Modeling Timber Appraisal Values on Native Trust Land
Objectives

“Modeling Timber Appraisal Values on Native Trust Lands”

a> Background to the Minnesota Chippewa Tribes Timber Appraisal Project

b> Geospatial data sets from BIA Midwest Region Branch of Forestry that enabled mass appraisal method

c> Processing steps

d> Obstacles encountered

e> Lessons learned from the experience at Midwest Regional Office
Background

• Minnesota Chippewa Tribes – An affiliation of 6 Bands
  • Grand Portage, Bois Forte, Fond du Lac, Leech Lake, White Earth, and Mille Lacs
• Trust Land – Tribal, Band, and Allotted
• MCT wanted to transfer its land to respective Bands
• Tribal land not equally distributed on Reservations
• MCT requested a real estate appraisal (and by extension the standing timber value) of its interests to make a more equitable transfer to the member Bands
<table>
<thead>
<tr>
<th>Reservation</th>
<th># of Tracts</th>
<th>Total Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bois Forte</td>
<td>212</td>
<td>25,443</td>
</tr>
<tr>
<td>Fond du Lac</td>
<td>95</td>
<td>4,316</td>
</tr>
<tr>
<td>Grand Portage</td>
<td>66</td>
<td>8,482</td>
</tr>
<tr>
<td>Leech Lake</td>
<td>228</td>
<td>11,676</td>
</tr>
<tr>
<td>White Earth</td>
<td>477</td>
<td>46,629</td>
</tr>
<tr>
<td>Mille Lacs</td>
<td>266</td>
<td>3,307</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,344</strong></td>
<td><strong>99,853</strong></td>
</tr>
</tbody>
</table>
MCT Timber Appraisal Project

Data Needs

• Vegetation
  Operations Inventory – OpInv
  Geospatial – Surface Cover Type (SCT)

• MCT tracts – Trust Asset Accounting Management System (TAAMS)
  Geospatial – Land Title Mapper (LTM)
  Updates based on local input
  Other Land Status layers

• Stumpage prices – Species and product

Data Formats

• Geospatial – Coverages, shapefiles, conversion to GeoDB
• OpInv – Microsoft Access application
MCT Timber Appraisal Project

Processing Strategy

• Overlay subject data sets

• Use frequency analysis to calculate area by vegetation/ownership classification

• Use Excel to manipulate data imported to a spreadsheet
Processing

ArcGIS Desktop Version 9.3.1

Ownership Processing - Tracts w/ MCT interests

Vegetation processing
  • Exclude type calls not in OpInv - Water, private
  • Set up RCS number to match OpInv tables

Overlay using Intersect; calculate geometry

Create display for QA/QC
  • Slivers/Overlaps
  • Lack of data overlay
    ▪ TAAMS show ownership, but no inventory
    ▪ Inventory, but not in the TAAMS record
Portion of Fond du Lac, showing gaps in inventory over the ownership layer.
Processing

Continue After Correcting Discrepancies

Export geospatial table to Excel
Acreage Adjustment
  Make to agree with TAAMS acreage
  Obvious errors show - large differences
  Differences proportionately applied

TAAMS Acres vs. GIS Acres
  TAAMS - System of record; it’s official
  Calculated acres - What is really being managed
### Sample Tract List with Acres by Stand

<table>
<thead>
<tr>
<th>TractID_x_RCS</th>
<th>GIS ACRES</th>
<th>Adj. ACRES</th>
<th>Wt. Factor</th>
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</thead>
<tbody>
<tr>
<td>T1003</td>
<td>3.0</td>
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<td>0.668015238</td>
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<tr>
<td>4050050053</td>
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<tr>
<td>4050050099</td>
<td>0.1</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>T1004</td>
<td>2.5</td>
<td>2.89</td>
<td>1.1572342</td>
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<tr>
<td>4050060201</td>
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<td>2.89</td>
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<tr>
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<td>1.011822443</td>
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<tr>
<td>T1007</td>
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<td>40.00</td>
<td>0.999042032</td>
</tr>
</tbody>
</table>
Modeling

From Dr. Thomas Burk, contractor completing the modeling for MCT

General approach consisted of 4 steps

- Update volume per acre for each RCS of interest
- Apply stumpage values to compute value per acre for each RCS of interest
- Compute weighted timber value per acre for each tract
- Compute the total MCT tract value

Completed through a contract, using Access, queries and VBA code, and Excel spreadsheets
Modeling – Step 1

Update volume per acre

No individual tree list available – would have been better

Used stand level data, applying a growth model from

Walters and Ek (1993)

“Grew” stands forward from inventory date to estimate

density per acre by species / product

combination


fourteen forest types in Minnesota. Northern Journal of Applied Forestry.

10(2):75 – 85.
Modeling – Step 2

Compute current value per acre of each RCS

- Applied stumpage values for species and products to the volumes from the first step
- Calculated a weighted average
- Assumed species mixes remained constant
Modeling – Steps 3 & 4

Current timber value per acre for each tract
Avg. Value / Ac. x Acres, summed across all stands, with the total divided by tract acres

Total timber value for each MCT tract
Value per acre x the TAAMS acreage gives the total timber value for the tract
Modeling – Limitations

Stand-level inventory error – as high as 15%
Stand-changing event not in the inventory record
Errors in the growth model predictions
Assumption of constant volume proportions by species
Stumpage values are averages
Obstacles & Opportunities

Standardization - Can’t stress enough for mass or bulk processing
Incomplete/incorrect data sets
Lack of exact registration between data sets
Dealing with TAAMS acres vs. “real” acres
   Surveyed plats - meander lines, lots
   Water body changes
   Missing or missed parcels
Conclusions

Requires better land record information

Standard, up-to-date forest inventory

Need for a method to quickly/accurately map these data
Comments and Questions

Carl Hardzinski
USDI – BIA – MWR
Bloomington, MN
carl.hardzinski@bia.gov
Voice (612) 725-4524
Fax (612) 713-4401