



**School of Environmental  
and Forest Sciences**

UNIVERSITY of WASHINGTON

College of the Environment



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# WESTERN WASHINGTON HARDWOOD ASSESSMENT

WASHINGTON HARDWOODS COMMISSION  
ANNUAL MEETING  
CHEHALIS, WA  
JUNE 12, 2014

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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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John Perez-Garcia  
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August 9, 2013

# Reports Available

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## □ 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

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

# Four Questions Posed

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- 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



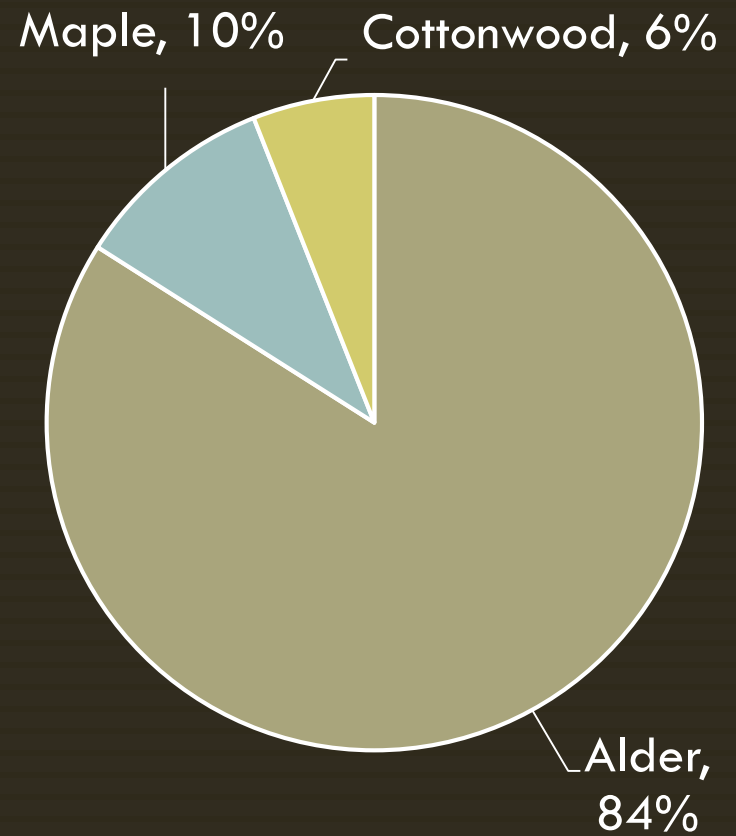
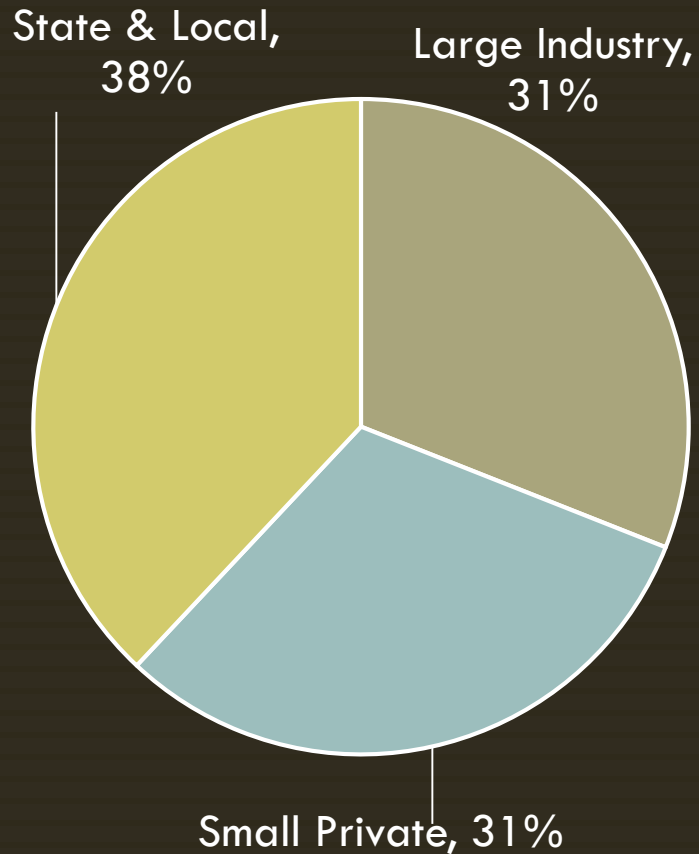
# Previous Hardwood Assessments

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- *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

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# Methodology of Current Study

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- 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

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- 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

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- Forest Vegetation Simulator (FVS) was calibrated against harvest data to create habitat/ecosystem type models for each FVS variant

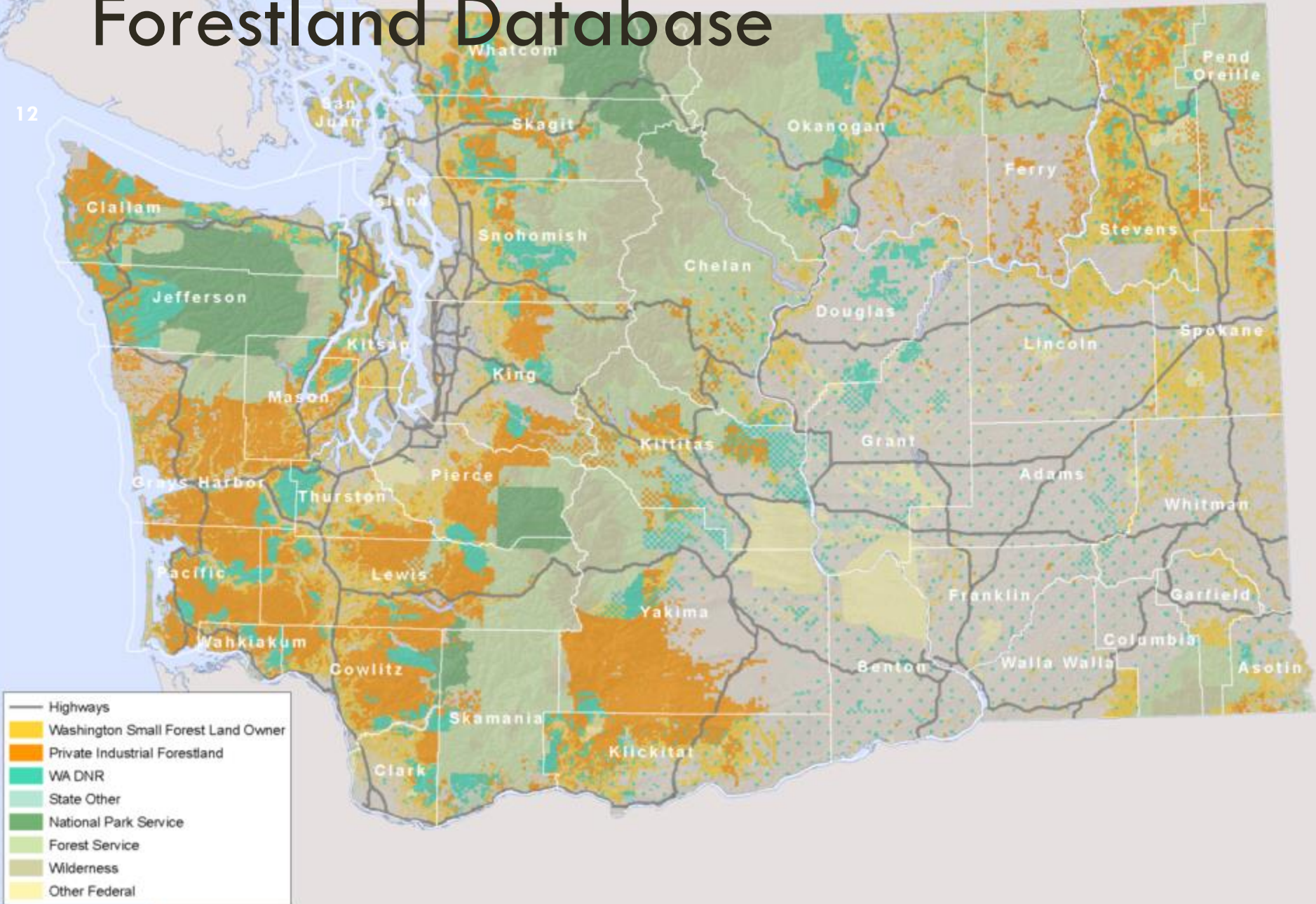
# Modeling Treatments

11

- 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

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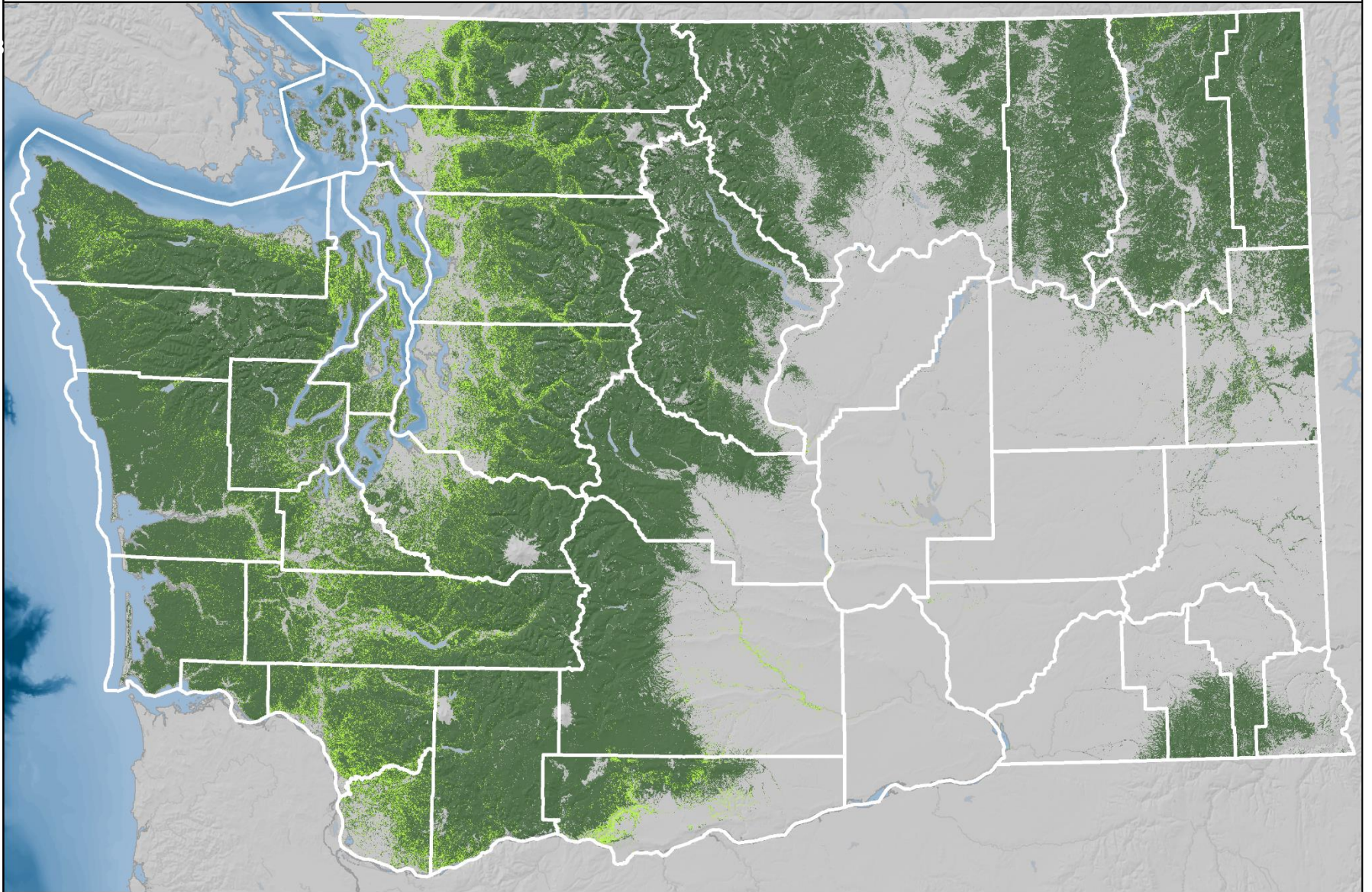


# GNN Forest Types

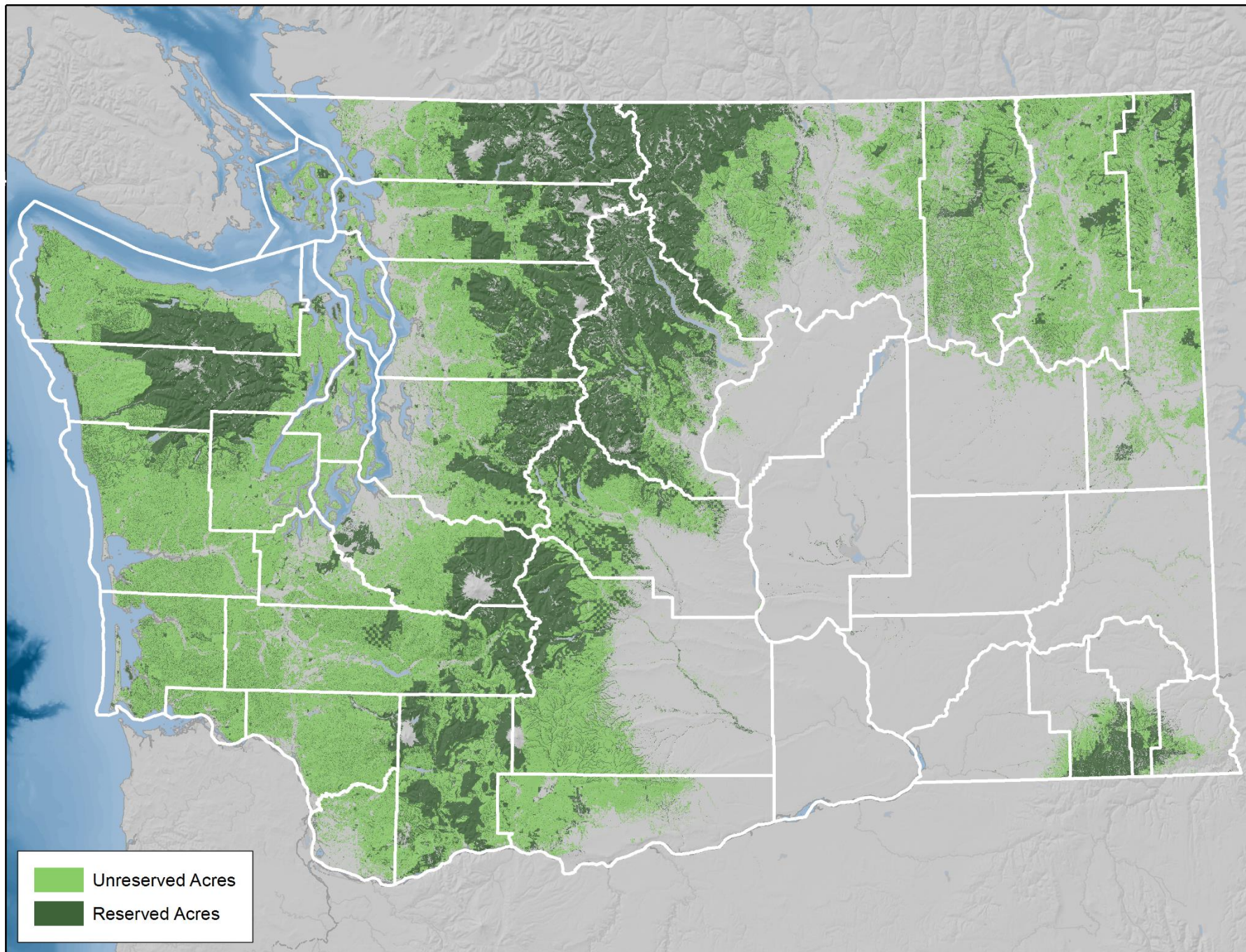
Hardwood Forest Types



All Forest Types









# Forested Area W WA(millions of acres)

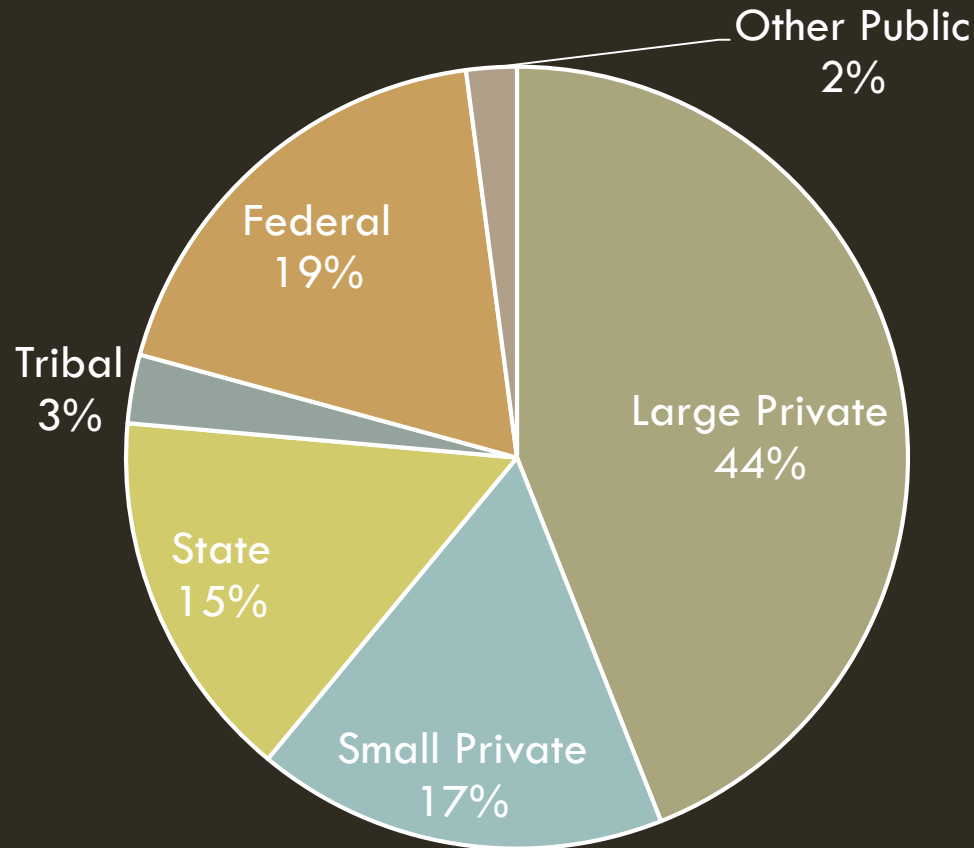
15

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

# Timberland Acres (Owner)

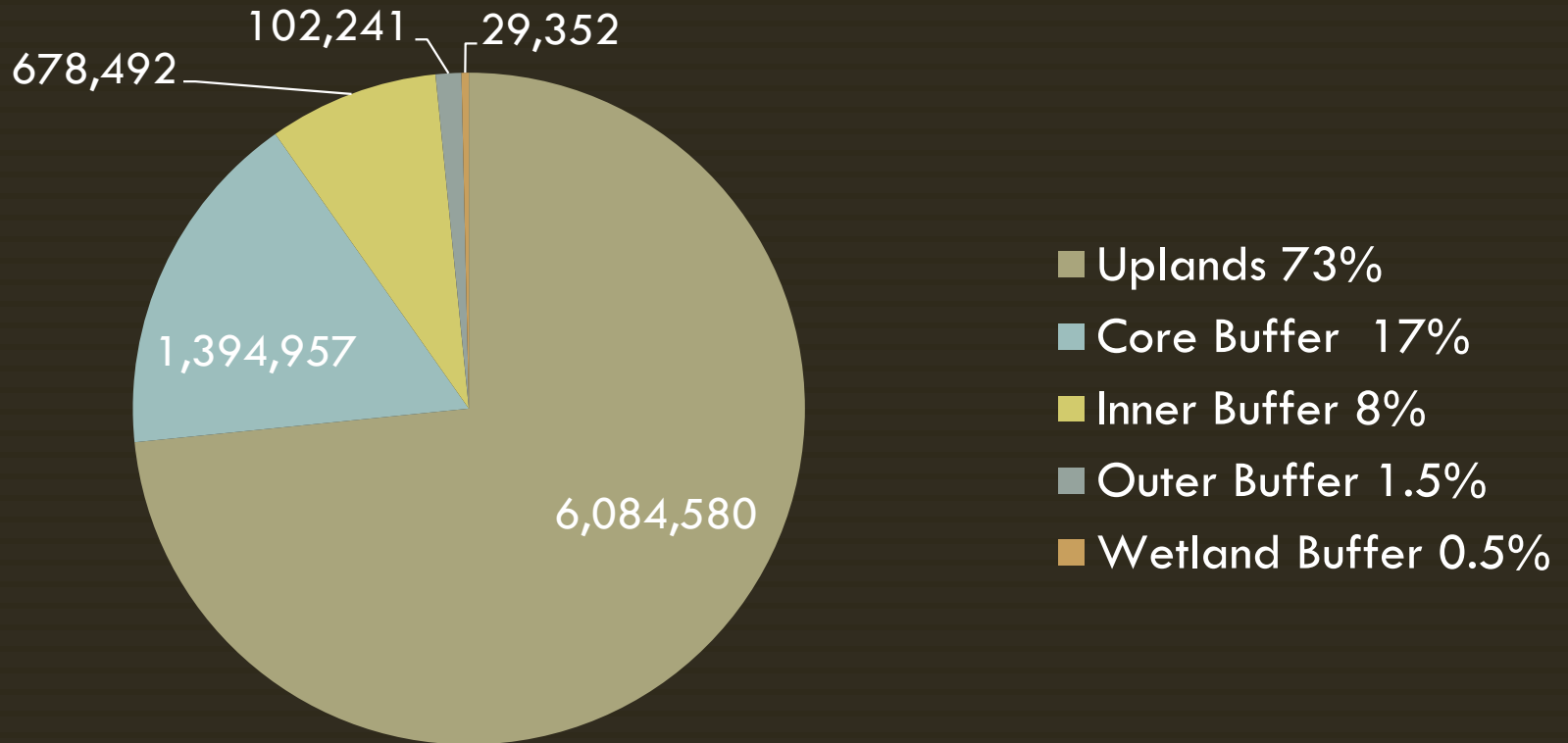
16

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

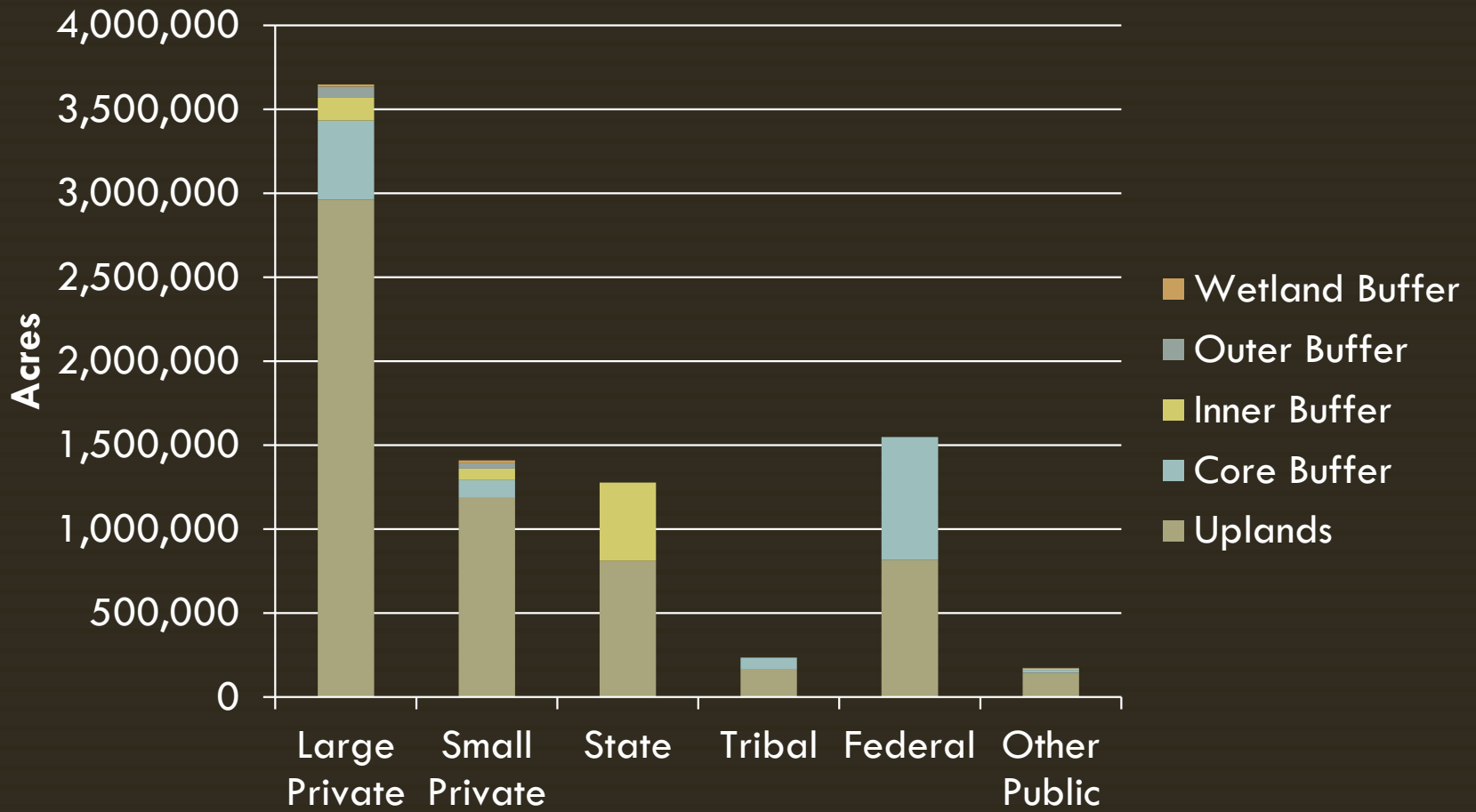


# Timberland Acres (Zone)

## Western Washington Unreserved Timberland Acres



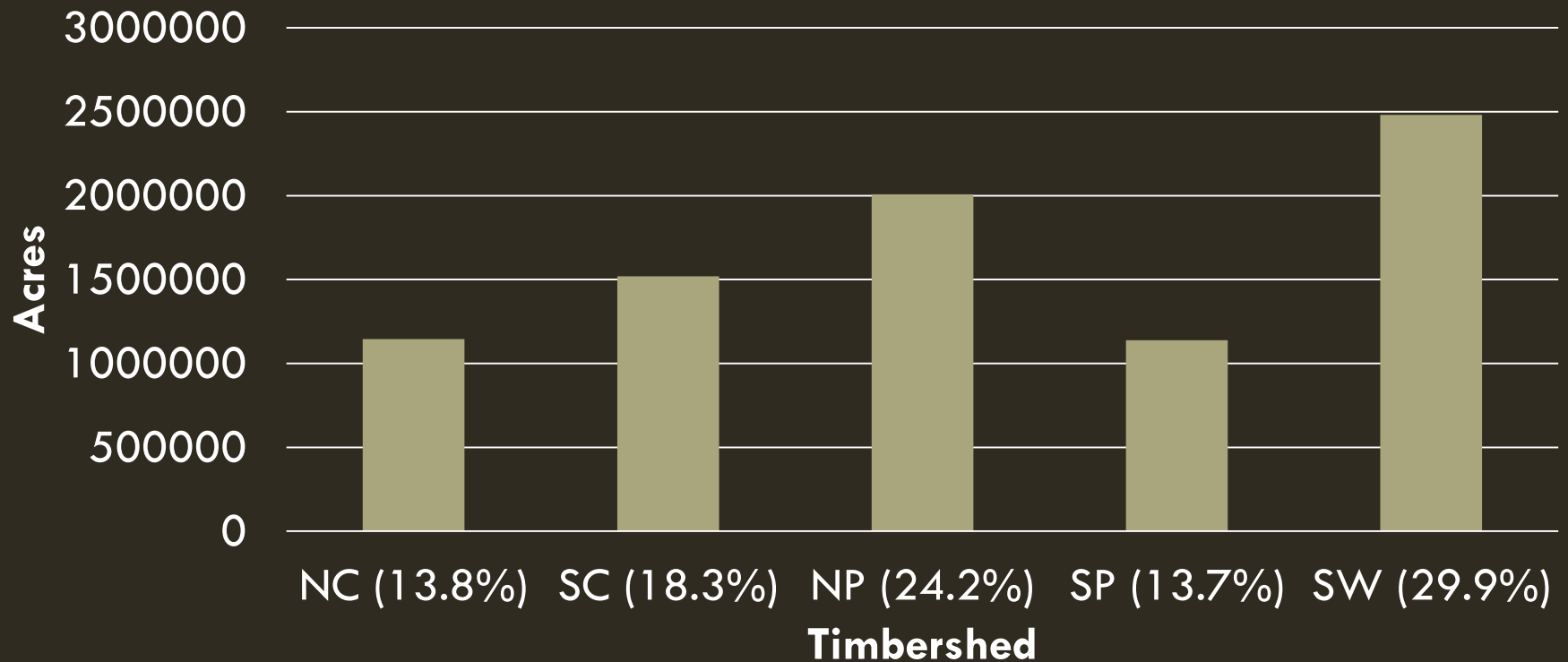
# Timberland Acres (Owner & Zone)



# Timberland Acres (Area)

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## Unreserved Timberland Acres by Area



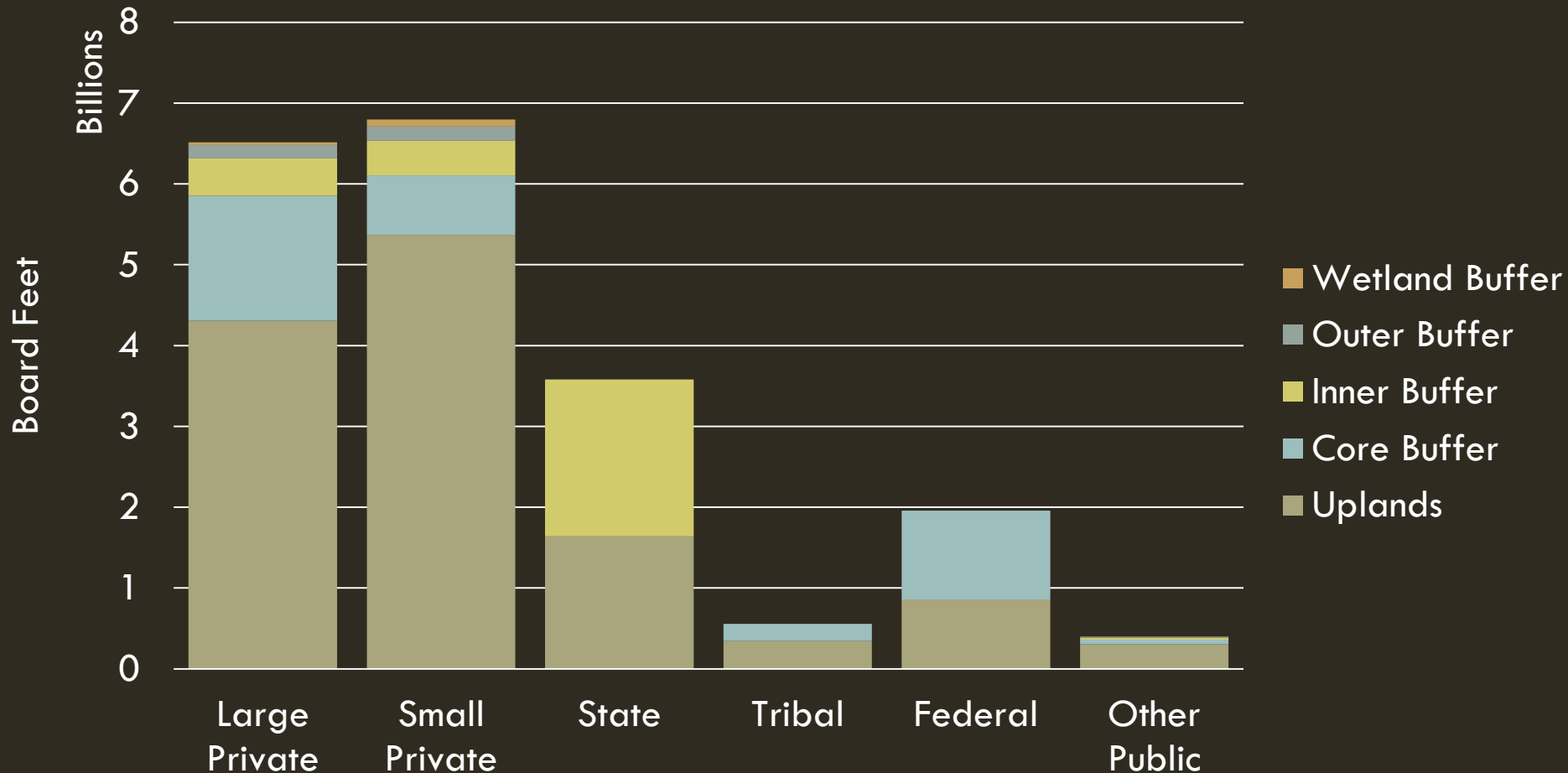




# 2010 Inventory (Owner & Zone)

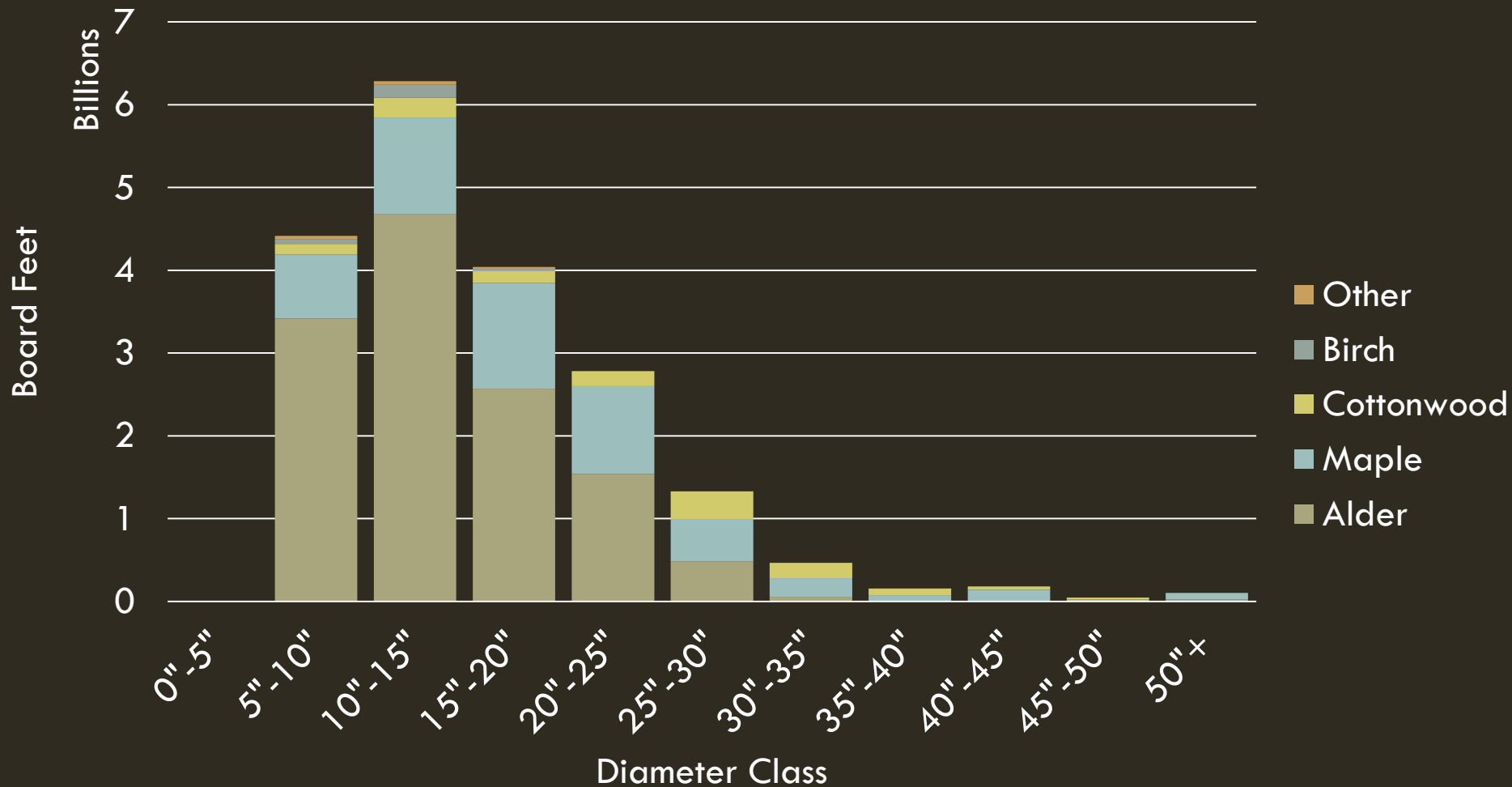
21

## 2010 Inventory by Owner Class and Management Zone (19.8 BBF)



# 2010 Inventory (Species & DBH)

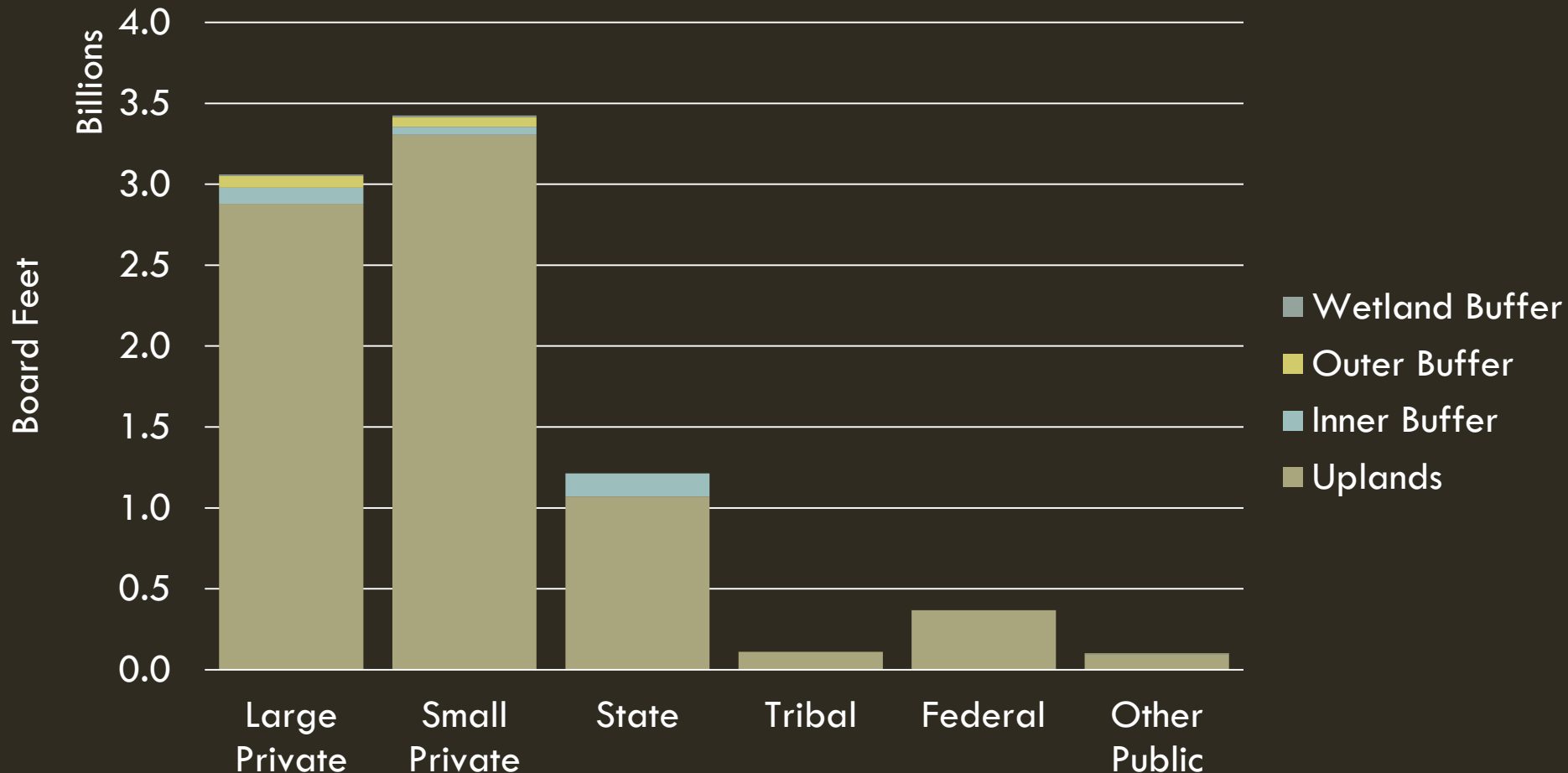
## 2010 Inventory by Species and Diameter Class (19.8 BBF)



# Available for Harvest (Owner & Zone)

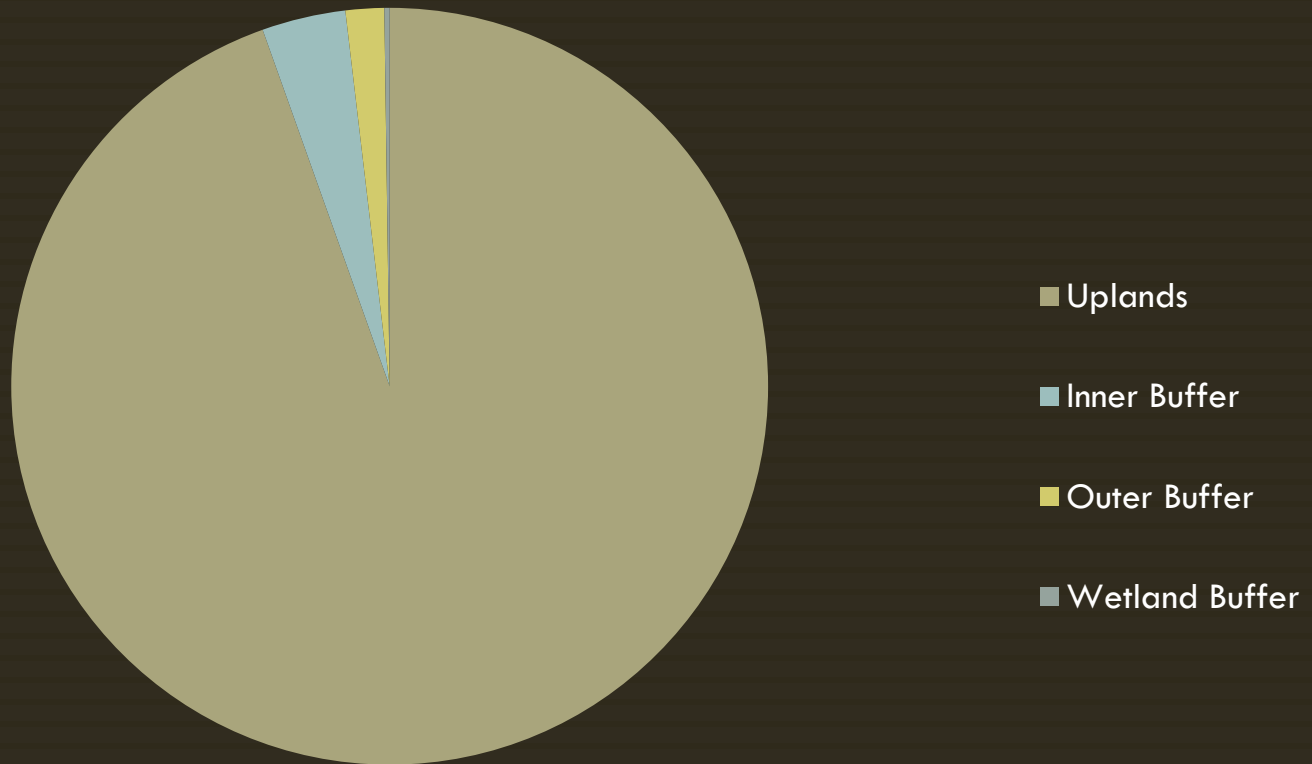
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## Western Washington Hardwoods Available for Harvest in 2010 by Owner Class and Management Zone (8.3 BBF)



# Available for Harvest (Zone)

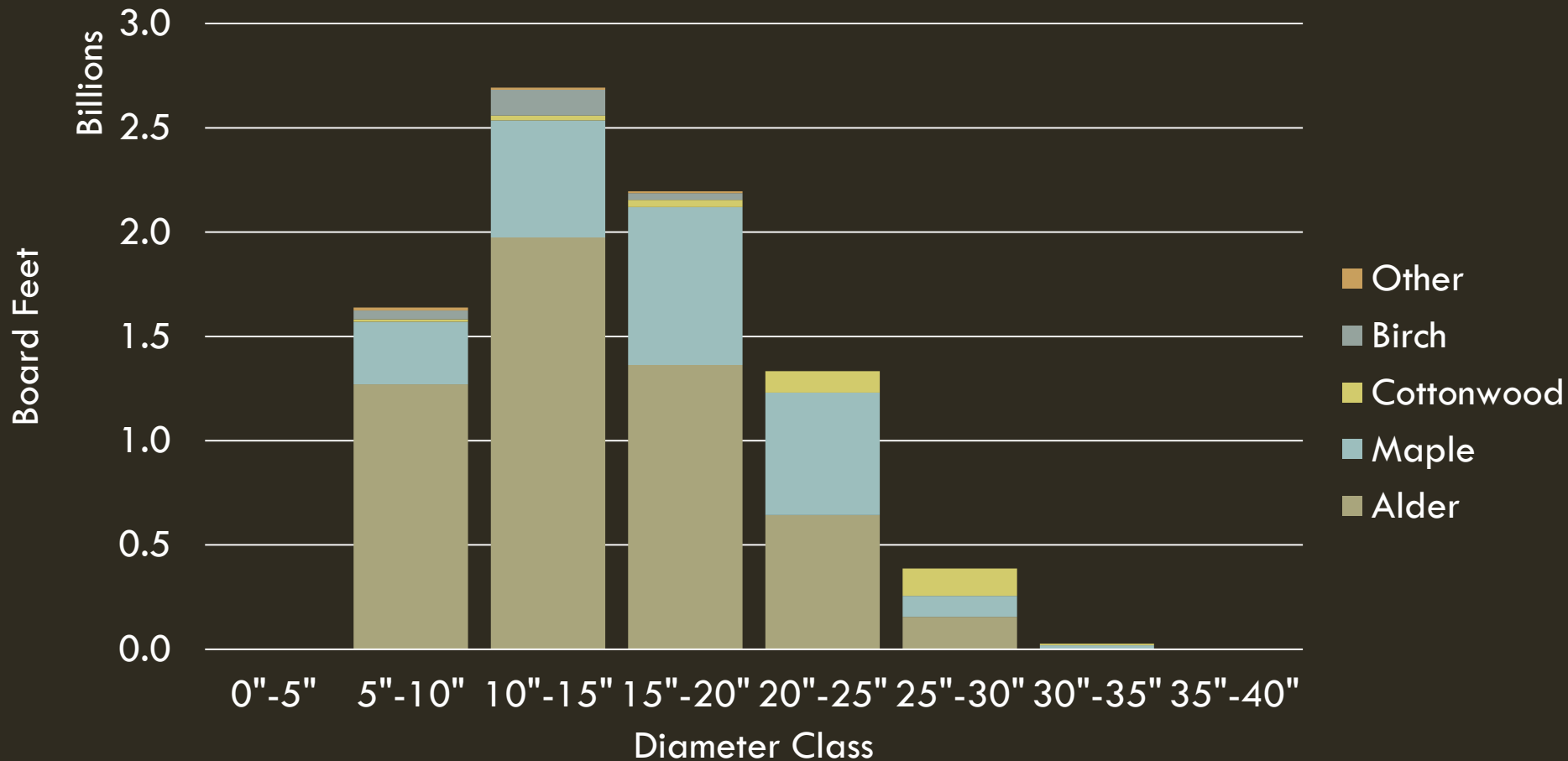
**Western Washington Hardwoods Available for Harvest in 2010  
(8.3 BBF)**



# Available for Harvest (DBH)

25

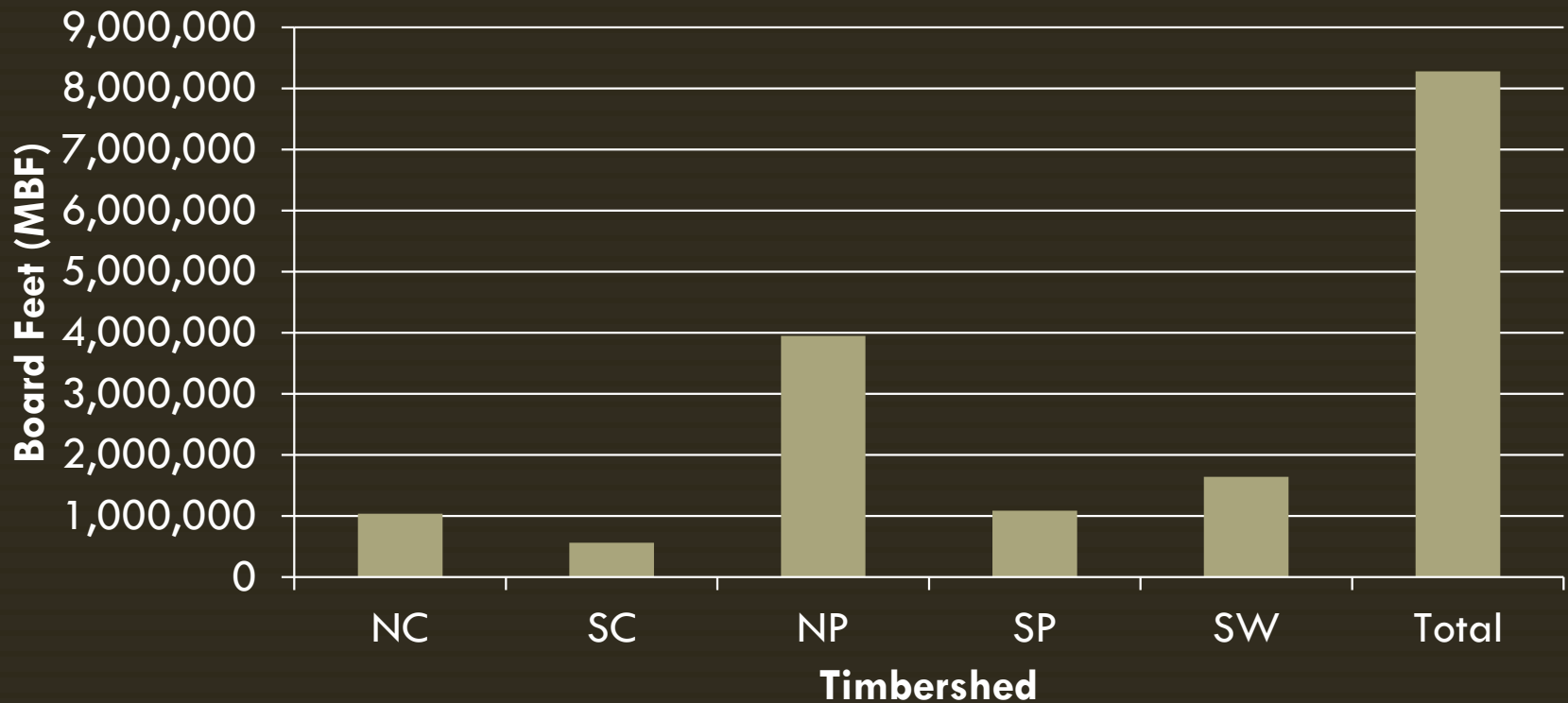
## Western Washington Hardwoods Available for Harvest in 2010 by Species & Diameter Class (8.3 BBF)



# Available for Harvest (Area)

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## Western Washington Hardwoods Available for Harvest in 2010 (8.3 BBF)







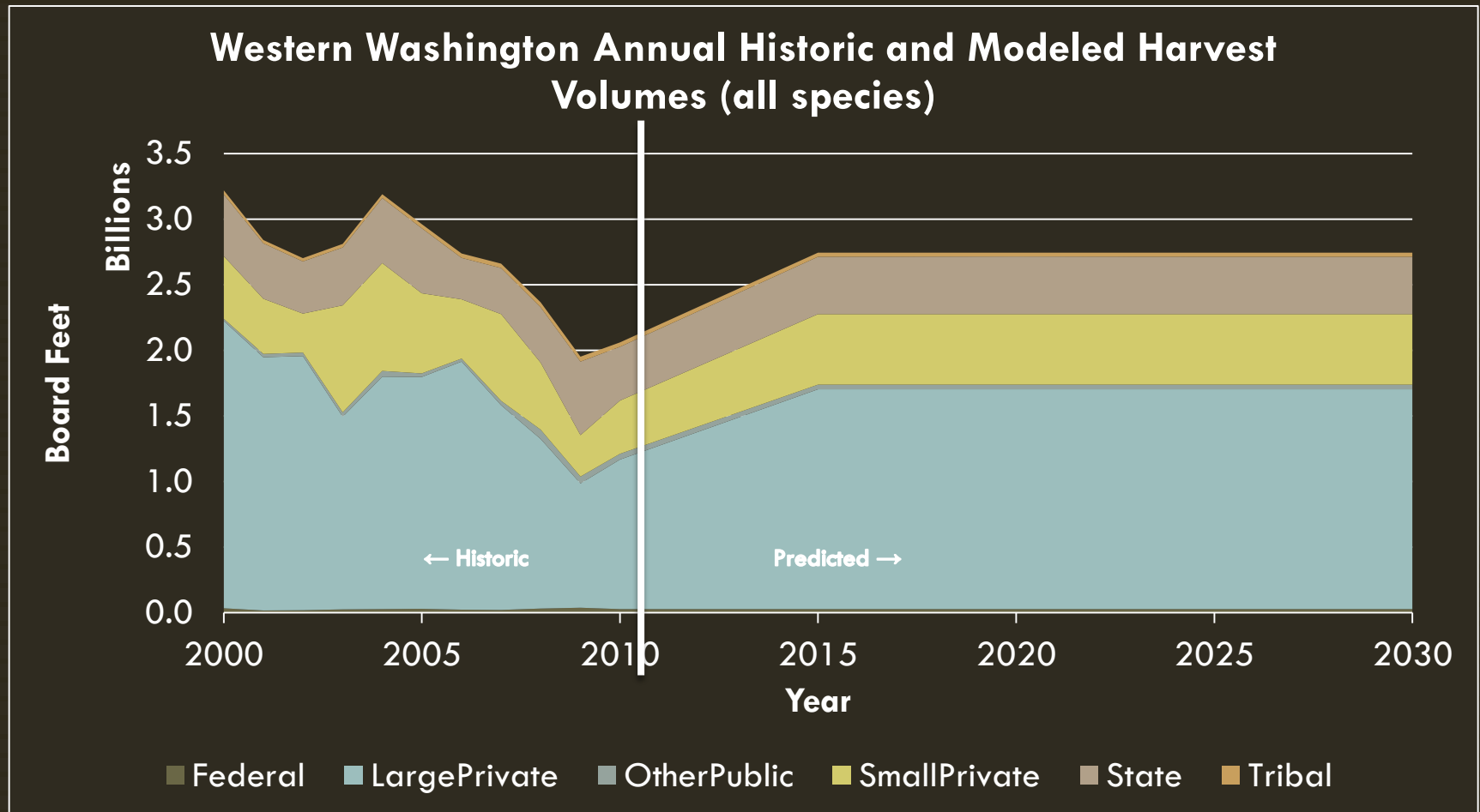
# Harvest Modeling

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- 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

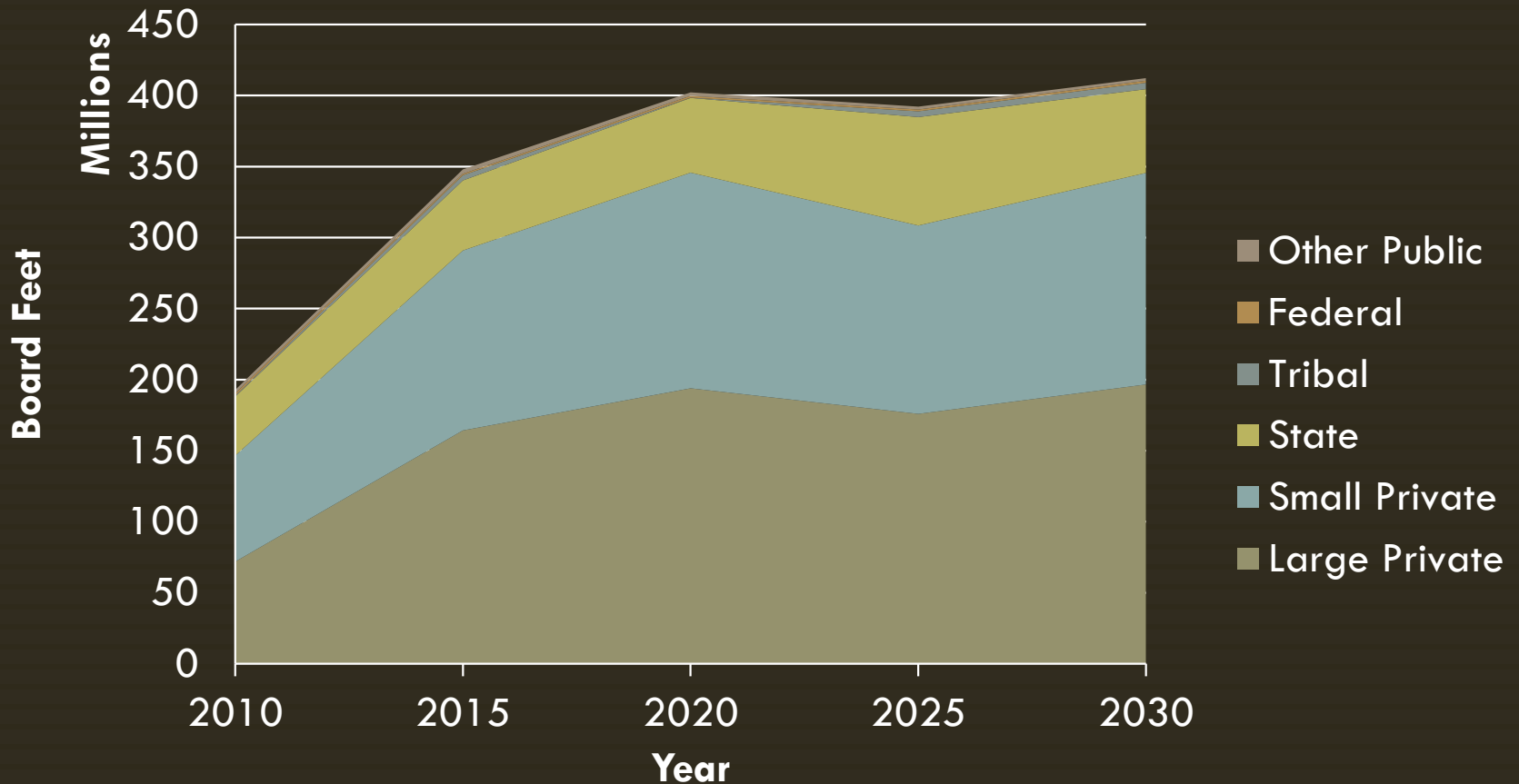
# All Species Harvest Volumes

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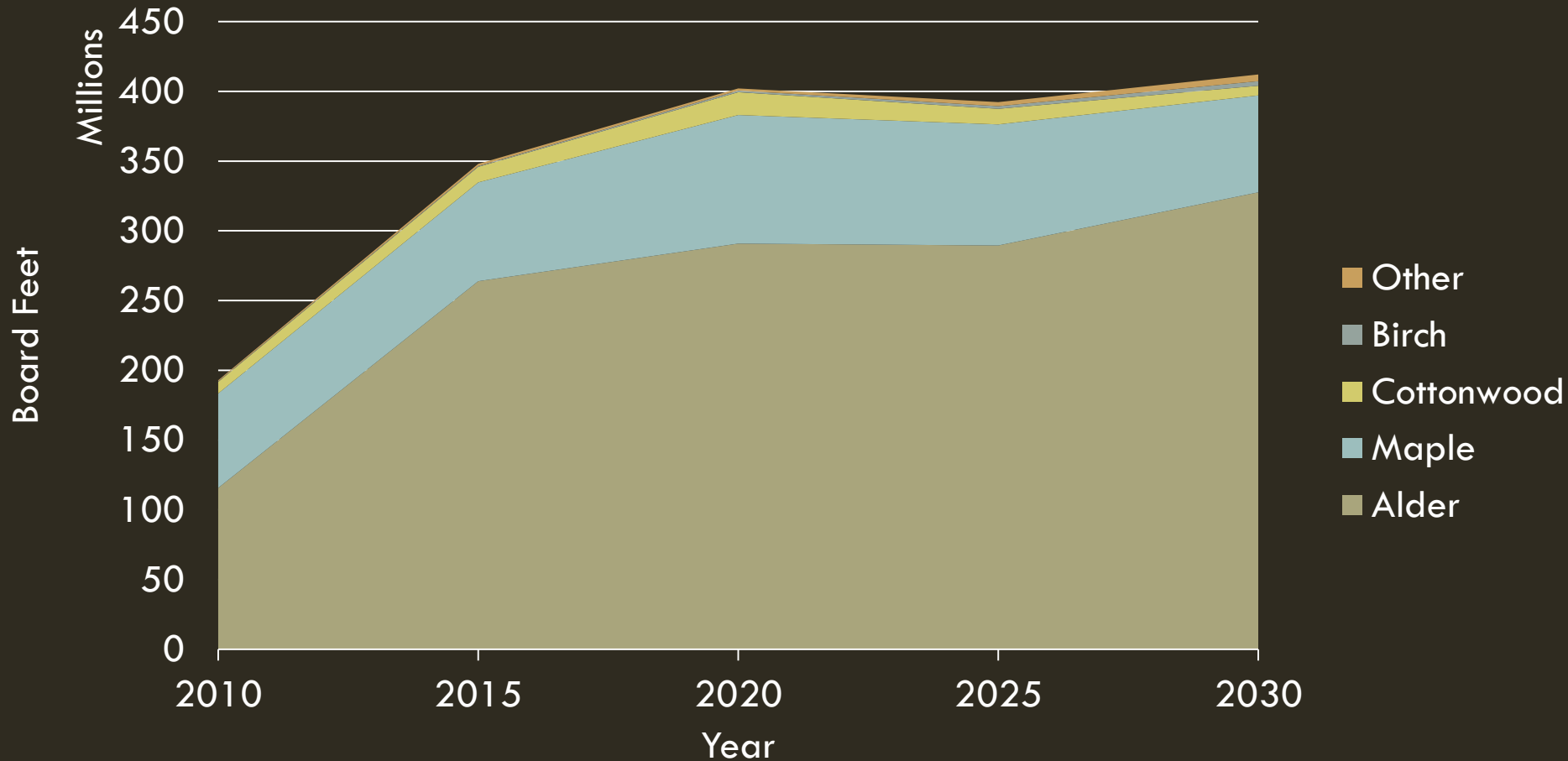
# Hardwood Harvest Volume (Owner)

## 2010 - 2030 Modeled Hardwood Harvest Volumes by Owner Type (MMBF)



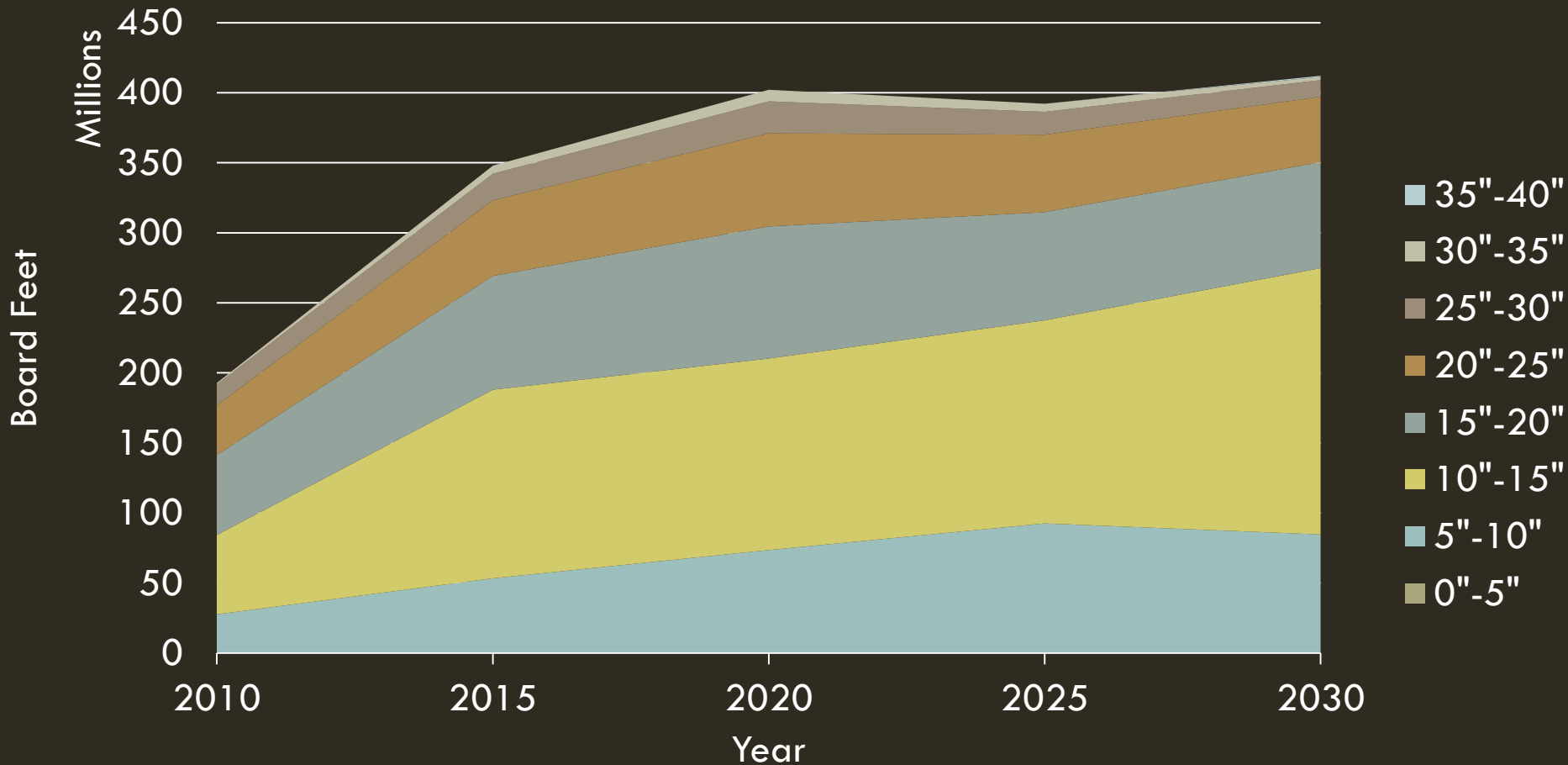
# Hardwood Harvest Volume (Species)

## Western Washington Modeled Hardwood Harvest Volumes by Species 2010 - 2030



# Hardwood Harvest Volume (DBH)

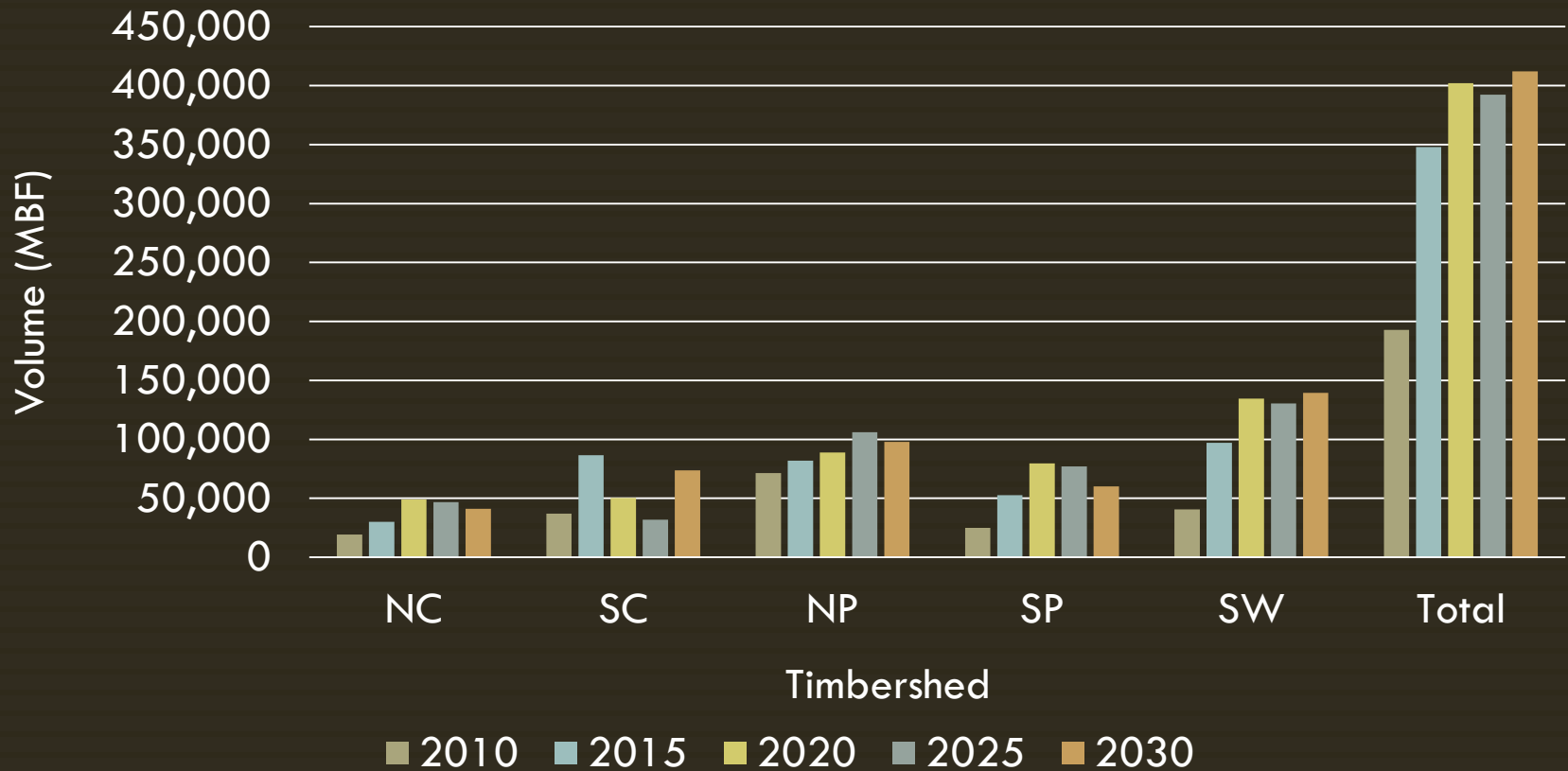
## Western Washington Modeled Hardwood Harvest Volumes by Diameter Class





# Hardwood Harvest Volume (Area)

## Annual Harvest Volume (MBF)



# Projection of 2010 – 2030 Inventory

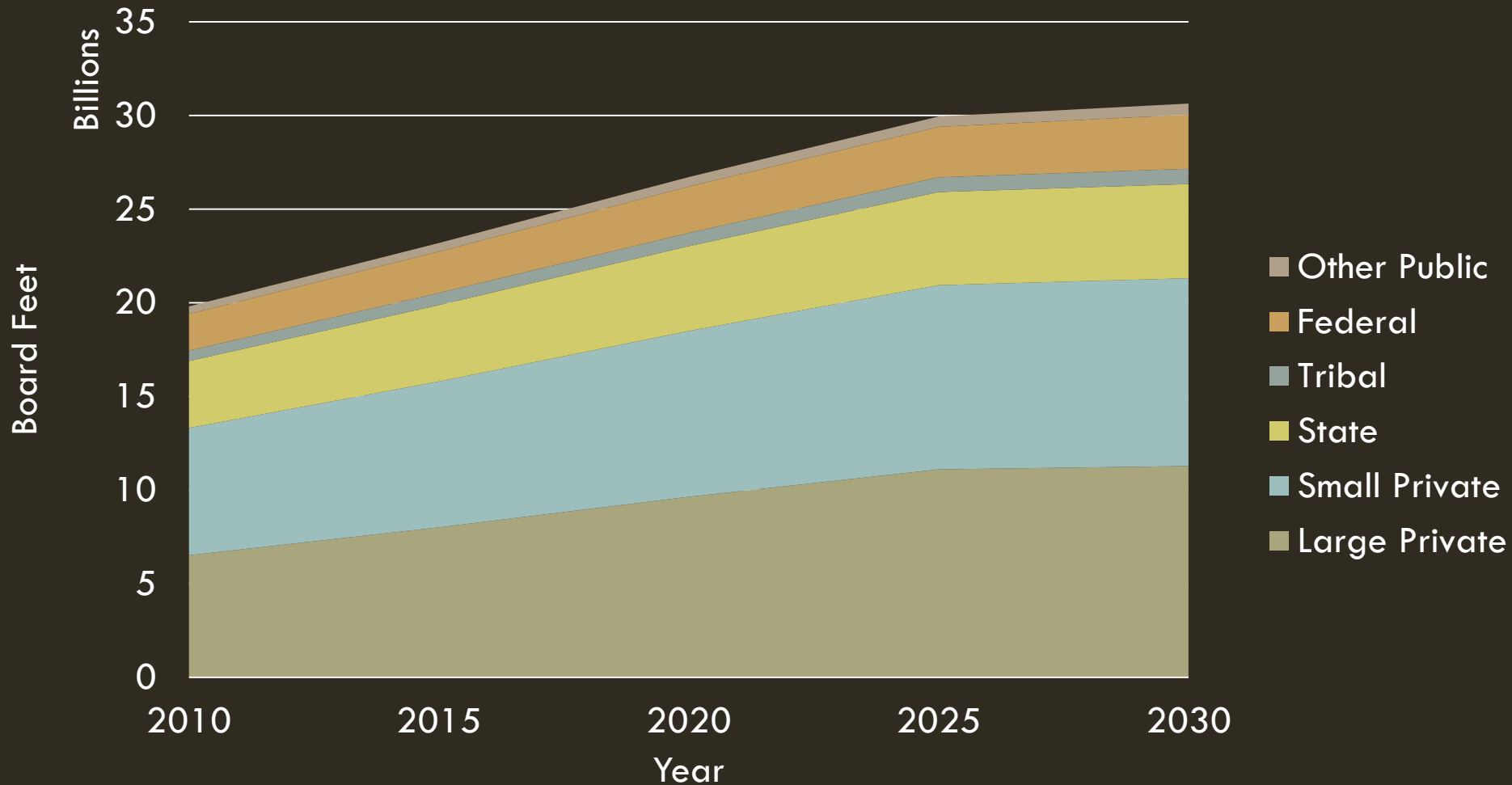
34

- 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)

35

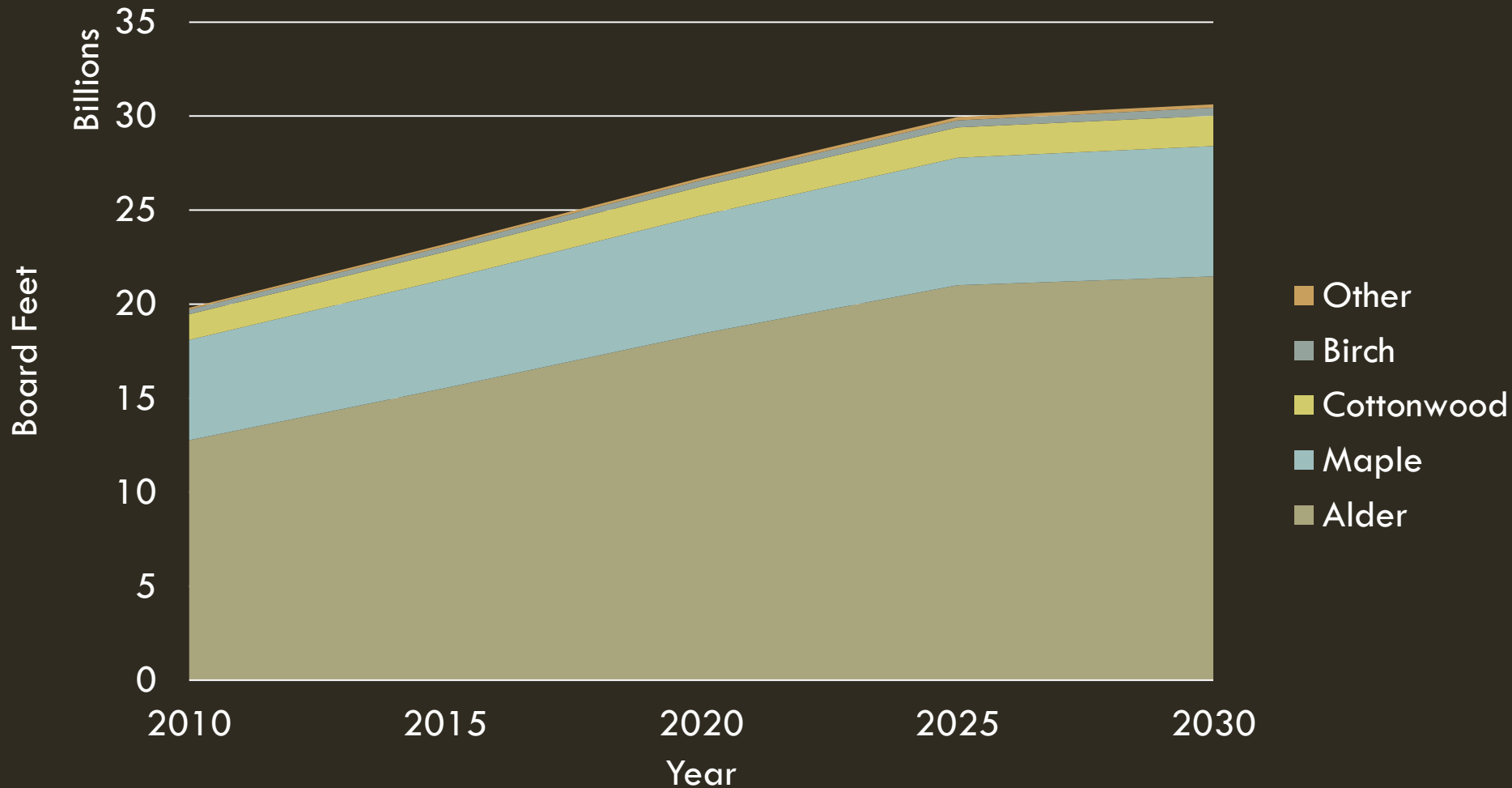
## 2010 - 2030 Hardwood Inventory by Owner Class (BBF)



# 2010 – 2030 Inventory (Species)

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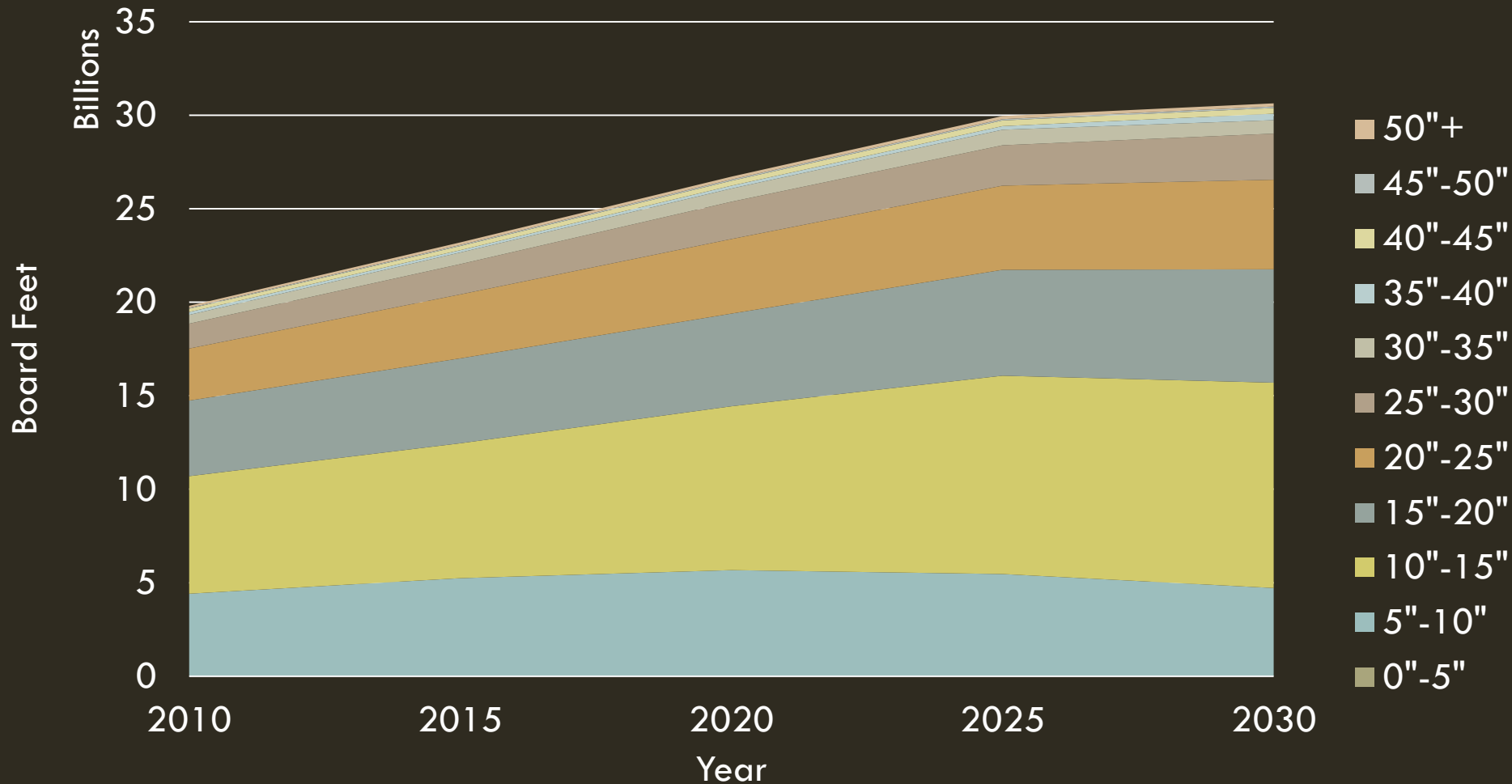
## 2010 - 2030 Hardwood Inventory by Species (BBF)



# 2010 – 2030 Inventory (DBH)

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## 2010 - 2030 Hardwood Inventory by Diameter Class (BBF)



# Summary

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- 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 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

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- 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

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



# The End