# Created Snags and Snag Management on Industrial Forests

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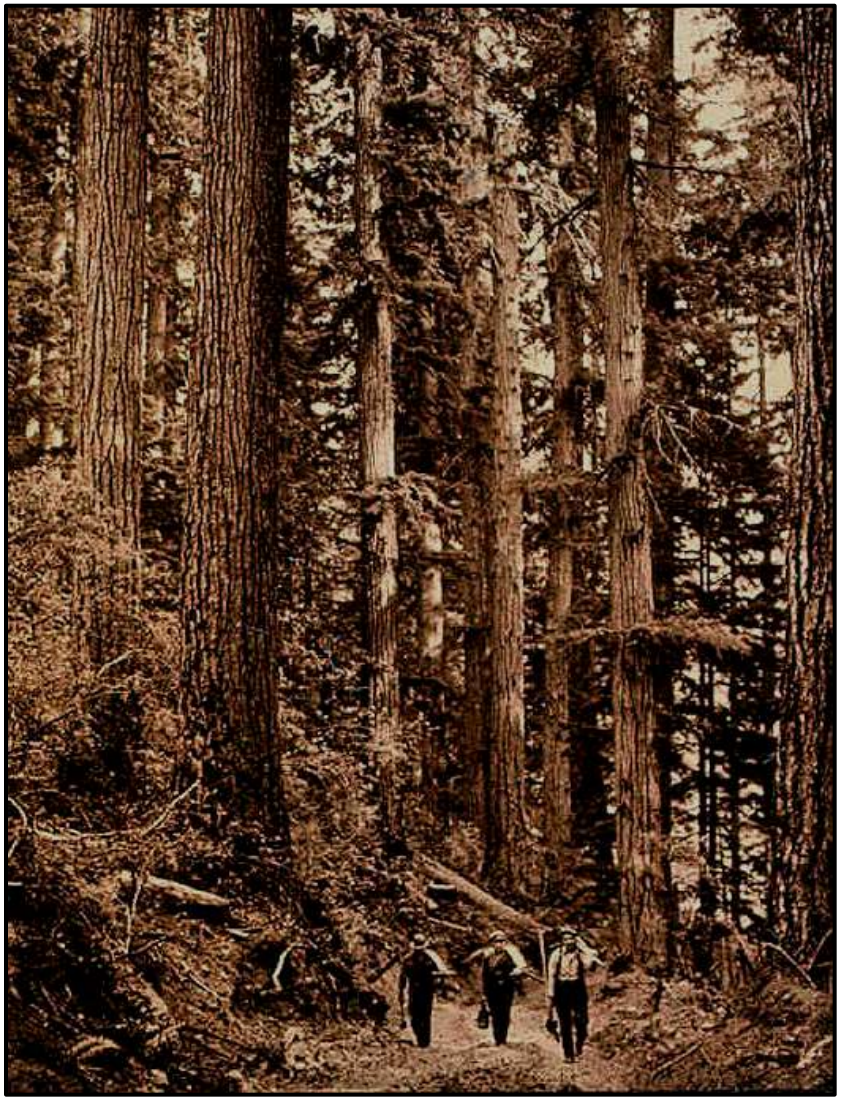
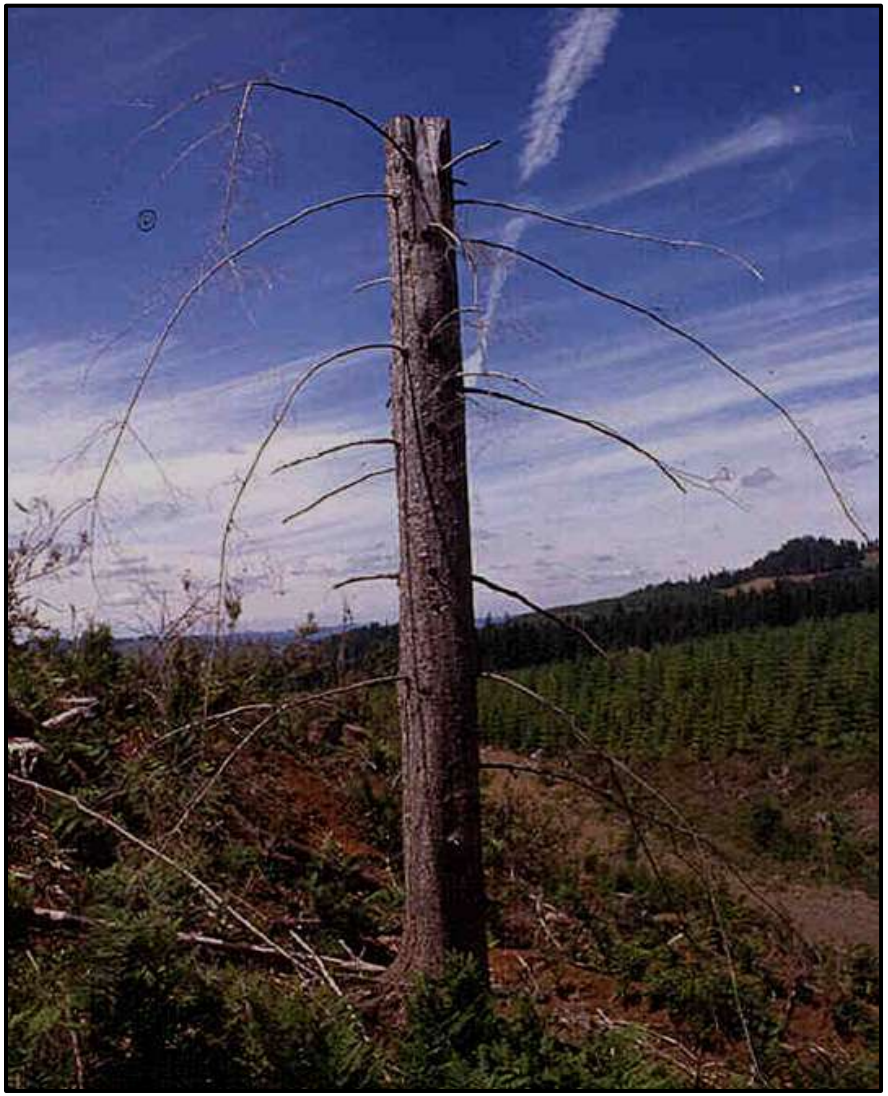
# Snags

*Then and Now*





# Snag Management

- Deficiencies in snag numbers and types
  - Management required to retain sufficient numbers in upland areas
- How many are needed?
  - Species, size, decay class
- Distributed how?
  - Uniformly? Clumps?
  - In patches of green trees?
  - Different distributions in different landscapes?
  - *Landscape has changed!*

# Current Regulations for Oregon and Washington

- Oregon (DOF 2007) regulations stipulate leaving:
  - 2 green trees (green trees are live, merchantable trees that are retained on a per acre basis in clearcut units) ***or***
  - 2 snags
  - > 30 feet in height and 11 inches dbh per acre

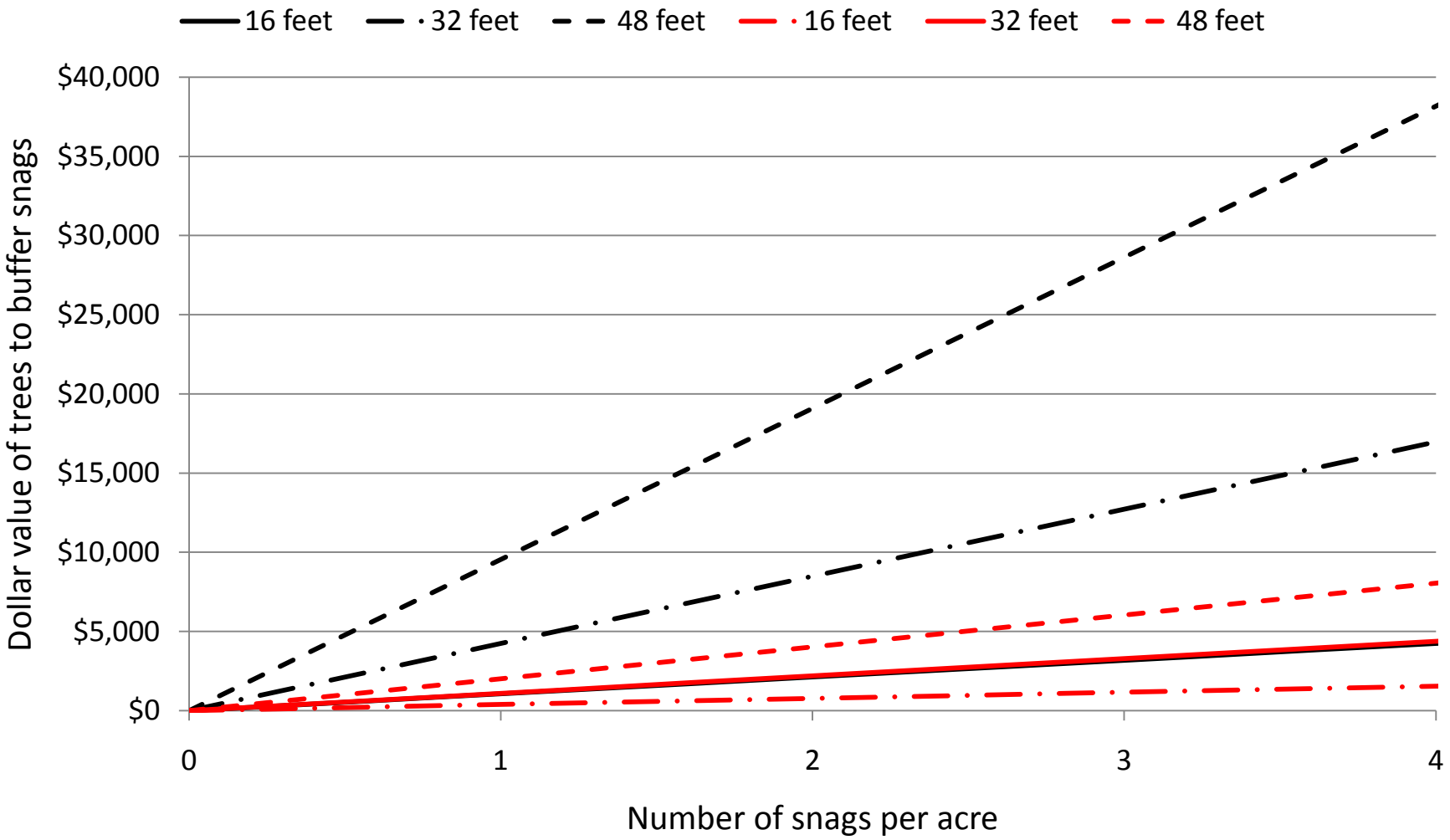
- Washington (WA DNR 2005) regulations stipulate leaving:
  - 2 green trees (> 30 feet in height and 10 inches dbh) per acre ***and***
  - 3 wildlife trees (defective trees > 10 feet in height and 12 inches dbh) per acre
  - Potential exists to retain 2 green trees per acre

- "Type 3 and Type 4 Wildlife Reserve Trees (WRTs) present significant safety considerations.
  - It is best to leave these trees in Riparian Management Zones (RMZs) and Wetland Management Zones (WMZs) where minimum activity will take place near them."

# Quantifying Safe Retention of Snags

*Assuming an average volume of 24 mbf/acre of Douglas fir at $400/mbf*

*Buffer area = 1.5 times the snag height or 2 times the snag height*



# Snag Retention and Development

*Ecological responses depend on context*

## Young *Harvest* Units

- Replanted at uniform densities
- Rarely contain scattered live trees of various ages or snags within the unit
- Pass through truncated successional stages
- Units are often located in proximity to a riparian buffer that was not disturbed during harvesting

## Young *Natural* Stands

- Recruitment is irregular
- Extensive biological legacies may remain
- Early successional stages can last for decades
- Disturbances influence both upland and riparian areas

# Options for Snag Retention and Development

- Thinning stands
  - Promotes growth, leading to large trees that can become large snags
  - However, survivorship could be high
- Green tree retention
  - What proportion of green trees survive to become large trees (and snags)?
  - Distribution:  upland or riparian areas?
- Patch retention
  - Grouping leave trees from multiple units in one area
  - Would encourage retention of “snag-rich” patches
- Unstable slope buffers
  - Occur in upland areas of the landscape
  - Provide an unexplored opportunity for green tree retention and snag creation

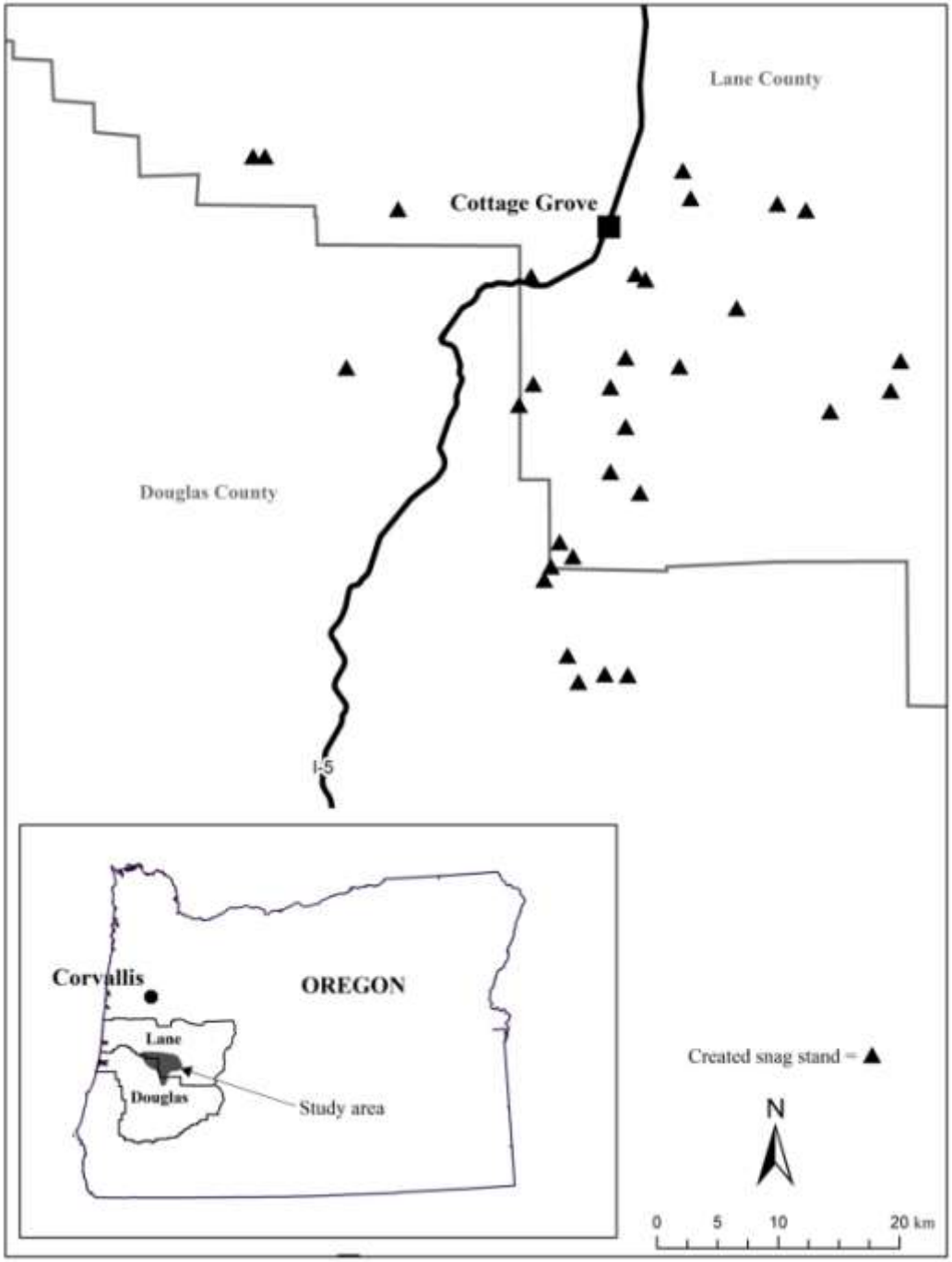
# Creating Snags

- Various methods
  - Safety concerns and costs
  - Operational efficiency
- Ecological effectiveness
  - Foraging
  - Nesting use
  - Demographic responses
- Longevity of snags
  - Decay rates

# The Cottage Grove Created Snag Project

*Objectives*

- Determine rate of avian *nest* survival in snags created from merchantable 2nd growth Douglas fir
  - Probability that a nest produces fledglings (≥ 1)
- 2008-2010
  - 9-11 years after snags were created


Lane County
Cottage Grove
Douglas County
I-5
Corvallis
OREGON
Lane
Douglas
Study area
Created snag stand = ▲
N
0 5 10 20 km

# Experimental Design

- Random selection of 31 harvest units, 1997-1999
  - Naturally regenerated 2nd growth Douglas fir stands
  - All units were harvested with ground-based systems
  - Harvester cut off tree at the highest point it could reach
- Treatments
  - Density:  0.2, 0.5, and 1.0 trees/acre
  - Clustered (5-6 trees) vs. uniformly distributed
  - Each treatment is a density*distribution combination: 6 different treatments

# Results

*Nest totals 2008-2010*

| Species | Total | Successful | Failed | Total | Successful | Failed | Total | Successful | Failed |
|---|---|---|---|---|---|---|---|---|---|
| Red-breasted sapsucker | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| Northern saw-whet owl | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| Northern flicker | 21 | 12 | 9 | 21 | 15 | 6 | 21 | 13 | 6 |
| Purple martin | 6 | 6 | 0 | 9 | 4 | 5 | 5 | 3 | 5 |
| Violet-green swallow | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hairy woodpecker | 3 | 2 | 1 | 2 | 2 | 0 | 1 | 1 | 0 |
| House wren | 36 | 27 | 9 | 51 | 41 | 10 | 21 | 17 | 4 |
| Chestnut-backed chickadee | 68 | 52 | 16 | 117 | 78 | 39 | 110 | 59 | 51 |
| Western bluebird | 3 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 |
| Red-breasted nuthatch | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| **TOTALS** | **142** | **103** | **39** | **202** | **142** | **60** | **161** | **93** | **69** |

# Results

- Snag adequacy
  - 10 different species used snags for nesting
  - Only 3 species were common nesters
  - Pileated woodpecker, brown creeper, and red-breasted nuthatch foraged on snags
- For 3 main species:
  - Nest survival was consistent with results from other studies
  - No treatment effect for HOWR and NOFL
  - An effect of snag density for CBCH
- Nesting use must be monitored over longer time periods to assess effectiveness
  - Walter and Maguire 2005
  - Arnett et al. 2010 (no use in 1st 5 years)
  - *Return to Cottage Grove in 2018?*

# Management Implications

*A partial solution*

- Leaving created snags at a density of 0.5/acre retains *some* cavity-nesting bird species
  - *Up to years 12-15…*
- Benefits restricted by rotation age
  - Snags must be created from trees growing in unit
  - *Suitability is also dependent on stand conditions (e.g., site index) and landscape context*
- Different strategies are required to provide tall snags
  - *Other taxa besides birds?*

# Final Thoughts

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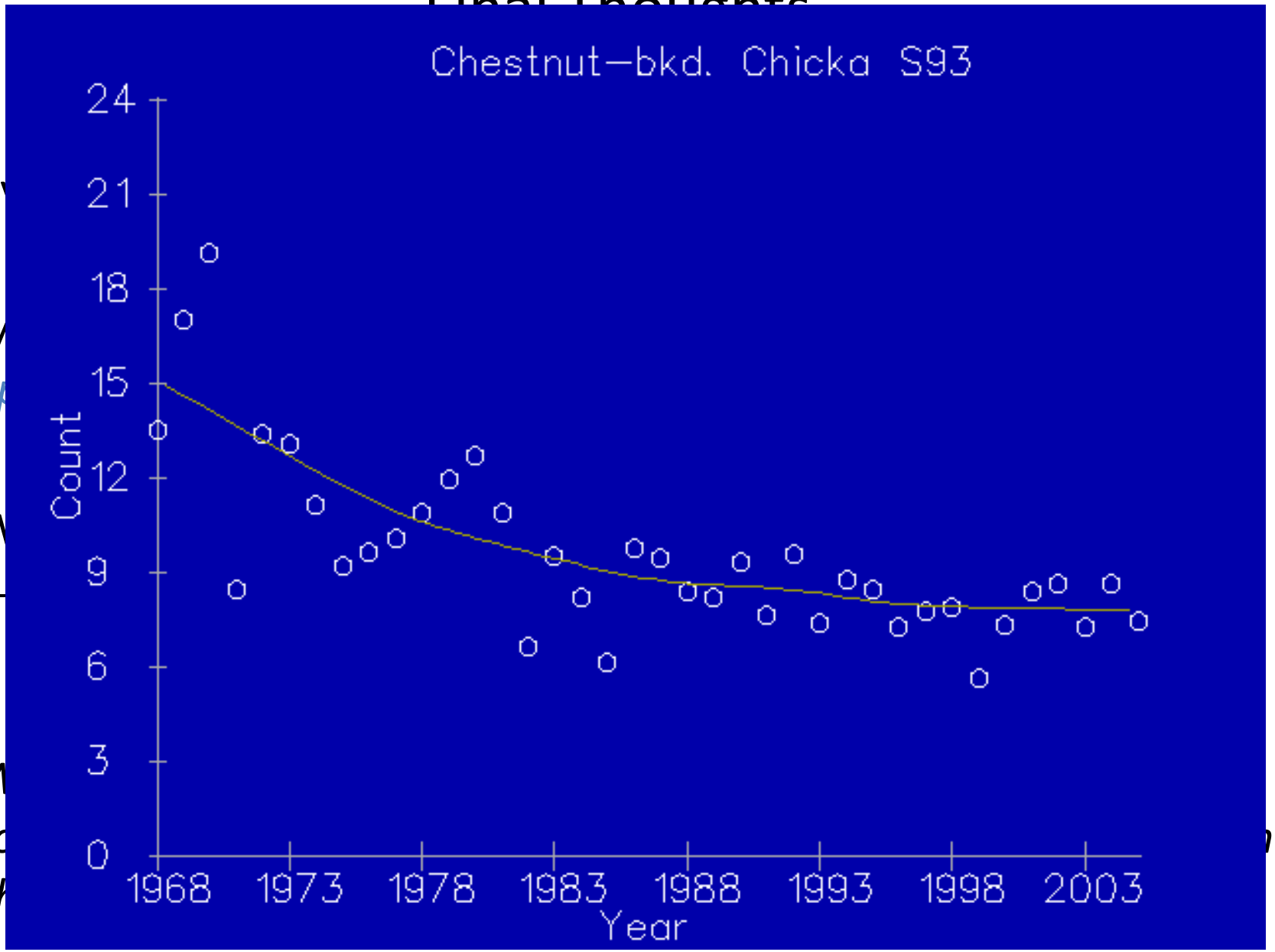

# Creating Snags in the eastern Cascades, WA

# Acknowledgments


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  - South Valley Operations for creating units and snags
  - Supporting research
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