WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES

SNC 2021 - 2022 Aerial & Ground Survey Results

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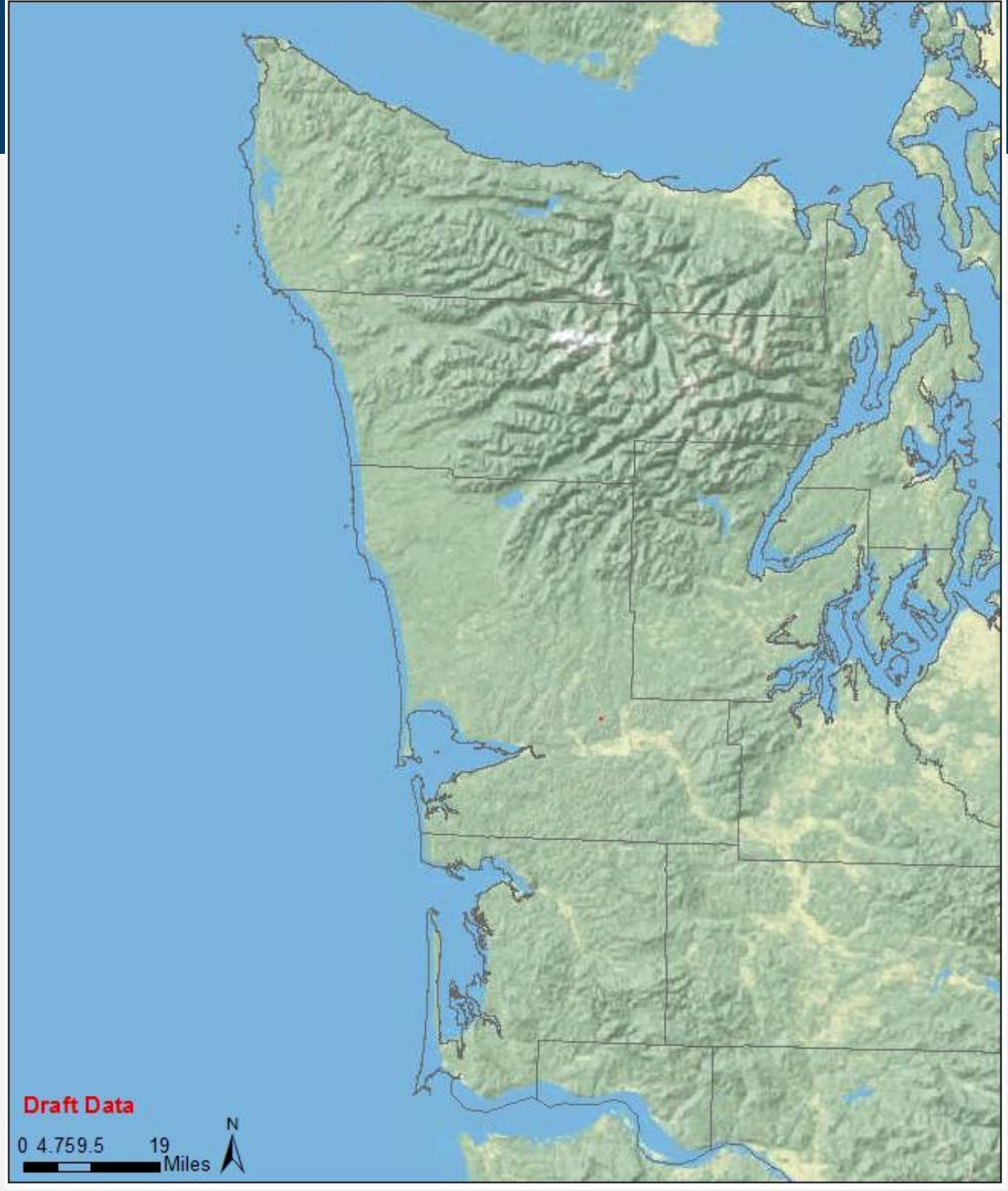
Dan Omdal, Glenn Kohler, Isaac Davis, Justin Hof, and Marty Kimbrel

SNC in WA

- 2020
  - Aerial survey canceled
  - Ground survey canceled
- 2021
  - Aerial survey canceled
  - Ground survey completed
- 2022
  - Aerial survey started
  - Ground survey completed



2022 Aerial Survey

- Completed in May
- 3-mile grids
- 1,500 to 2,000 ft above ground level
- Observers on both sides of plane
- Mapped “yellow-brown” foliage signature

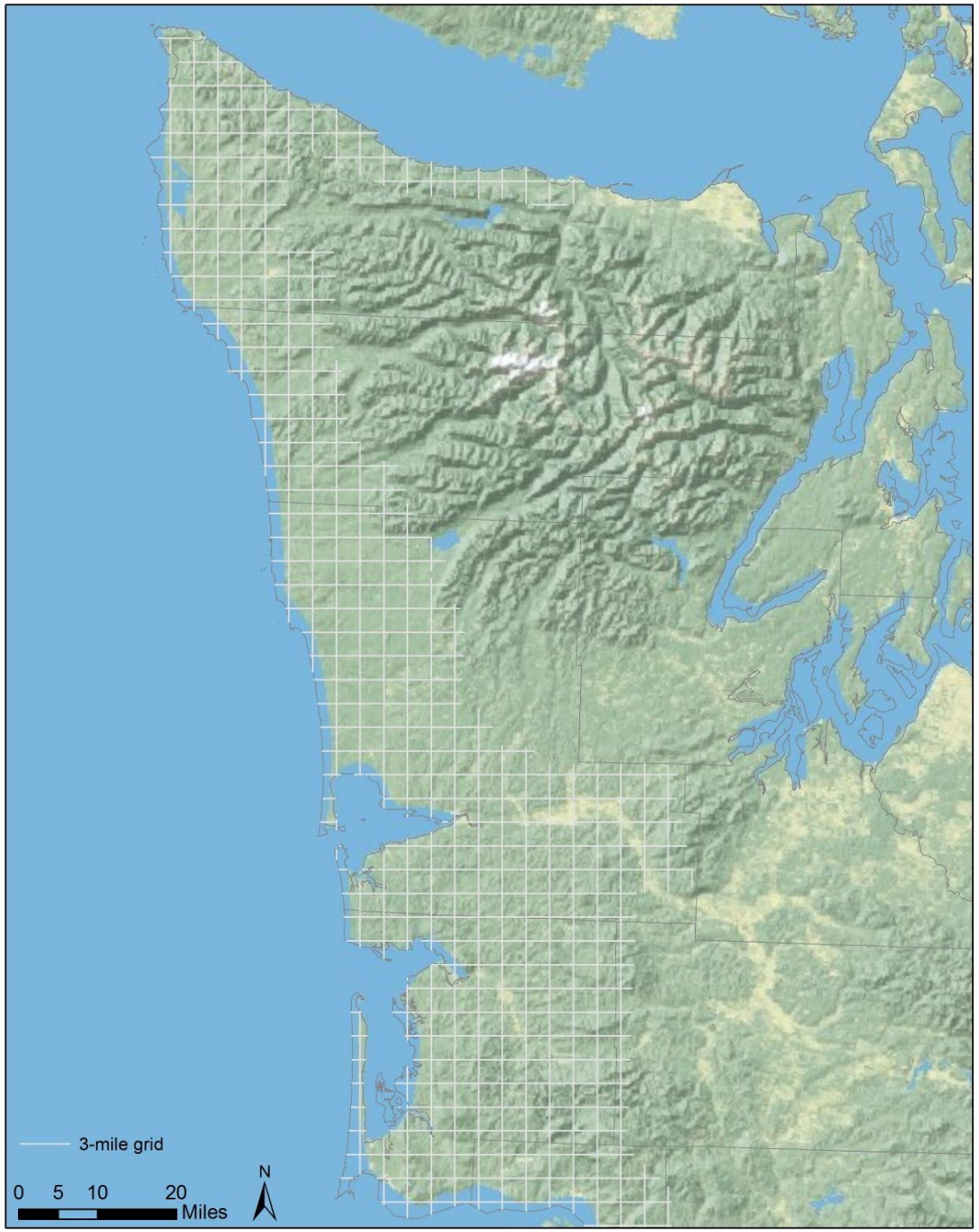
Pilot: Marty (WDFW); Surveyors: Isaac (WDNR), Justin (USFS), Glenn (WDNR); Trainee: Rachel (WDNR)

What We Saw in 2022

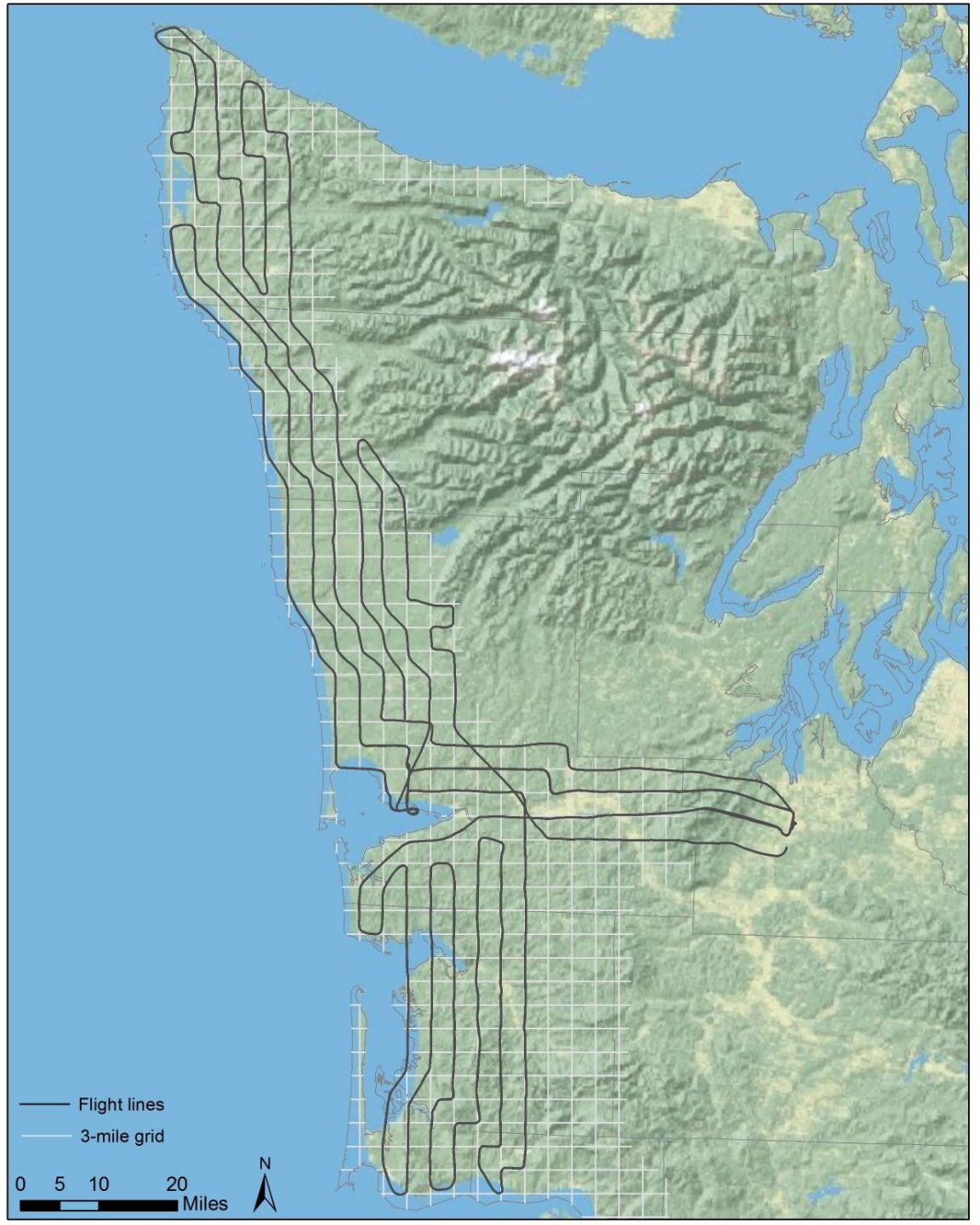
- Yellow-brown foliage signature seen
- Signature was more distinct early May

Aerial Survey 2022

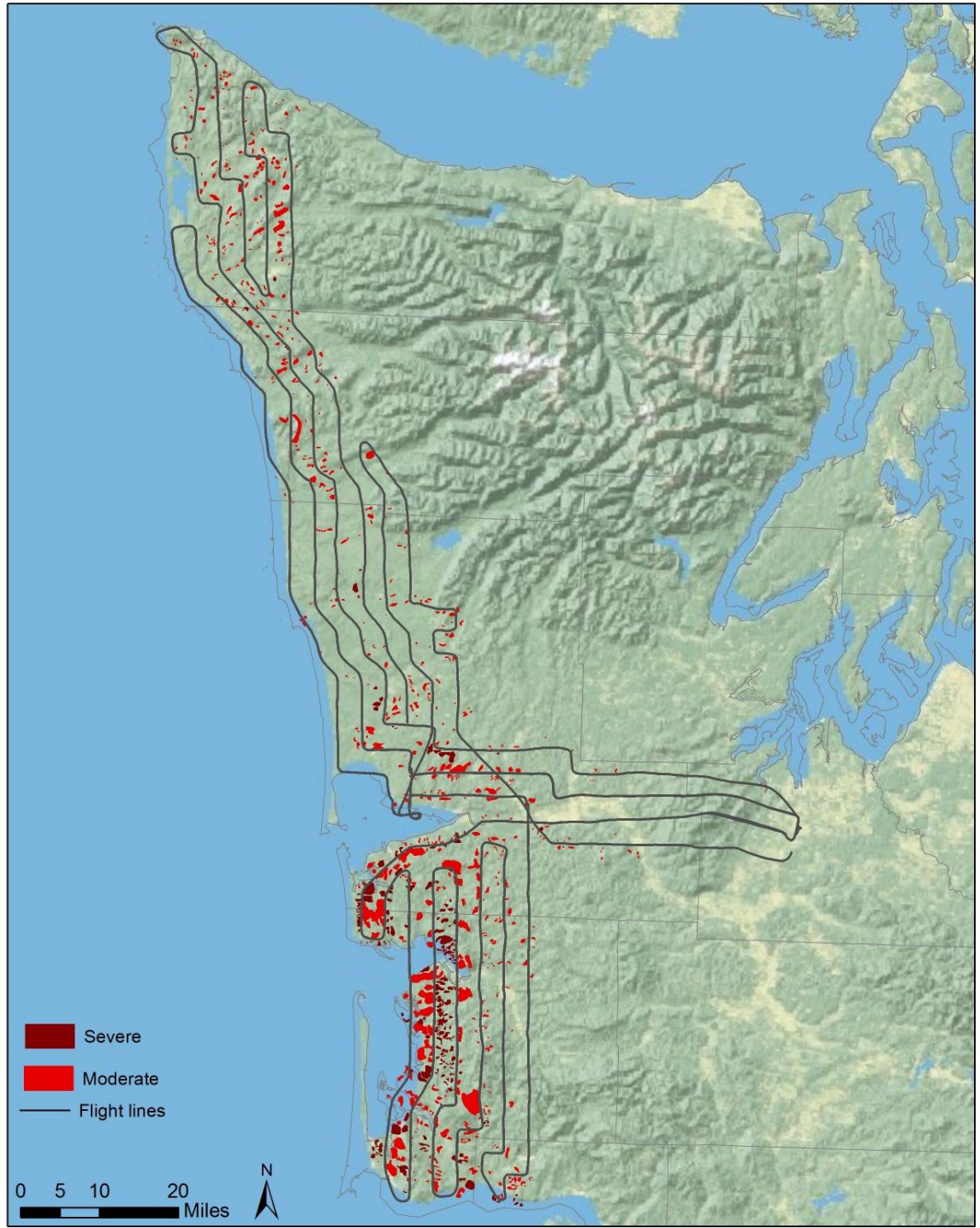
Aerial Survey 2022



Aerial Survey 2022

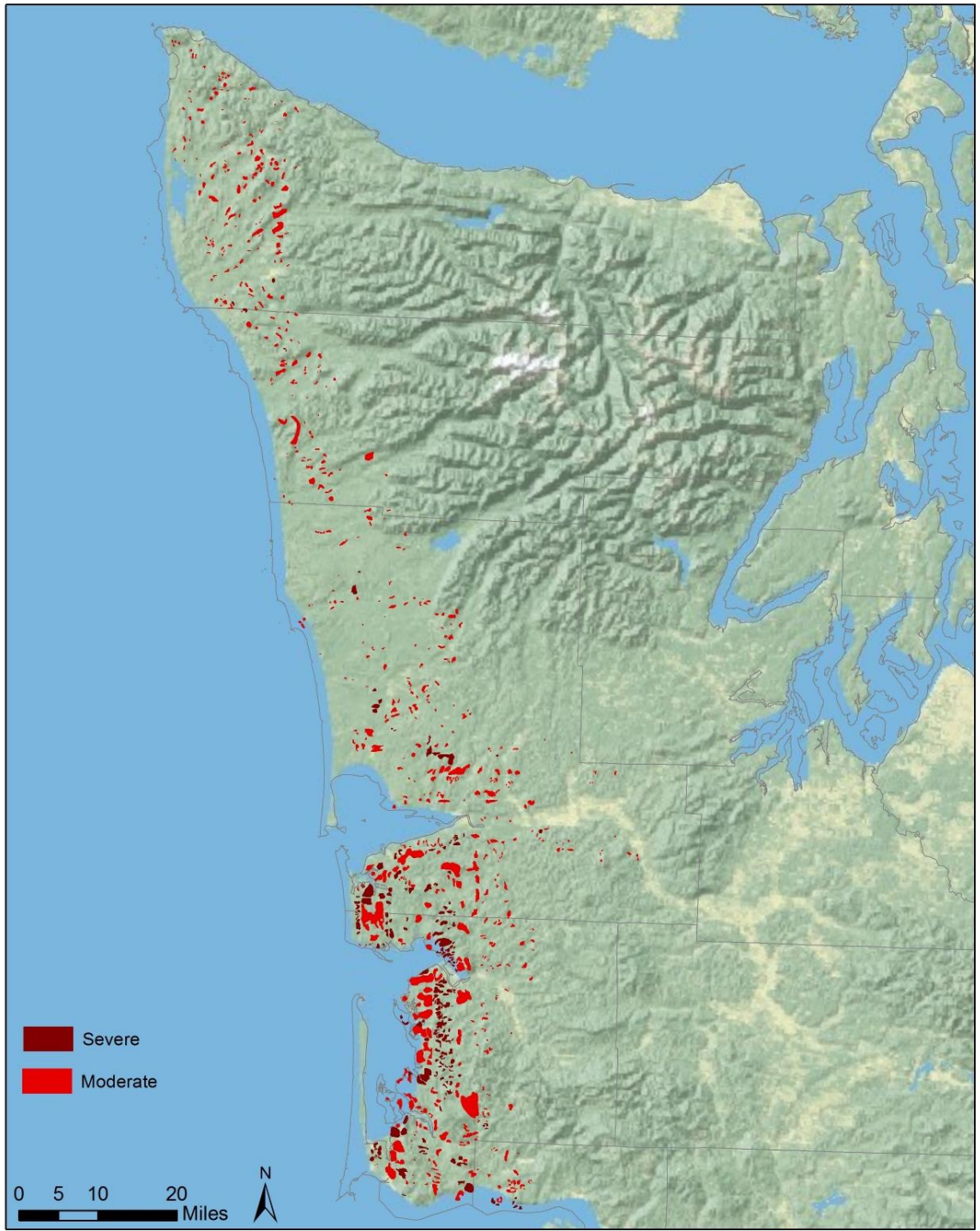


Aerial Survey 2022



Aerial Survey 2022

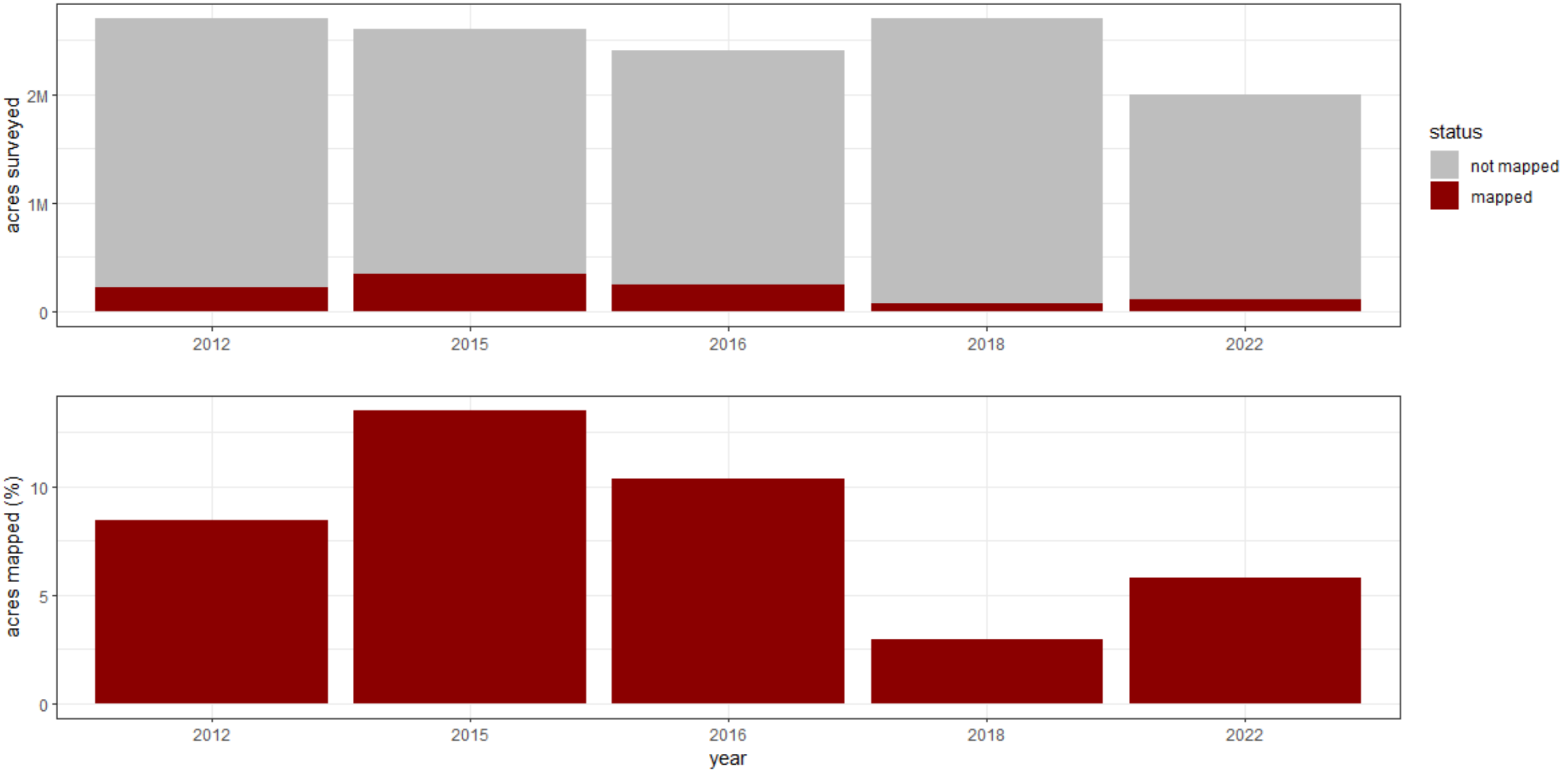
- Total acres surveyed: 2,000,000
- Moderate acres: 87,000 (4%)
- Severe acres: 29,000 (1%)
- All mapped acres: 115,000 (6%)



Recent years of aerial survey

	severe SNC symptoms		moderate SNC symptoms		total SNC symptoms		area flown
year	% of total acres	severe SNC acres	% of total acres	moderate SNC acres	% of total acres	total SNC acres	acres in millions
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 sruvey



Aerial Survey Challenges

- Tree ID is difficult from so far up

Aerial Survey Challenges

- Other things cause discoloration!!!

High ground water = anoxic soils (ignore bright yellow)

Root rots (isolated pockets)

Bud break (survey early, but not too early)

Other foliar diseases (ex: needle rusts)

Abiotic conditions, ex: drought/heat

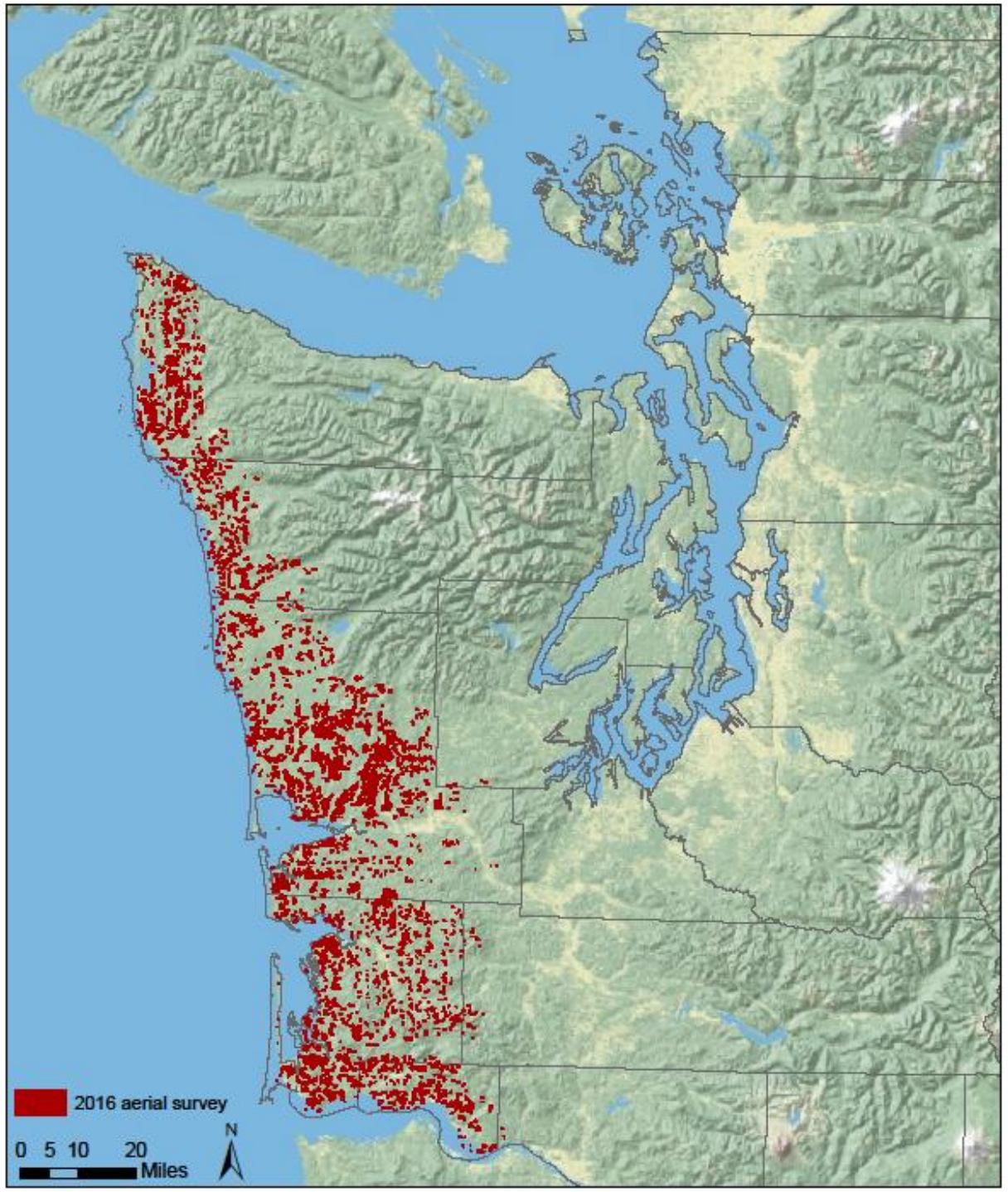
Overall Aerial Survey Results

- Mapping symptoms not signs
- Stable aerial survey results

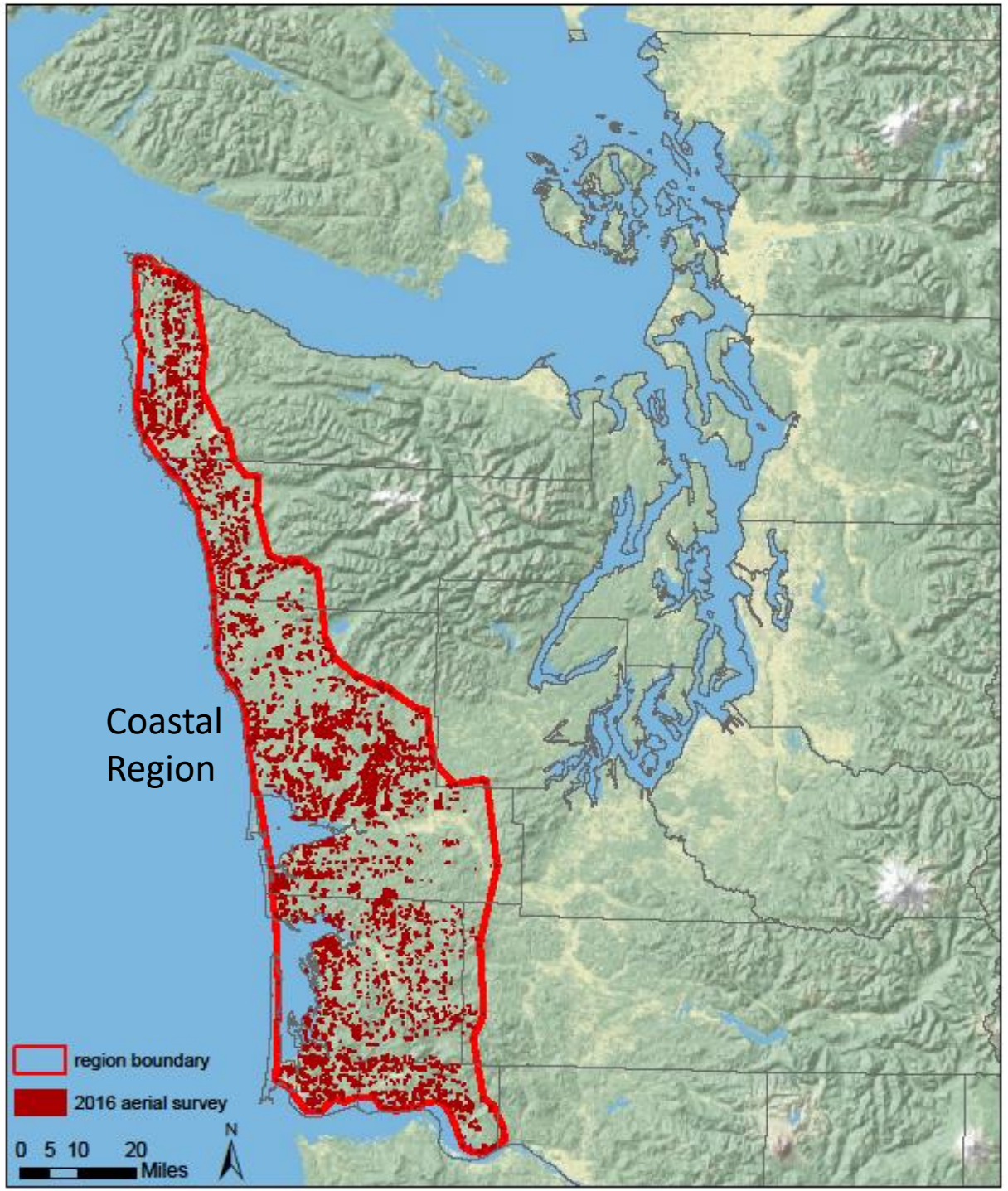
Ground Survey 2021-2022

- Goal:
  - Help “ground truth” aerial survey
- Updated methods:
  - Input from Connie Okasaki WSU (PhD Candidate)

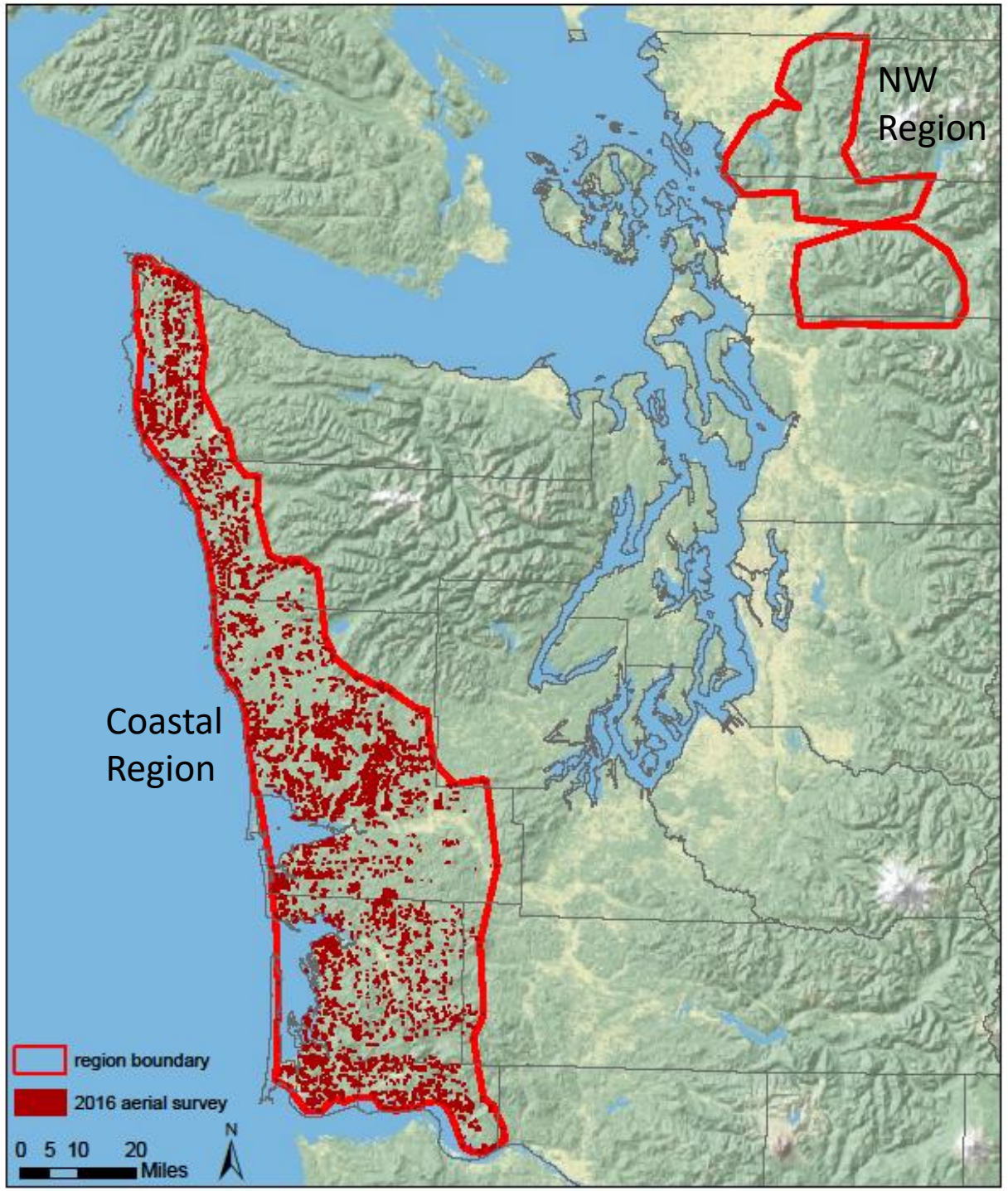
2021-22 Ground Methods



2021-22 Ground Methods



2021-22 Ground Methods



2021-22 Ground Methods

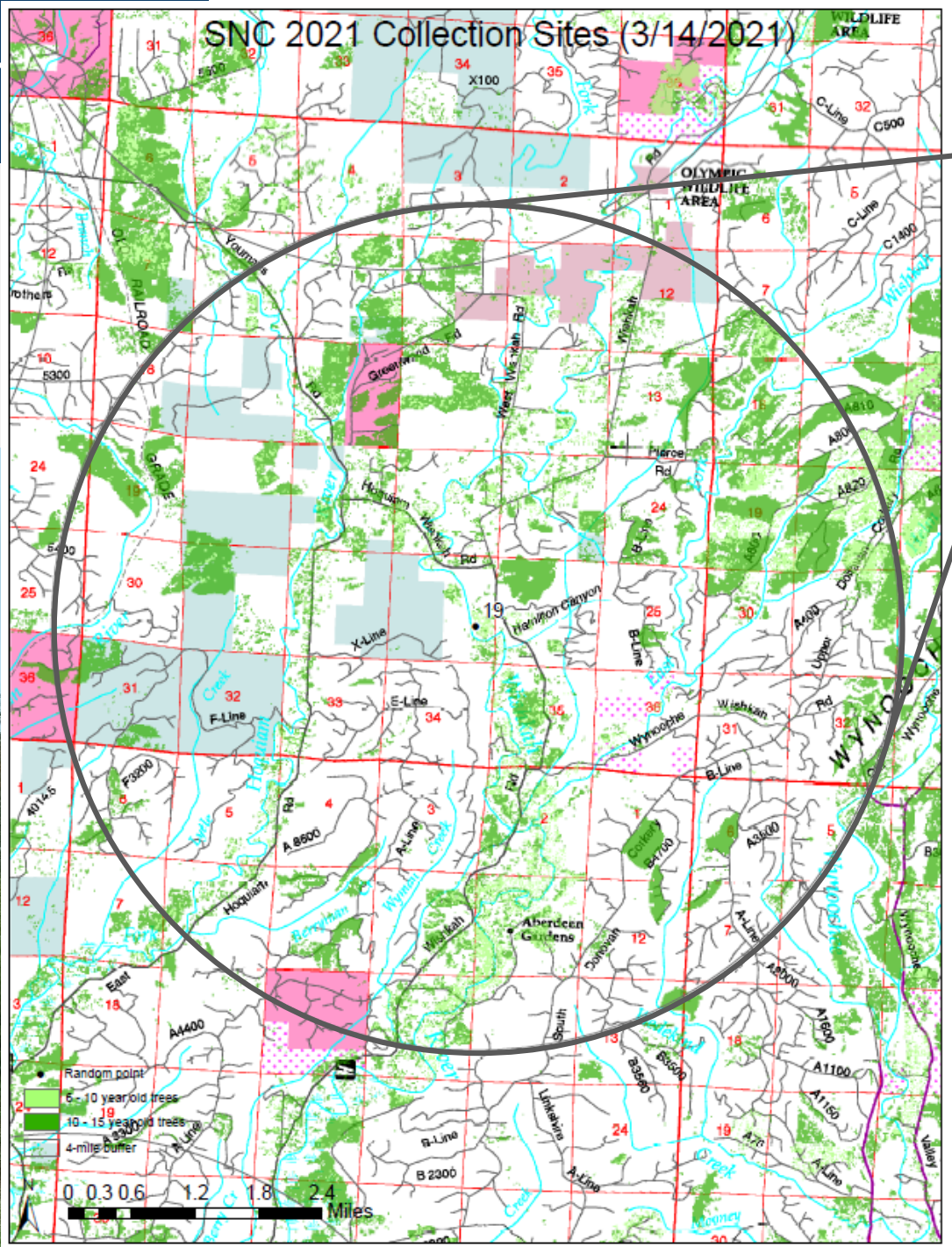
2021-22 Ground Methods

- 50 coastal region sites
- 17 NW region sites

2021-22 Ground Methods

2021-22 Ground Meth

- Douglas-fir dominated stands
- Certain size trees



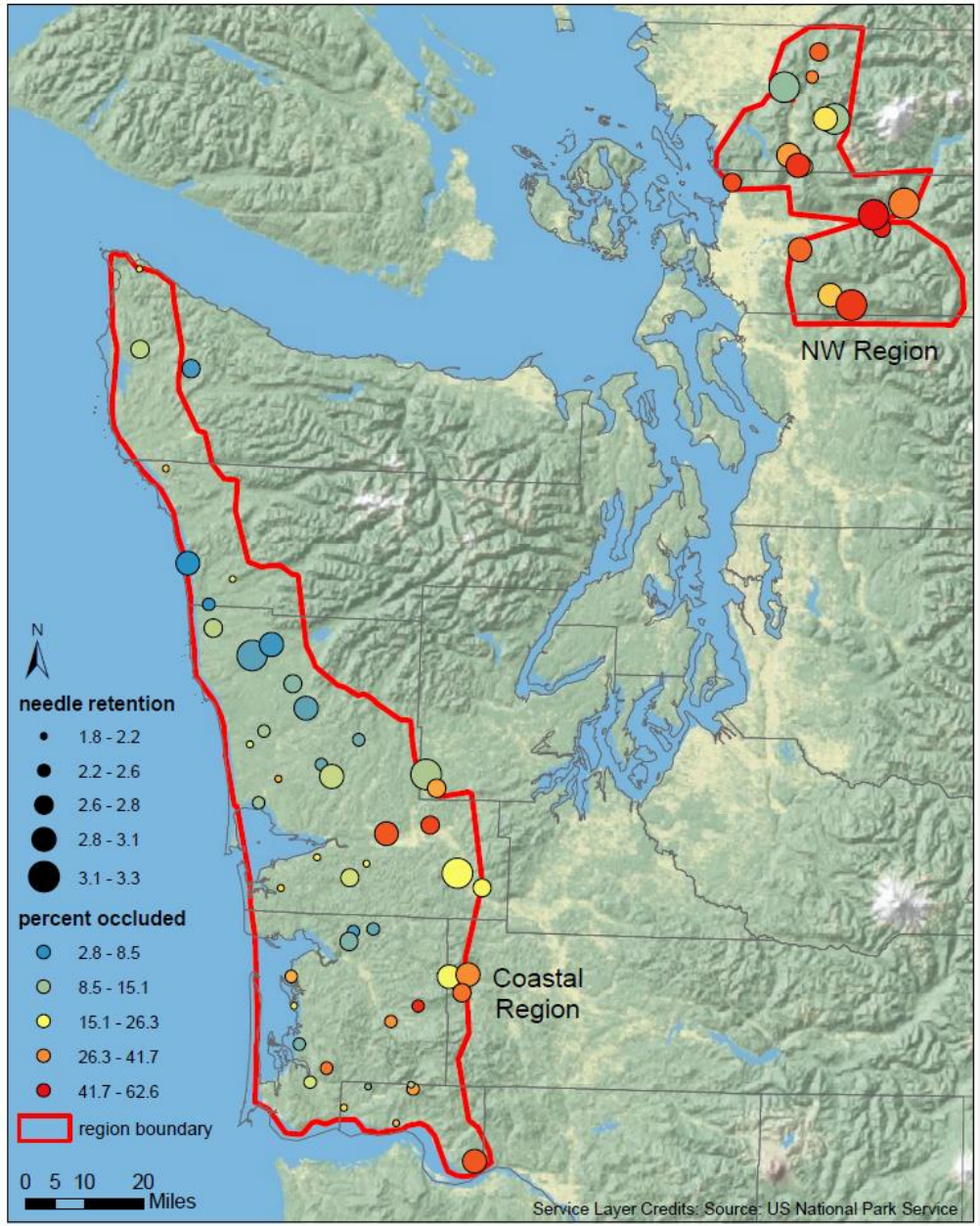
2021-22 Ground Methods

- Pseudothecia density

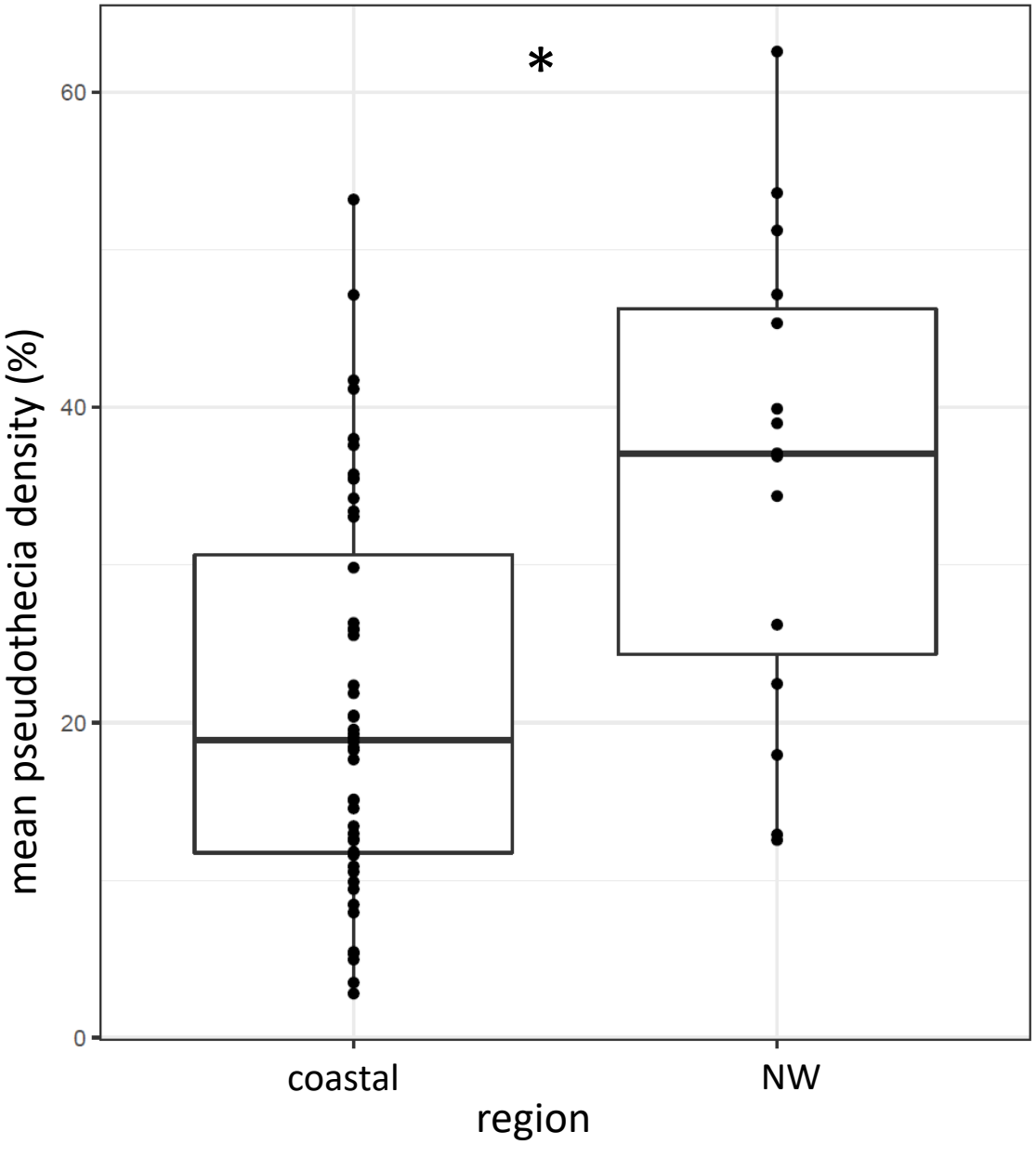
- Needle retention

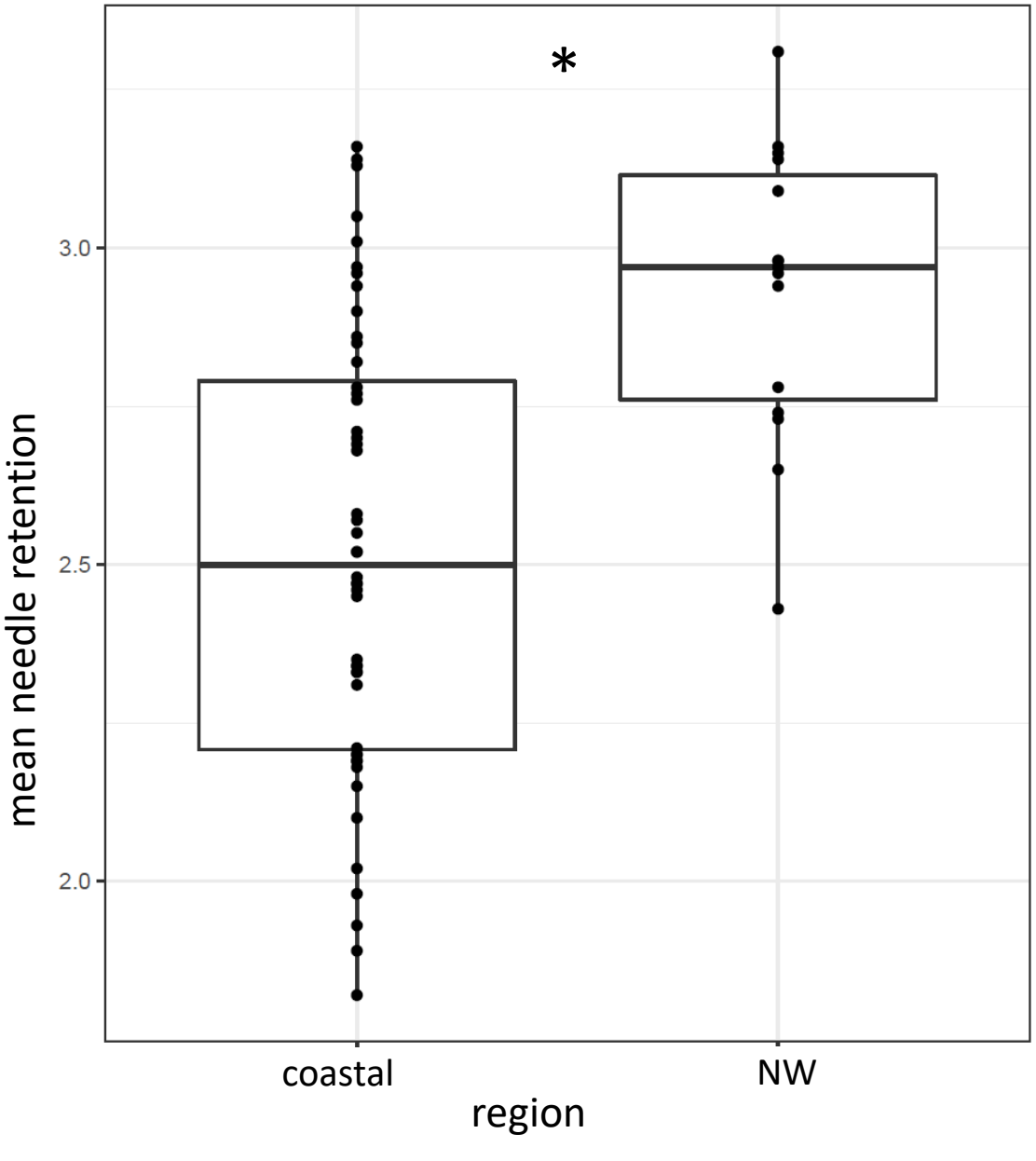
Previous literature tells us: Needle retention and pseudothecia density should be positively correlated

2021 Results 2022

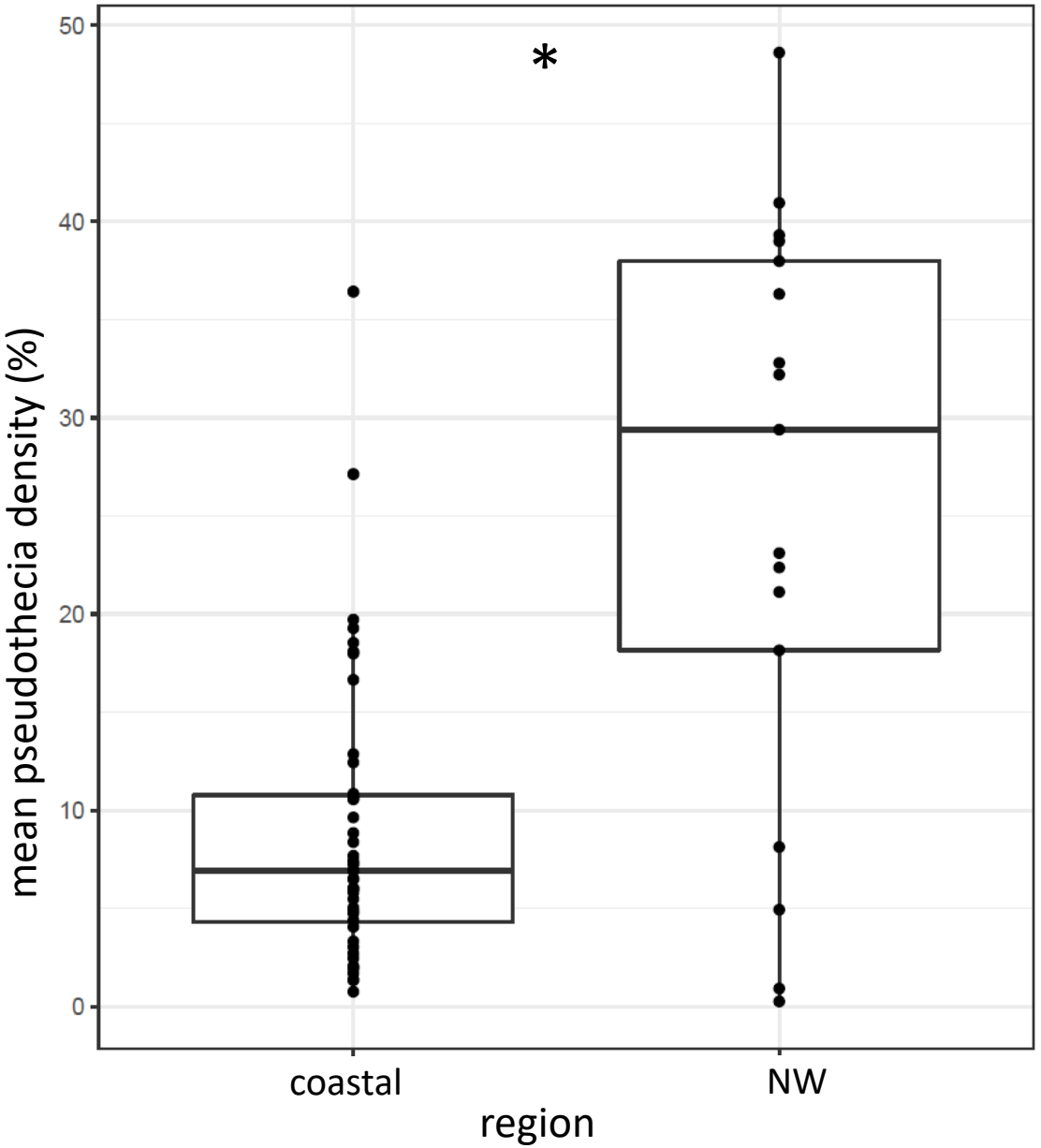


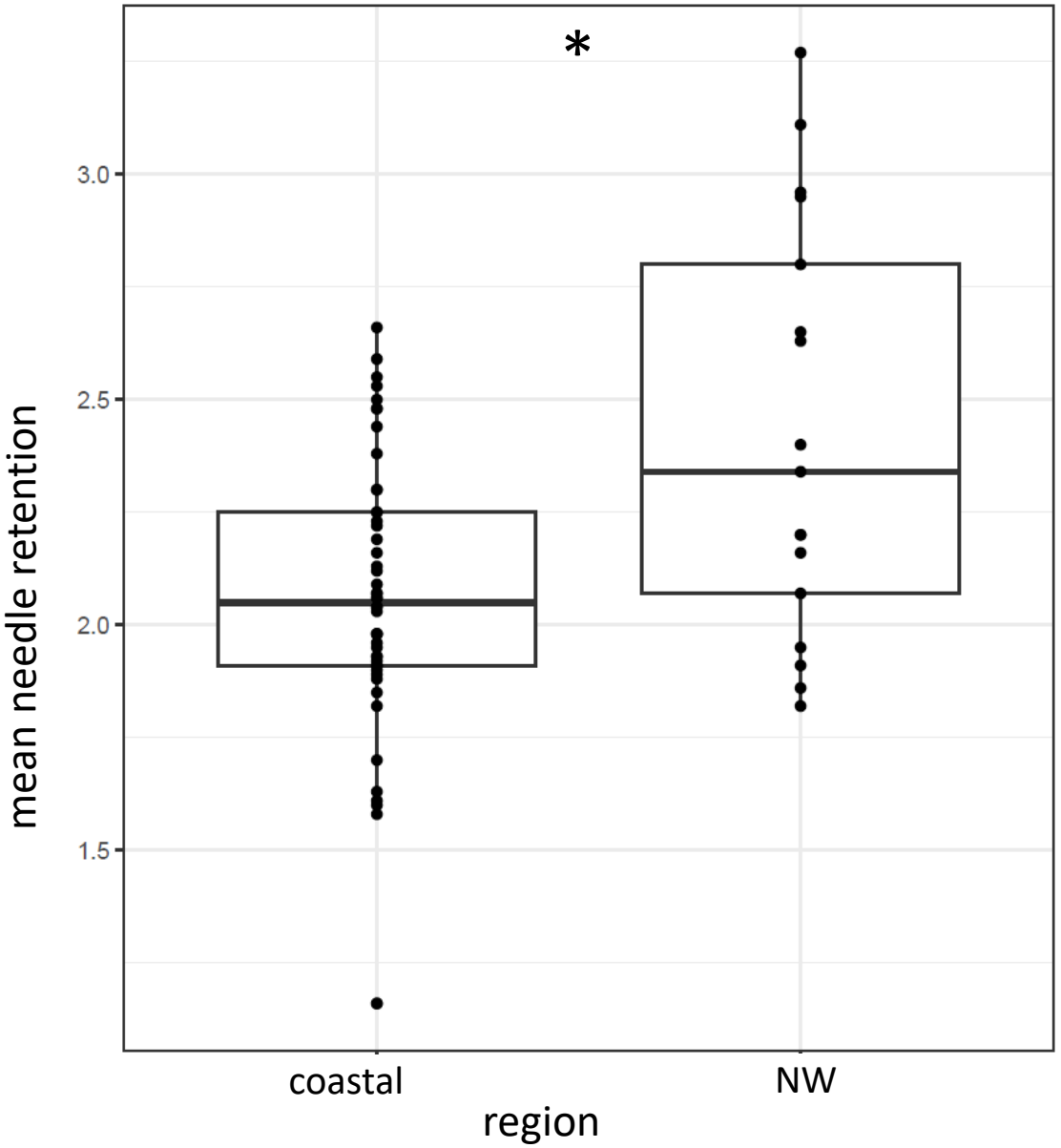
2021 difference between regions



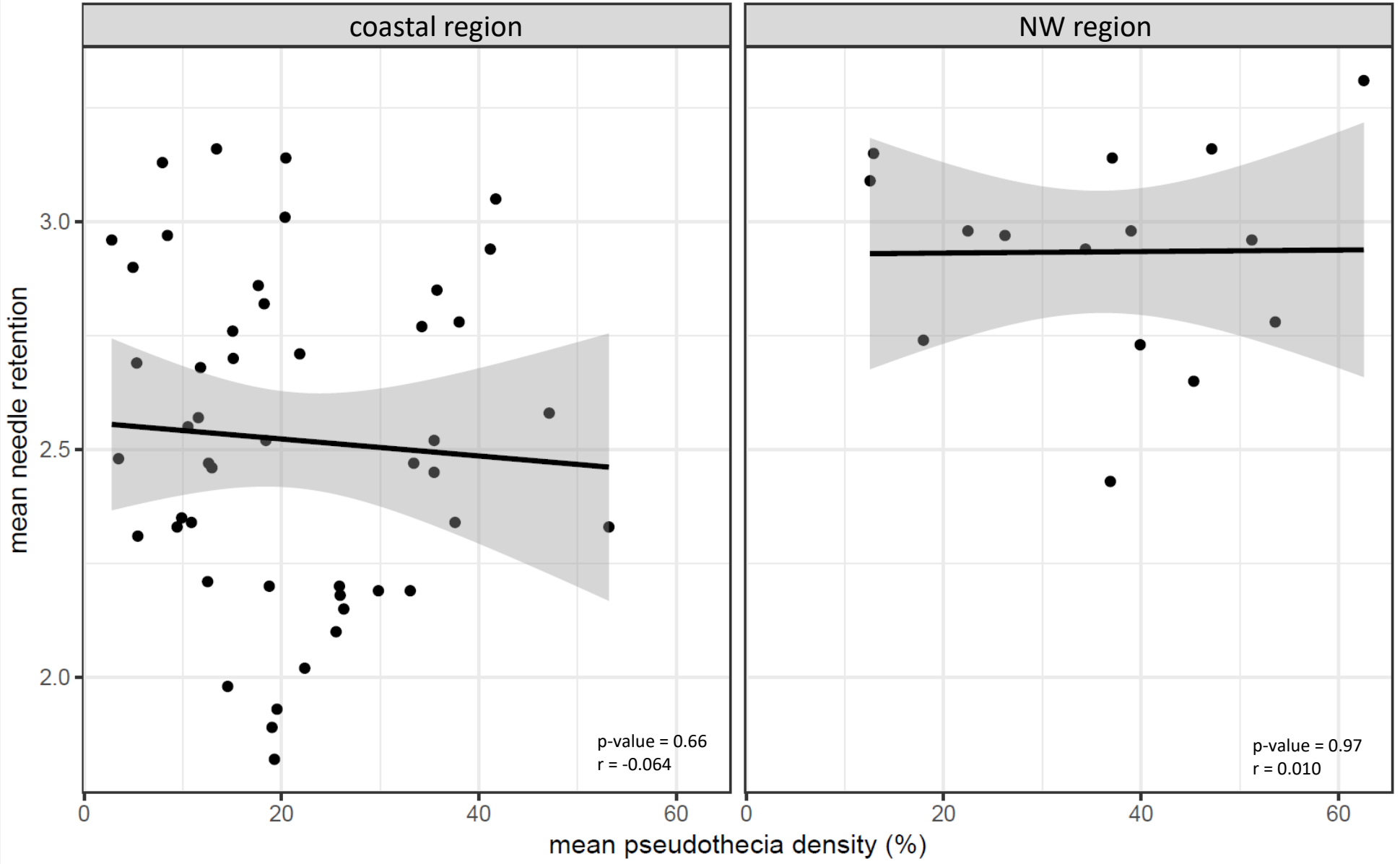


2022 difference between regions

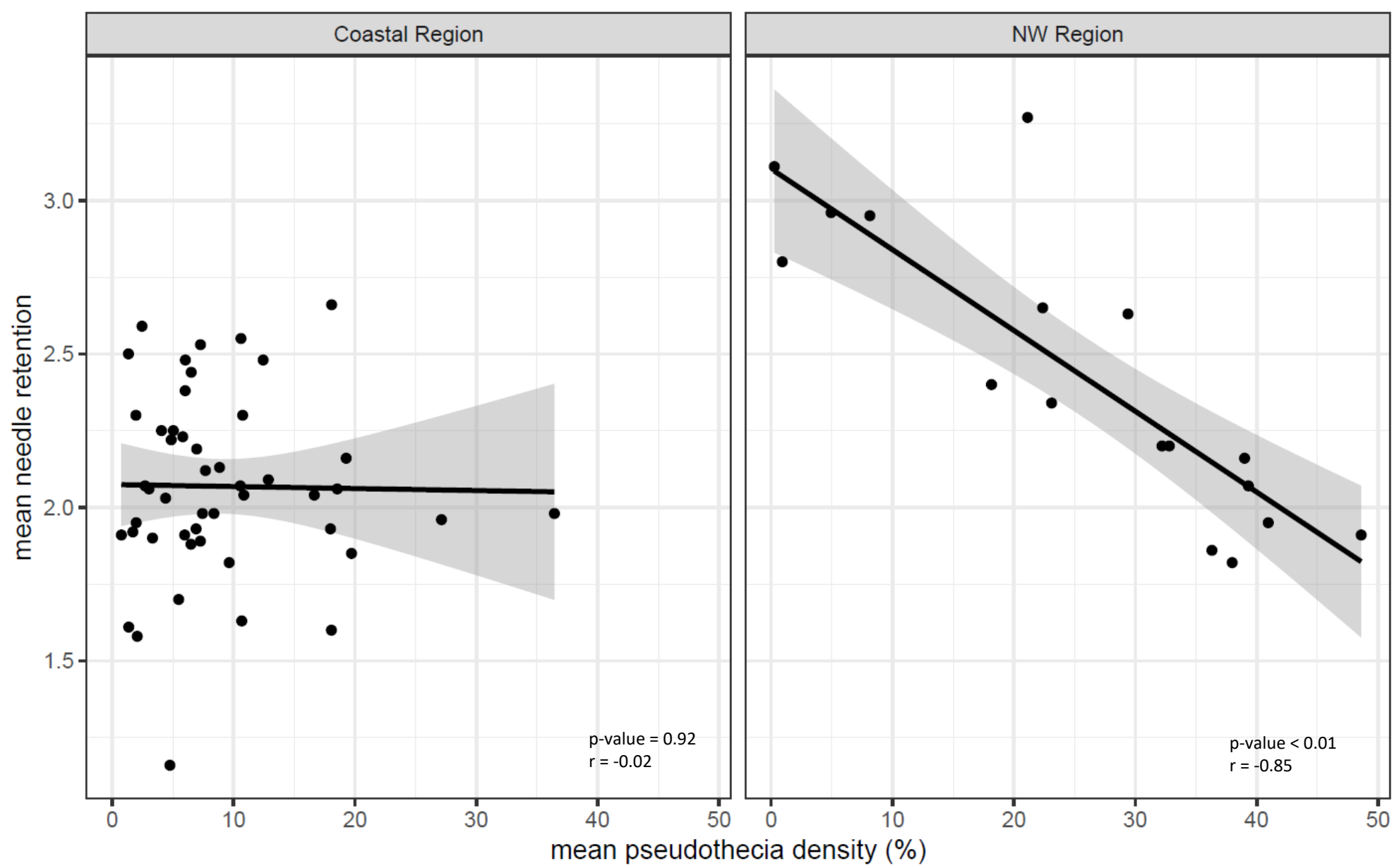




2021 difference within regions



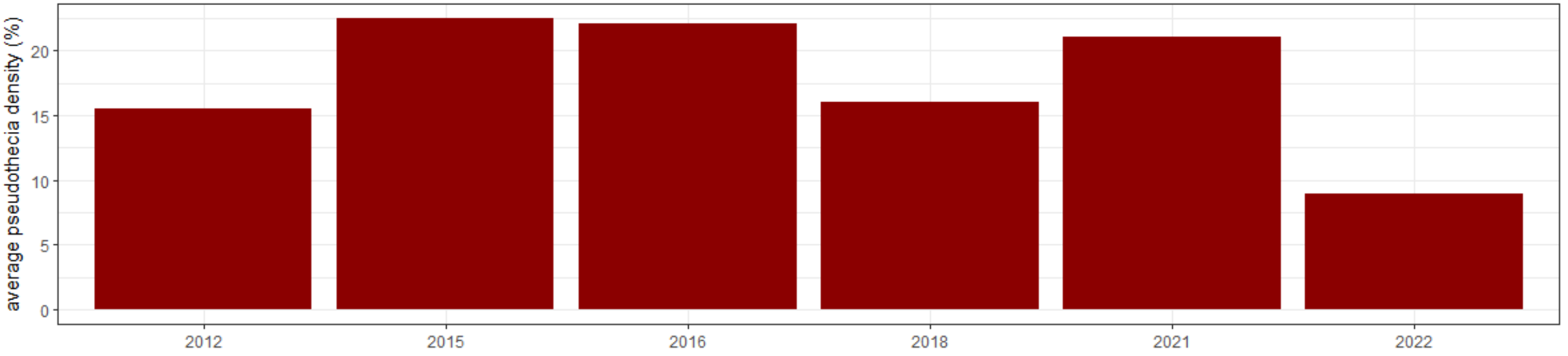
2022 difference within regions

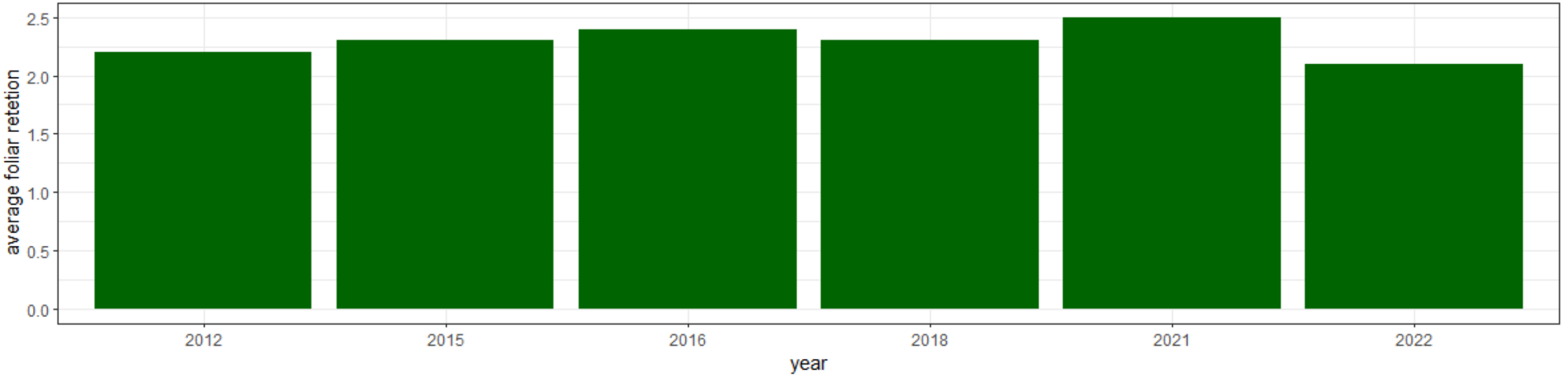


Ground survey trends over the years

region	year	number of sites	average pseudothecia density (%)	average foliar retention
Coastal	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	2022	17	25.6	2.4
	2021	15	35.9	2.9

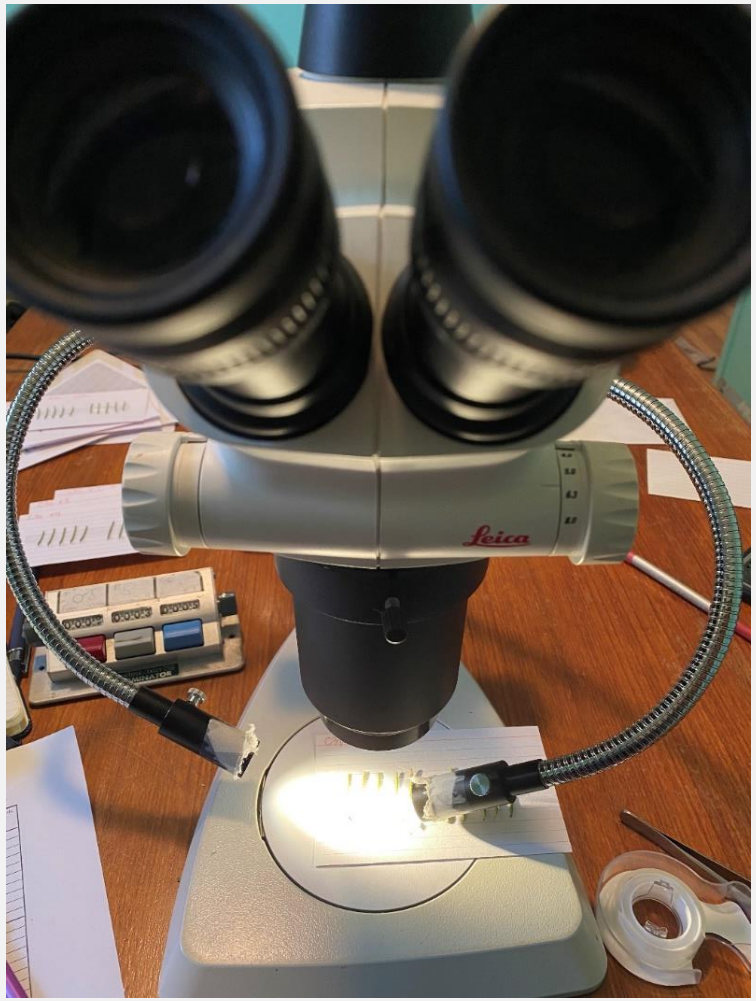
Coastal Region trend over the yeears





Future plans

- Aerial survey on even years (funding dependent)
- Ground survey to support aerial survey



Happy holidays!

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