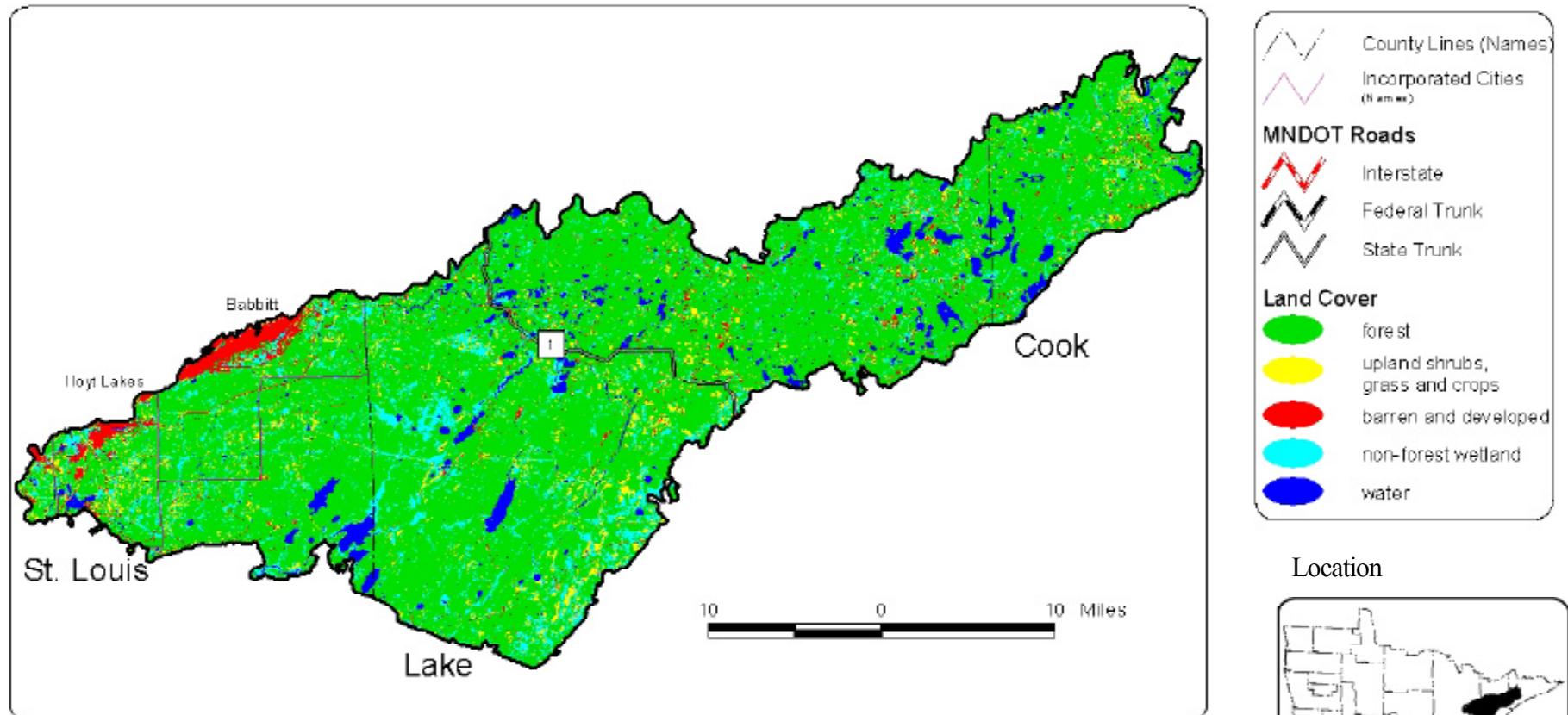
### Location



*SOURCE:*  
*-Manitoba LC*  
*(Appendices A and C have more information)*

# Laurentian Uplands

## NRRI LC - Map



SOURCE:  
-NRRILC  
(Appendices A and C have more information)

# Nashwauk Uplands

## Ownership - Charts

### SOURCES :

-USFS FIA

-DNR GAP Ownership

(Appendices B and C have more information)

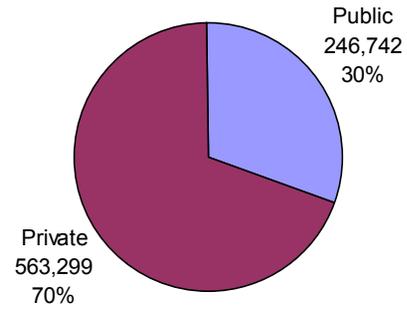
### NOTES:

In the Nashwauk Uplands there were 847 FIA sample plots.

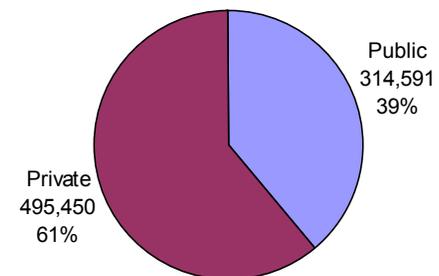
### Location



### Nashwauk Uplands - FIA Ownership (acres)



### Nashwauk Uplands - GAP Ownership (acres)

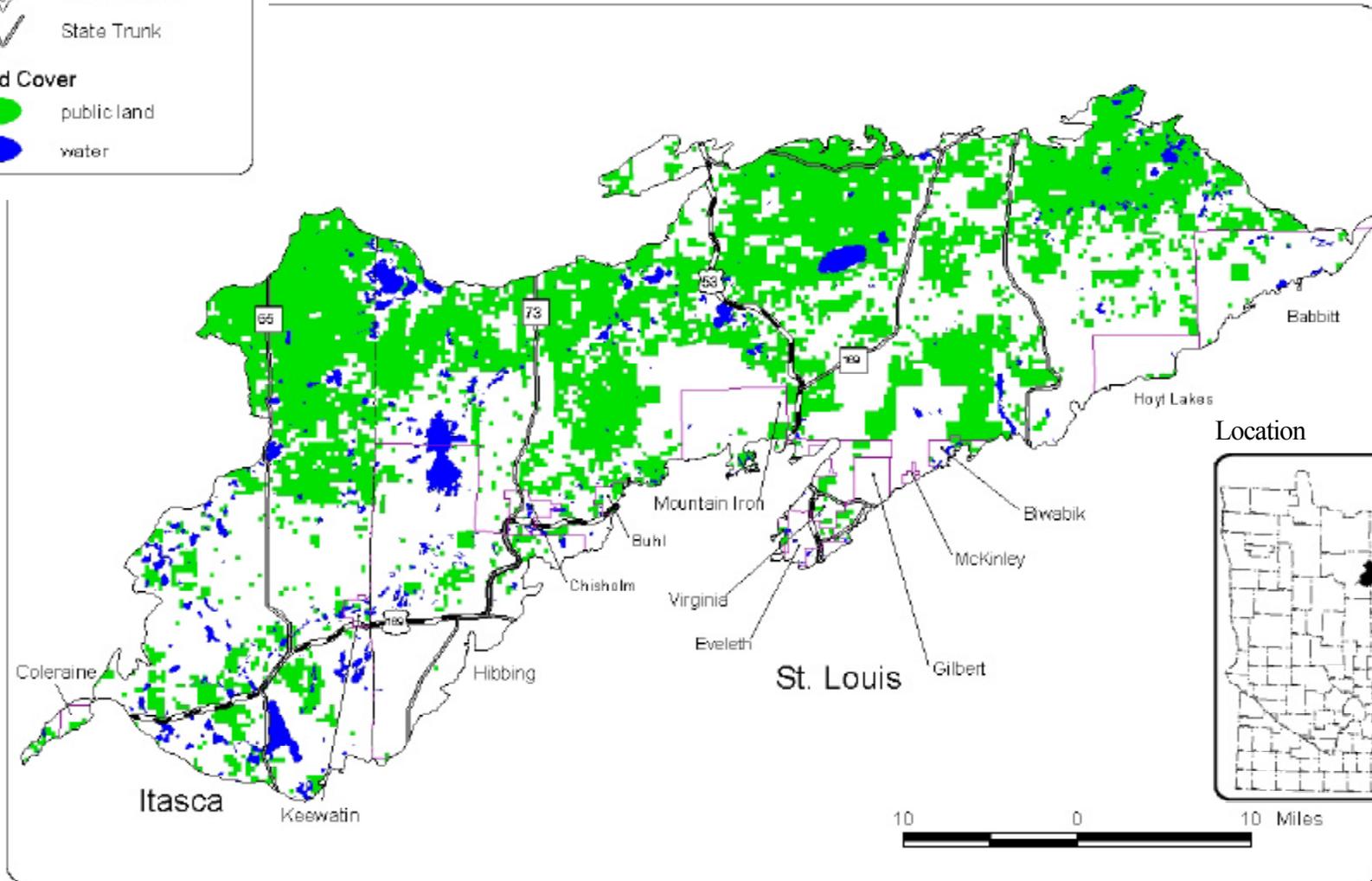


# Nashwauk Uplands

## GAP Ownership - Map



SOURCES :  
-DNR GAP Ownership  
(Appendix C has more information)



# Nashwauk Uplands

## Land Cover - Table

*SOURCES :*

-DNR GAP LC

-USFS FIA

-Manitoba LC

-NRRI LC

(Appendices A and C have more information)

|             | forest | shrubs, grass, and crops | barren and developed | non-forest wetland | water |
|-------------|--------|--------------------------|----------------------|--------------------|-------|
| NRRI LC     | 58%    | 15%                      | 12%                  | 11%                | 5%    |
| Manitoba LC | 52%    | 13%                      | 11%                  | 19%                | 6%    |
| GAP LC      | 55%    | 24%                      | 6%                   | 10%                | 6%    |
| FIA         | 69%    | 24%                      |                      | 2%                 | 5%    |

### Location

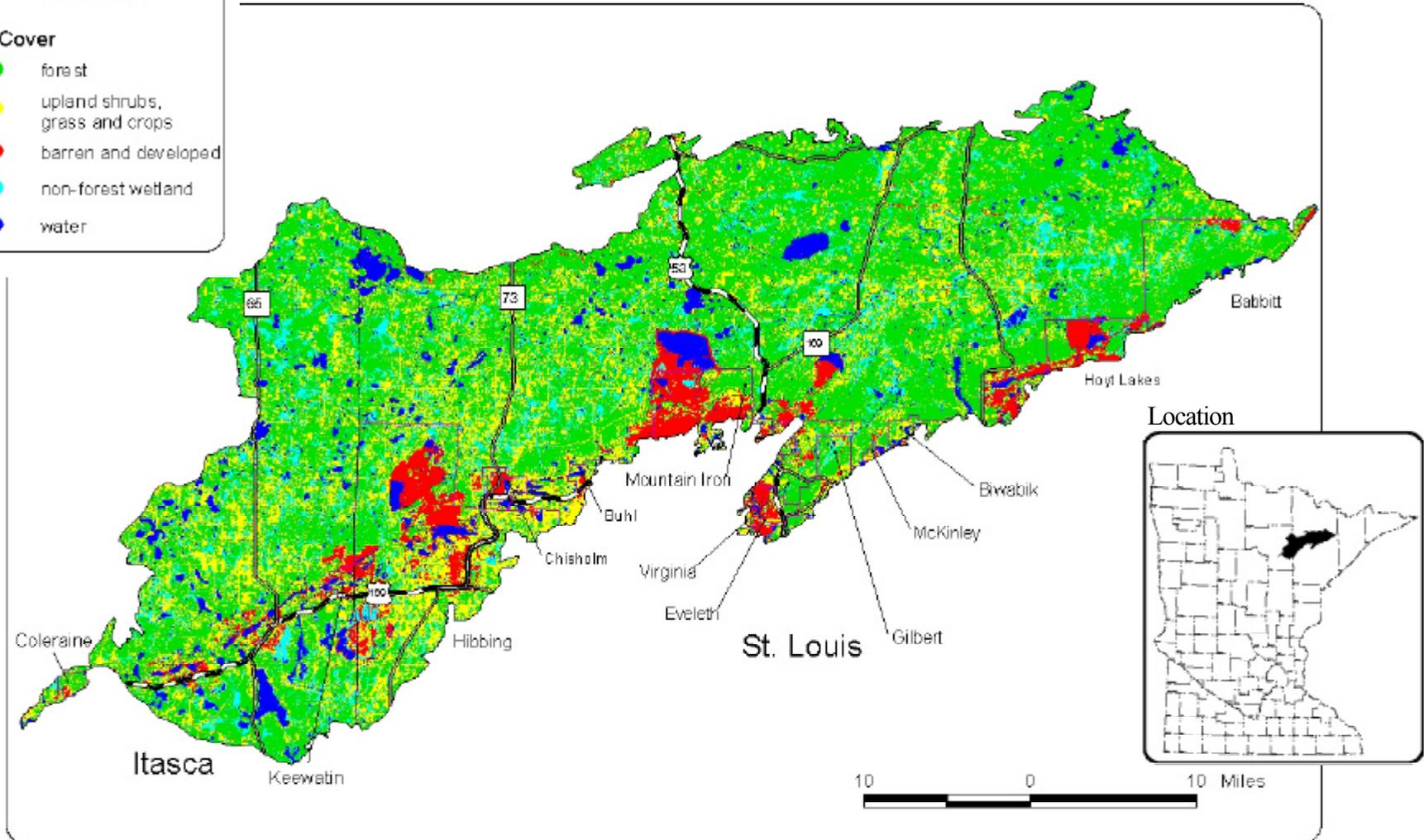


# Nashwauk Uplands

## GAP LC - Map



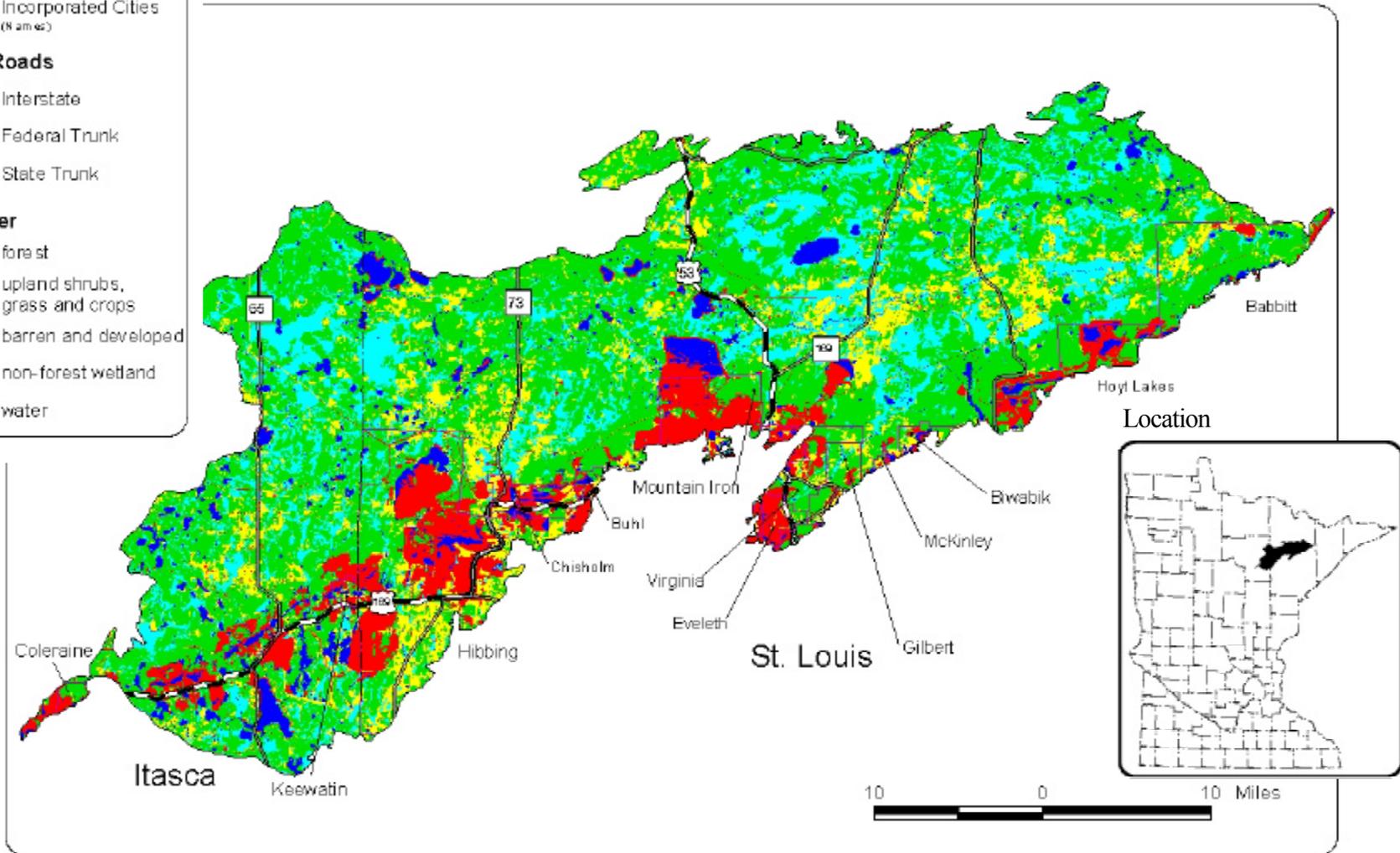
SOURCE:  
-DNR GAP LC  
(Appendices A and C have more information)



# Nashwauk Uplands

## Manitoba LC - Map

SOURCE:  
 -Manitoba LC  
 (Appendices A and C have more information)

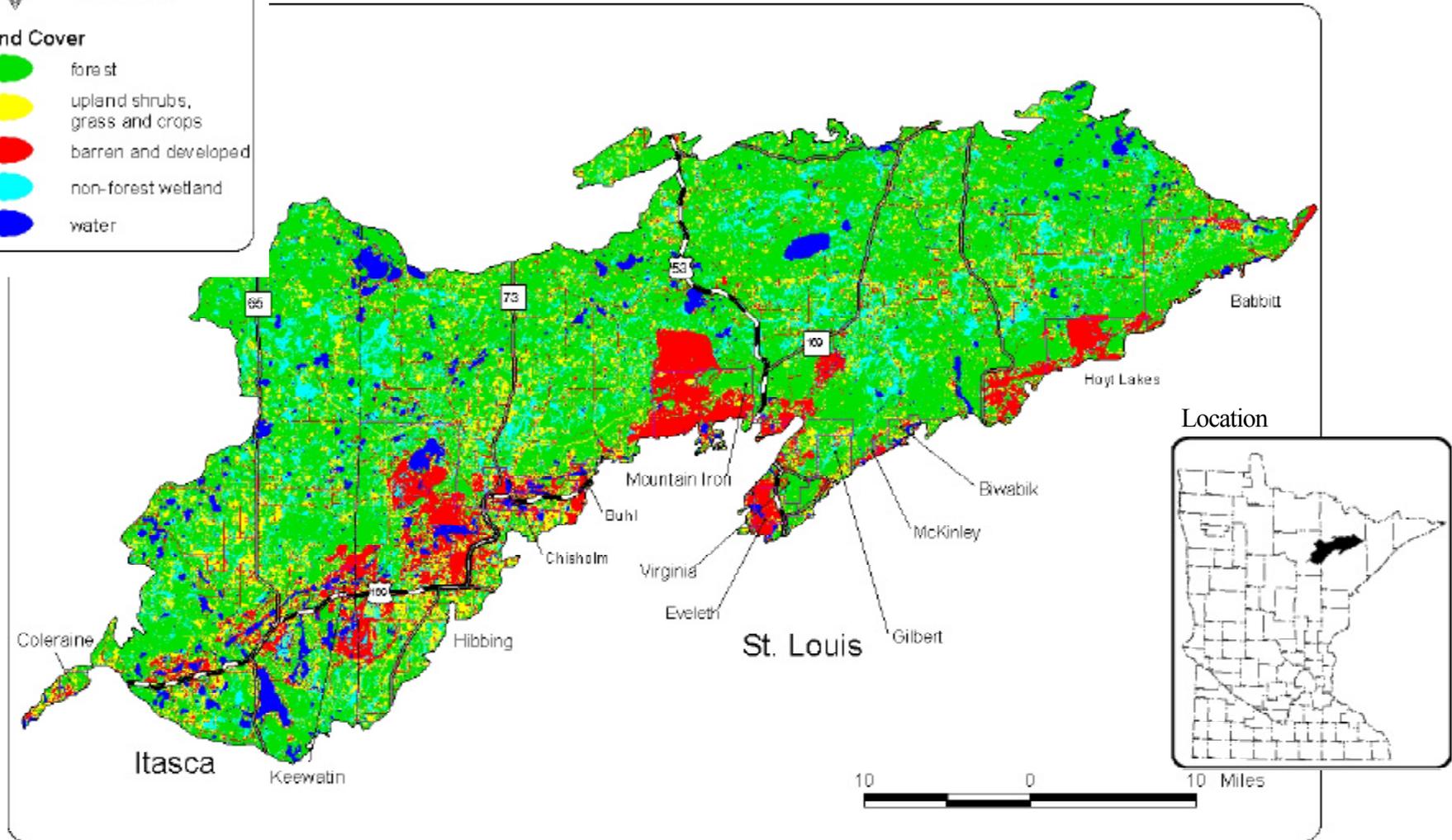


# Nashwauk Uplands

## NRRI LC - Map



SOURCE:  
-NRRI LC  
(Appendices A and C have more information)



# Toimi Uplands

## Ownership - Charts

### SOURCES :

-USFS FIA

-DNR GAP Ownership

(Appendices B and C have more information)

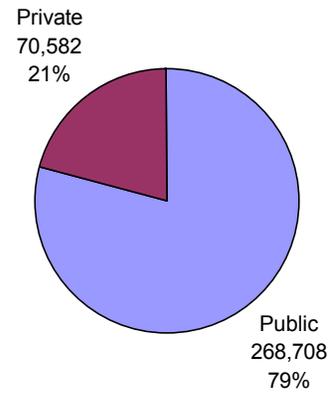
### NOTES:

In the Toimi Uplands there were 274 FIA sample plots.

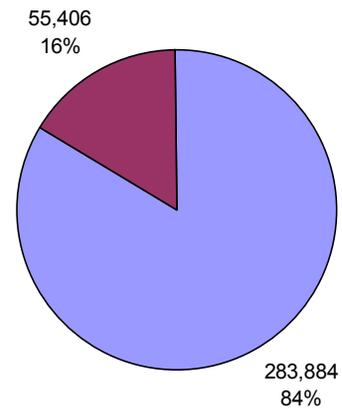
### Location



### Toimi Uplands - FIA Ownership (acres)

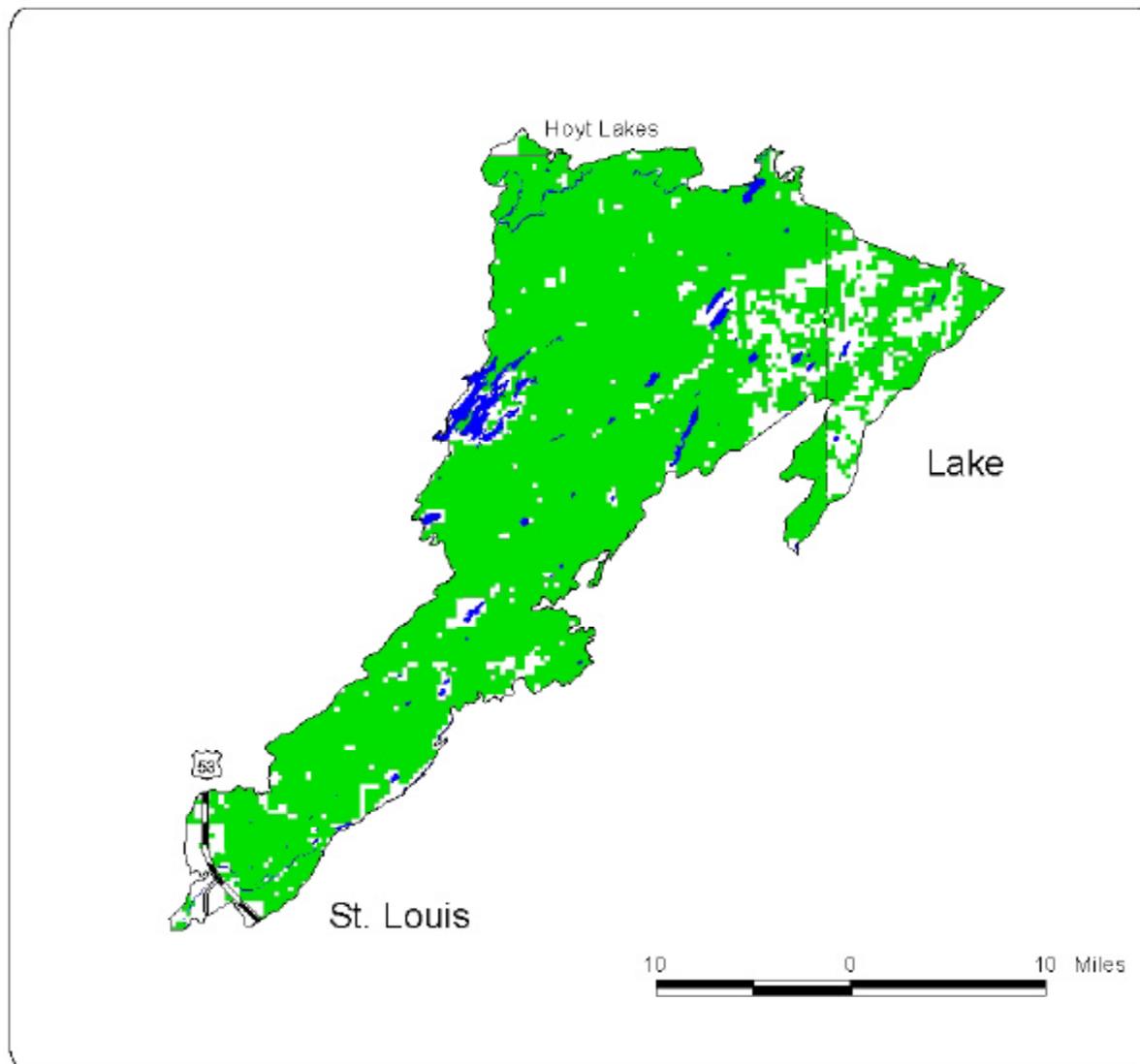


### Toimi Uplands - GAP Ownership (acres)



# Toimi Uplands

## GAP Ownership - Map



SOURCES:  
-DNR GAP Ownership  
(Appendix C has more information)

## Location



# Toimi Uplands

## Land Cover - Table

*SOURCES :*

-DNR GAP LC

-USFS FIA

-Manitoba LC

-NRRI LC

(Appendices A and C have more information)

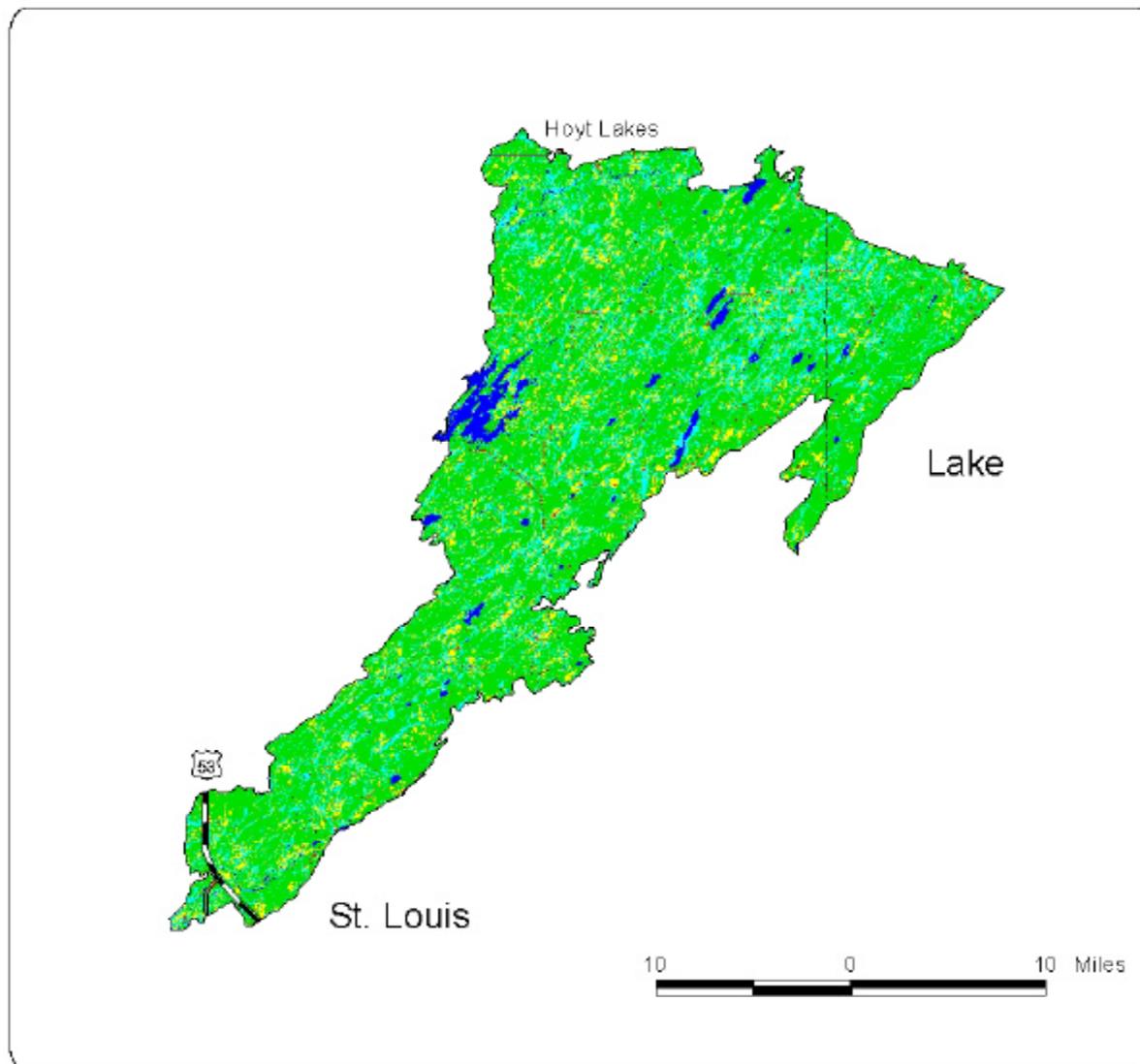
|             | forest | shrubs, grass, and crops | barren and developed | non-forest wetland | water |
|-------------|--------|--------------------------|----------------------|--------------------|-------|
| NRRI LC     | 77%    | 7%                       | 2%                   | 11%                | 3%    |
| Manitoba LC | 60%    | 10%                      |                      | 26%                | 3%    |
| GAP LC      | 67%    | 10%                      | 1%                   | 19%                | 3%    |
| FIA         | 91%    | 5%                       |                      | 1%                 | 2%    |

### Location



# Toimi Uplands

## GAP LC - Map



### Location

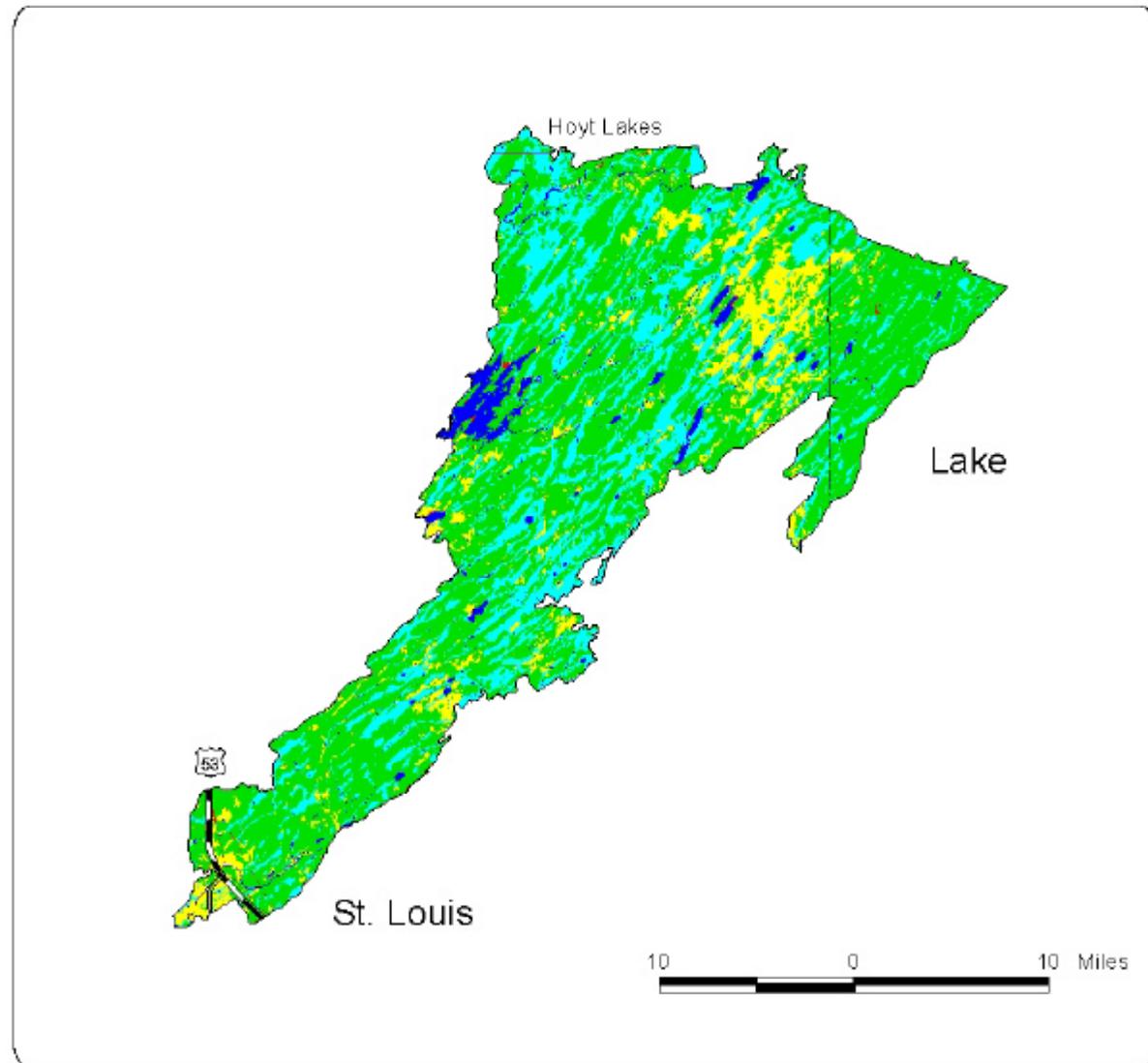


# Toimi Uplands

## Manitoba LC - Map

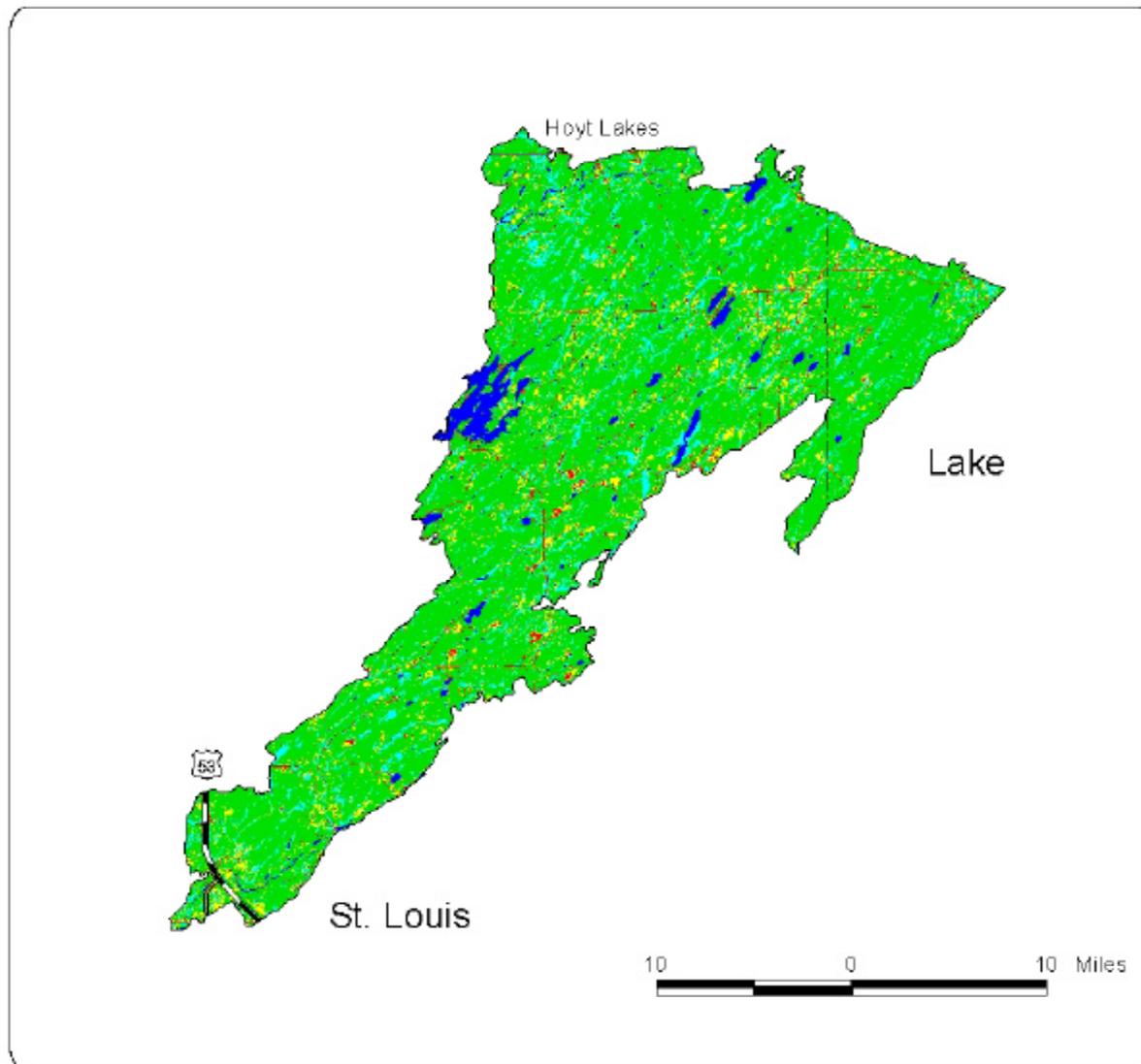


### Location



# Toimi Uplands

## NRRI LC - Map



### Location



SOURCE:  
-NRRI LC  
(Appendices A and C have more information)

# Appendix A - Simplified Code Transition Tables

## 1990 FIA Simplified Coding

| value | class code                 | simplified class code           |
|-------|----------------------------|---------------------------------|
| 20    | timberland                 | forest                          |
| 25    | reserved timberland        | forest                          |
| 40    | other forest land          | non-forest wetland              |
| 45    | reserved other forest land | forest                          |
| 60    | nonforest land             | upland shrubs, grass, and crops |
| 91    | census water               | water                           |

# Appendix A - Simplified Code Transition Tables (continued)

## 1995 GAP Land Cover Simplified Coding

| value | class name  | simplified class name           |
|-------|---|---------------------------------|
| 0     | No data (off-site)  | unknown                         |
| 1     | Urban/Developed   | barren and developed            |
| 2     | Urban/Developed - High intensity  | barren and developed            |
| 3     | Urban/Developed - Low intensity   | barren and developed            |
| 4     | Urban/Developed - Transportation  | barren and developed            |
| 11    | Agriculture - Herbaceous/field cropland   | upland shrubs, grass, and crops |
| 30    | Grassland   | upland shrubs, grass, and crops |
| 41    | Shrubland - Upland broadleaf deciduous shrub                                    | upland shrubs, grass, and crops |
| 52    | Upland Coniferous Forest - Jack pine  | forest                          |
| 54    | Upland Coniferous Forest - Red/White pine                                       | forest                          |
| 55    | Upland Coniferous Forest - Mixed/other coniferous                               | forest                          |
| 56    | Upland Coniferous Forest - Balsam fir/mix - (contains other forest types also)  | forest                          |
| 57    | Upland Coniferous Forest - White spruce   | forest                          |
| 72    | Broad-leaved deciduous Forest - Aspen/birch mix - (includes balsam poplar also) | forest                          |
| 75    | Broad-leaved deciduous Forest - White/Bur oak                                   | forest                          |
| 78    | Broad-leaved deciduous Forest - Red oak   | forest                          |
| 85    | Broad-leaved deciduous Forest - Maple/Basswood                                  | forest                          |
| 87    | Broad-leaved deciduous Forest - Mixed/other Broad-leaved deciduous              | forest                          |
| 90    | Mixed deciduous/coniferous  | forest                          |
| 100   | Open Water  | water                           |
| 112   | Wetland - Emergent/wet meadow - Floating aquatic                                | non-forest wetland              |
| 114   | Wetland - Emergent/wet meadow - Fine-leaf sedge                                 | non-forest wetland              |
| 115   | Wetland - Emergent/wet meadow - Broad-leaved sedge-grass                        | non-forest wetland              |
| 121   | Wetland - Lowland shrub - Lowland broad-leaved deciduous shrub                  | non-forest wetland              |
| 122   | Wetland - Lowland shrub - Lowland broad-leaved evergreen shrub                  | non-forest wetland              |
| 132   | Lowland forest - Lowland Black spruce   | forest                          |
| 133   | Lowland forest - Tamarack   | forest                          |
| 134   | Lowland forest - Lowland Northern white cedar                                   | forest                          |
| 137   | Lowland forest - Stagnant Black spruce  | forest                          |
| 138   | Lowland forest - Stagnant Tamarack  | forest                          |
| 151   | Lowland - Broad-leaved deciduous - Black ash                                    | forest                          |
| 153   | Lowland - Broad-leaved deciduous - Silver maple                                 | forest                          |
| 159   | Lowland - Broad-leaved deciduous - Low mixed/other deciduous                    | forest                          |
| 184   | Mixed barren  | barren and developed            |

# Appendix A - Simplified Code Transition Tables (continued)

## 1995 Manitoba Land Cover Simplified Coding

| value | class name  | simplified class name           |
|-------|---|---------------------------------|
| 1     | Cultivated land - Includes those areas under intensive cropping or rotation, including fallow fields. Fields seeded to forage or cover crops are included. The fields exhibit linear or other patterns associated with current or recent tillage.               | upland shrubs, grass, and crops |
| 2     | Deciduous forest - Includes areas with at least two-thirds or more of the total canopy cover composed of predominantly woody deciduous species. It may contain coniferous species but is dominated by deciduous species. It includes woodlots, shelter belts, a | forest                          |
| 3     | Open water - Includes permanent water bodies such as lakes, rivers, reservoirs, stock ponds, ditches, and permanent and intermittently exposed palustrine open water areas where photo evidence indicates that the area is covered by water the majority of the | water                           |
| 4     | Grassland - Includes areas covered by grasslands and herbaceous plants. May contain up to one third shrubs and/or tree cover. Areas may be small to extensive and range from regular to irregular in shape. These areas are often found between agricultural la | upland shrubs, grass, and crops |
| 5     | Mixedwood forest: Areas of forest where the canopy is composed of approximately equal amounts of deciduous and coniferous species.  | forest                          |
| 6     | Wetlands: marsh and fens - Grassy, wet areas with standing or slowly moving water. Vegetation consists of grass and sedge sods, and common hydrophytic vegetation such as cattail and rushes. Areas are often interspersed with channels or pools of open water | non-forest wetland              |
| 7     | Wetlands: bogs - Peat covered or peat filled depressions with a high water table. The bogs are covered with a carpet of sphagnum and ericaceous shrubs and may be treeless or tree covered with black spruce and/or tamarack.                                   | non-forest wetland              |
| 8     | Farmsteads and rural residences - Farmsteads include farmhouse and adjoining farmyard area. Includes machinery storage buildings, grain storage buildings, corrals, livestock holding and feeding areas directly associated with farmyard area.                 | barren and developed            |
| 9     | Coniferous forest - Includes areas with at least two thirds or more of the total canopy composed of predominantly woody coniferous species. It may contain deciduous species but is dominated by coniferous species. It includes woodlots, shelter belts, and p | forest                          |

# Appendix A - Simplified Code Transition Tables (continued)

## 1995 Manitoba Land Cover Simplified Coding (continued)

| value | class name  | simplified class name           |
|-------|---|---------------------------------|
| 10    | Other rural developments - Includes commercial and industrial, cultural and recreational, and agricultural developments not associated with urban areas. Commercial/industrial developments include substations, communications facilities, power plants, private airstrips, landfills, storage maintenance yards, businesses, factories, lumber mills, commercial livestock/poultry/grain operations. Cultural/recreational developments include built-up facilities and service areas associated with parks, rest areas, campgrounds, and golf courses. Includes churches, cemeteries, community halls, and rural schools. Agricultural developments include agricultural facilities not directly associated with farmsteads. Includes machine and grain storage areas, barns and corrals, and isolated buildings and farmsteads that no longer have apparent road access.  | barren and developed            |
| 11    | Shrubby grassland - This class includes a combination of grass, shrubs, and trees in which deciduous and/or coniferous treed cover comprises from one third to two thirds of the area, and/or the shrub cover comprises more than one third of the area. This complex is often found adjacent to grassland or forested areas, but may be found alone. These areas are often irregular in shape and vary greatly in size.  | upland shrubs, grass, and crops |
| 12    | Gravel pits and open mines - Areas are stripped of top soil revealing exposed substrate such as sand/gravel. Included are gravel quarry operations, mine tailings, burrow pits, and rock quarries. Natural beaches/sand dunes are included.   | barren and developed            |
| 13    | Urban/industrial (cities)   | barren and developed            |
| 14    | Regeneration/Young Forest - DNR revised definition (see Attribute Accuracy element for original definition): This class is made up of areas that have a good likelihood of being young forest which were replanted or naturally regenerated since 1970. It includes lands that were commercially logged or affected by catastrophic events, primarily fire and wind damage. Caution: Two significant sources of classification confusion exist that result in older forest being classed as young. (1) One source of confusion results because stands having very good conditions for regrowth (measured by site index) mature faster than stands with poor regrowth conditions. The result is older stands with a low site index look very much like younger stands having a higher site index. (2) A second source of confusion is caused by some misclassified mature hardwoods that are found in this category, possibly misclassified because the crown cover is similar to the dense cover such as that which exists in a regenerating aspen stand. | forest                          |
| 15    | Bare rock - Includes areas of rock outcrops that lack appreciable soil development or vegetation cover.   | barren and developed            |

# Appendix A - Simplified Code Transition Tables (continued)

## 1990 NRRI Land Cover Simplified Coding

| value | class name                    | simplified class name | value | class name               | simplified class name           |
|-------|-------------------------------|-----------------------|-------|--------------------------|---------------------------------|
| 0     | unknown                       | unknown               | 25    | red oak                  | forest                          |
| 1     | jack pine                     | forest                | 26    | oak - pine               | forest                          |
| 2     | jack pine - hardwood          | forest                | 27    | hardwod transitional     | forest                          |
| 3     | jack pine - oak               | forest                | 28    | hardwood regeneration    | forest                          |
| 4     | red pine                      | forest                | 29    | bare ground              | barren and developed            |
| 5     | red pine - hardwood           | forest                | 30    | water                    | water                           |
| 6     | spruce-fir                    | forest                | 31    | emergent - augatic       | non-forest wetland              |
| 7     | spruce-fir - hardwood         | forest                | 32    | emergent                 | non-forest wetland              |
| 8     | cedar                         | forest                | 33    | Sphagnum soo.            | non-forest wetland              |
| 9     | cedar - hardwood              | forest                | 34    | grass - native           | upland shrubs, grass, and crops |
| 10    | tamarack                      | forest                | 35    | grass - native (lowland) | non-forest wetland              |
| 11    | black spruce                  | forest                | 36    | grass, cool season       | upland shrubs, grass, and crops |
| 12    | acid bog conifer stagnant     | forest                | 37    | grass domestic           | upland shrubs, grass, and crops |
| 13    | conifer - misc. (low density) | forest                | 38    | brush alder              | upland shrubs, grass, and crops |
| 14    | conifer regeneration          | forest                | 39    | brush alder (lowland)    | non-forest wetland              |
| 15    | black ash                     | forest                | 40    | brush, willow            | upland shrubs, grass, and crops |
| 16    | black ash - conifer           | forest                | 41    | brush, willow (lowland)  | non-forest wetland              |
| 17    | black ash - conifer under.    | forest                | 42    | brush - misc.            | upland shrubs, grass, and crops |
| 18    | haedwoods - misc. (lowland)   | forest                | 43    | brush - misc. (lowland)  | non-forest wetland              |
| 19    | aspen-birch                   | forest                | 44    | brush, ericacious        | non-forest wetland              |
| 20    | aspen-birch - conifer         | forest                | 45    | developed                | barren and developed            |
| 21    | aspen-birch - conifer under.  | forest                | 46    | roads                    | barren and developed            |
| 22    | northern hardwoods            | forest                | 47    | cloud & cloud shadow     | unknown                         |
| 23    | northern hwd - transitional   | forest                | 48    | pin oak                  | forest                          |
| 24    | northern hwd - regeneration   | forest                |       |                          |                                 |

# Appendix B - FIA Summary of Accuracy

## Summary of FIA Statistics

| <b>Subsection</b>  | <b>Number of all FIA Plots (acres)*</b> | <b>Number of Timberland FIA Plots (acres)*</b> | <b>% Accuracy based on Timberland FIA Plots (acres)**</b> |
|--------------------|---|--|---|
| Laurentian Uplands | 420 (525,000)                           | 341 (426,250)                                  | 2.12 (9,037)  |
| Nashwauk Uplands   | 847 (1,058,750)                         | 578 (722,500)                                  | 1.63 (11,777)   |
| Toimi Uplands      | 274 (308,750)                           | 250 (312,500)                                  | 2.48 (7,750)  |

*SOURCE:*  
1990 USFS FIA

*NOTES:*

\*FIA data is based on a statistical sample, where 1 plot roughly represents 1,250 acres.

\*\*The equation following equation was used to determine accuracy:

$$[ (0.36) * \text{sqrt}(\text{total timberland in MN}) ] / \text{sqrt}(\text{acres of timberland in subsection}) = [ (0.36) * \text{sqrt}(14,773,400) ] / \text{sqrt}(\text{acres of timberland in subsection})$$

# Appendix C - Metadata

## Summary of Data

| Data            | Creator                        | Source                                      | Scale        | Spatial Resolution   | Summary  | Notes  |
|-----------------|--------------------------------|---|--------------|----------------------|--|--|
| FIA*            | USFS                           | aerial photos and ground surveys, 1989-1991 | Statewide    | 1250 acres per plot  | A federally funded inventory of the state's forest resources: their type, extent, growth, mortality, and removals. | Detailed forest stand information, Represents public and private lands, Based on a statistical sample, Poor spatial resolution |
| GAP Ownership** | DNR                            | land records 1976-98, predominantly 1983-85 | Statewide    | 40 acres (PLS forty) | Provides ownership and administration information for each PLS quarter-quarter section.                            | Provides ownership information for the entire state, Poor spatial resolution   |
| GAP LC          | DNR                            | satellite imagery from 1995 - 1996          | Statewide    | 1/4 acre             | LandSat satellite images classified into land cover types.   | Detailed cover type classes, High spatial resolution, Only has information on cover types                                      |
| LULC            | Manitoba Remote Sensing Centre | satellite imagery from 1995 - 1996          | Northeast MN | 1/4 acre             | LandSat satellite images classified into land cover types.   | Detailed cover type classes, High spatial resolution, Only done for the NE MN image, Only has information on cover types       |
| NRRI LC         | NRRI                           | satellite imagery from 1989 - 1991          | Northeast MN | 1/4 acre             | LandSat satellite images classified into land cover types.   | Detailed cover type classes, High spatial resolution, Only done for the NE MN image, Only has information on cover types       |

\* Data available on the Internet at <http://www.srsfia.usfs.msstate.edu/ewdata/ewrec.htm>

\*\* Data available on the Internet at <http://deli.dnr.state.mn.us>



# Appendix D - Example Metadata (continued)

|  |   |
|--|---|
| <i>Theme Keywords</i>                  | Public Land Survey, PLS, land ownership, land administration, conservation status, gap analysis, GAP  |
| <i>Theme Keyword Thesaurus</i>         | None  |
| <i>Access Constraints</i>              | None  |
| <i>Use Constraints</i>                 | This dataset is not intended for site specific work, but for more generalized analysis or reference. Appropriate uses of this data include, but are not limited to, regional or large area planning or analysis, coarse scale impacts of initiatives affecting biodiversity protection, large scale environmental impact, or education. Inappropriate uses include, but are not limited to, establishing exact boundaries of ownership or administration, establishing definite presence or absence of ownership or administration, using this data in lieu of source information for small scale analysis. PLS delineations below the forty level have been arbitrarily generated and cannot be considered in any way accurate.  |
| <i>Contact Person Information</i>      | Robert Maki, GIS Database Coordinator<br>DNR-MIS<br>500 Lafayette Road<br>St. Paul, MN 55155-4011<br>Phone: (651) 297-2329<br>FAX: (651) 297-4946<br><u>E-mail: <a href="mailto:robert.maki@dnr.state.mn.us">mailto:robert.maki@dnr.state.mn.us</a></u>   |
| <i>Browse Graphic File Name</i>        | <u><a href="#">gapstpy2_sam.gif</a></u>   |
| <i>Browse Graphic File Description</i> |   |
| <i>Associated Data Sets</i>            | The dataset is built on top of the PLSDVNE2 layer (Mathematically Divided Public Land Survey); also known as the PLSS-TRSQ (by the Land Management Information Center)  |
| <i>Section 2</i>                       | <u><a href="#">Data Quality Information - - - - top</a></u>   |
| <i>Attribute Accuracy</i>              | Public Land Survey attribute reference is described in metadata for the PLSDVNE2 data set. Ownership accuracy will vary depending on source information provided. No formal methods were used to verify non-PLS information in this database. No systematic review or correction procedure by source data providers was used for verification. Conflicting ownership claims are retained in the field REMARKS, but these were not resolved. Informal verification of the attributes was done by visually comparing the final information with the source data or maps. Some sources provided current but incomplete information. Several sources provided ownership information with PLS reference, and should be considered accurate as of the time of addition to the database. Conservation management codes were set depending not on individual PLS quarter-quarter sections, but on the administrating entity. This generalization may provide a code inaccurate for a particular parcel, but will provide a reasonably accurate assessment of the type of management |
| <i>Logical Consistency</i>             | Data are topologically correct using ARC/INFO 7.2.1. All polygons are closed and lines intersect where intended.  |
| <i>Completeness</i>                    | Ownership information is complete for state agencies as recorded in the Bureau of Real Estate Management database (1996). This includes county ownership without specific designation. State ownership from other sources is of varying completeness and vintage. Most federally owned lands are complete but smaller holdings are of older vintage, and may thus not reflect current ownership. Tribal ownership is complete for the state but does not include all federally owned lands held in trust or as reservation land. Privately managed lands are complete for over sixty counties. Difficulty of collecting information prevented this piece from being completed. Included are individuals, groups, or companies owning at least 1000 acres, The Nature Conservancy, and Conservation Reserve Program lands administered by the MN Department of Agriculture. DNR users should note that DNR interests are   |
| <i>Horizontal Positional Accuracy</i>  | Source township and range lines were tested by the USGS National Mapping Division's Mid-Continent Mapping Center in August of 1993 for two files: Anoka and Battle Lake. The following evaluation was submitted to LMIC on September 1, 1993 in a letter from Mapping Center Chief Merle E. Southern: The positional accuracy of the Minnesota LMIC PLSS data evaluated met most of our recently adopted acceptance/rejection criteria. Tests of three thirty-minute segments all showed standard errors for x and y to be 5-mils [0.005 inch] or less. Tracking test on two segments were generally acceptable -- one line was encountered that was 12-mils off. No deviations of more than 11-mils are allowed. Shaping of linework was acceptable. Lines internal to the sections were arbitrarily generated and should not be treated in any way as authoritative.  |

# Appendix D - Example Metadata (continued)

|  |   |
|--|---|
| <i>Vertical Positional Accuracy</i>          | Not Applicable  |
| <i>Lineage</i>                               | Using the PLSS-TRSQ layer as a base, stewardship attributes were populated with collected information. Source information was added in one of three methods: a) Source information received as a database with a PLS description was joined to the base layer directly. If acreage was provided with the source data, it was compared to the base layer area to determine if at least half of the quarter-quarter section was accounted for. Attributes in the base layer were coded with information from the source database; b) Source information taken from printed maps was manually entered into a database template and joined to the base layer in the same manner as the databases received; c) Source information received as an Arc/INFO coverage was intersected with the 100k quadrangles. Each base layer quarter-quarter section was compared with the output to determine whether or not it was overlaid by the source information coverage. All quarter-quarter sections with at least half of their area covered by the source information coverage were coded with that |
| <i>Source Scale Denominator</i>              | 100000  |
| <b>Section 3</b>                             | <b><u>Spatial Data Organization Information - - - - - top</u></b>   |
| <i>Native Data Set Environment</i>           | ARC/INFO  |
| <i>Geographic Reference for Tabular Data</i> | Not Applicable  |
| <i>Spatial Object Type</i>                   | Vector  |
| <i>Vendor Specific Object Types</i>          | polygons, arcs  |
| <i>Tiling Scheme</i>                         | q100k   |
| <b>Section 4</b>                             | <b><u>Spatial Reference Information - - - - - top</u></b>   |
| <i>Horizontal Coordinate Scheme</i>          | UTM   |
| <i>Ellipsoid</i>                             | GRS1980   |
| <i>Horizontal Datum</i>                      | NAD83   |
| <i>Horizontal Units</i>                      | meters  |
| <i>Distance Resolution</i>                   | meters  |
| <i>Altitude Datum</i>                        | n/a   |
| <i>Altitude Units</i>                        | n/a   |
| <i>Depth Datum</i>                           | n/a   |
| <i>Depth Units</i>                           | n/a   |
| <i>Cell Width</i>                            | 0   |
| <i>Cell Height</i>                           | 0   |
| <i>Latitude Resolution</i>                   | 0   |
| <i>Longitude Resolution</i>                  | 0   |
| <i>UTM Zone Number</i>                       | 15  |
| <i>SPCS Zone Identifier</i>                  | 0   |
| <i>County Coordinate Zone Identifier</i>     | 0   |
| <i>Coordinate Offsets or Adjustments</i>     | n/a   |
| <i>Map Projection Name</i>                   | n/a   |
| <i>Map Projection Parameters</i>             | n/a   |
| <i>Other Coordinate System's Definition</i>  | n/a   |

# Appendix D - Example Metadata (continued)

|   |   |
|---|---|
| <i>Section 5</i>                              | <u>Entity and Attribute Information - - - - - top</u>   |
| <i>Entity and Attribute Overview</i>          | PLS quarter-quarter sections (forties) attributized with PLS description; major ownership category; administering agency code; administering agency name; contact phone number; long name of land unit; source numeric land unit code; management protection status code; remarks field; and flag fields indicating known ownership conflicts, and instances where land owner and steward differ.   |
| <i>Entity and Attribute Detailed Citation</i> | GAP Stewardship   |
| <u>HTML Table</u>                             | --gapstpy2.pat--<br><br>OWNER: Major stewardship category<br>AGENCY: Administering agency code<br>AGEN_NAME: Administering entity long name<br>AREA_CODE: Area Code of Administering Agency Office<br>PHONE: Local phone number expressed as a real number<br>OWNER_FLAG: Identifies records of forties where the owner and administrator of the land unit is different. A principal example of this is state-owned tax forfeit lands, which are administered by the county governments within their jurisdictional boundaries.<br>UNIT: Long name of administrative unit<br>UNIT_CODE: Numeric unit code provided by contributing agency. These values are not unique within this field.<br>SUBUNIT: Not implemented<br>MGMT: Management protection status code<br>CONFL_FLAG: A field to flag records with conflicting claims to majority ownership<br>REMARKS: Any remarks, such as conflicting claims, etc.<br>COUN: Standard two digit county code<br>TOWN: Three digit township (tier) number<br>RDIR: Range direction<br>RANG: Two digit range number<br>SECT: PLS section number<br>FORT: A combination of a code for the quarter section and a code for the quarter of the quarter section:<br>NUM_OF_GLOTS: Number of Government lots occurring within the forty acre size area<br>GOVT_LOTA: The identifier of the government lot occurring within the forty. The actual number is unique within each section. Sometimes the same identifier is assigned to adjacent forties, indicating that a single government lot with that identifier extends across those forties.<br>GOVT_LOTB: See description for the GOVT_LOTA field<br>GOVT_LOTC: See description for the GOVT_LOTA field<br>GOVT_LOTD: See description for the GOVT_LOTA field<br>GOVT_LOTE: See description for the GOVT_LOTA field<br>GOVT_LOTF: See description for the GOVT_LOTA field<br>GOVT_LOTG: See description for the GOVT_LOTA field<br>GOVT_LOTH: See description for the GOVT_LOTA field<br>GOVT_LOTI: See description for the GOVT_LOTA field<br>GOVT_LOTJ: See description for the GOVT_LOTA field |

# Appendix D - Example Metadata (continued)

|  |   |
|--|---|
|  | <p>GLOTMATCH: A geocoding field designed to optimize matches between this data and tabular real estate management records. This field differs from the GEOGLOT field in that forty code values for records that represent government lots are expressed as zero. When using this field to match with land records, care should be taken to ensure that forty codes in government lot records are treated identically. An ARCVIEW tool has been developed to automate this process--contact Tim Loesch at <a href="mailto:tim.loesch@dnr.state.mn.us">tim.loesch@dnr.state.mn.us</a>.</p> <p>GEOPARC: REDEFINED<br/>         GEOGLOT: REDEFINED<br/>         GEOFORT: REDEFINED<br/>         GEOSECT: REDEFINED<br/>         GEORANG: REDEFINED<br/>         RANG.DIR: REDEFINED</p> |
| <b>Section 6</b>                         |   |
|  | <u>Distribution Information - - - - - top</u>   |
| <i>Publisher</i>                         | Minnesota DNR - MIS Bureau  |
| <i>Publication Date</i>                  | 8/11/1998   |
| <i>Contact Person Information</i>        | Robert Maki, GIS Database Coordinator<br>Minnesota DNR<br>500 Lafayette Road, Box 11<br>St. Paul, MN 55155<br>Phone: (651) 297-2329<br>FAX: (651) 297-4946<br><u>E-mail: <a href="mailto:robert.maki@dnr.state.mn.us">mailto:robert.maki@dnr.state.mn.us</a></u>  |
| <i>Distributor's Data Set Identifier</i> | gapstpy2  |
| <i>Distribution Liability</i>            | None stated   |
| <i>Transfer Format Name</i>              | 7.1.2   |
| <i>Transfer Format Version Number</i>    | ARC/INFO  |
| <i>Transfer Size</i>                     | 860   |
| <i>Ordering Instructions</i>             | Contact above Person  |
| <i>Online Linkage</i>                    | <u><a href="#">DNR Data Deli</a></u>  |
| <b>Section 7</b>                         |   |
|  | <u>Metadata Reference Information - - - - - top</u>   |
| <i>Metadata Date</i>                     | 8/11/1998   |
| <i>Contact Person Information</i>        | Robert Maki, GIS Database Coordinator<br>Minnesota DNR - MIS Bureau<br>500 Lafayette Road<br>Saint Paul, MN 55155<br>Phone: (651) 297-2329<br>FAX: (651) 297-4946<br><u>E-mail: <a href="mailto:robert.maki@dnr.state.mn.us">mailto:robert.maki@dnr.state.mn.us</a></u>   |
| <i>Metadata Standard Name</i>            | Minnesota Geographic Metadata Guidelines  |
| <i>Metadata Standard Version</i>         | 1.1   |
| <i>Metadata Standard Online Linkage</i>  | <u><a href="http://www.lmic.state.mn.us/gc/stds/metadata.htm">http://www.lmic.state.mn.us/gc/stds/metadata.htm</a></u>  |