

# Strategic Seed Management to Meet Reforestation Needs

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National Reforestation and Nursery System Program



Forest Service  
U.S. DEPARTMENT OF AGRICULTURE



# Managing Seed to Address our Needs



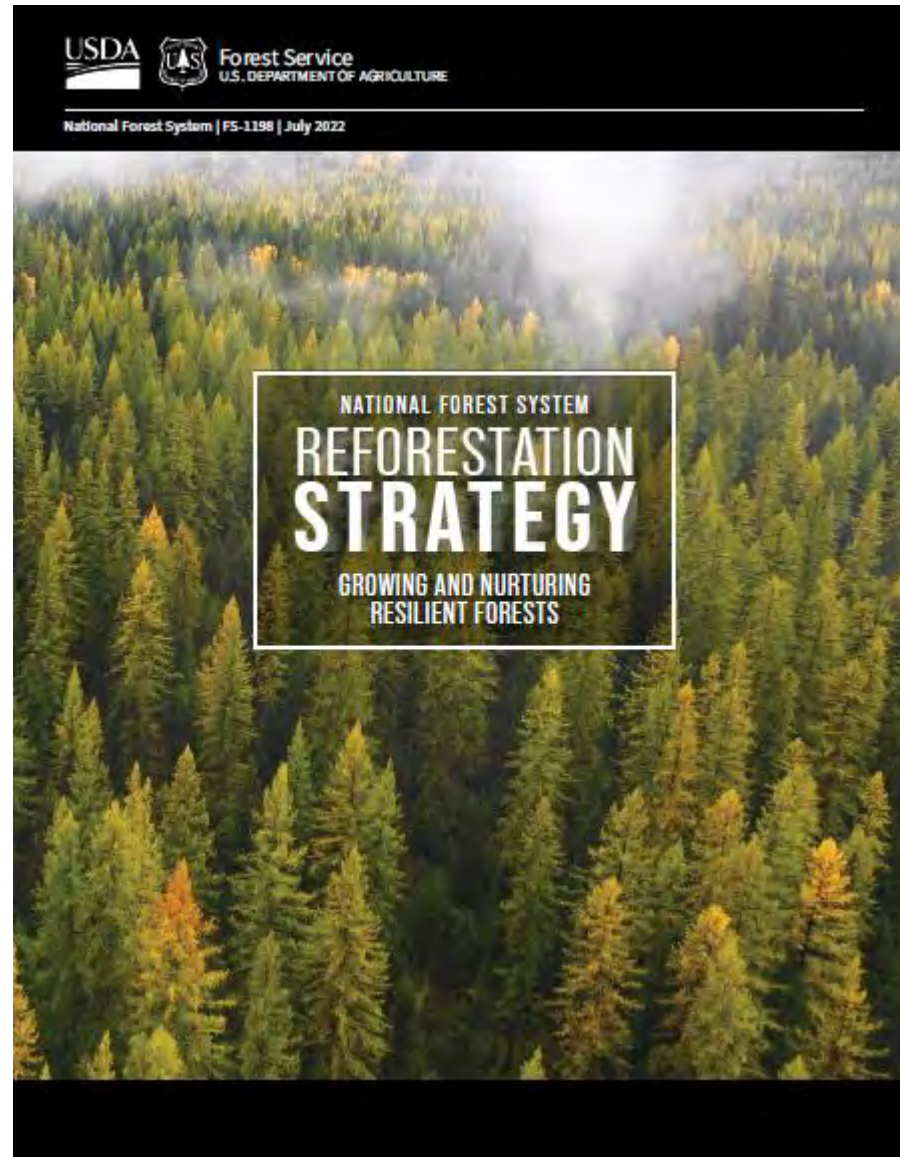
**5+ million acres in  
potential need of  
reforestation**

# Law and Policy



- **REPLANT Act** - Repairing Existing Public Land by Adding Necessary Trees Act
- **Executive Order 14008**, Tackling the Climate Crisis at Home and Abroad
- **Executive Order 14072**, Strengthening the Nation's Forests, Communities, and Local Economies

# National NFS Reforestation Strategy



# Forest Service National Nursery Program

## Forest Service Nurseries and Extractories



# Managing Seed



## Seed are the principal means of regeneration in PNW conifer species

- Serve as the delivery system for the transfer of genes from one generation to the next
- Provide the foundation for healthy and resilient forests

## Reforestation is a primary tool for re-aligning species and genetic resources

- Deployment of disease resistant germplasm
- Climate change adaptation response

## Seed quality directly influences the next steps in reforestation

- Quality seed can reduce cost in extraction
- Reduces cost and space needs in the nursery
- Improves survival in the field

# Seed Collection and Management



# Capacity – Your Account



Weighing each aspect and deciding where to put your risk, energy, time, funds.

- Seedling success
  - Target plant concept
  - Climate change adaptation
- Seed Use
  - How much seed do you have
  - How difficult is it to replace that seed
  - Cone crop periodicity
- Accomplishments
  - Set yourself and your team up for success
  - Think about what you can manage physically, mentally, emotionally



# Complexity of Seed Management



Incorporate all aspects into your plan

- Planning timeframe
  - Planned reforestation needs (acres)
  - Unplanned needs due to disturbances (acres)
- Cone crop periodicity of target species
  - Seed & cone insects
- Seed quality & longevity in storage
  - Germination and purity
- Stocktype & nursery sowing factors
- TPA, planting density
- Field survival

# Seed Use Plans

## Seed Procurement Plan - Mt. Hood National Forest

### Pseudotsuga menziesii - Douglas-fir

PSF seedlings per pound of seed = 11730 Ref R1 FSH 2409.26f 131-EX2 Container

				Operational + Existing Needs Planting										Large-Scale Disturbance Planting							Totals	
Dist.	Identified Collect Zone	Special Overlap With These Zone	Corresponding Elevation	Operational Planting	Trees Acre	Seedlin Req'd	Seed Ne * (lb)	Fores Inventory	Other Inventory	Seed Available	Collect Needs	Large Scale Disturb Plant (AC)	Trees Acre	Seedlin Req'd	Seed Ne * (lb)	Fores Inventory	Other Inventory	Seed Available	Collect Needs	Total S Needs	Collecti Needs	
	042	042	Elevations < 1000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01	042	042/06012	1000 - 2000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01	042	042/06013	2000 - 3000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01	042	042/06014	3000 - 4000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01	042	042/06015	> 4000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
	451	451	Elevations < 1000	0	200	0.0	0.00	1.46		1.46	-1.46	0	200	0.0	0.00			0.00	0.00	0.00	0.00	-1.46
01	451	451/06012	1000 - 2000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01	451	451/06013	2000 - 3000	265	76	20.1	1.72	1.71		1.71	0.01	0	200	0.0	0.00			0.00	0.00	0.00	1.72	0.01
01/02	451	451/06014/06024	3000 - 4000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01/02	451	451/06015/06025	> 4000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
	452	452	Elevations < 1000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01	452	452/06012	1000 - 2000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01	452	452/06013	2000 - 3000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01/02	452	452/06014/06024	3000 - 4000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01/02	452	452/06015/06025	> 4000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
	462	462/06014	3000 - 4000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01	462	462/06015	> 4000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
	463	463/06015	> 4000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01/02	661	661/06012/06022	1000 - 2000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01/02	661	661/06013/06023	2000 - 3000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01/02	661	661/06014/06024	3000 - 4000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01/02	661	661/06015/06025	> 4000	0	200	0.0	0.00	10.58		10.58	-10.58	0	200	0.0	0.00			0.00	0.00	0.00	0.00	-10.58
01/02	662	662/06015/06025	> 4000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
02	662	662/06022	1000 - 2000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
02	662	662/06023	2000 - 3000	0	200	0.0	0.00	8.17		8.17	-8.17	0	200	0.0	0.00			0.00	0.00	0.00	0.00	-8.17
01/02	662	662/06014/06024	3000 - 4000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
	662	662	> 4000	0	200	0.0	0.00	0.73		0.73	-0.73	0	200	0.0	0.00			0.00	0.00	0.00	0.00	-0.73
02	671	671/06023	2000 - 3000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01/02	671	671/06014/06024	3000 - 4000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01	671	671/06015	> 4000	0	200	0.0	0.00			0.00	0.00	0	200	0.0	0.00			0.00	0.00	0.00	0.00	0.00
01	06012	06012/042/451/452/661	1000 - 2000	9896	132	1306.3	111.36	21.37		21.37	89.99	4920	130	639.6	54.53			0.00	54.53	165.89	144.52	2.21
01	06013	06013/042/451/452/661	2000 - 3000	10129	76	769.8	65.63	95.36		95.36	-29.73	5064	74	374.7	31.95			0.00	31.95	97.57	97.57	2.21
01	06014	06014/042/451/452/462/661	3000 - 4000	10667	45	480.0	40.92	118.82		118.82	-77.90	5208	44	229.2	19.54			0.00	19.54	60.46	60.46	-58.36
01	06015	06015/042/451/452/462/463/661	> 4000	4455	28	124.7	10.63	14.21		14.21	-3.58	2212	28	61.9	5.28			0.00	5.28	15.91	15.91	1.70
02	06022	06022/661/662	1000 - 2000	0	200	0.0	0.00	0.00		0.00	0.00	2000	200	400.0	34.10			0.00	34.10	34.10	34.10	34.10
02	06023	06023/661/662	2000 - 3000	0	200	0.0	0.00	0.50		0.50	-0.50	2000	200	400.0	34.10			0.00	34.10	34.10	34.10	33.60
02	06024	06024/451/452/661/662/671	3000 - 4000	0	200	0.0	0.00	50.86		50.86	-50.86	2000	200	400.0	34.10			0.00	34.10	34.10	34.10	-16.76
02	06025	06025/451/452/661	> 4000	0	200	0.0	0.00	11.12		11.12	-11.12	1000	200	200.0	17.05			0.00	17.05	17.05	17.05	5.93

Readme

Seed Inventory 05-2022

PSME

THPL

PIPO

LAOC

PILA

PICO

PIEN

TSHE

PIMO3

TSME

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# Local Knowledge



They help us understand the plans for the land area and how that compares to what is available on the inventory

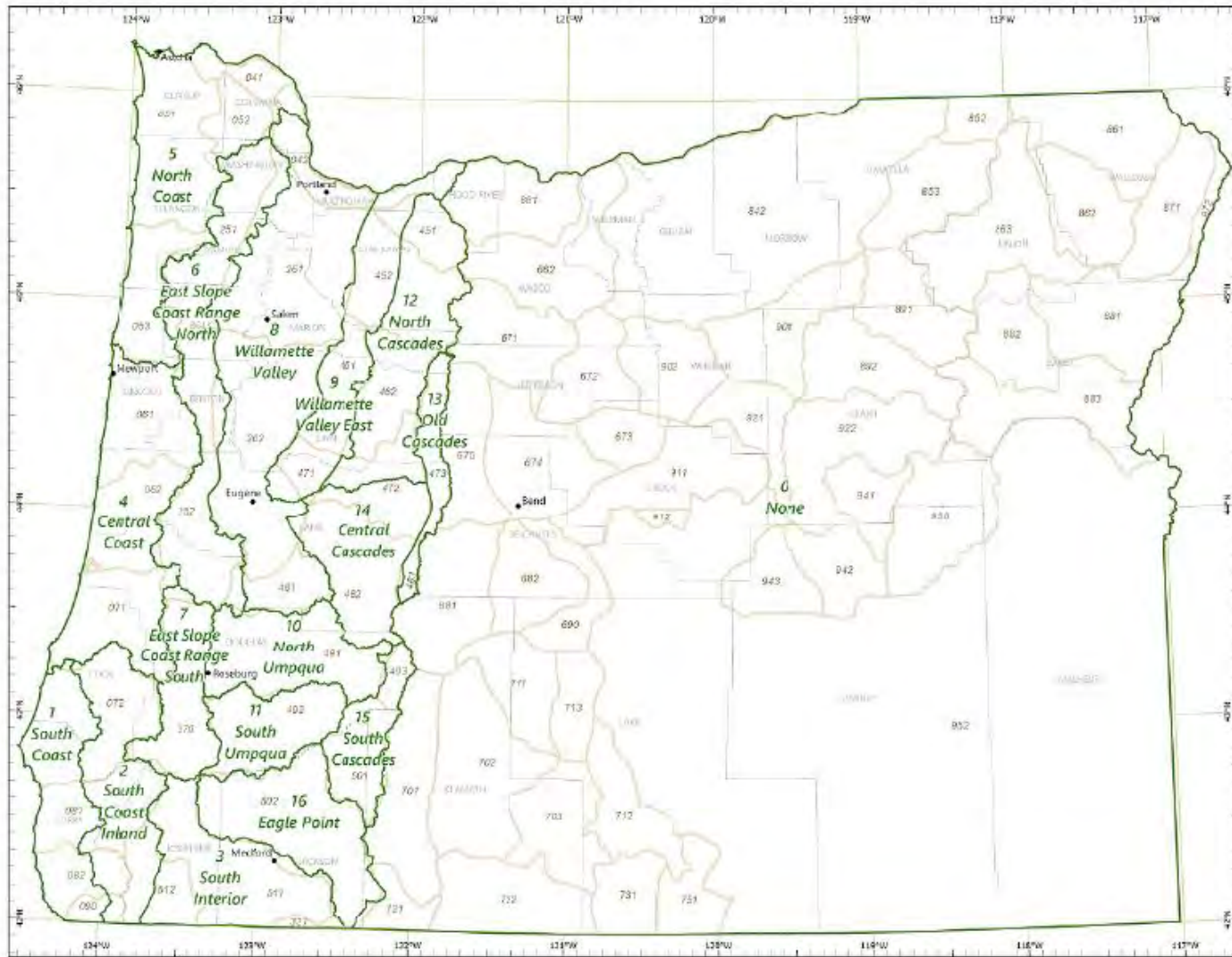
- Know the area you are planning for
  - Know the seed zones spatially and how they overlap
- Understand the land use/management need for the area
- Understand your elevation ranges
- Know the species composition
  - Where they occur or where they don't

# Seed Use Plans

Operational + Existing Needs Planting						
Seedlin Req'd	Seed Ne * (lb)	Fores' Inventory	Other Inventory	Seed Available	Collecti Needs	
1306.3	111.36	21.37		21.37	89.99	
769.8	65.63	95.36		95.36	-29.73	
480.0	40.92	118.82		118.82	-77.90	
124.7	10.63	14.21		14.21	-3.58	
<b>2701.0</b>	<b>230.26</b>	<b>334.89</b>	<b>0.00</b>	<b>334.89</b>	<b>90.00</b>	

# Tree Seed Zones




Oregon State 1966 tree seed zones (Western Forest Tree Seed Council, 1966; Revised 1973).



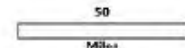
## Oregon forest tree seed zones

### Seed zones

#### Douglas-fir

-  Douglas-fir
-  Seed zones pre-1996
-  Counties

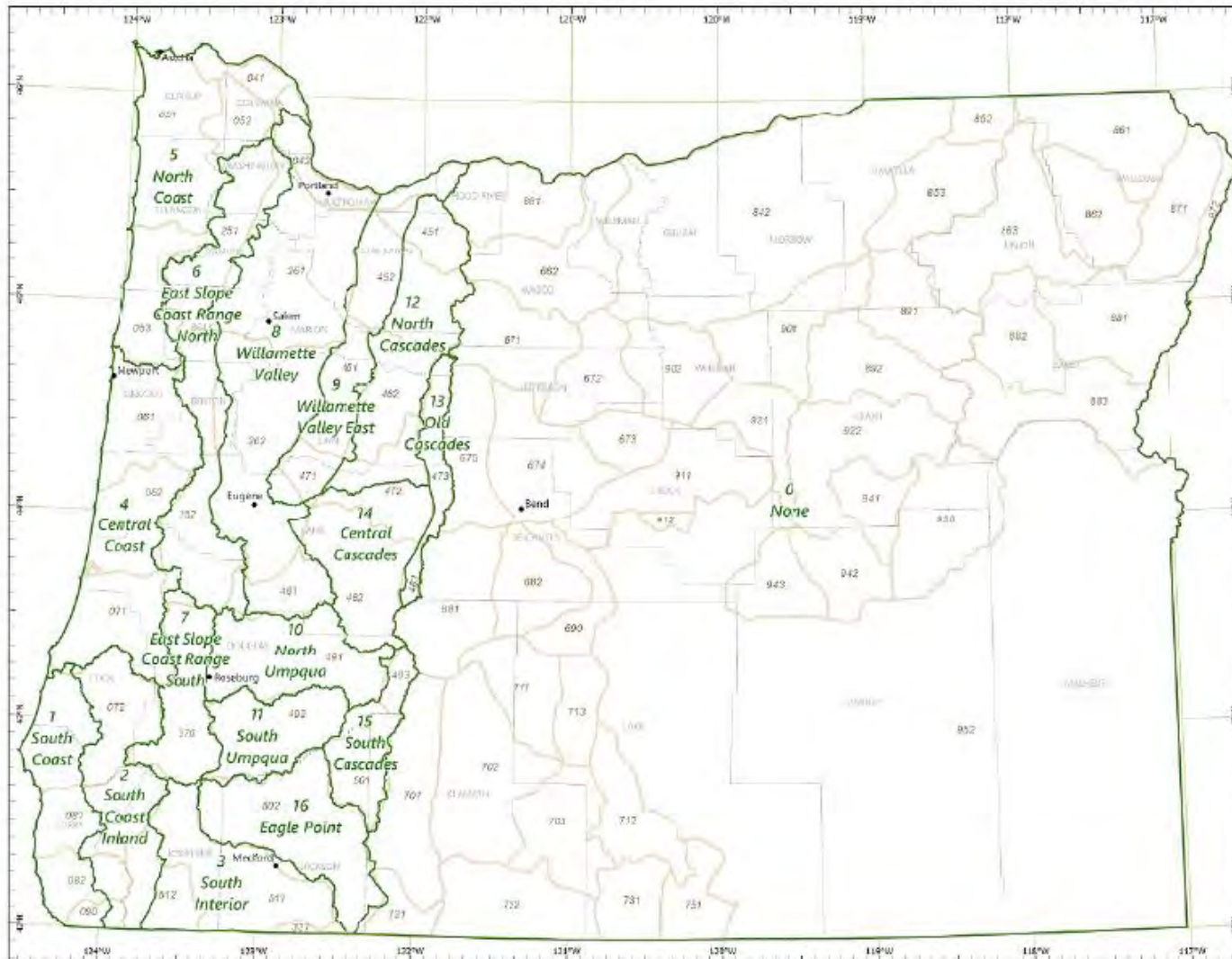
Source:  
Randall - Forest Tree Seed Zones  
for Western Oregon, 1996



OCF GIS, March 6, 2019



# Species Specific Zones



## Oregon forest tree seed zones

### Seed zones

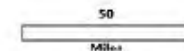
#### Douglas-fir

□ Douglas-fir

□ Seed zones pre-1996

□ Counties

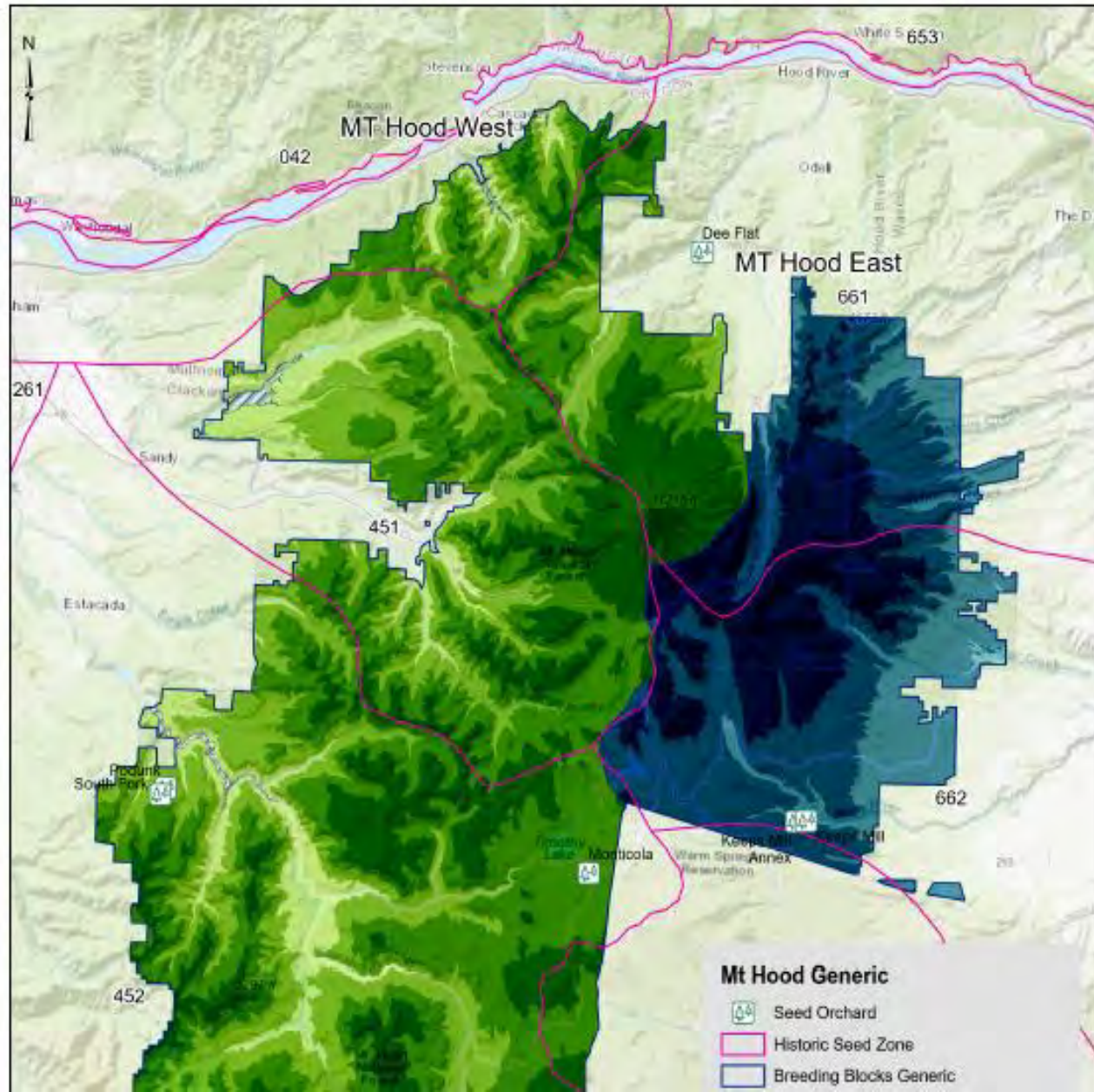
Source:  
Randall - Forest Tree Seed Zones  
for Western Oregon, 1996



OCF GIS, March 6, 2019



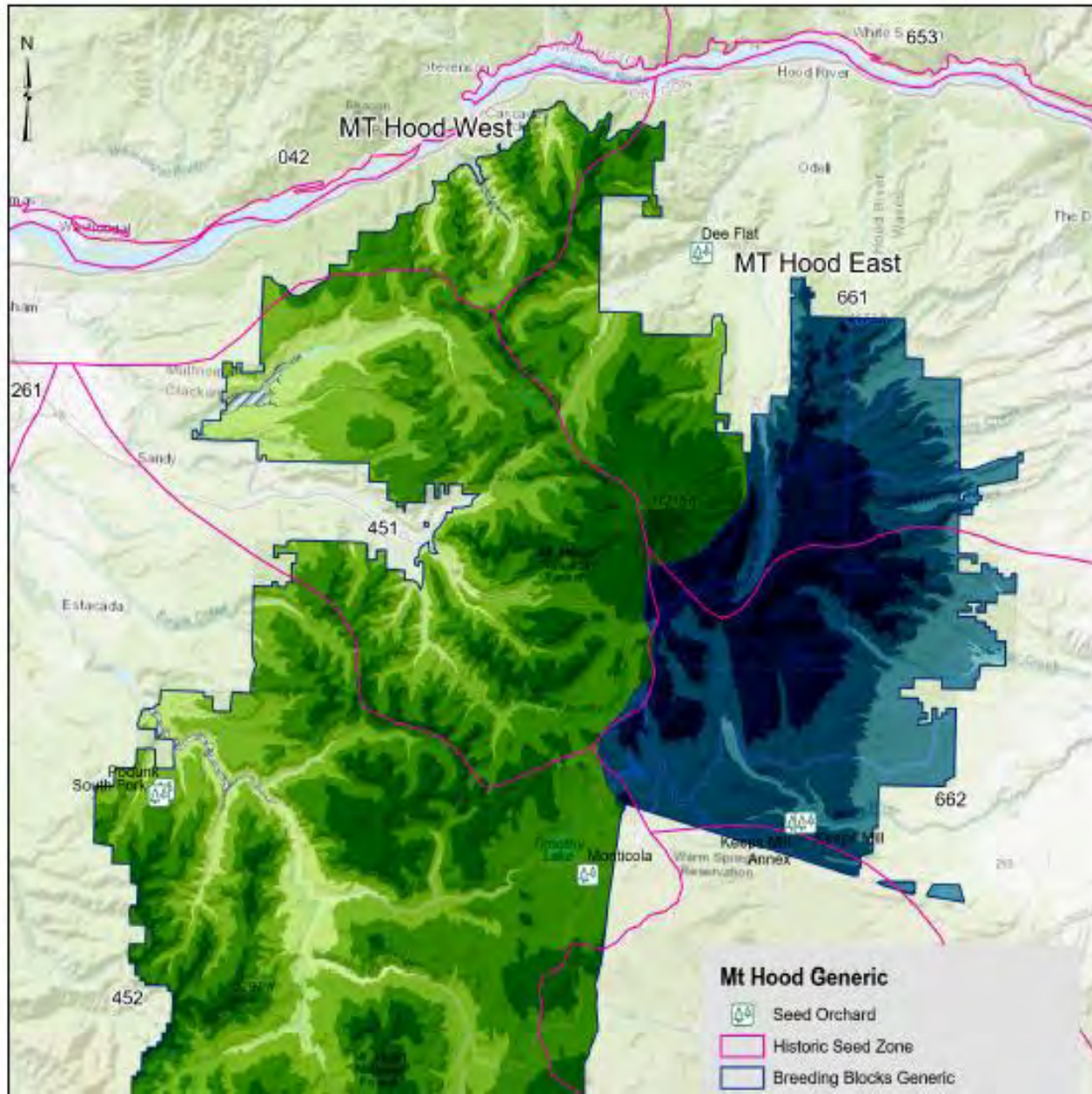
# Looking at Seed Spatially



	A	B	C	D
1				
2				
3				
4	<b>Pseudotsuga menziesii - Douglas-fir</b>			
5				
6	Dist.	Identified Collect Zone	Spacial Overlap With These Zone	Correspondin Elevation
7		042 042		Elevations < 1000
8	01	042 042/06012		1000 - 2000
9	01	042 042/06013		2000 - 3000
0	01	042 042/06014		3000 - 4000
1	01	042 042/06015		> 4000
2		451 451		Elevations < 1000
3	01	451 451/06012		1000 - 2000
4	01	451 451/06013		2000 - 3000
5	01/02	451 451/06014/06024		3000 - 4000
6	01/02	451 451/06015/06025		> 4000
7		452 452		Elevations < 1000
8	01	452 452/06012		1000 - 2000
9	01	452 452/06013		2000 - 3000
0	01/02	452 452/06014/06024		3000 - 4000
1	01/02	452 452/06015/06025		> 4000
2	01	462 462/06014		3000 - 4000
3	01	462 462/06015		> 4000
4	01	463 463/06015		> 4000
5	01/02	661 661/06012/06022		1000 - 2000
6	01/02	661 661/06013/06023		2000 - 3000
7	01/02	661 661/06014/06024		3000 - 4000
8	01/02	661 661/06015/06025		> 4000
9	01/02	662 662/06015/06025		> 4000
0	02	662 662/06022		1000 - 2000
1	02	662 662/06023		2000 - 3000
2	01/02	662 662/06014/06024		3000 - 4000
3		662 662		> 4000
4	02	671 671/06023		2000 - 3000
5	01/02	671 671/06014/06024		3000 - 4000
6	01	671 671/06015		> 4000
7	01	06012 06012/042/451/452/661		1000 - 2000
8	01	06013 06013/042/451/452/661		2000 - 3000
9	01	06014 06014/042/451/452/462/661		3000 - 4000
0	01	06015 06015/042/451/452/462/463/661		> 4000
1	02	06022 06022/661/662		1000 - 2000
2	02	06023 06023/661/662		2000 - 3000
3	02	06024 06024/451/452/661/662/671		3000 - 4000
4	02	06025 06025/451/452/661		> 4000
5				
6				
7	Totals - All districts			
8				



# Looking at Seed Spatially



## Pseudotsuga menziesii - Douglas-fir

Dist.	Identified Collect Zone	Spatial Overlap With These Zone	Corresponding Elevation
01	042	042/06012	1000 - 2000
01	042	042/06013	2000 - 3000
01	042	042/06014	3000 - 4000
01	042	042/06015	> 4000
01	451	451/06012	1000 - 2000
01	451	451/06013	2000 - 3000
01/02	451	451/06014/06024	3000 - 4000
01/02	451	451/06015/06025	> 4000
01	452	452/06012	1000 - 2000
01	452	452/06013	2000 - 3000
01/02	452	452/06014/06024	3000 - 4000
01/02	452	452/06015/06025	> 4000
01	462	462/06014	3000 - 4000
01	462	462/06015	> 4000
01	463	463/06015	> 4000
01/02	661	661/06012/06022	1000 - 2000
01/02	661	661/06013/06023	2000 - 3000
01/02	661	661/06014/06024	3000 - 4000
01/02	661	661/06015/06025	> 4000
01/02	662	662/06015/06025	> 4000
01/02	662	662/06014/06024	3000 - 4000
01/02	671	671/06014/06024	3000 - 4000
01	671	671/06015	> 4000
01	06012	06012/042/451/452/661	1000 - 2000
01	06013	06013/042/451/452/661	2000 - 3000
01	06014	06014/042/451/452/462/661	3000 - 4000
01	06015	06015/042/451/452/462/463/661	> 4000
<b>Totals - All districts</b>			





# Acres of Need

## USFS National Reforestation Program Needs

Choose Region and Forest

Region

No category selected

National Forest

Selection required

### Filter by:

State

No category selected

Reforestation Need

All Needs

Causal Agent

All Agents

\*\*Refresh browser to reset all filters\*\*

Contact:

Nicole Balloffet  
National Reforestation & Nurseries  
Program Manager  
nicole.balloffet@usda.gov

Sources:

Reforestation Needs  
Reforestation Accomplishments  
Fire data

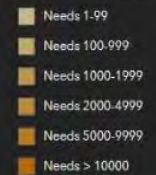


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US States

Reforestation Needs

Silviculture Reforestation Needs Acres  
Planned Summary by Ranger District

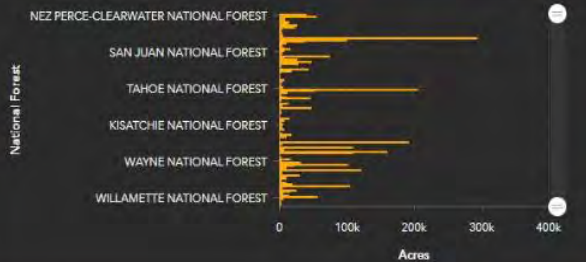


Ranger District Without Silviculture Needs



Forest Service Region Boundaries

Forest Service Regional Boundaries - National Extent



Acres Planned (total)  
**2,563,104.1**  
Last update: 38 seconds ago



# Putting it All Together

## Pseudotsuga menziesii - Douglas-fir

				Operational + Existing Needs Planting							
Dist.	Identified Collect' Zone	Spacial Overlap With These Zone	Correspondin Elevation	Operatio Planting	Trees p Acre	Seedlin Req'd	Seed Ne * (lb)	Fores Inventory	Other Inventory	Seed Available	Collecti Needs
01	042	042/06012	1000 - 2000	0	200	0.0	0.00			0.00	0.00
01	042	042/06013	2000 - 3000	0	200	0.0	0.00			0.00	0.00
01	042	042/06014	3000 - 4000	0	200	0.0	0.00			0.00	0.00
01	042	042/06015	> 4000	0	200	0.0	0.00			0.00	0.00
01	451	451/06012	1000 - 2000	0	200	0.0	0.00			0.00	0.00
01	451	451/06013	2000 - 3000	265	76	20.1	1.72	1.71		1.71	0.01
01/02	451	451/06014/06024	3000 - 4000	0	200	0.0	0.00			0.00	0.00
01/02	451	451/06015/06025	> 4000	0	200	0.0	0.00			0.00	0.00
01	452	452/06012	1000 - 2000	0	200	0.0	0.00			0.00	0.00
01	452	452/06013	2000 - 3000	0	200	0.0	0.00			0.00	0.00
01/02	452	452/06014/06024	3000 - 4000	0	200	0.0	0.00			0.00	0.00
01/02	452	452/06015/06025	> 4000	0	200	0.0	0.00			0.00	0.00
01	462	462/06014	3000 - 4000	0	200	0.0	0.00			0.00	0.00
01	462	462/06015	> 4000	0	200	0.0	0.00			0.00	0.00
01	463	463/06015	> 4000	0	200	0.0	0.00			0.00	0.00
01/02	661	661/06012/06022	1000 - 2000	0	200	0.0	0.00			0.00	0.00
01/02	661	661/06013/06023	2000 - 3000	0	200	0.0	0.00			0.00	0.00
01/02	661	661/06014/06024	3000 - 4000	0	200	0.0	0.00			0.00	0.00
01/02	661	661/06015/06025	> 4000	0	200	0.0	0.00	10.58		10.58	-10.58
01/02	662	662/06015/06025	> 4000	0	200	0.0	0.00			0.00	0.00
01/02	662	662/06014/06024	3000 - 4000	0	200	0.0	0.00			0.00	0.00
01/02	671	671/06014/06024	3000 - 4000	0	200	0.0	0.00			0.00	0.00
01	671	671/06015	> 4000	0	200	0.0	0.00			0.00	0.00
01	06012	06012/042/451/452/661	1000 - 2000	9896	132	1306.3	111.36	21.37		21.37	89.99
01	06013	06013/042/451/452/661	2000 - 3000	10129	76	769.8	65.63	95.36		95.36	-29.73
01	06014	06014/042/451/452/462/661	3000 - 4000	10667	45	480.0	40.92	118.82		118.82	-77.90
01	06015	06015/042/451/452/462/463/661	> 4000	4455	28	124.7	10.63	14.21		14.21	-3.58
<b>Totals - All districts</b>				<b>35412</b>		<b>2701.0</b>	<b>230.26</b>	<b>334.89</b>	<b>0.00</b>	<b>334.89</b>	<b>90.00</b>



# Inventory Management



Understanding seed quality and knowing what you have on inventory

- Review your inventory for your area
  - Up to date germination tests
  - Keep in mind the species and where it was collected
    - How detailed is that collection data
- Review outliers
  - Low germination results
  - Extreme weight on inventory
  - Underrepresented species

# Thank You - Questions

