



WASHINGTON STATE DEPARTMENT OF
NATURAL RESOURCES

Washington SNC 2024 Aerial & Ground Survey Results

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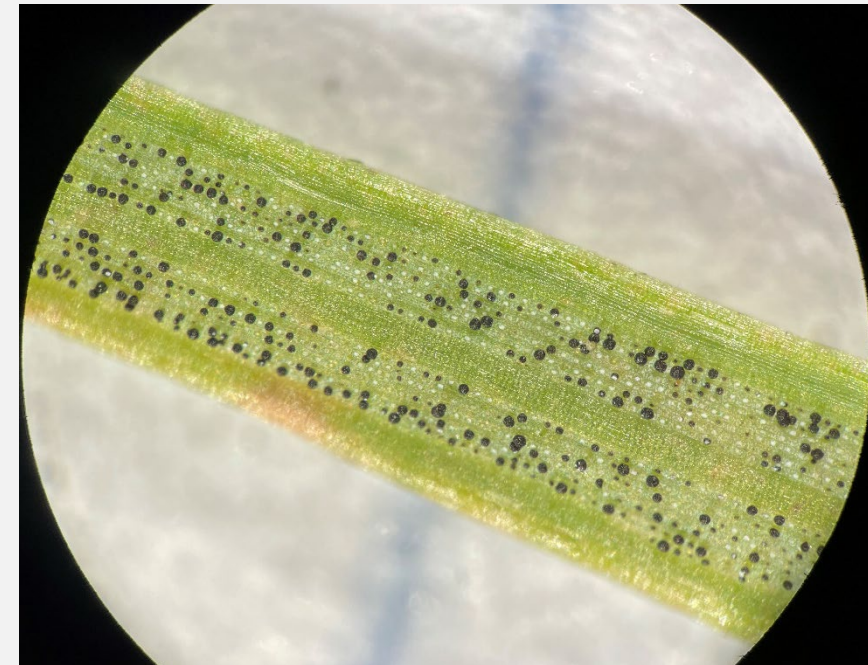
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Dan Omdal, Glenn Kohler, Justin Hof, Mike Burke, and Marty Kimbrel



Recent SNC surveys in WA

- 2012
 - Ground & Aerial
- 2015
 - Ground & Aerial
- 2016
 - Ground & Aerial
- 2018
 - Ground & Aerial
- 2021
 - Ground
- 2022
 - Ground & Aerial
- 2024
 - Ground & Aerial



2024 Aerial survey

- Completed May 2024
- 3-mile grids
- 1,500 to 3,000 ft above ground level
- Observers on both sides of plane



Pilots: Marty (WDFW) & Mike (WDNR); Surveyors: Isaac, Glenn, Rachel (WDNR)

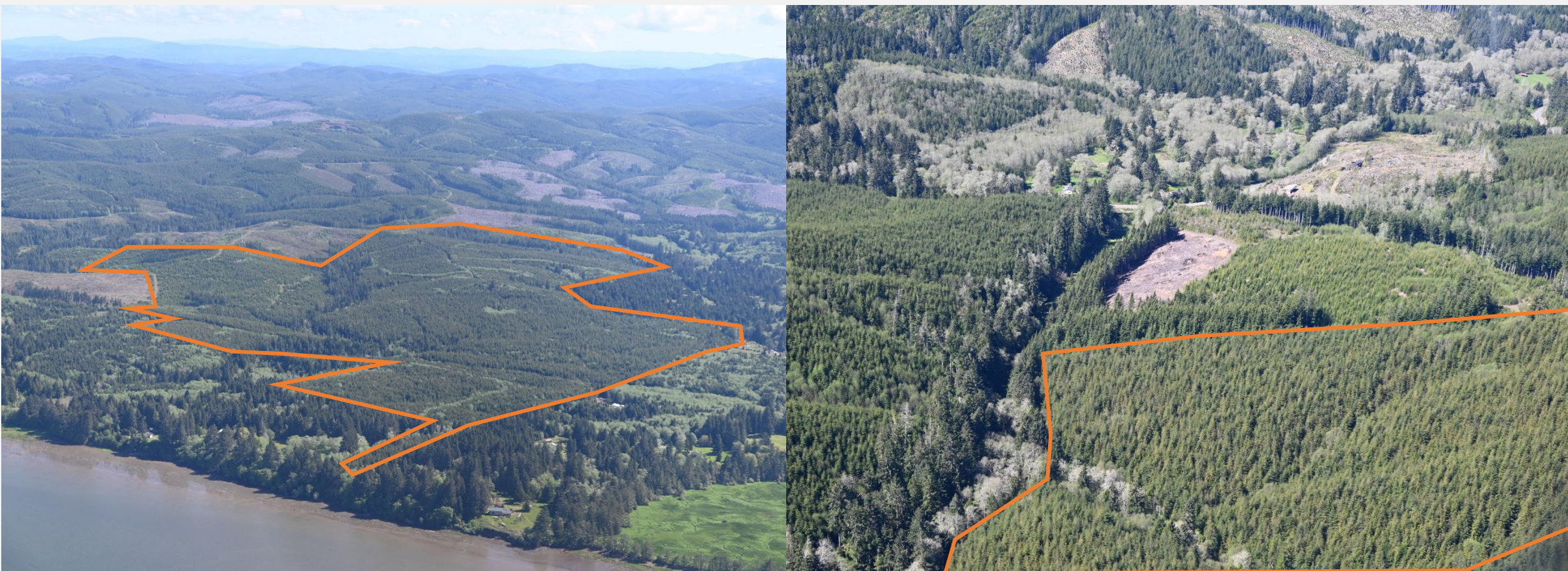
What we saw in 2024



Mapped discolored Douglas-fir trees:

- Brownish lighter color, thinning
- Not just yellowing

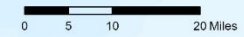
What we saw in 2024



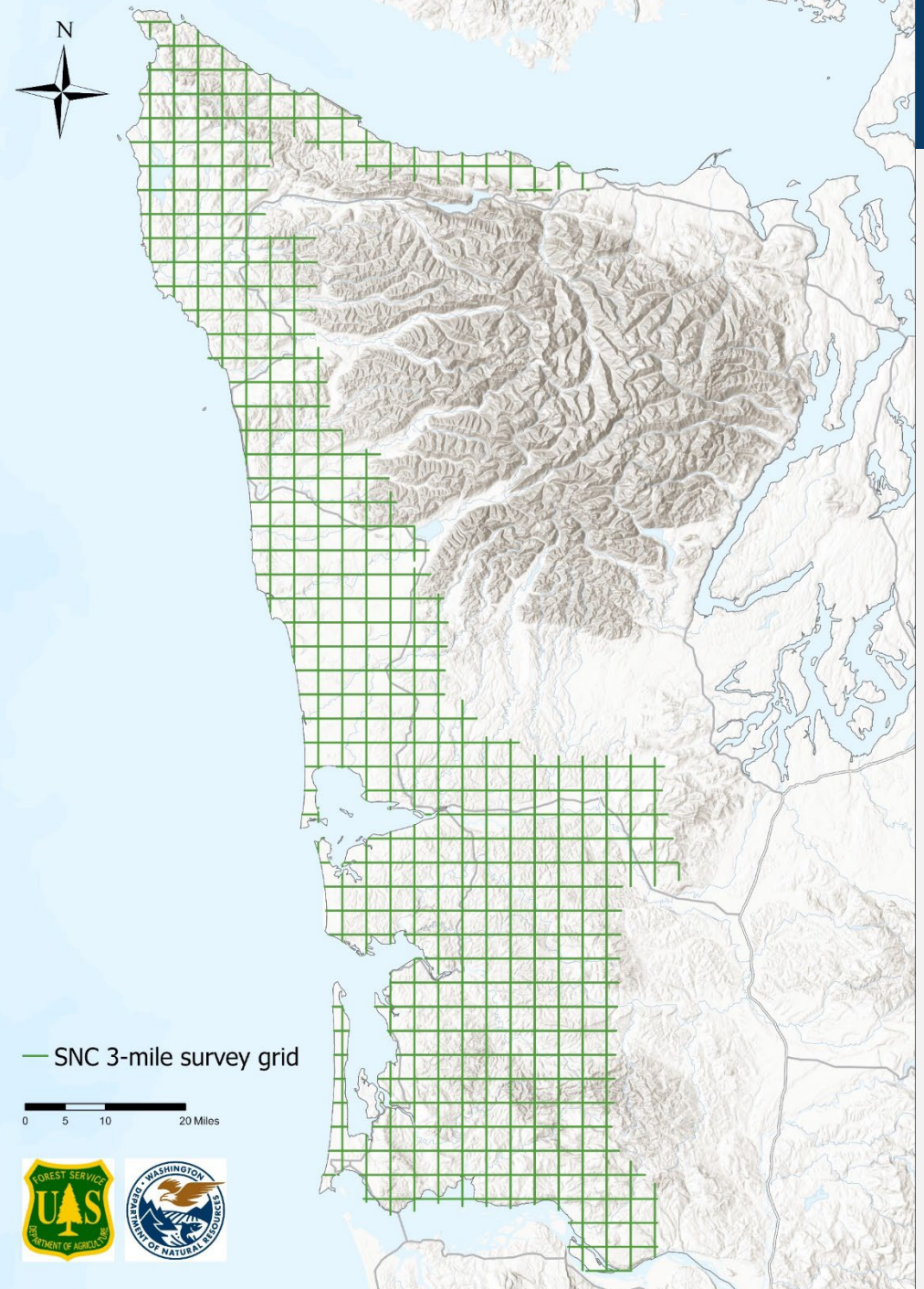
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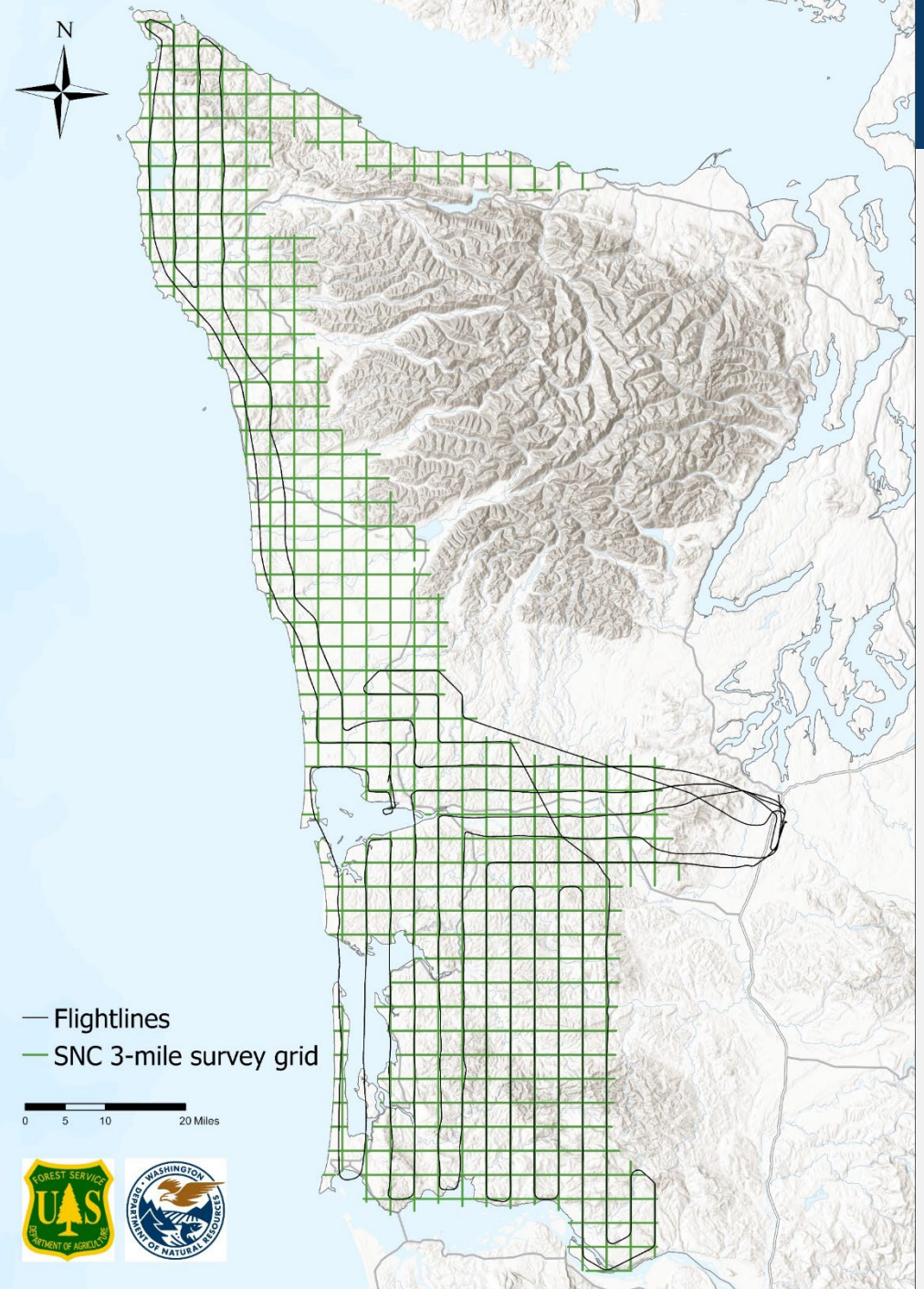
Aerial survey 2024



Aerial survey 2024



Aerial survey 2024



— Flightlines
— SNC 3-mile survey grid




0 5 10 20 Miles

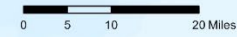


Aerial survey 2024



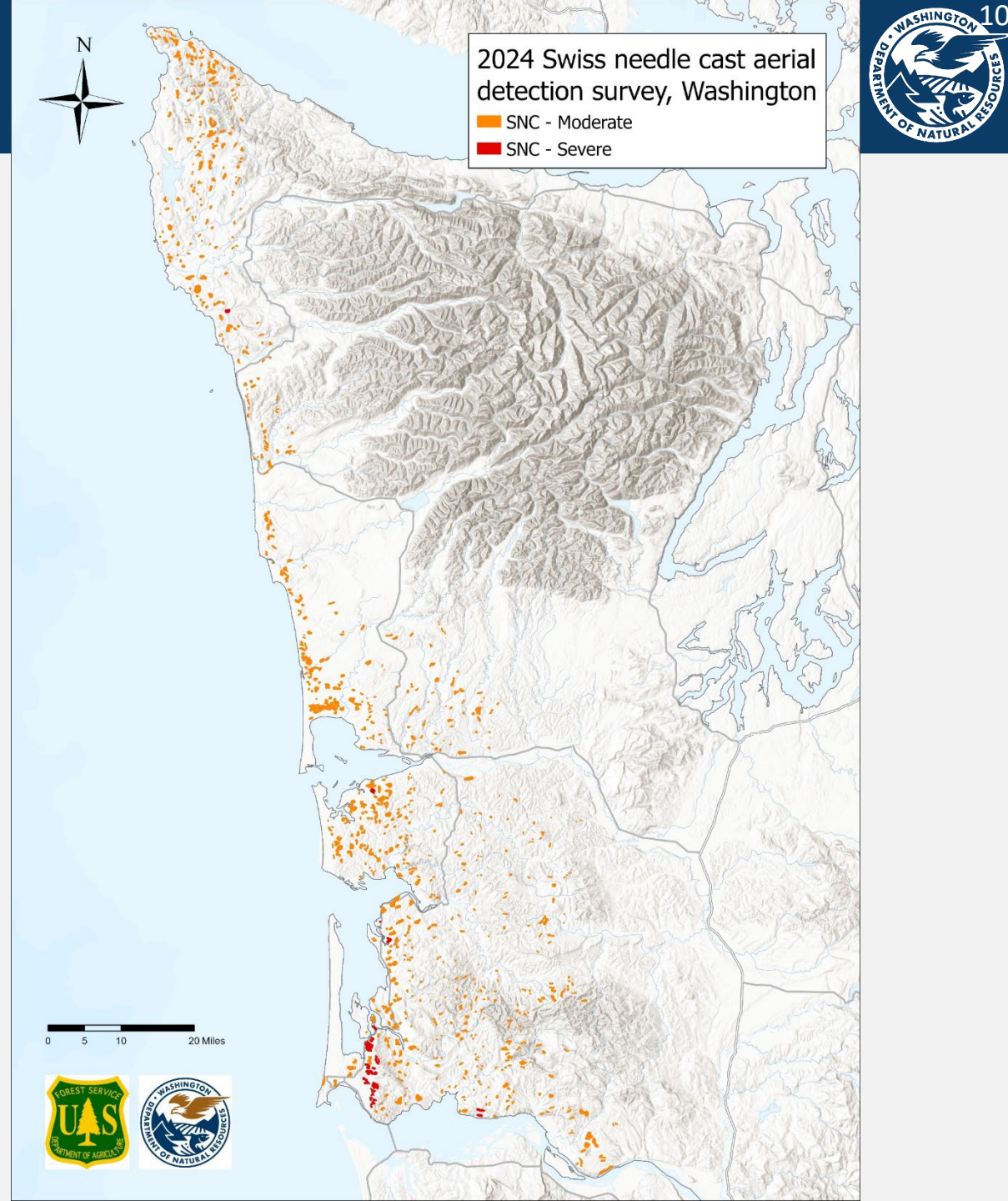
2024 Swiss needle cast aerial detection survey, Washington

-  SNC - Moderate
-  SNC - Severe
-  Flightlines, 3 mile grid



Aerial survey 2024

- Total acres surveyed: 2,100,000
- Moderate acres: 46,500 (2.2%)
- Severe acres: 3,000 (<1%)
- All mapped acres: 49,500 (2.4%)

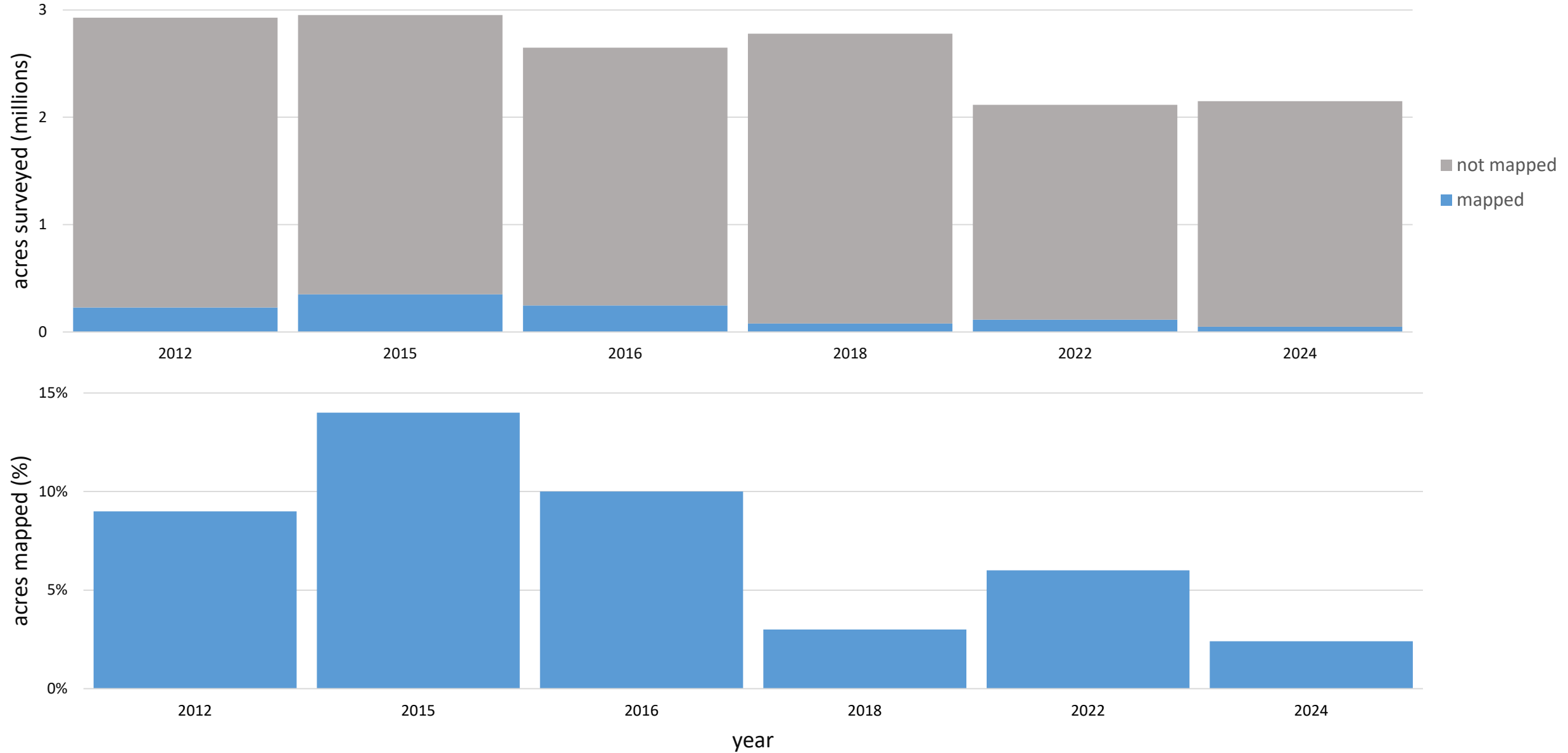


Recent years of aerial survey



	severe SNC symptoms		moderate SNC symptoms		total SNC symptoms		area flown
	% of total acres	acres	% of total acres	acres	% of total acres	acres	acres in millions
2024	< 1%	3,000	2.2%	46,500	2.4%	49,500	2.1
2022	1%	29,000	4%	87,000	6%	115,000	2.0
2018	< 1%	6,000	3%	73,000	3%	79,000	2.7
2016	< 1%	14,000	10%	234,000	10%	248,000	2.4
2015	1%	19,000	13%	332,000	14%	351,000	2.6
2012	< 1%	6,000	8%	222,000	9%	228,000	2.7

Recent years of aerial survey



Overall aerial survey results



- Mapping symptoms not signs
- Recently declining acres

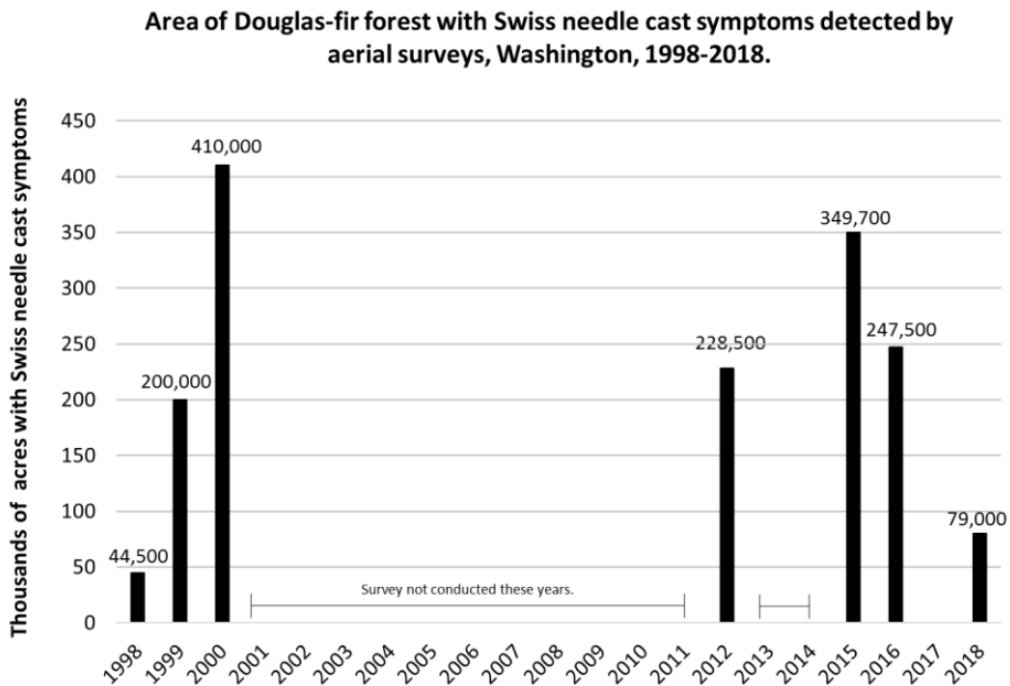
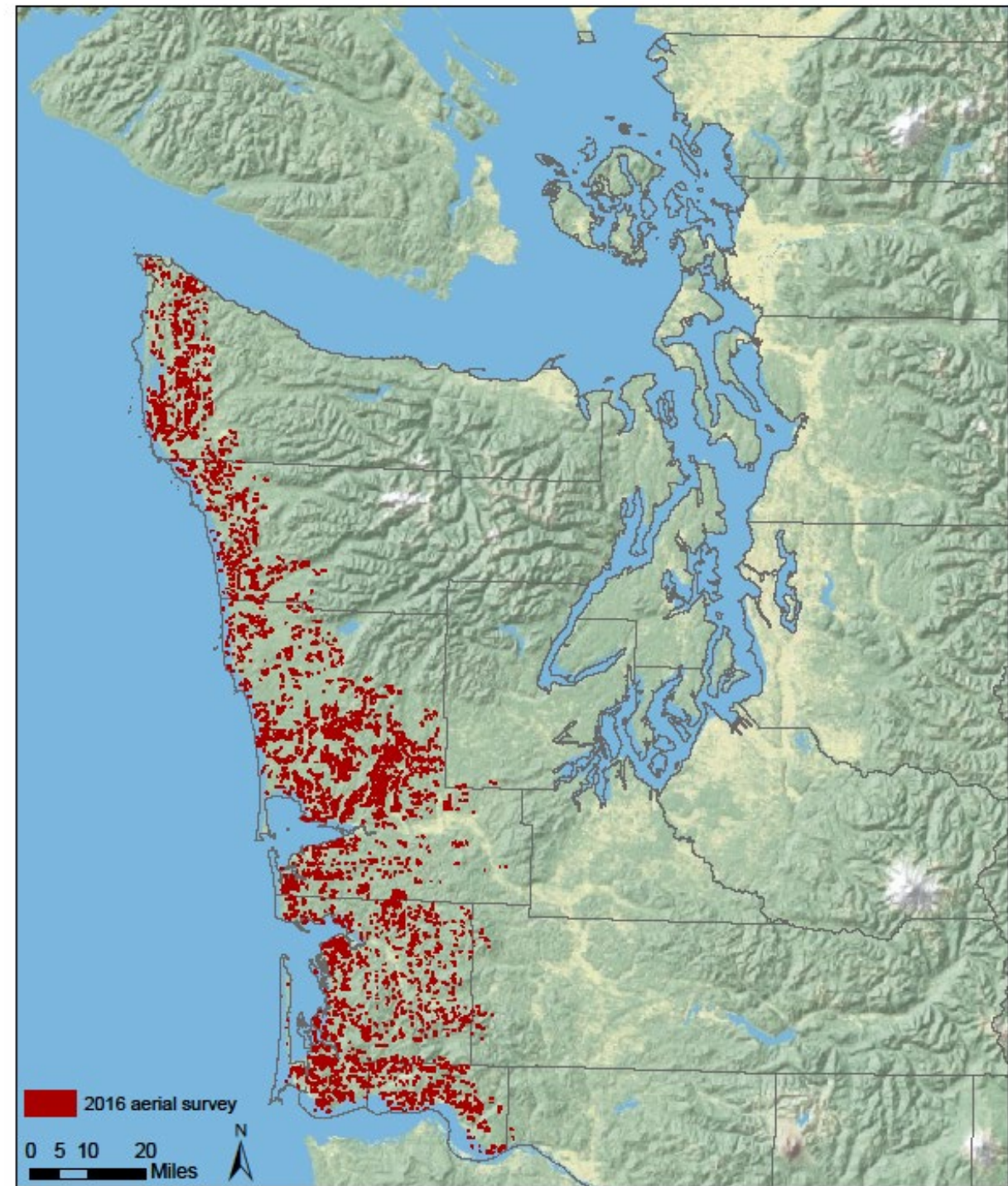


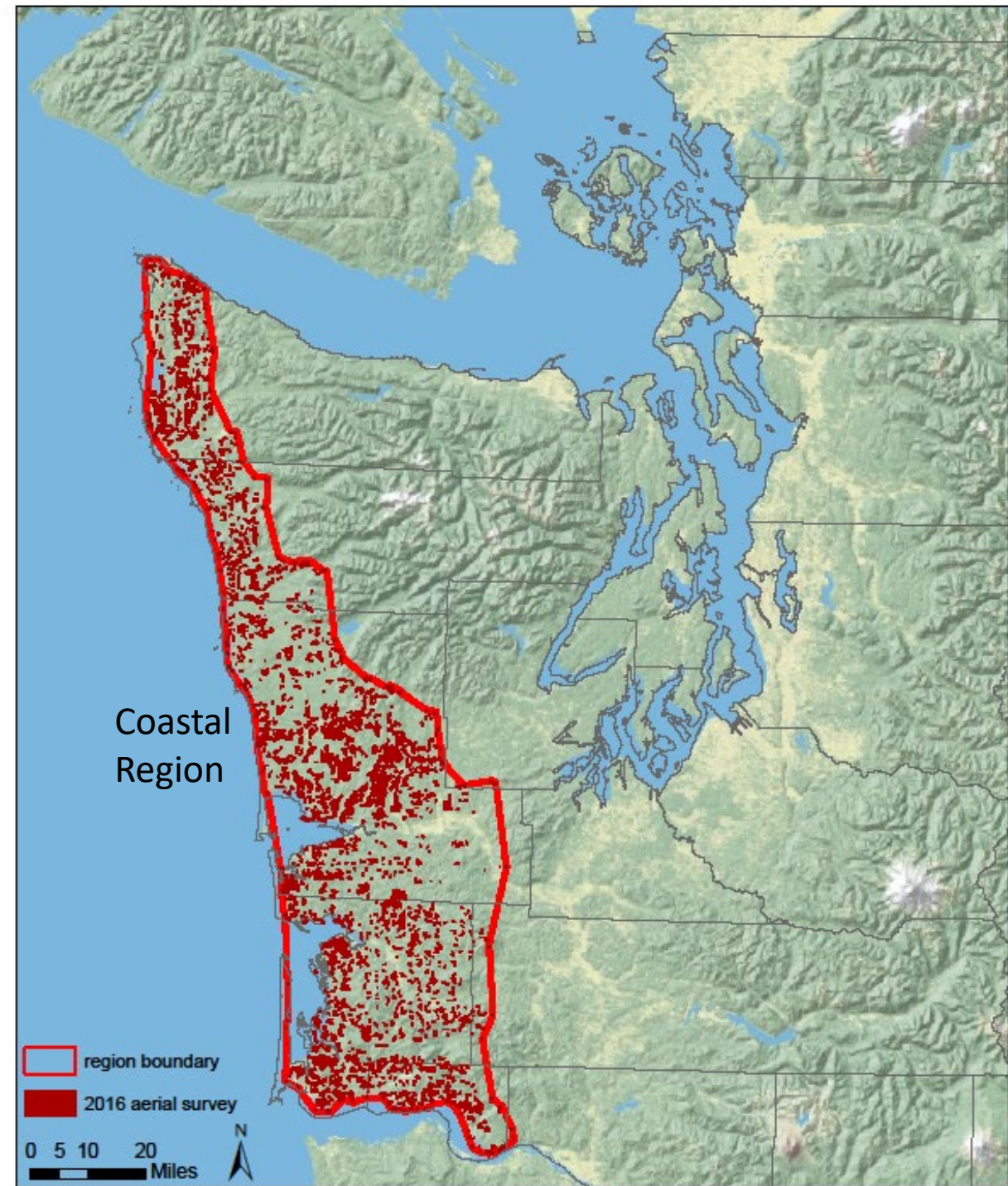
Figure 4. Area of Douglas-fir forest with Swiss needle cast symptoms detected by aerial surveys in Washington, 1998-2018.



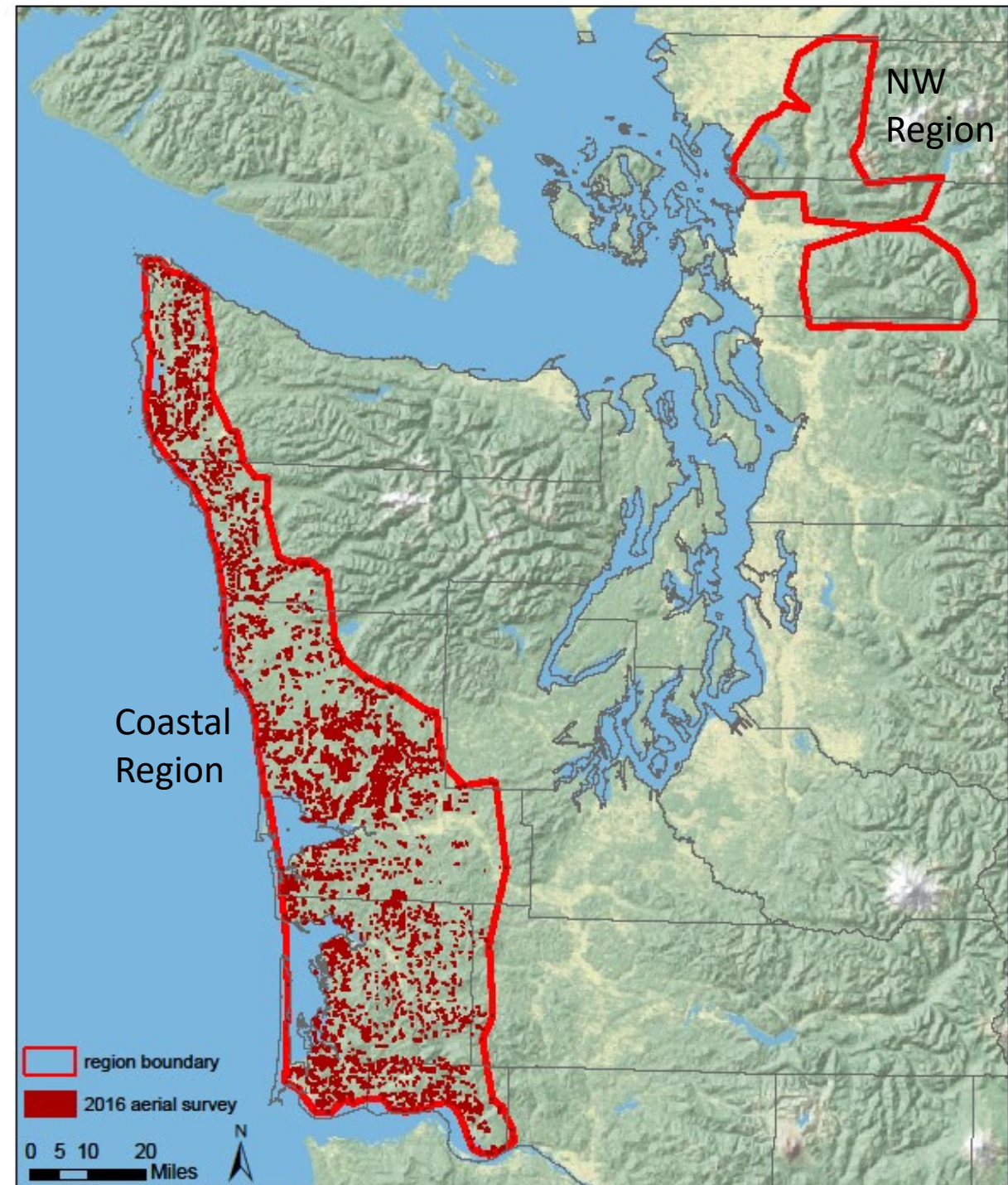
2021-24 ground methods



2021-24 ground methods



2021-24 ground methods



2021-24 ground methods



2021-24 ground methods

- 50 coastal region sites
- 17 NW region sites



2021-24 ground methods



2021-24 ground methods

- Pseudothecia density (fungal counts)



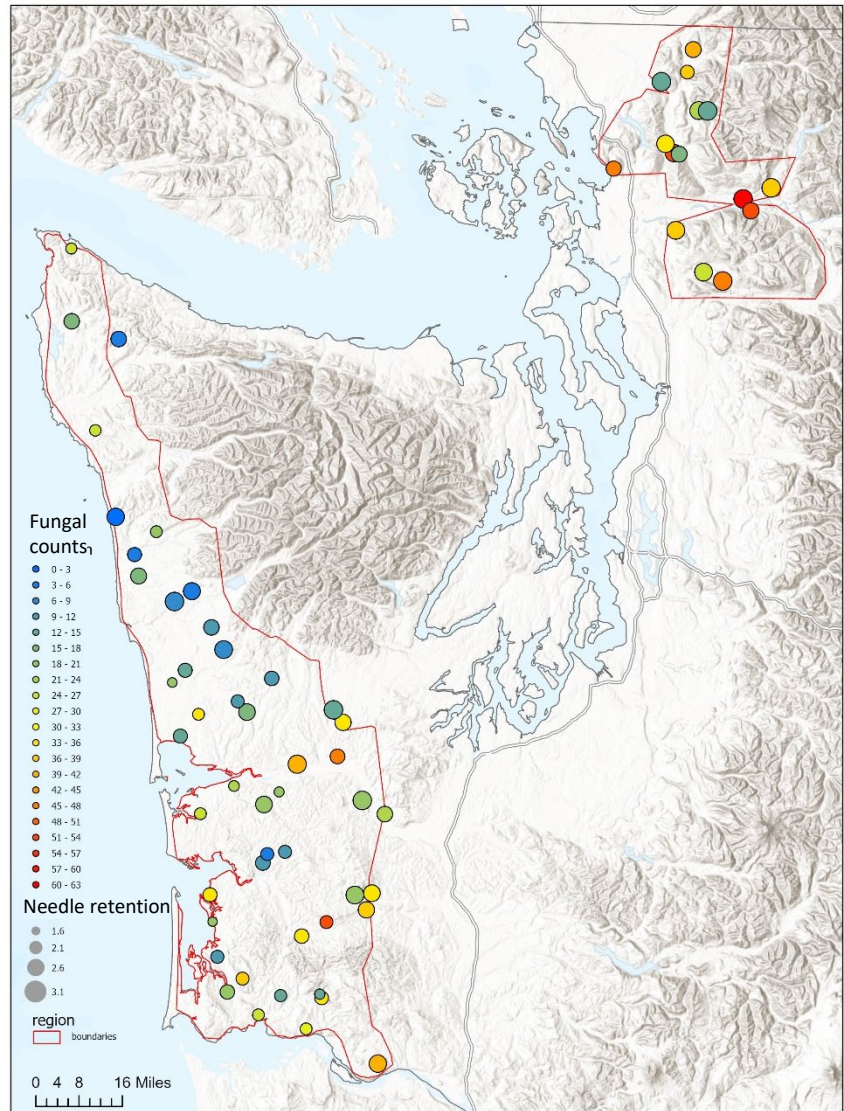
- Needle retention



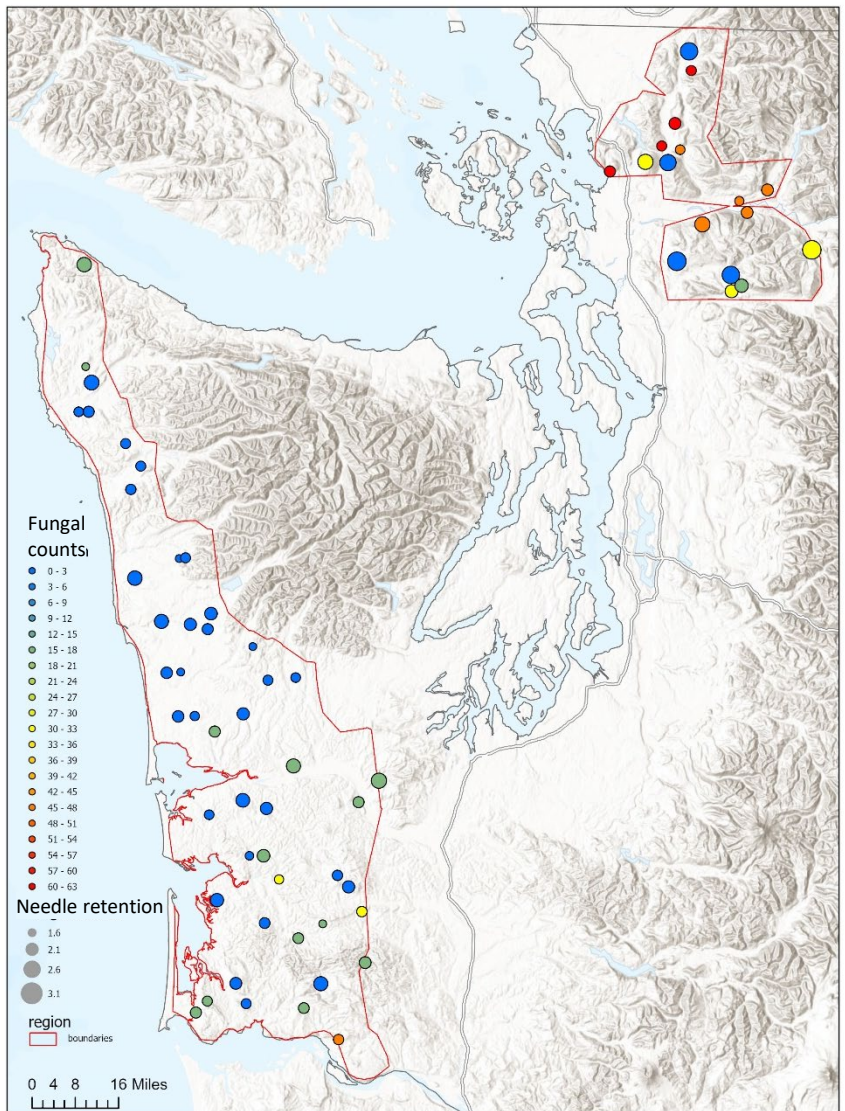
Previous literature tells us: Needle retention and pseudothecia density should be positively correlated



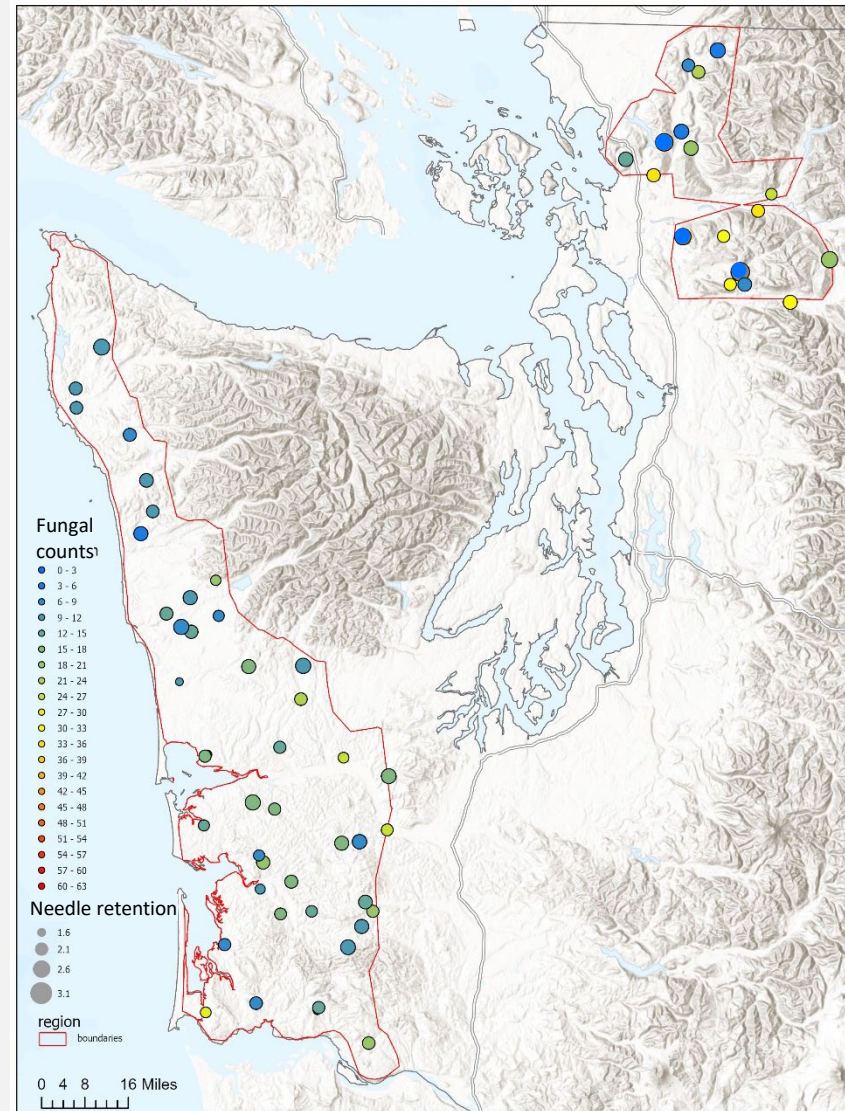
Ground survey



2021



2022



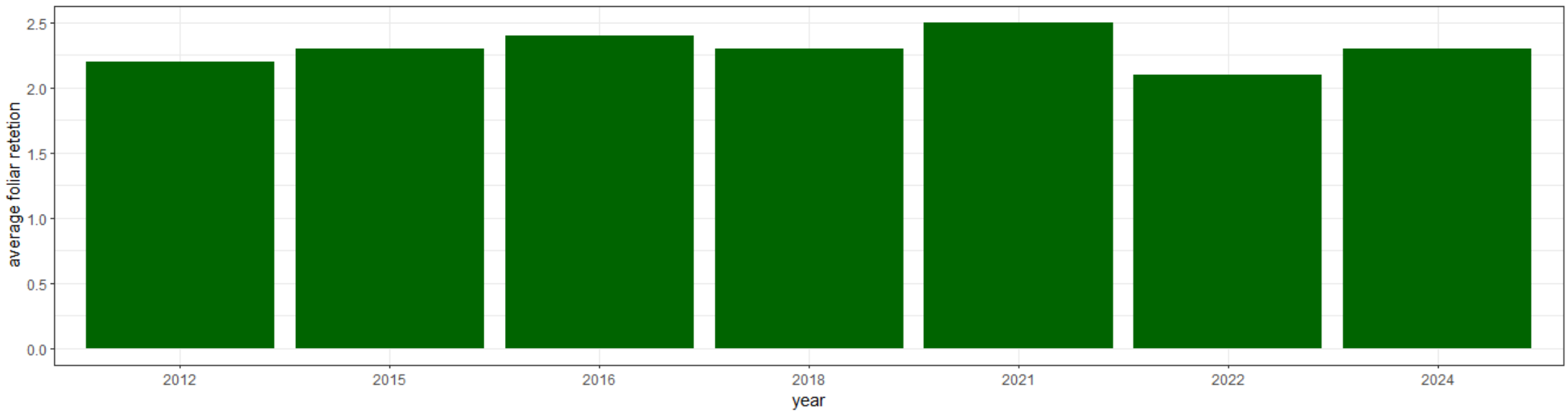
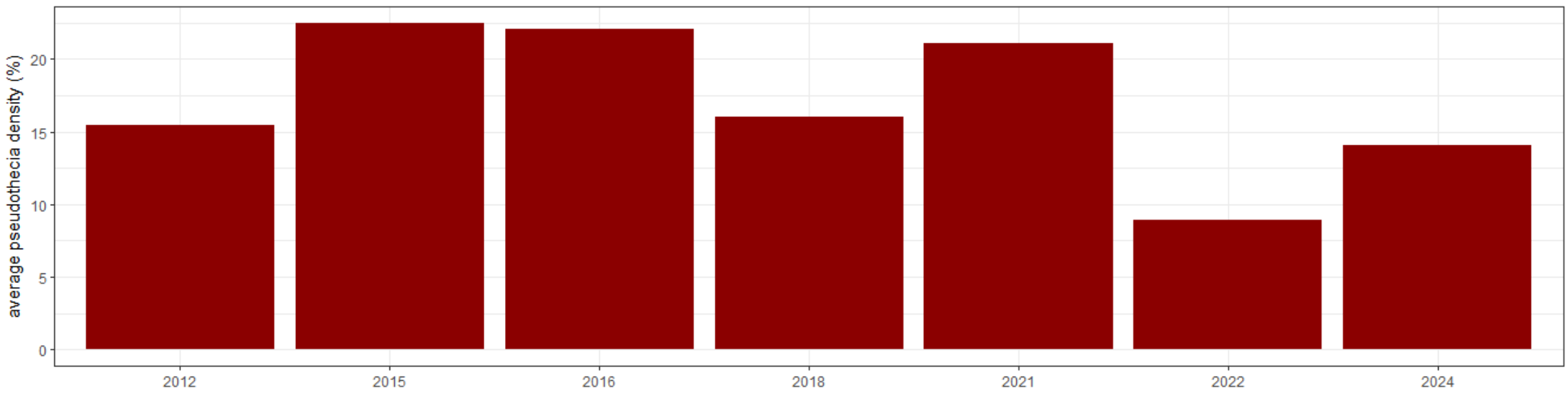
2024

Ground survey trends over the years

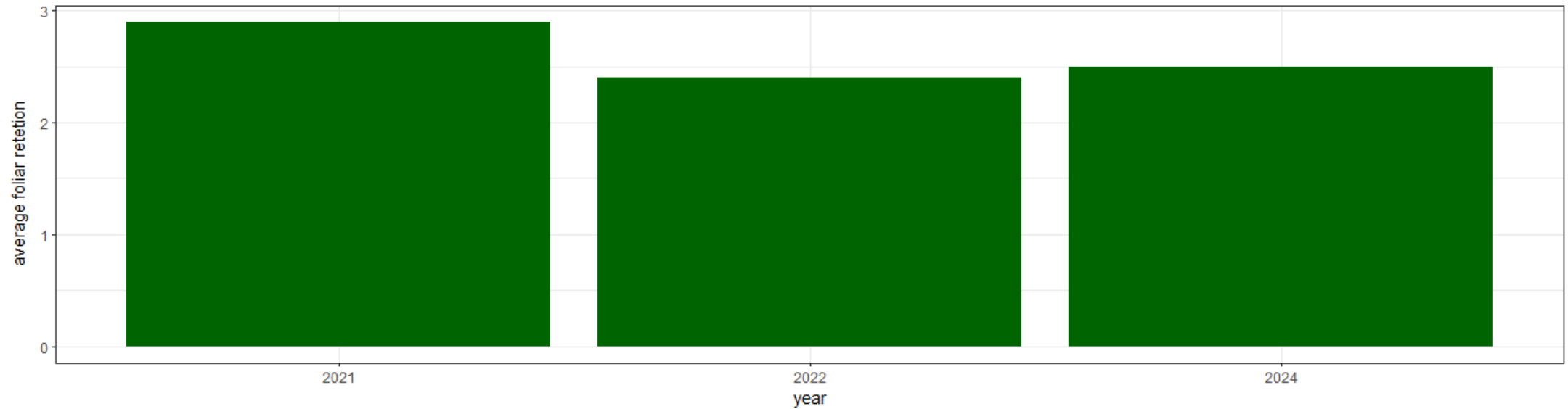
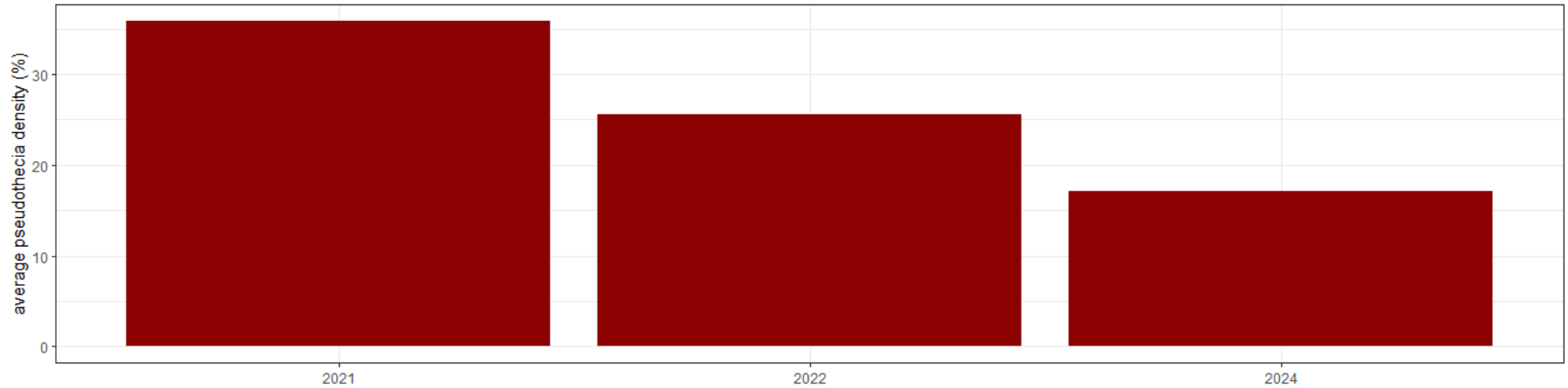


region	year	number of sites	average pseudothecia density (%)	average foliar retention
Coastal	2024	44	14.1	2.3
	2022	48	8.9	2.1
	2021	48	21.1	2.5
	2018	26	16.0	2.3
	2016	63	22.1	2.4
	2015	47	22.5	2.3
	2012	75	15.5	2.2
NW	2024	17	17.1	2.5
	2022	17	25.6	2.4
	2021	15	35.9	2.9

Coastal region trends

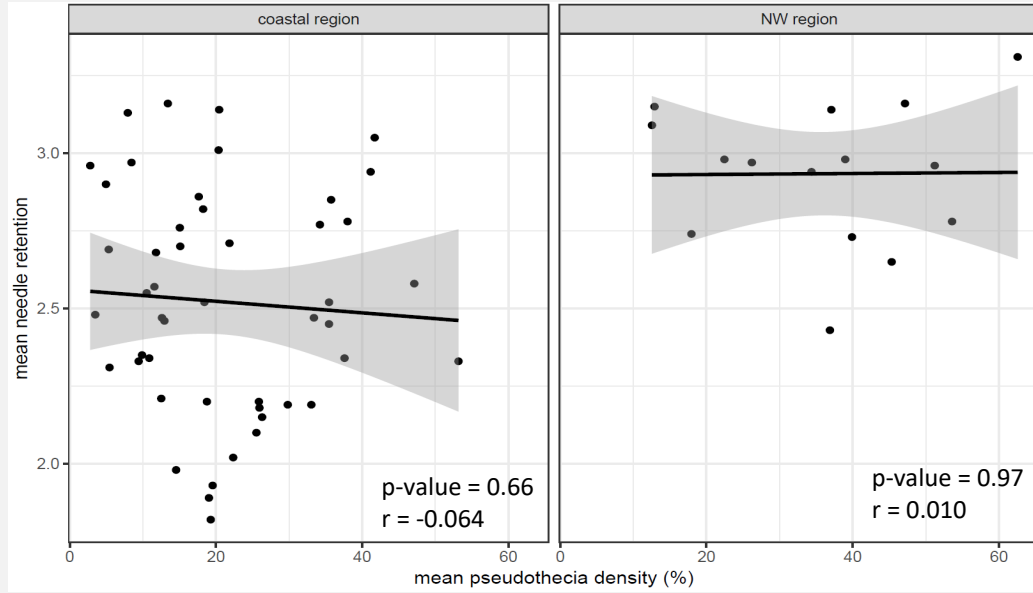


NW region trends

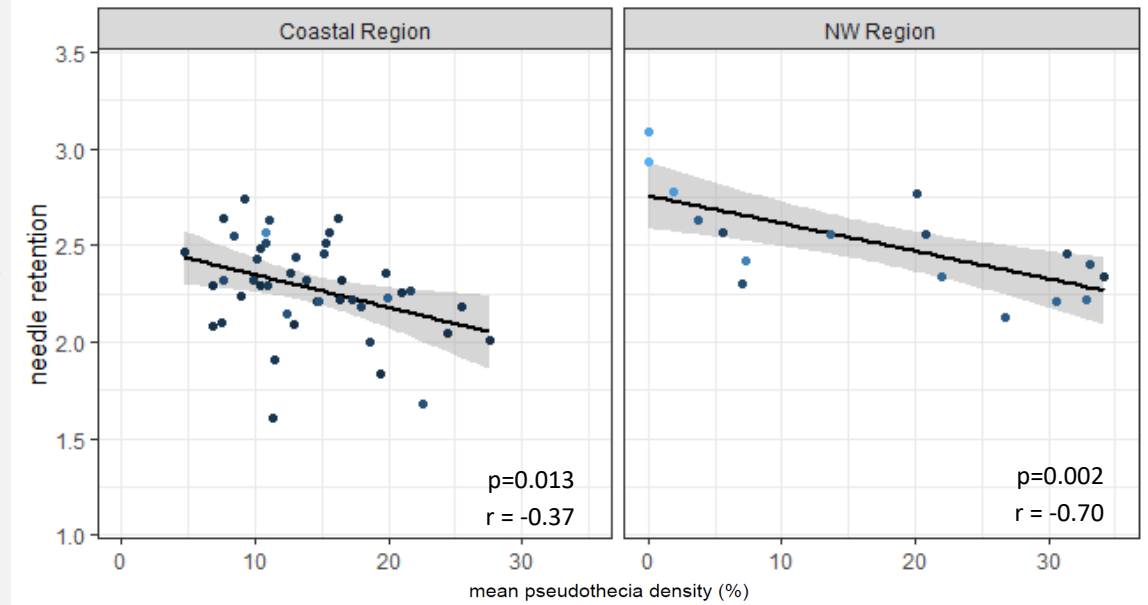


Needle retention ~ Pseudothecia %

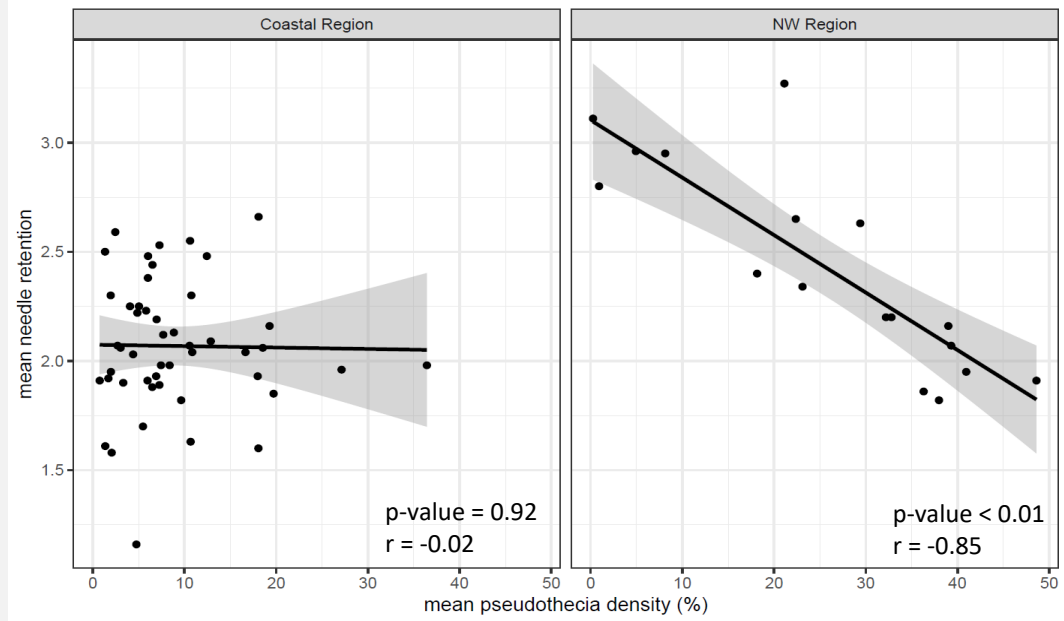
2021



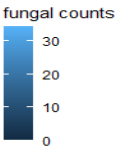
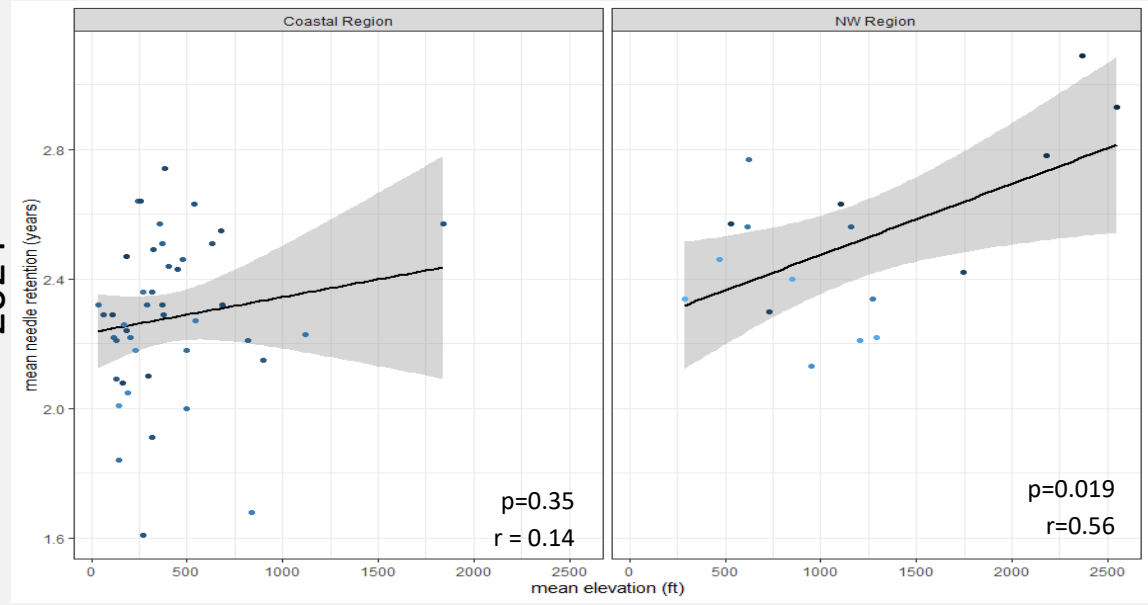
2024



2022



2024



Aerial Survey Challenges



- Tree ID is difficult from so far up
- Many species may be discolored



Aerial Survey Challenges



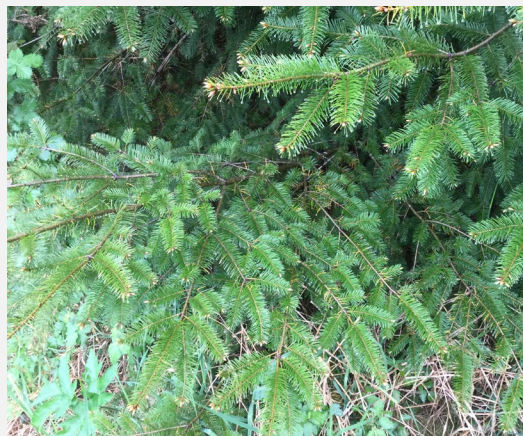
- Other things cause discoloration



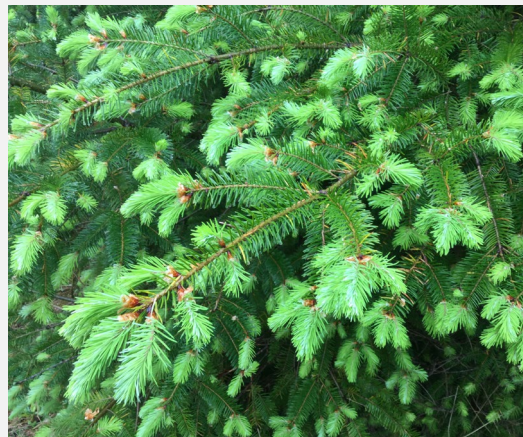
High ground water
(ignore bright yellow)



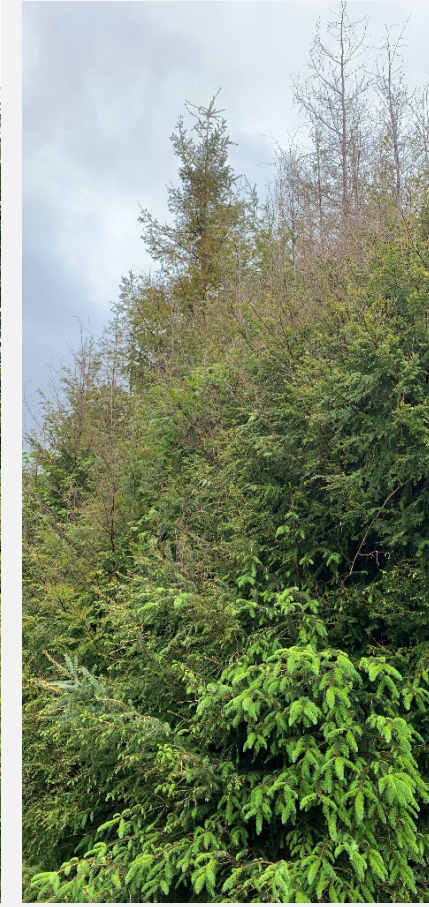
Root rots (isolated
pockets)



Bud break (survey early,
but not too early)



Other foliar diseases
(ex: needle rusts)



Heat (ex: heat
dome)

Other things: drought, tree genetics...

Ground survey issues

- Other things influence needle retention issues!!!



Soil quality (ex: nutrients, compaction etc.)



Root issues (ex: root disease, poor planting, high groundwater)



Other foliar diseases or pests (ex: rhabdocline)



Weather events, (ex: parch blight)

Other things: drought, tree genetics...

Future SNC work

- Discussing monitoring methods with Oregon
- Ground survey when an aerial survey occurs



Conclusions



Status: SNC is prevalent and acting like an endemic disease of Douglas-fir in western Washington

Management: If you are growing Douglas-fir for timber along the coast, walk your property and assess needle retention and growth, if low consider planting another species next rotation.

Happy holidays!



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