School of Environmental and Forest Sciences
UNIVERSITY of WASHINGTON
College of the Environment

WASHINGTON HARDWOODS COMMISSION

WESTERN WASHINGTON HARDWOOD ASSESSMENT

2ND ANNUAL WESTERN HARDWOOD INTERNATIONAL CONVENTION & EXPOSITION
PORTLAND, OR
MAY 21, 2014

Luke Rogers, John Perez-Garcia, B. Bruce Bare

UNIVERSITY of WASHINGTON COLLEGE of the ENVIRONMENT

School of Environmental and Forest Sciences

2013 Western Washington Hardwood Assessment

WASHINGTON HARDWOODS COMMISSION

&

University of Washington Institute of Forest Resources

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August 9, 2013

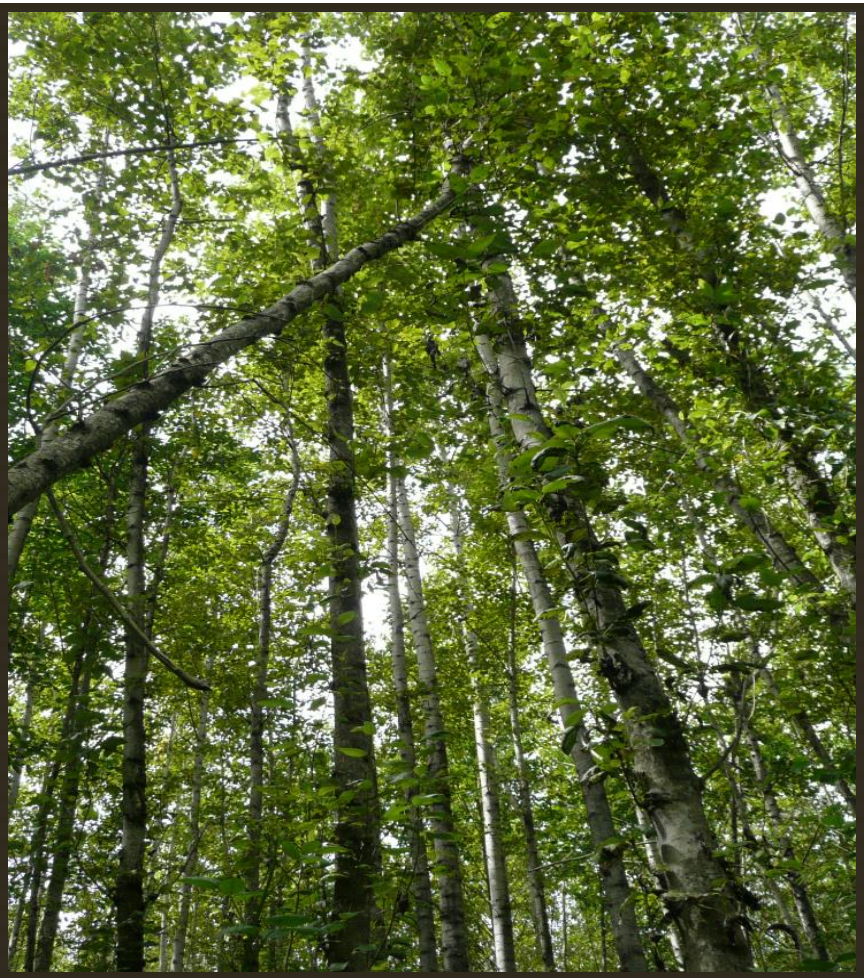
Reports Available

- At these links are:
  - The Report
    - https://www.dropbox.com/s/1mtnhksy8atog6e/2013WesternWashingtonHardwoodAssessment.pdf?dl=0
  - Series of Report tables
    - https://www.dropbox.com/s/9o6bnl7lyib2itc/2013WesternWashingtonHardwoodAssessmentReportTables.xlsx?dl=0
  - An Extended Executive Summary
    - https://www.dropbox.com/s/6f0n2mqqcm0h9wc/2013WesternWAHdwdAsmtExtExecSum20131119.pdf?dl=0

Funding for Study

- Washington Hardwoods Commission
- McIntire-Stennis Federal Cooperative Forestry Program
- Assessment coordinated by the UW Institute of Forest Resources

Four Questions Posed

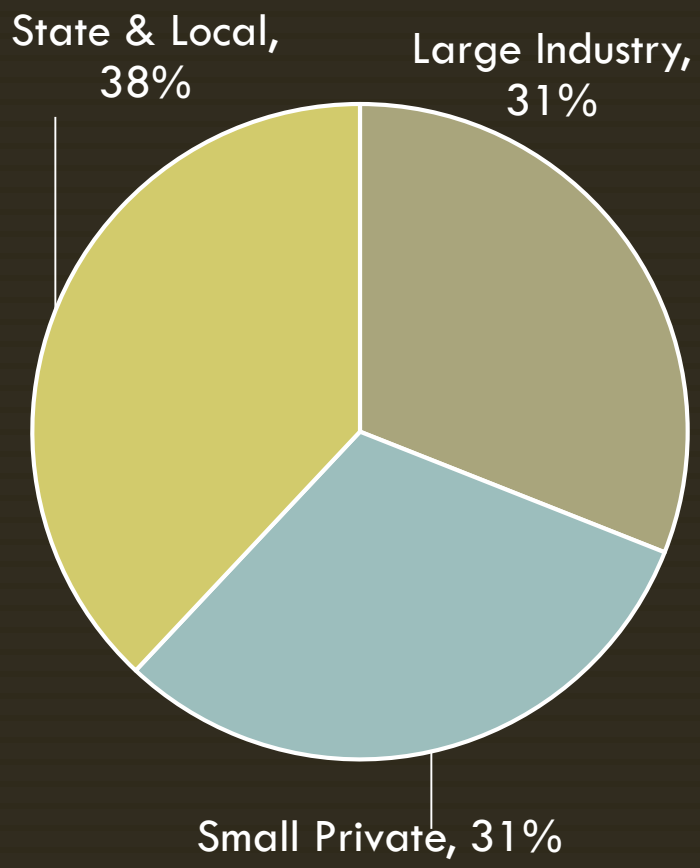


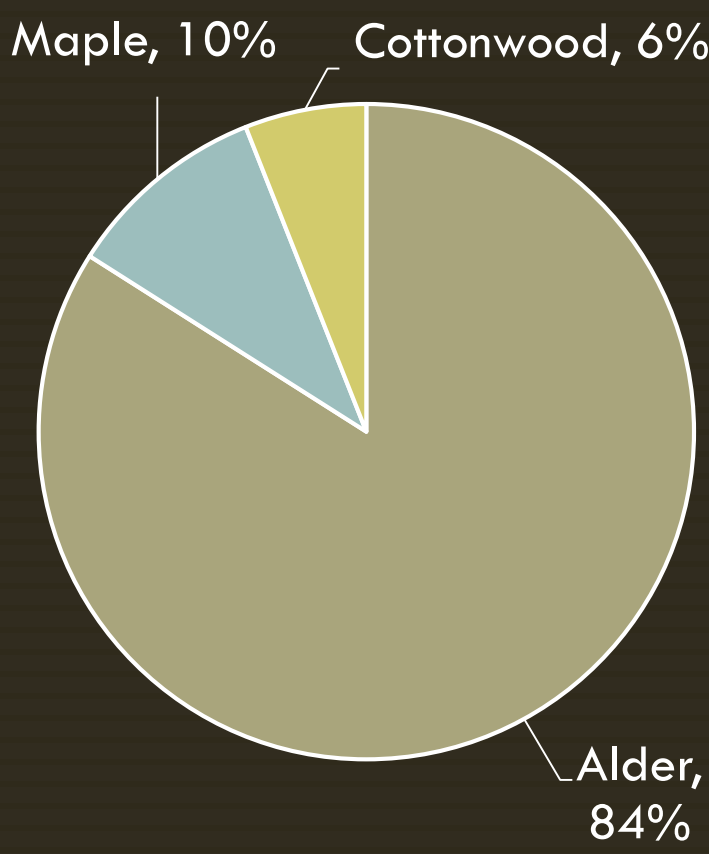
- How much hardwood growing stock currently exists in WA
- What is the age (or size) class and location of the inventory
- What ownerships currently manage the growing stock
- How much volume is impacted by riparian management regulations

Previous Hardwood Assessments

- *Classification of Landsat Thematic Mapper Imagery for the Purpose of Developing a Hardwood Forest Inventory for the State of Washington* (Marshal and Associates, 1996)
- *Report to the Hardwoods Commission* (Marshal and Associates, 1999)
- *Riparian Buffer Analysis* (Marshal and Associates, 2000)
- *A Hardwood Resource Assessment for Western Washington* (WHC members, 2002)

2002: 9 billion board feet





Methodology of Current Study

- Landsat-based inventory stratification based on the Gradient Nearest Neighbor (GNN) methodology
- Forest inventory data provided by OSU scientists who used GNN methods combined with FIA and other plot data from ODF, BLM, USFS, etc.
- Riparian buffer rules were modeled differently
- Washington State Biomass Assessment database which, in turn, is based on a parcel database maintained at the UW

Study Methodology

- Forest Vegetation Simulator (FVS) used to estimate future forest inventories from 2010 – 2030 in five year intervals
- Four silvicultural treatment options are modeled
  - No harvest alternative
  - Commercial thinning
  - Clear cut final harvest
  - Commercial thinning and clear cut final harvest

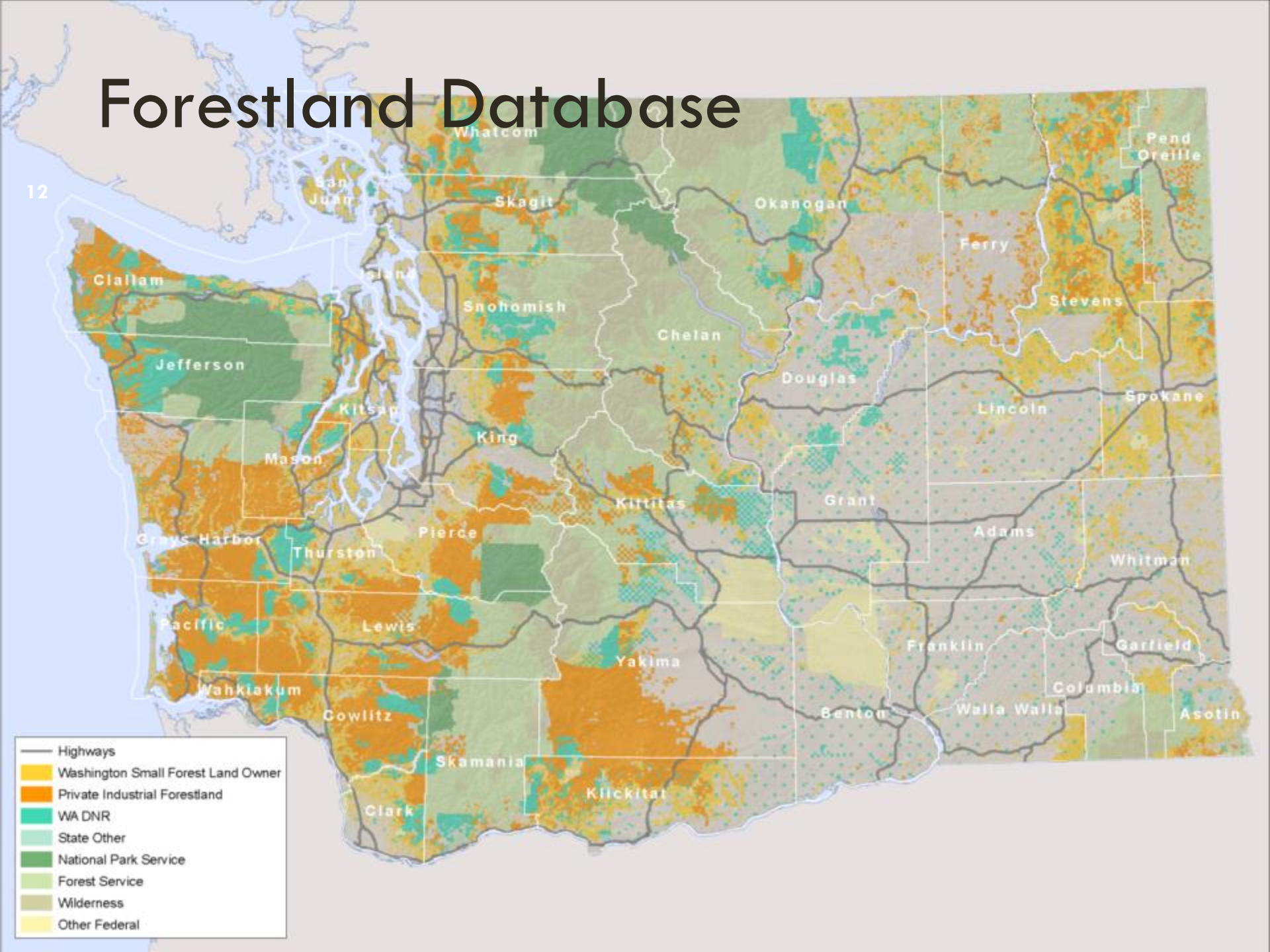
Growth Modeling

- Forest Vegetation Simulator (FVS) was calibrated against harvest data to create habitat/ecosystem type models for each FVS variant
- 6,000 plots * variants * years * ownerships * management zones = 51,247,388 alternatives
- Trees planted by habitat type in varying intensities but are not harvested during the simulation period; however they do contribute to total inventory

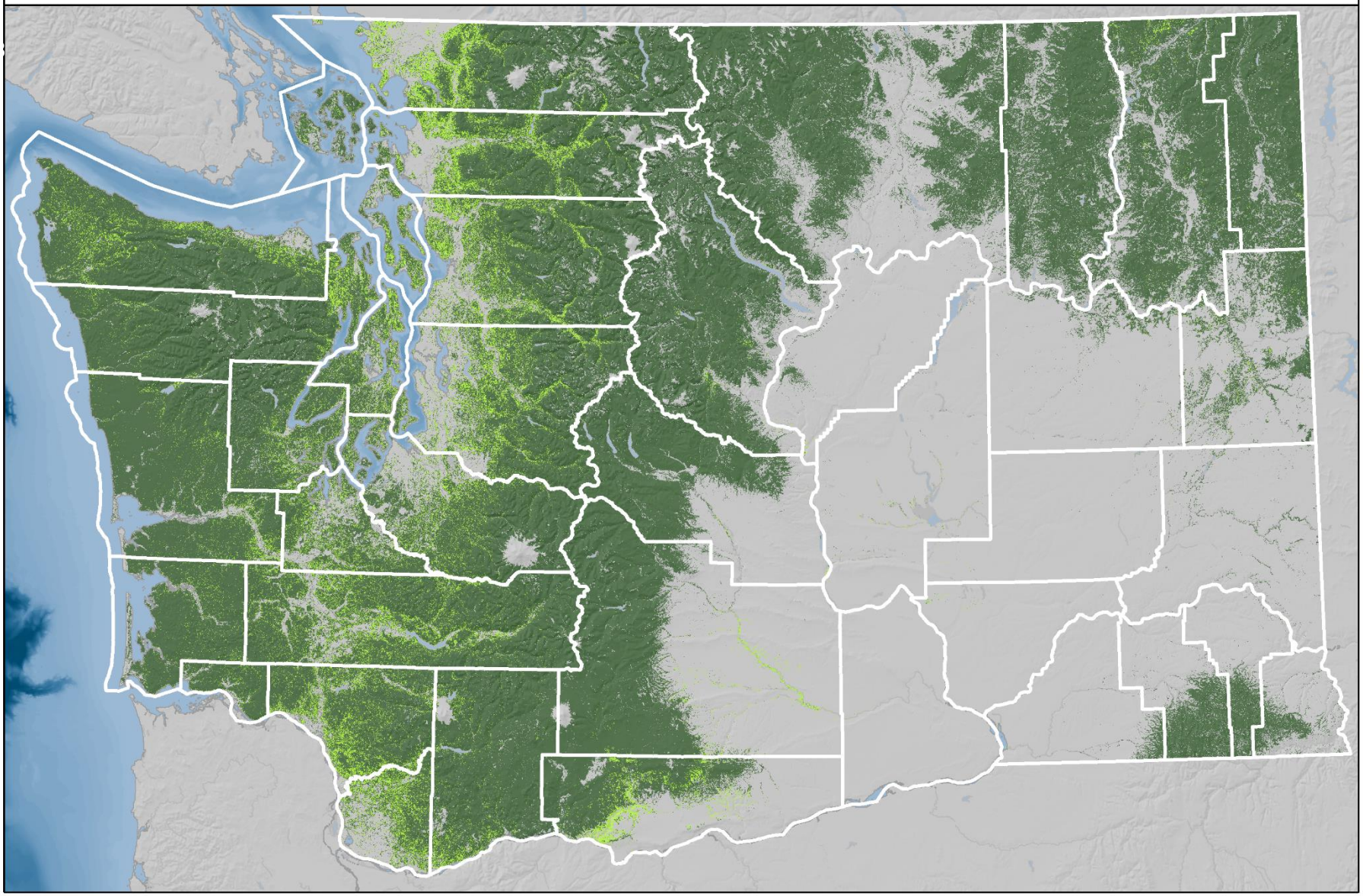
Modeling Treatments

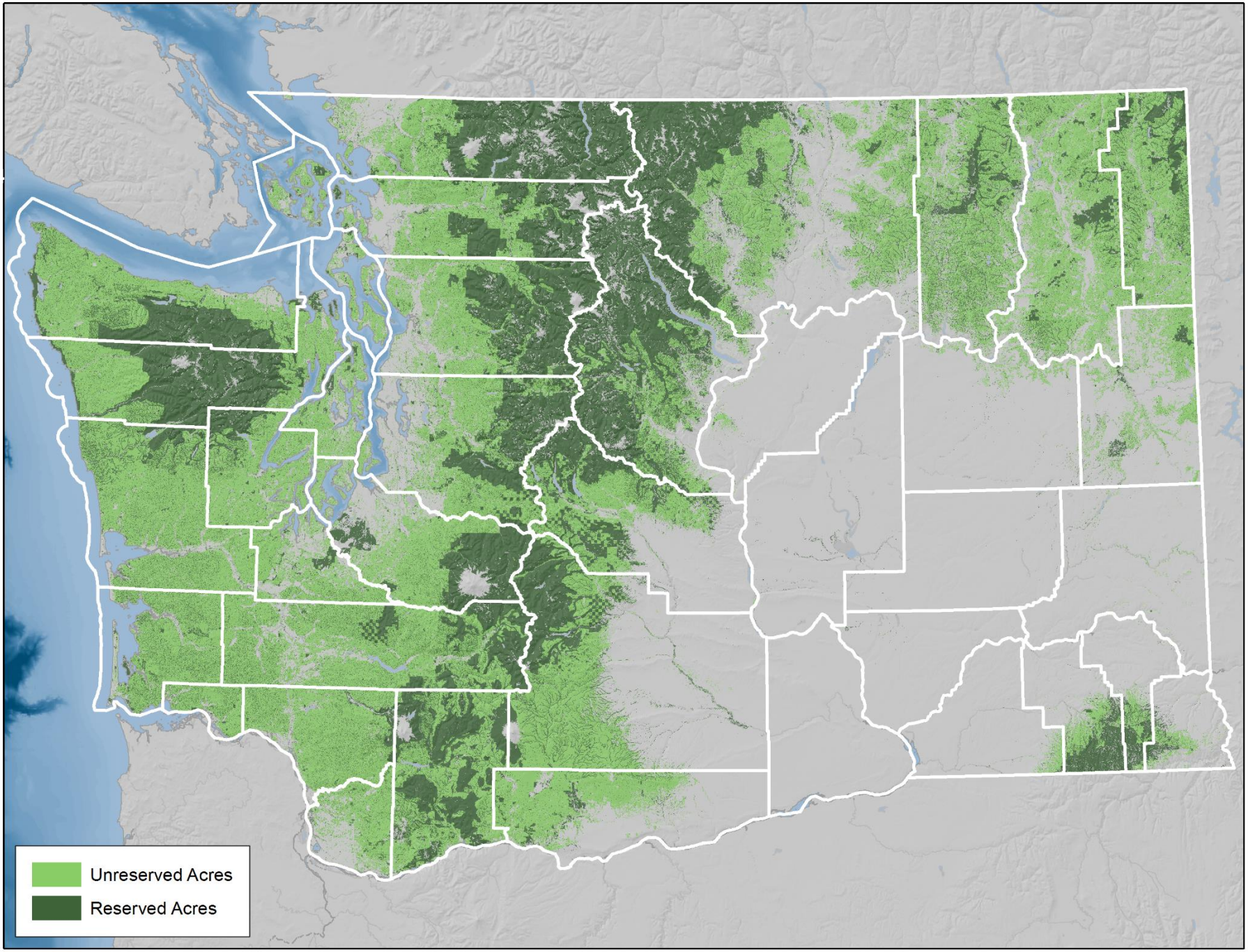
- Two primary western Washington treatments:
  - Commercial thin
    - 150/250 TPA
    - 30+ yr. old stands
    - From below using a diameter limit
  - Final Harvest
    - Minimum age varies by owner
    - Intensity varies by management zone & owner
      - 5 leave trees in the uplands
      - Buffers: Inner leave 100 TPA, Outer leave 10 TPA, Wetland leave 75 TPA

Forestland Database



GNN Forest Types



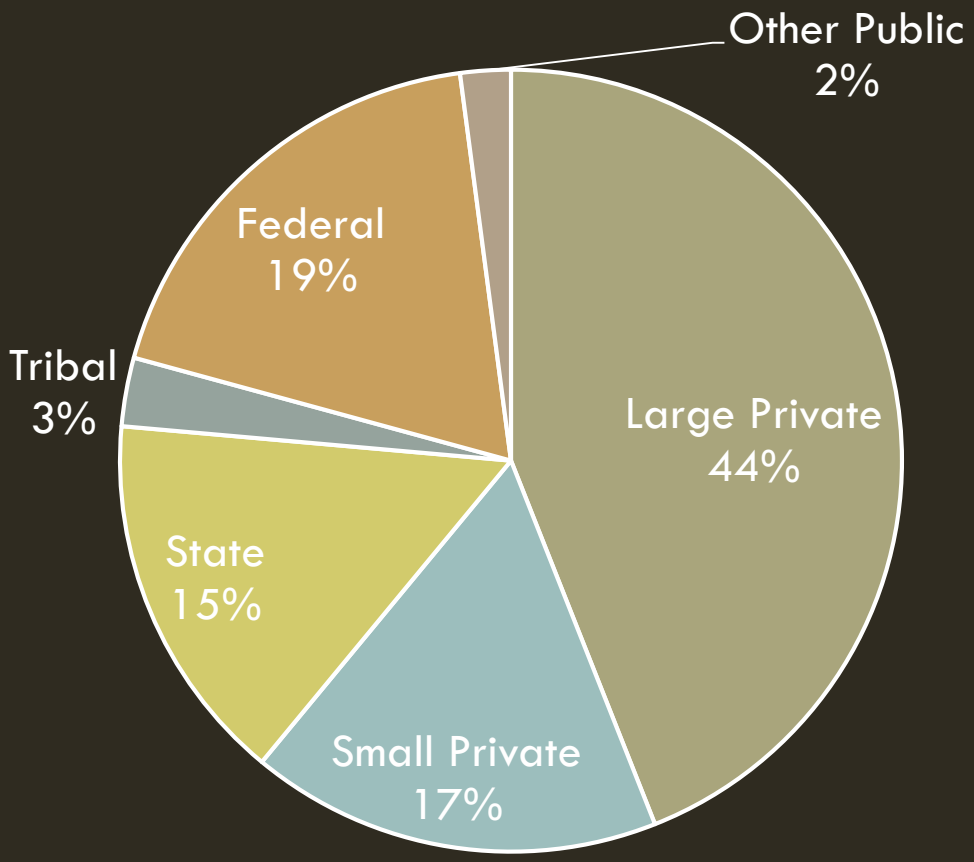

Unreserved Acres
Reserved Acres

Forested Area W WA(millions of acres)

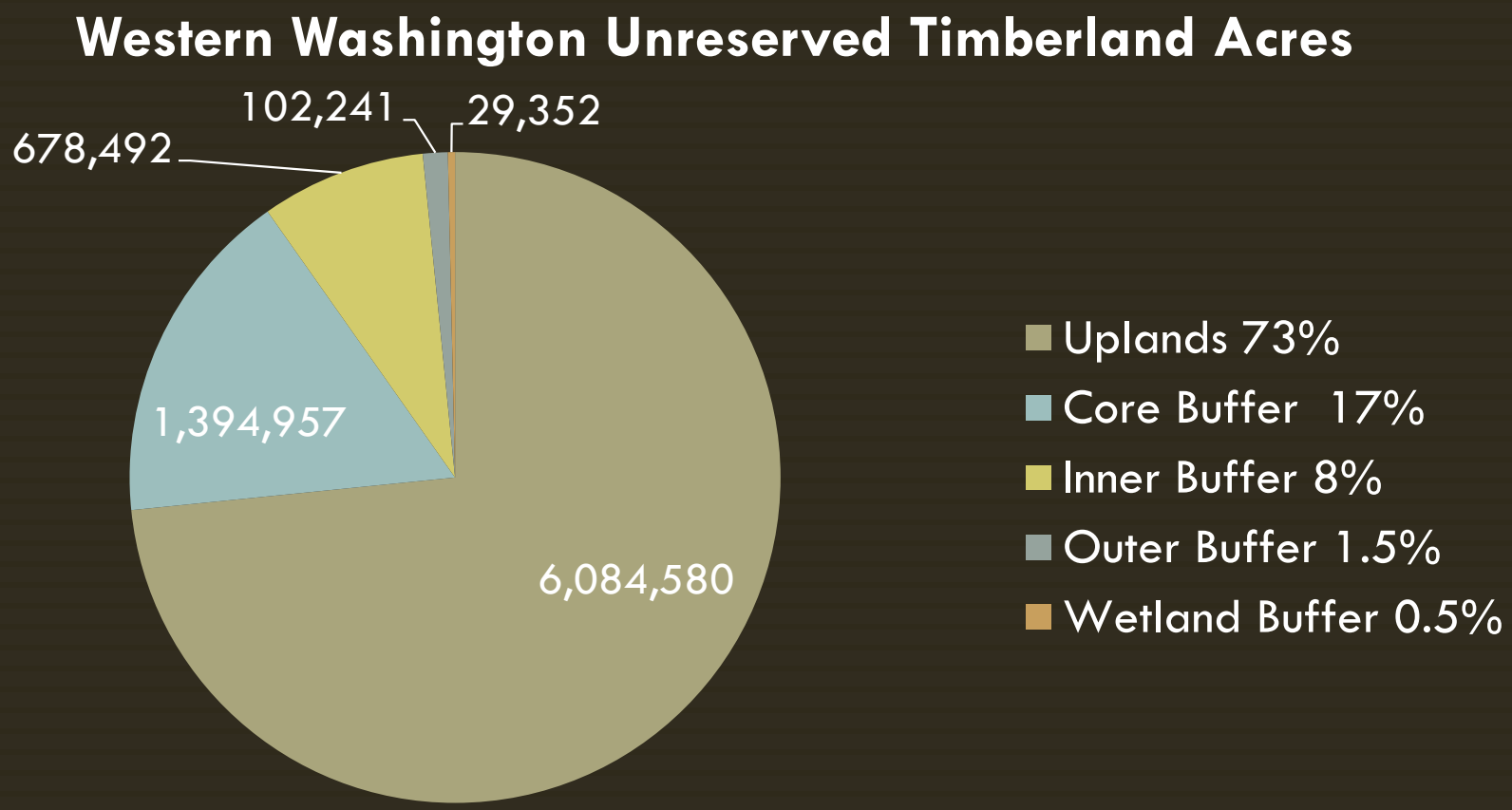
Forested Acres	13.128
Less open water	0.118
Less parks & other non-timber forest	1.848
Less than 10 forested acres owned	0.715
Timberland	10.447
Less withdrawn areas	2.157
Unreserved timberland	8.290

Timberland Acres (Owner)

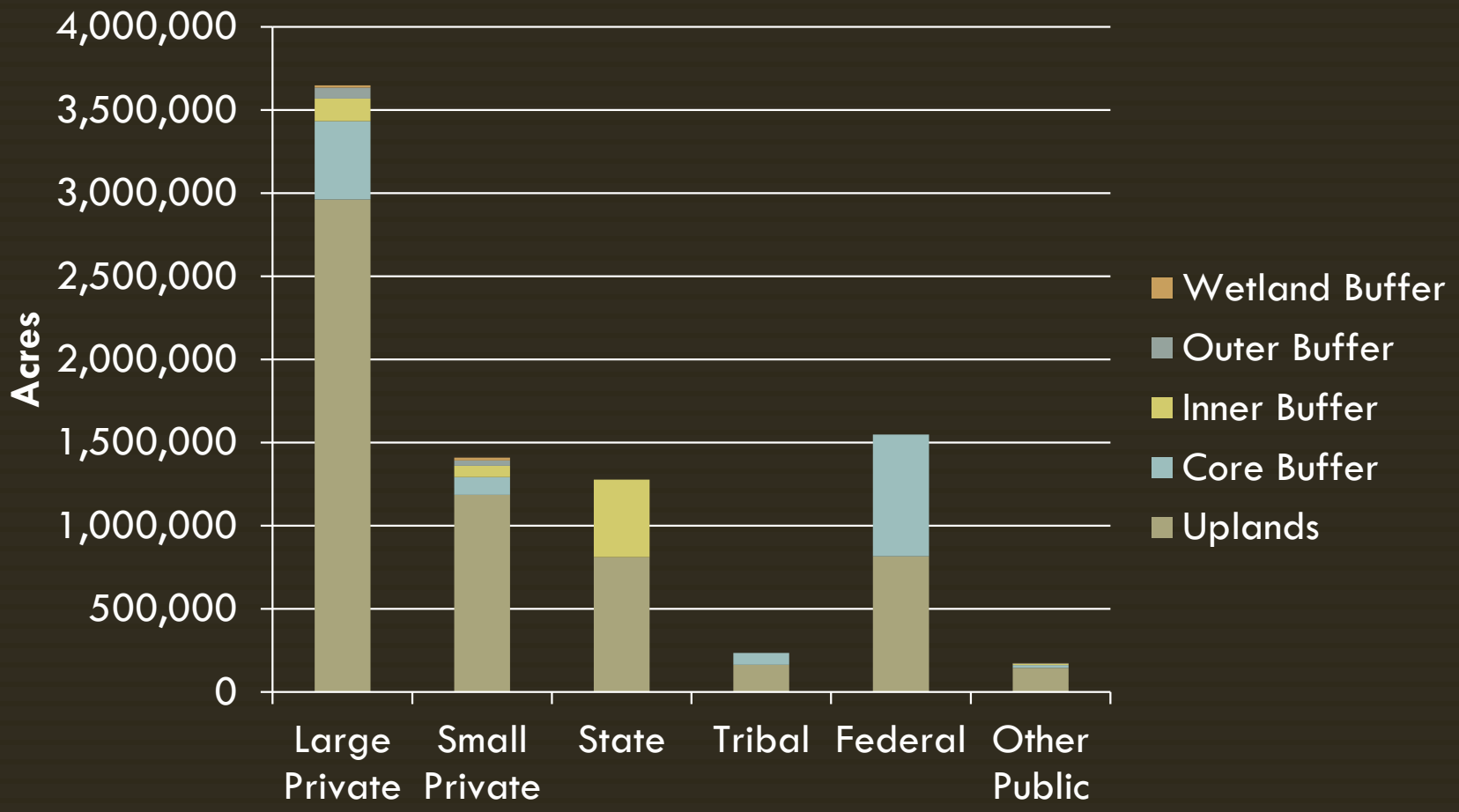
Western Washington Unreserved Timberland Acres
Over 10 Acres in Size by Owner Class (8.3 million)



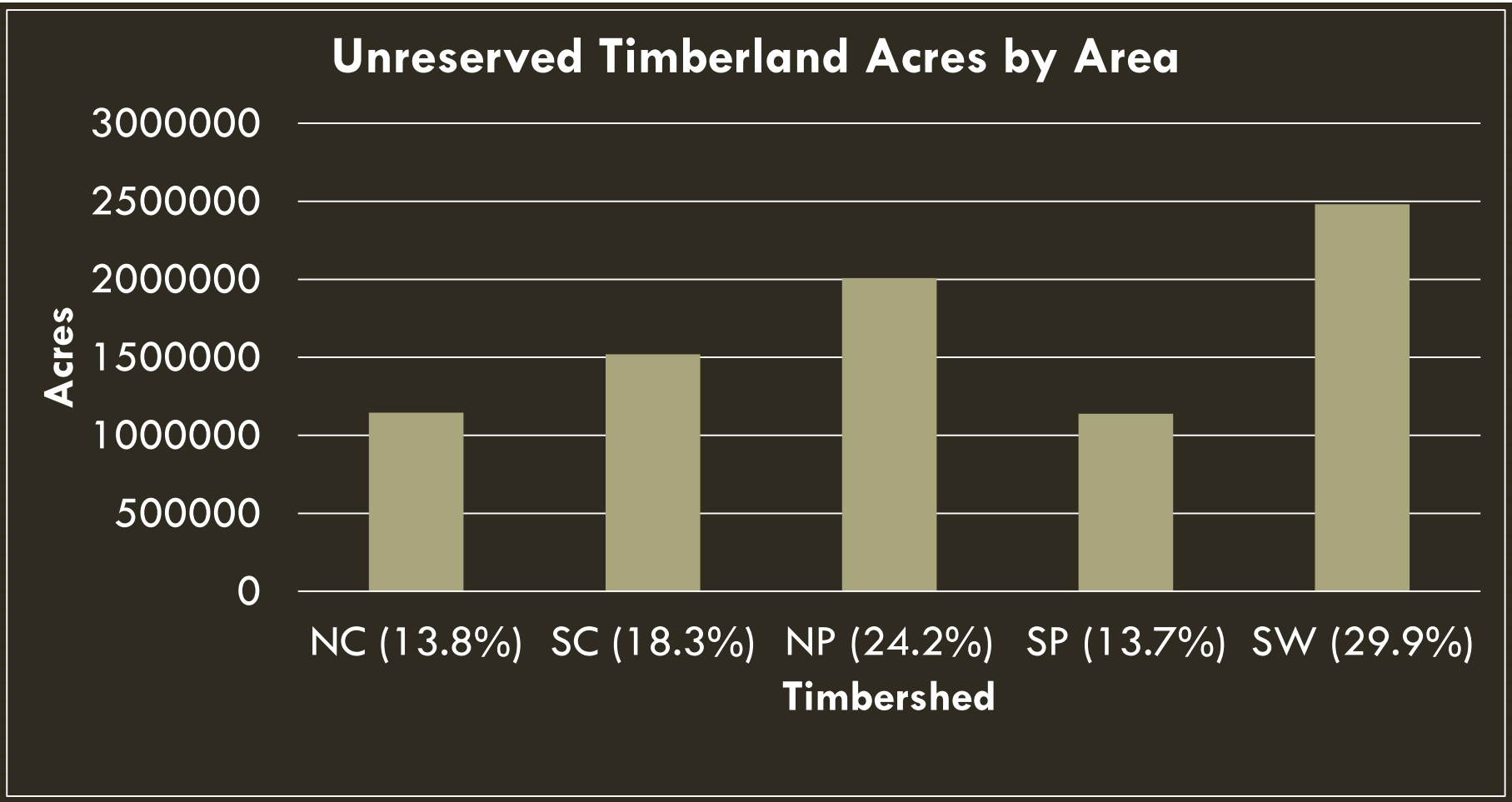
Timberland Acres (Zone)



Timberland Acres (Owner & Zone)



Timberland Acres (Area)

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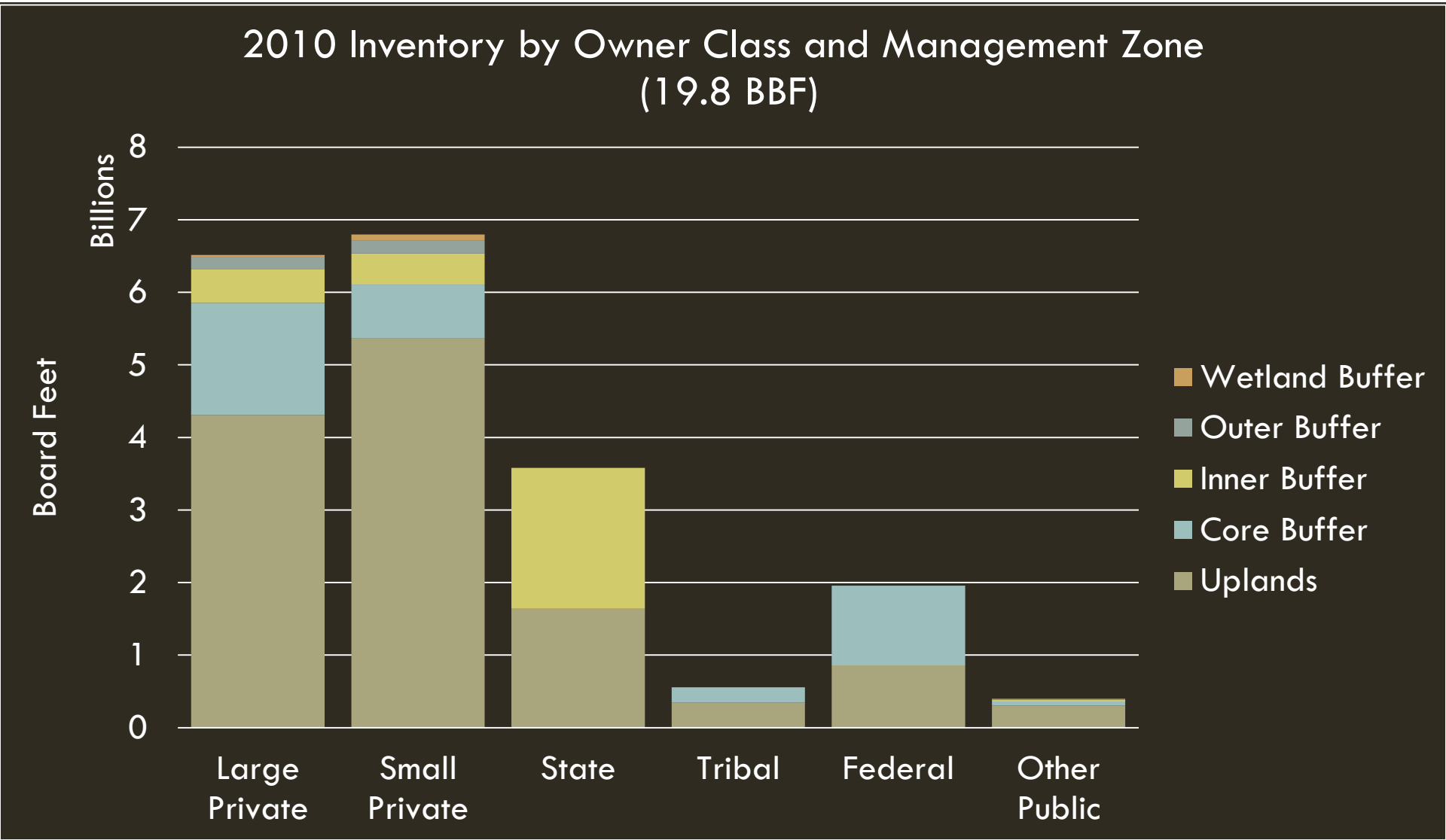
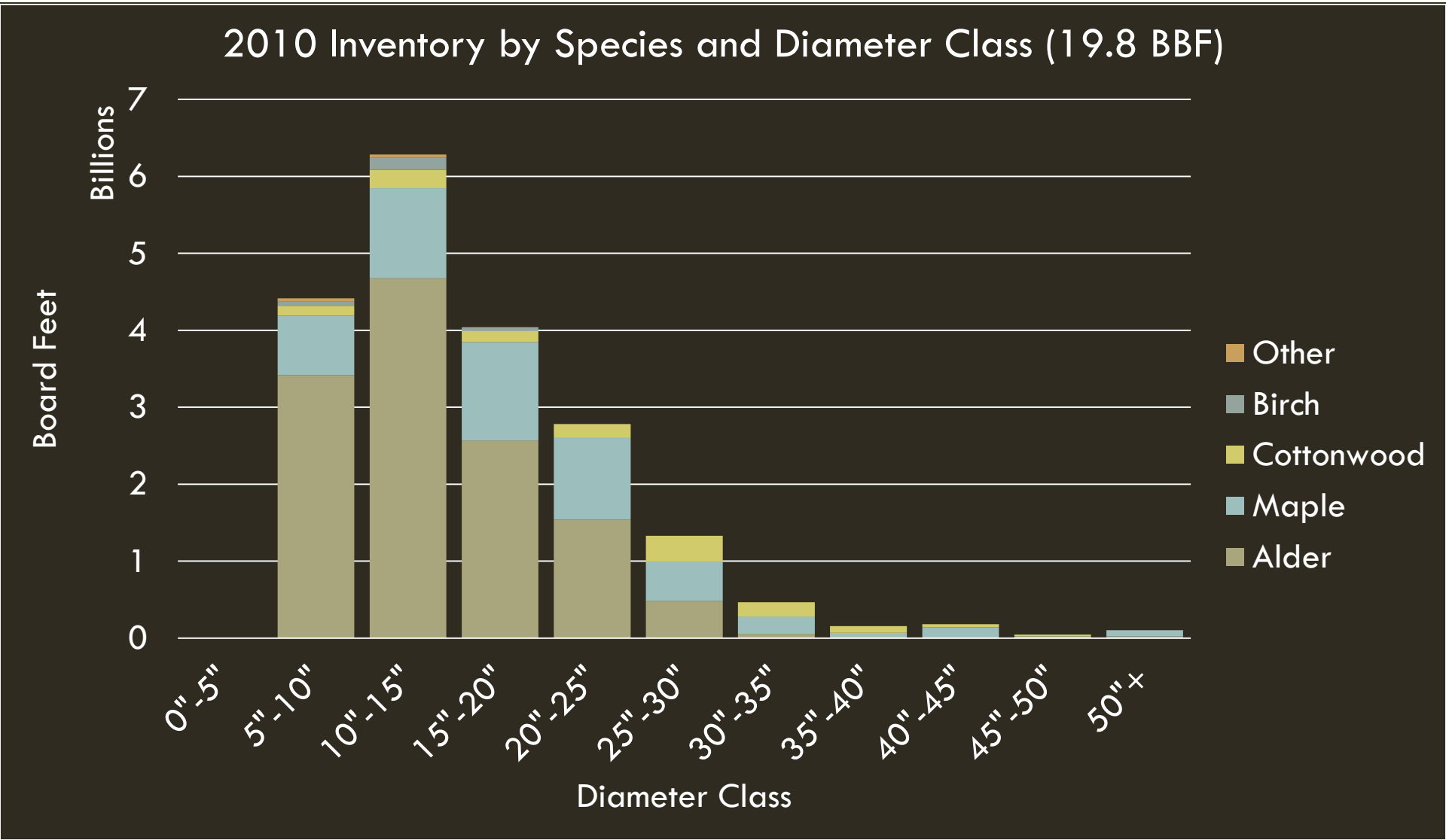
LINCOLN
SPOKANE
JEFFERSON
KITSAP
KING
MASON
GRAYS HARBOR
KITTITAS
GRANT
ADAMS
WHITMAN
PIERCE
THURSTON
PACIFIC
LEWIS
YAKIMA
FRANKLIN
GARFIELD
WAHKIAKUM
COWLITZ
BENTON
COLUMBIA
WALLA WALLA
SKAMANIA
CLARK
KLICKITAT
OREGON

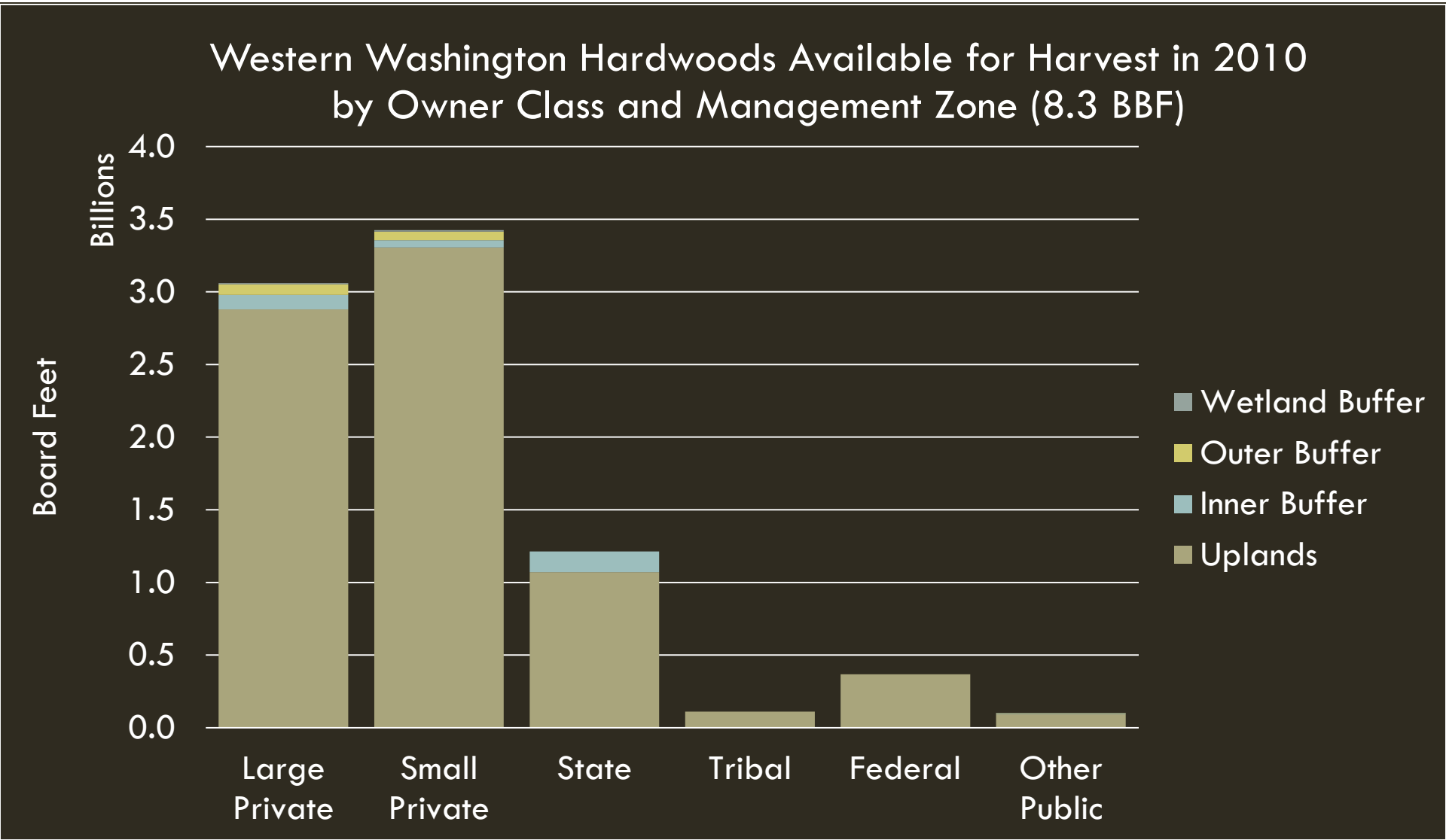
2010 Inventory (Owner & Zone)



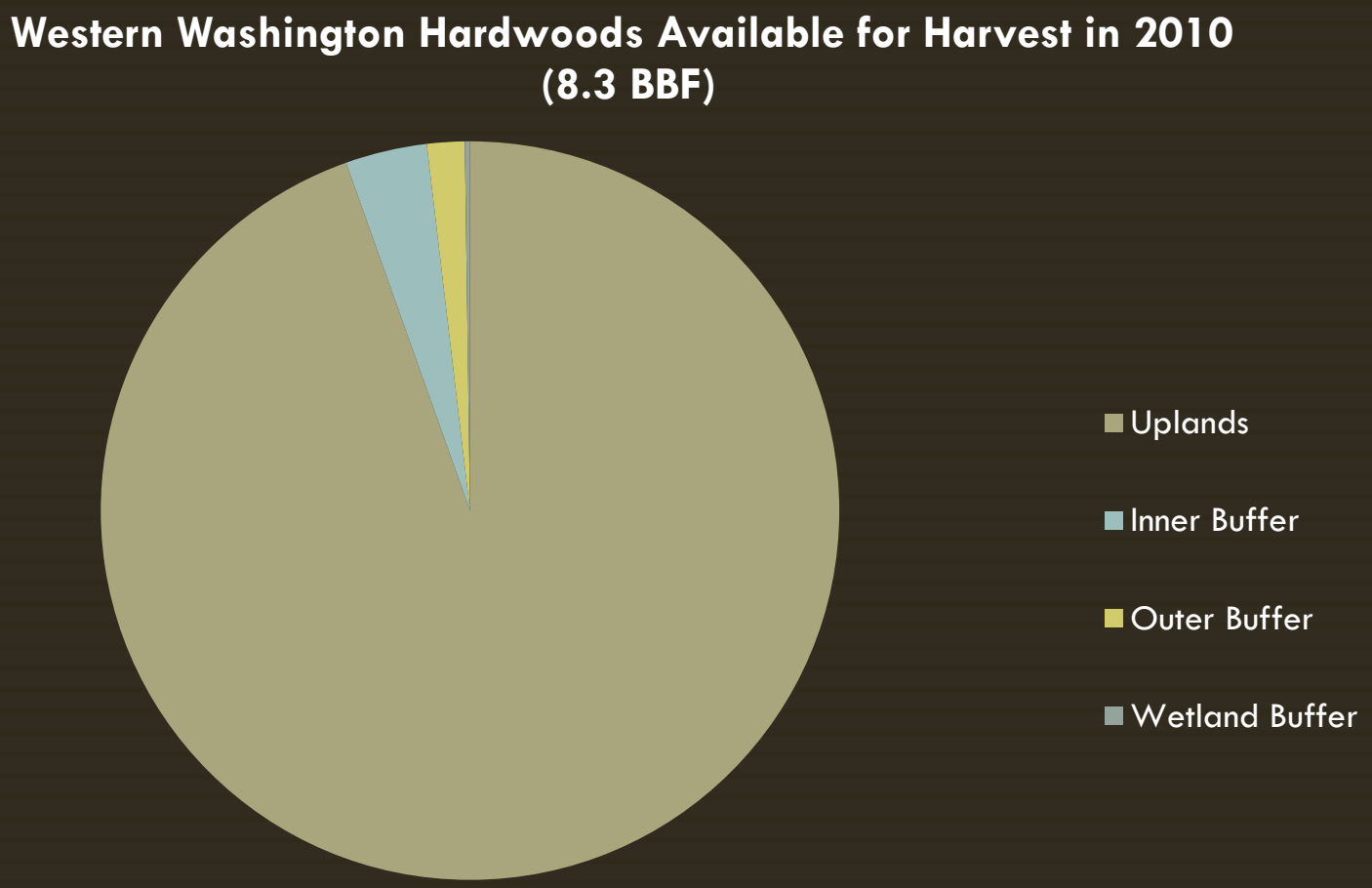
2010 Inventory (Species & DBH)



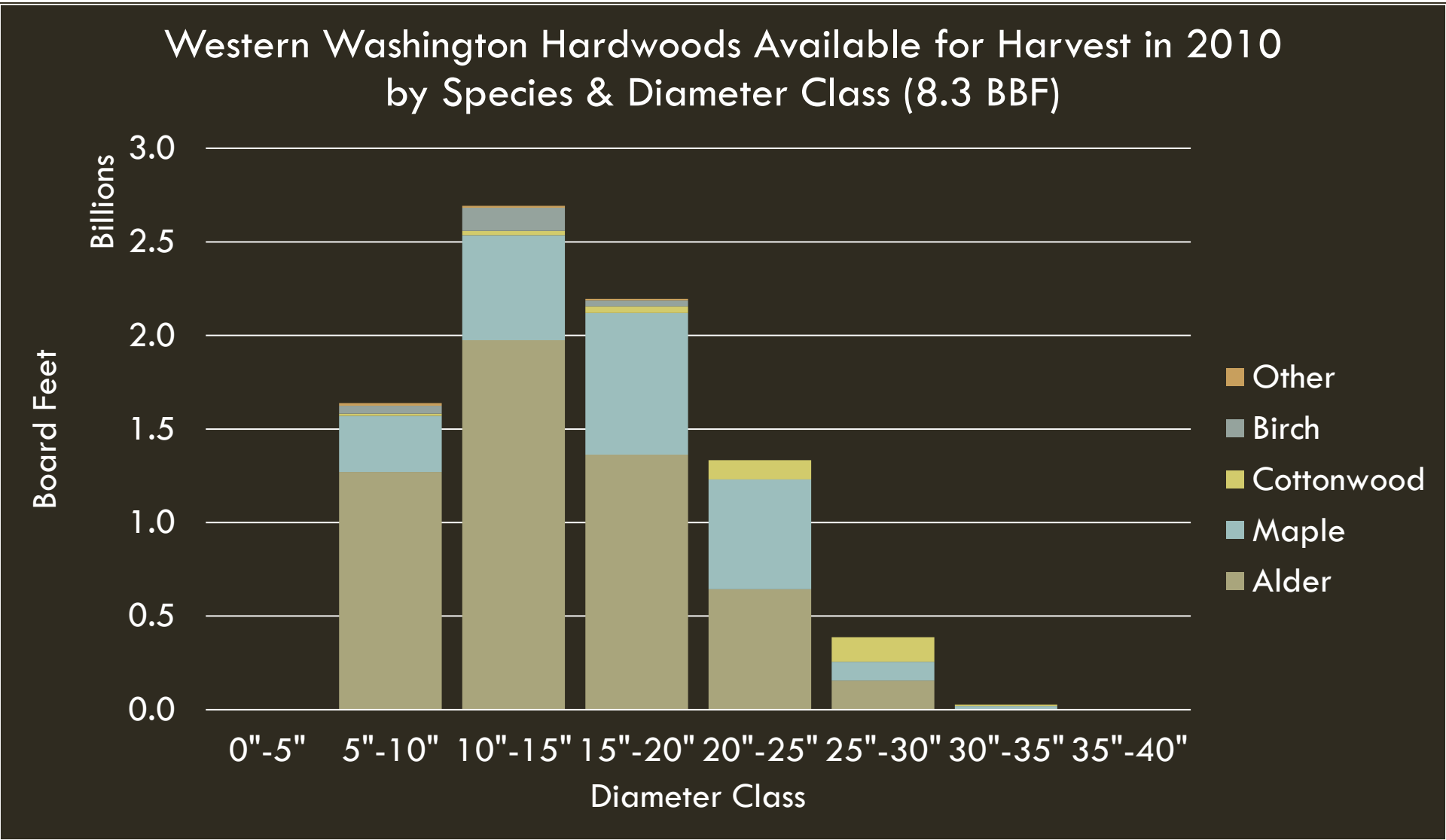
Available for Harvest (Owner & Zone)



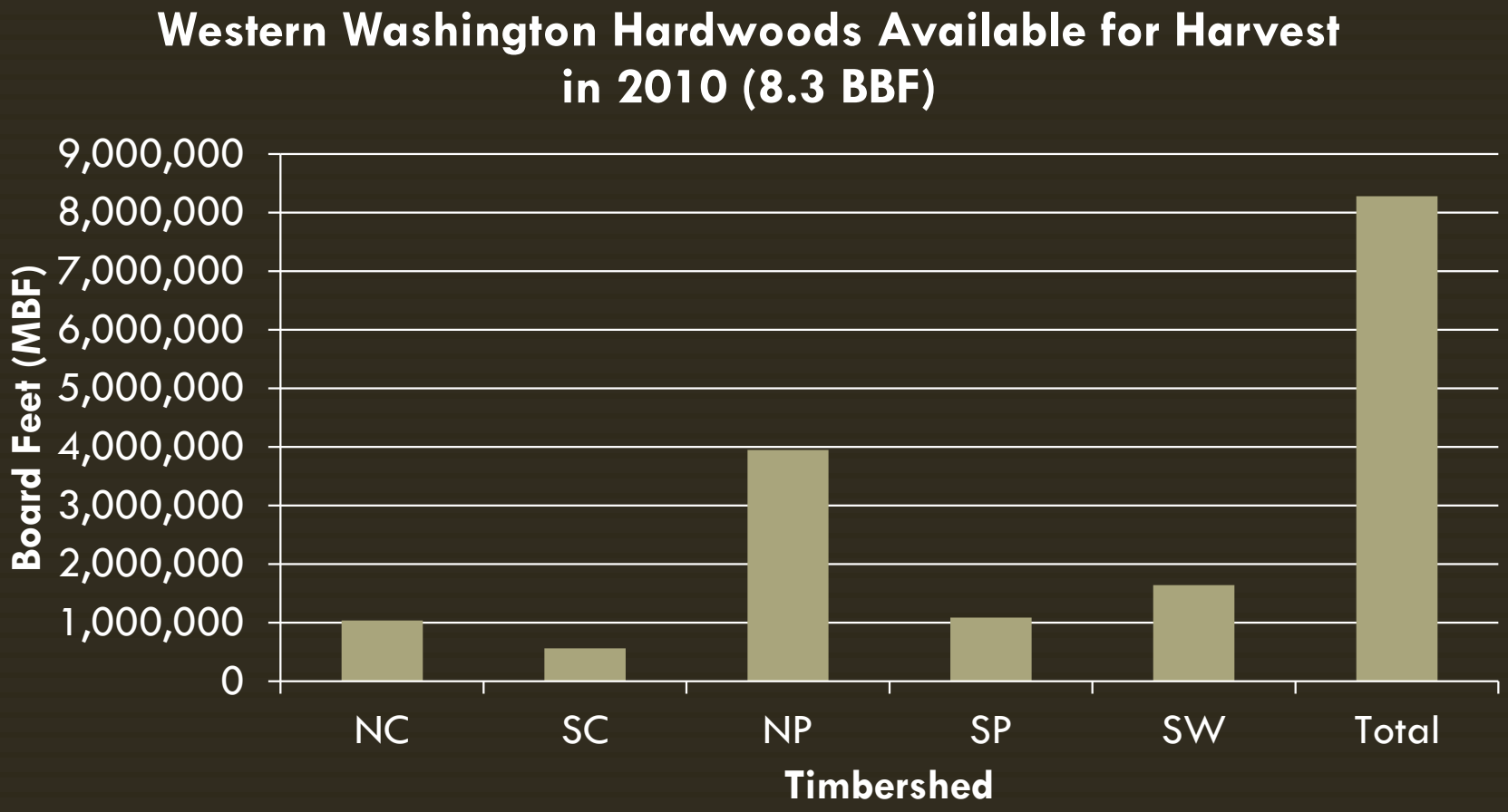
Available for Harvest (Zone)



Available for Harvest (DBH)



Available for Harvest (Area)

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FRANKLIN
GARFIELD
WAHKIAKUM
COWLITZ
BENTON
COLUMBIA
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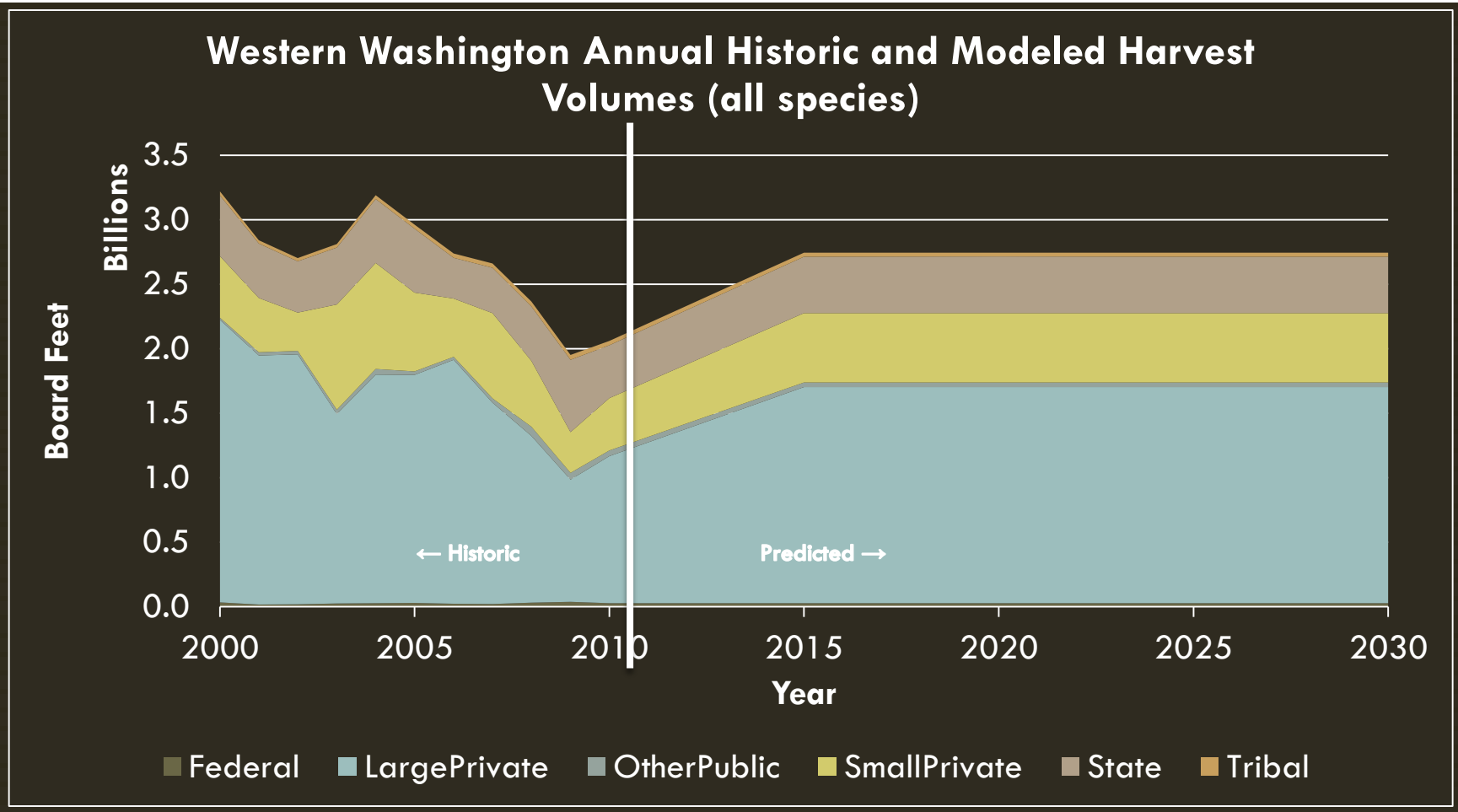
KLICKITAT
OREGON

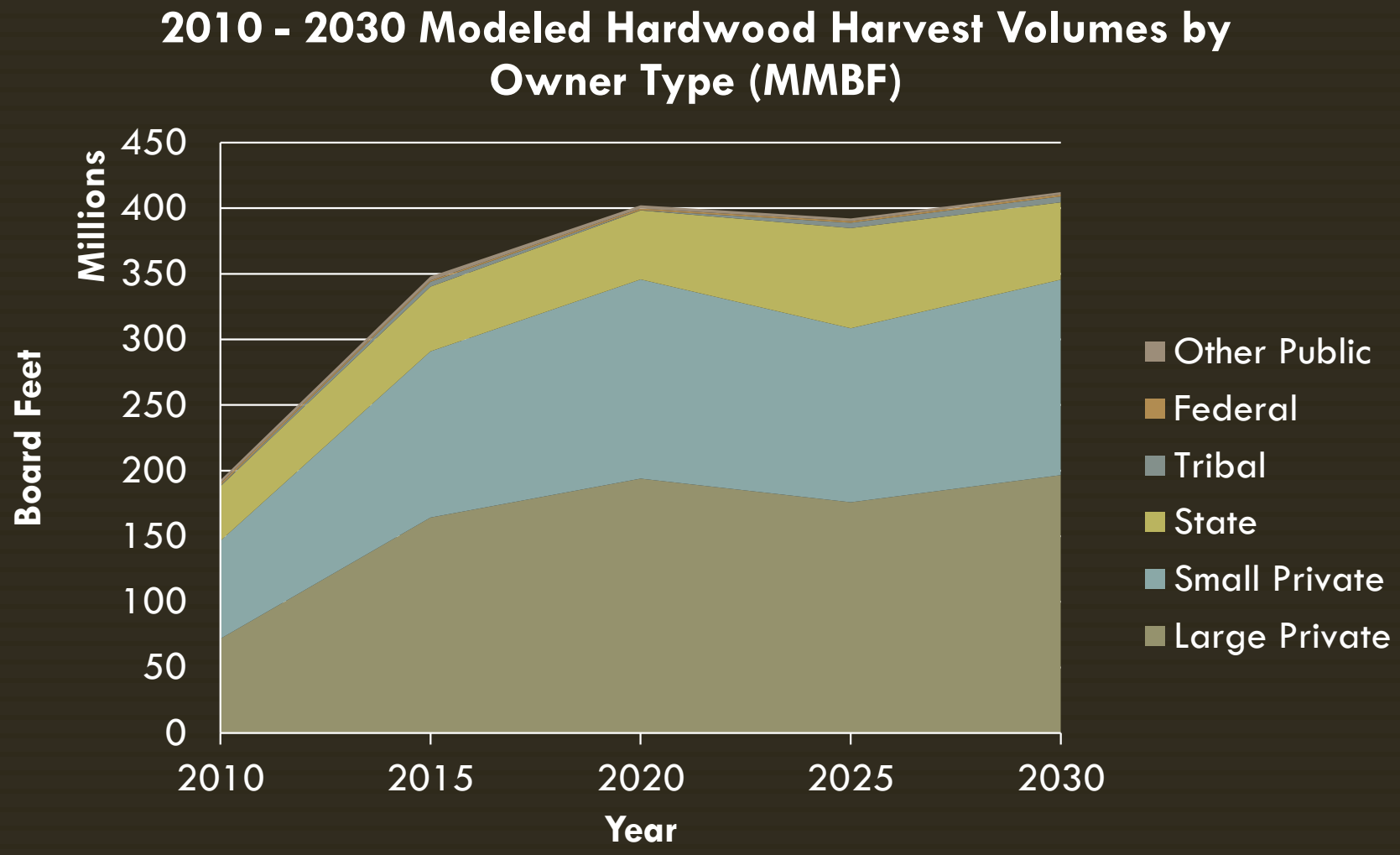
Harvest Modeling

- A 2010 baseline harvest of 2.74 BBF (includes coniferous & hardwood species) is maintained over 20-year planning period
- Eligible stands and treatments are identified then aggregated to the parcel and prioritized by volume/acre
- Species is NOT a factor in prioritizing the harvest
- Harvest targets are set by county & owner class
- Harvest target for this presentation is the average by county & owner class for the past ten years

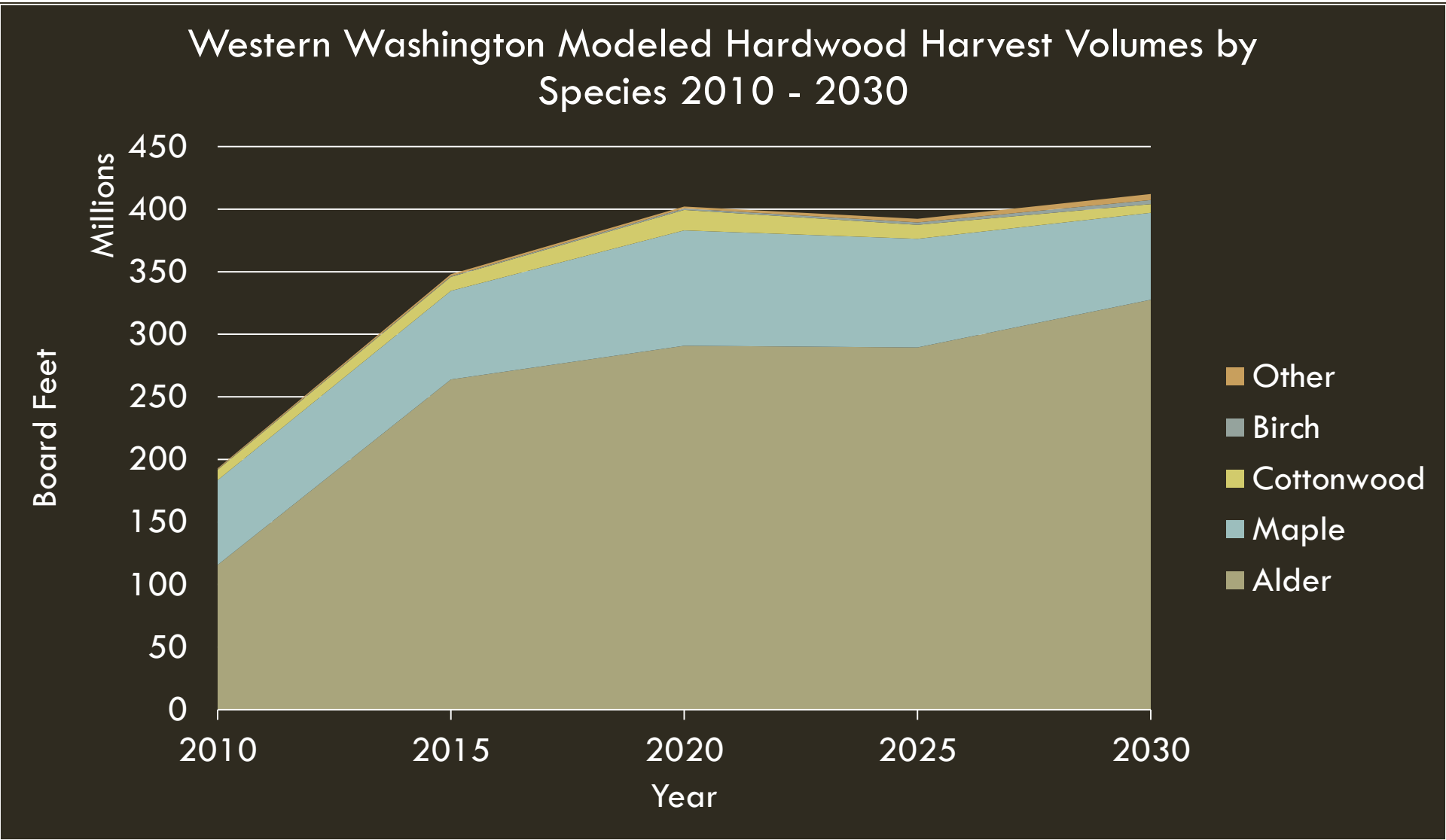
All Species Harvest Volumes



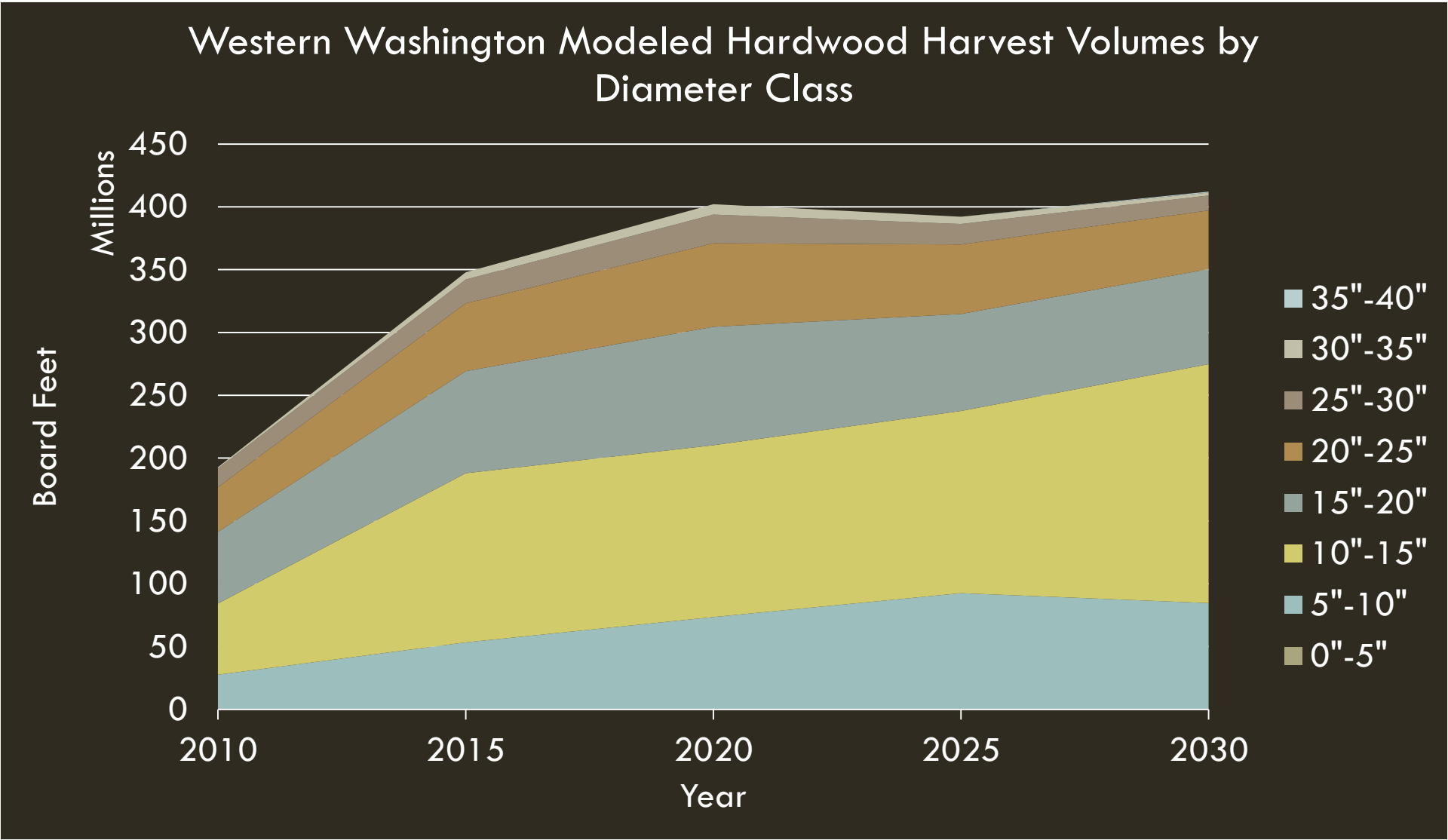
Hardwood Harvest Volume (Owner)



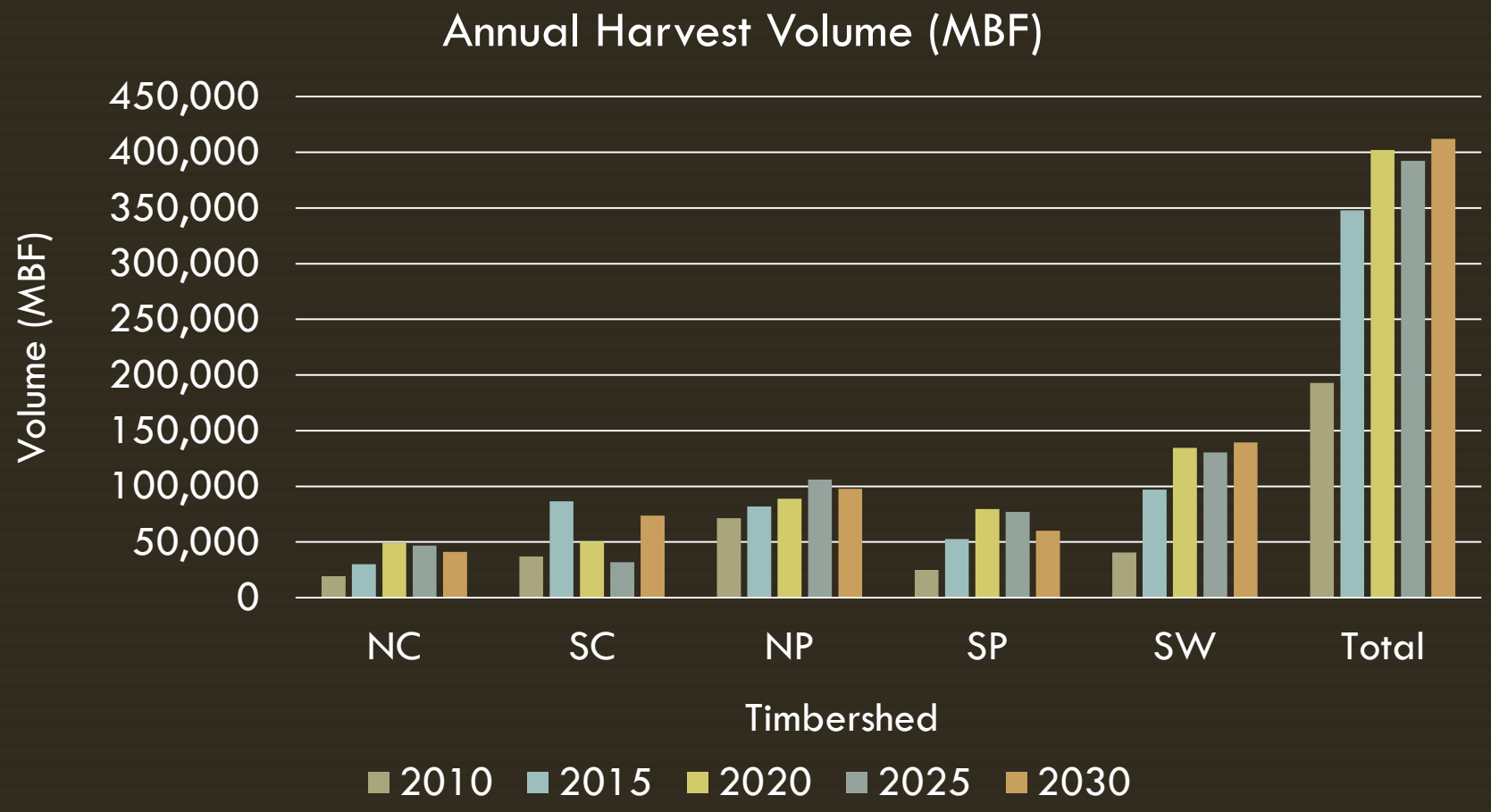
Hardwood Harvest Volume (Species)



Hardwood Harvest Volume (DBH)



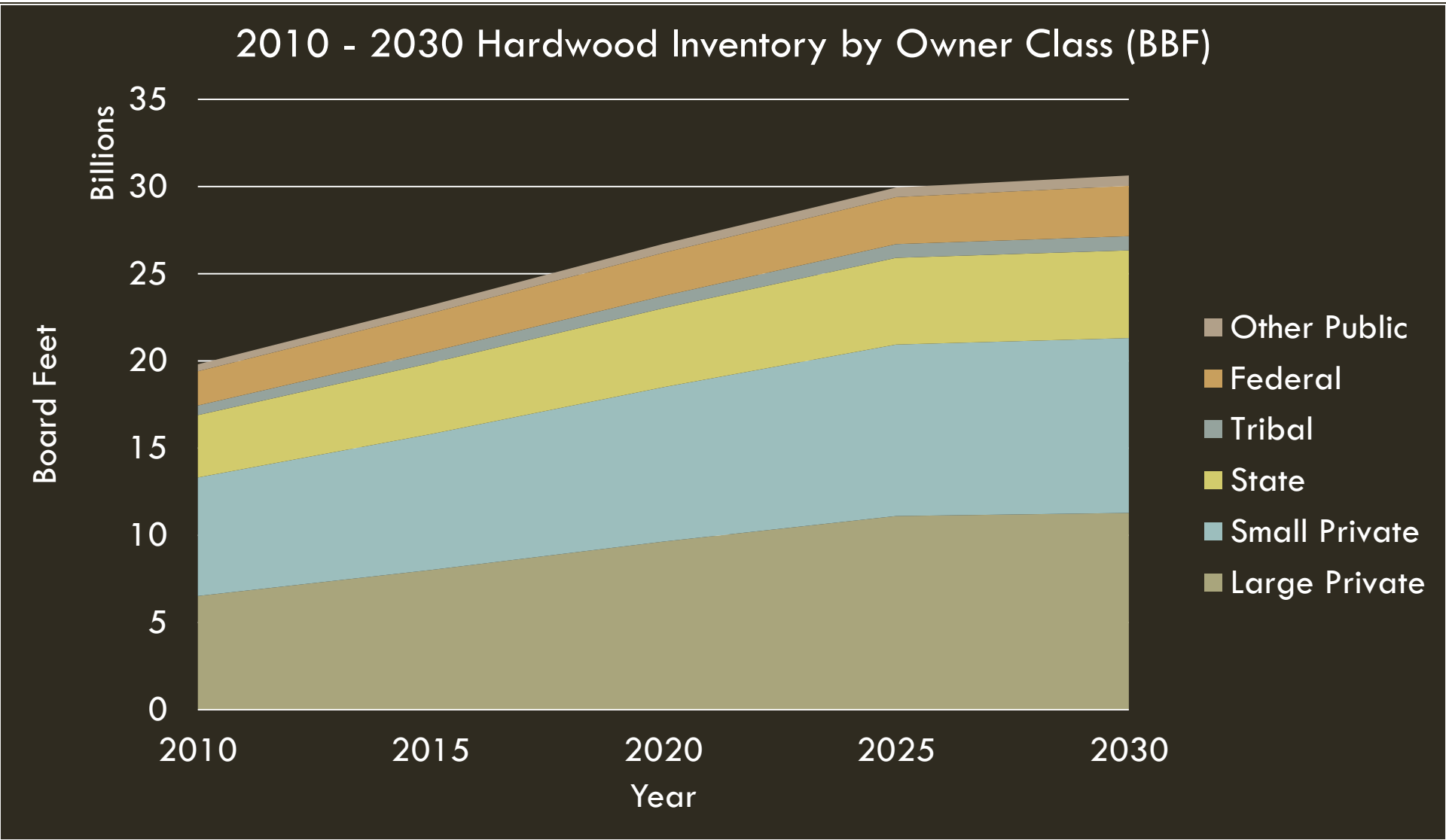
Hardwood Harvest Volume (Area)



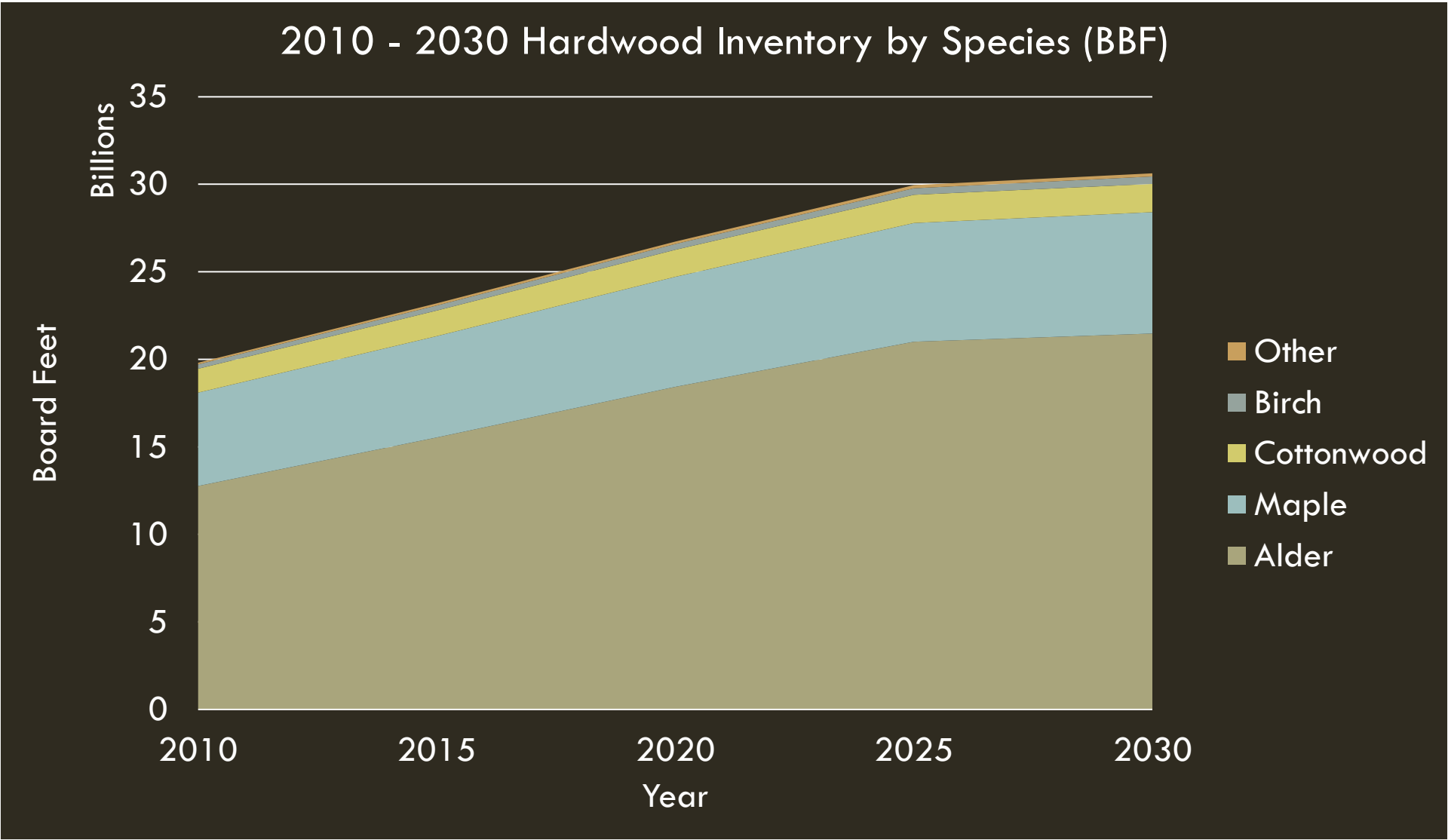
Projection of 2010 – 2030 Inventory

- Apply annual modelled harvest to total inventory of 19.8 BBF as of 2010
- Produces an estimate of total standing hardwood inventory on 8.3 million acres in western Washington

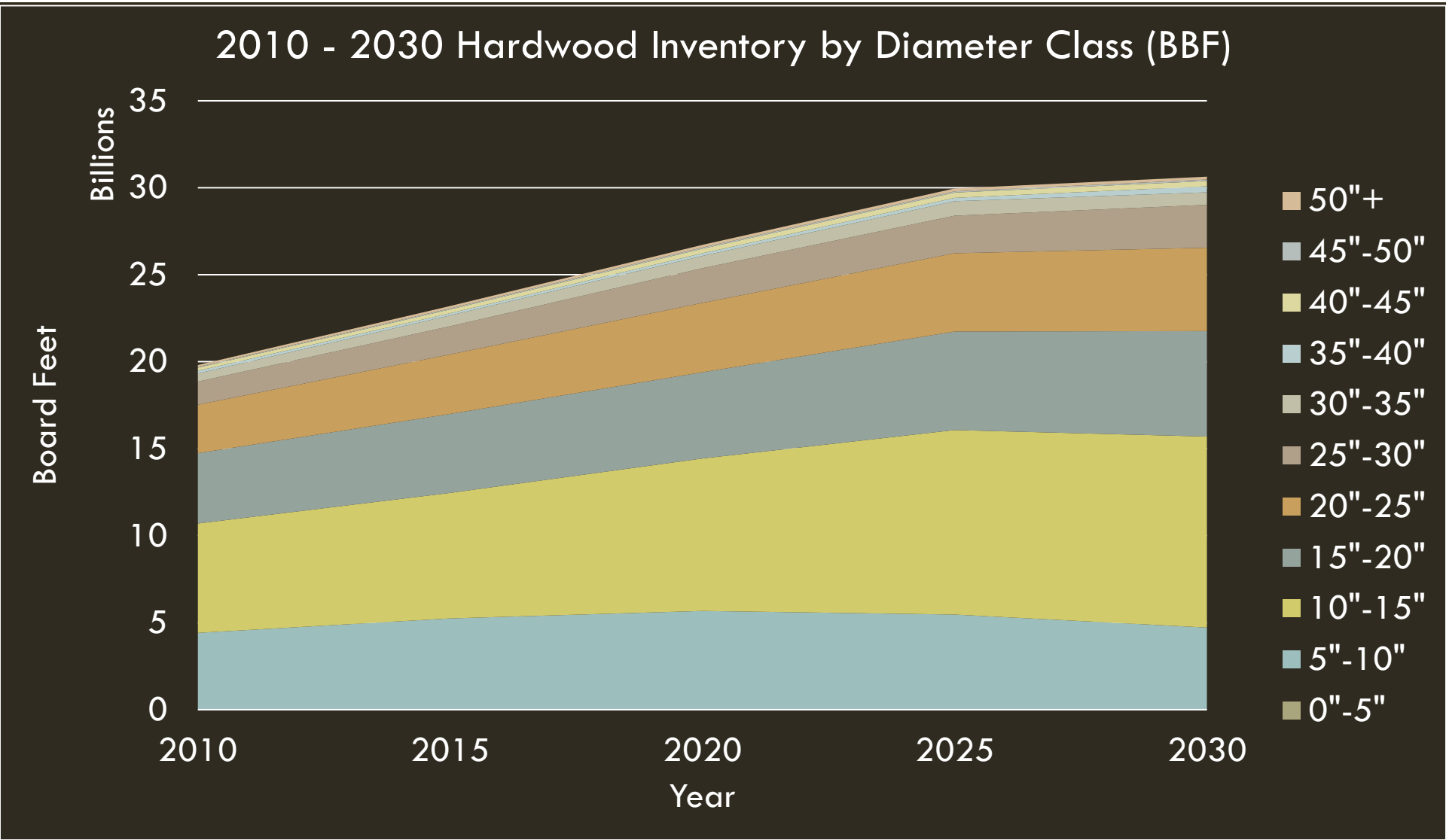
2010 – 2030 Inventory (Owner)



2010 – 2030 Inventory (Species)



2010 – 2030 Inventory (DBH)



Summary

- How much hardwood growing stock currently exists in WA?
  - 8.3 BBF available for harvest in 2010
  - Available growing stock is increasing over time
    - Harvest levels are less than the growth on inventory
  - Economic availability was not studied
- What is the age (or size) class and location of the inventory?
  - 80% is greater than 10 inches in diameter
  - 54% of the acres in Southwest (30%) and North Puget Sound (24%)
- What ownerships currently manage the growing stock?
  - Small private and large private owners each have about one-third of the available volume
- How much volume is under riparian management regulations?
  - 3.6 BBF in core buffer zone
  - 2.9 BBF in inner buffer zone
  - 0.4 in outer buffer zone
  - 0.1 in wetlands buffer zone

Limitations of the study

- Leave trees & remnants from thinning are inventory but not available for harvest for 20 years
- When stands are harvested we are not controlling for species
- Harvest targets are for total volume across all species
- Inventory is from 2006 and is projected to 2010
- Mixed stands are the most difficult to classify

Future Work

- Validating the results of the study
- Considering ways to update the inventory for fururе use

The End