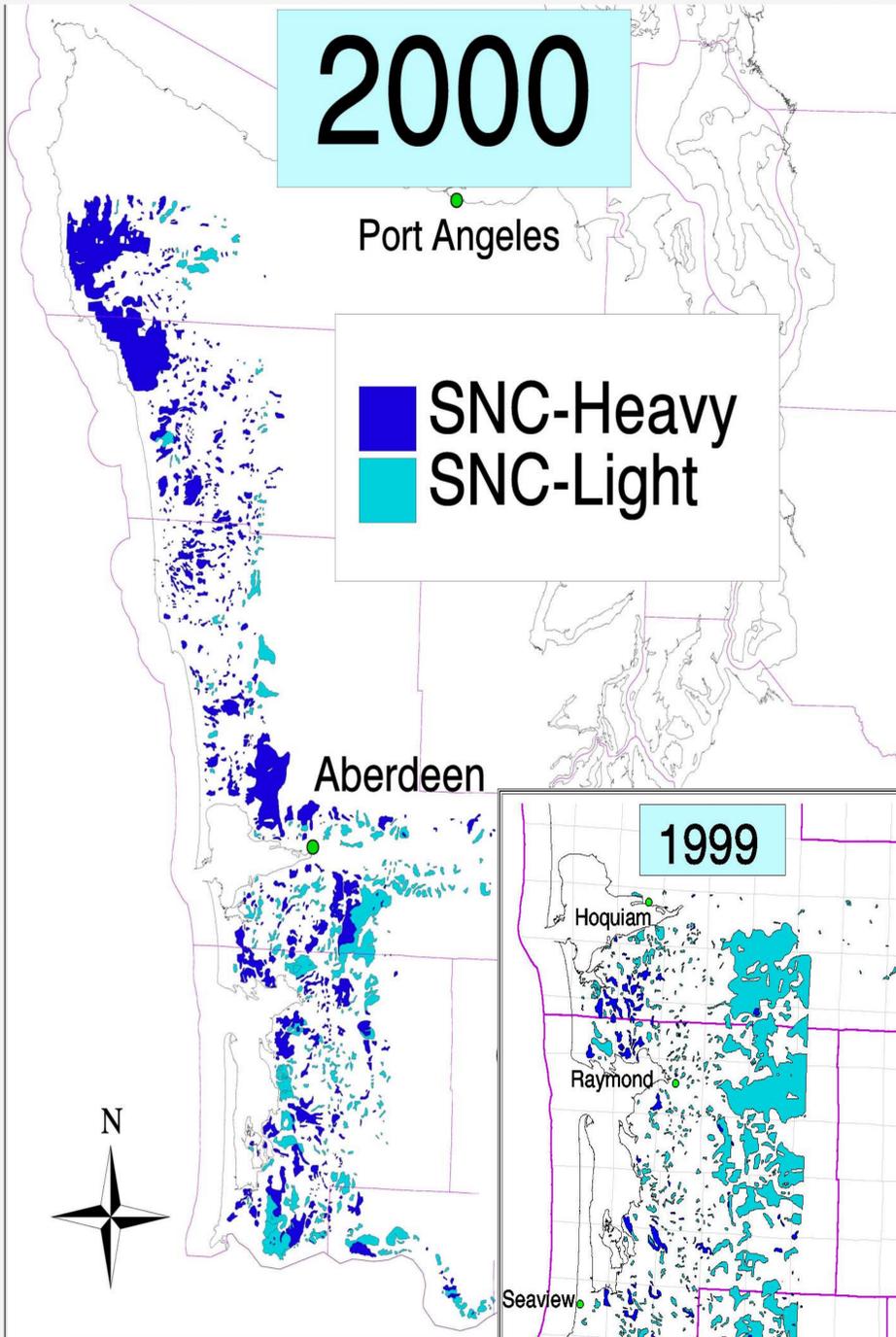


Three Years of Swiss Needle Cast Aerial Survey in Washington State 1998 - 2000

D. Omdal, J. Moore and C. Burns Resource Protection P.O. Box 47037 Olympia WA 98504-7037 forest.health@wadnr.gov



2000

Port Angeles

SNC-Heavy
SNC-Light

Aberdeen

Intro: Swiss Needle Cast *Phaeocryptopus gaumanni* is a foliar fungal disease affecting Douglas-fir. It is most damaging in young plantations near the coast of Oregon and Washington. The fungus attacks the undersides of needles along the stoma causing the needles to turn yellow, brown, and shed prematurely.

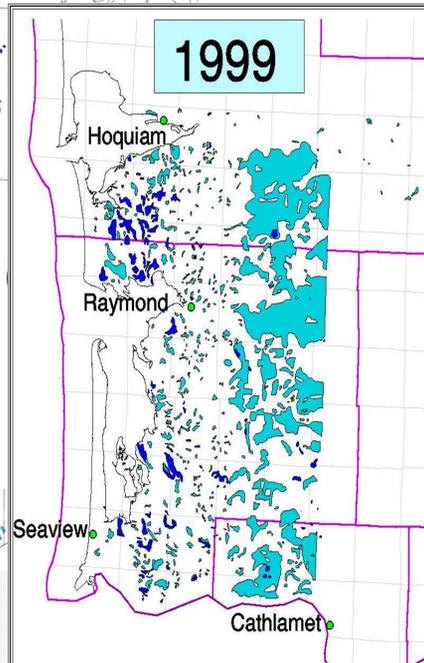
Procedures: Almost Two Million acres along the coast of Western Washington were surveyed for symptoms of SNC. For the third year survey flights were made, and for the first time, the coastal areas north of Aberdeen to the Hoh River delta were surveyed. The survey was flown between 05 May and 02 June. This is the latest that the survey has ever been flown, as cloudy weather delayed earlier flights. This delay forced us to fly several days after bud break.

Flights were made at ca. 1000 feet above the terrain, following North-South lines separated by two miles. The survey was flown using two observers, one on each side of the aircraft. Each surveyor was responsible for recording SNC symptoms for a 1 mile distance from the plane's path of travel.

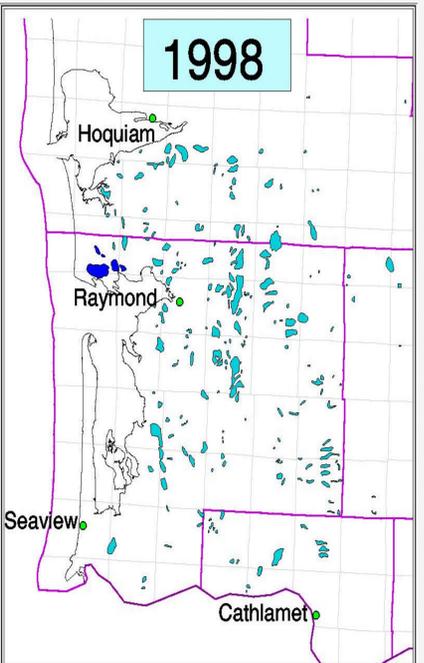
Stands composed primarily (> 50%) of Douglas-fir, with abnormally yellow/brown foliage, were identified as symptomatic for SNC. Patches of forest with these symptoms (referred to as polygons) were drawn onto a 1:100,000 scale topographic map. Each polygon was rated depending upon the degree of discoloration. Polygons classified as "L" had trees with dense crowns and only minor yellowing, while polygons classified as "H" had trees with sparse crowns and yellow to brown foliage. 34



2000 Survey results: A total of 1.95 million acres were flown. Symptoms of SNC were detected on 409,889 acres. 131,422 acres were classified "L", while 278,467 acres were classified "H". Thirty-four polygons were visited to confirm the presence of SNC and assess disease severity. Disease assessments were made on an additional 40 sites, some of which were outside of the area surveyed by air. All polygons and sites checked confirmed that SNC was present. Needle retention, the primary measure of disease severity, averaged a little more than 2.5 years.



1999



1998



Heavily Infected vs. Uninfected Needle

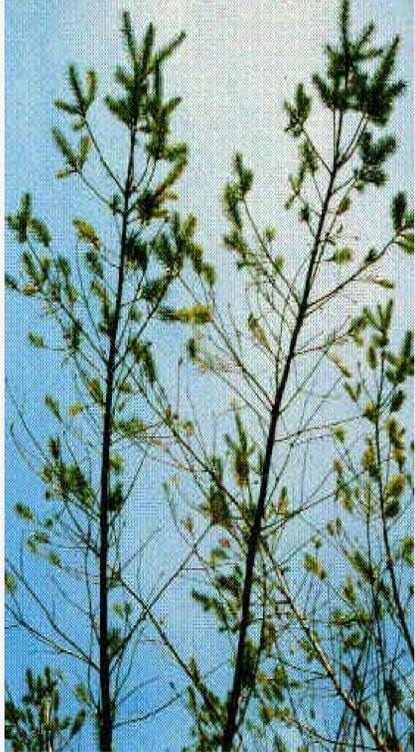
Discussion: Aerial survey observers see and record only those areas with obvious foliage discoloration. This survey is complicated by the fact that soil infertility, winter "parch blight," elevated water tables, and SNC can all result in similar discoloration. Similarly, the color change for detecting SNC from the air is extremely subtle, and the thresholds for L, H, and non-affected trees are not well defined. Furthermore, since nearly every Douglas-fir tree along the coast has SNC, at least to some extent, the threshold for a polygon to be recorded is ambiguous.

Nevertheless, SNC symptoms generally intensify through April and May, with the most pronounced discoloration occurring about two weeks before bud-break. Moreover, the apparent size of the polygons increases as the season progresses. Given the marked color changes over a relatively short time period, it is most desirable to fly during this period of peak signature expression and to complete the survey within a few days.

The unstable weather this spring was disruptive to our survey. It took 27 days to complete, versus 29 last year, but was weeks later in the season! Therefore, comparisons with previous years' surveys may be spurious. Still, areas with the most pronounced SNC signatures continue to be concentrated along the Washington coast.

Other observations made during the aerial survey include:

- The overall appearance, of virtually all stands, appeared poorer than last year.
- Signatures for SNC become less pronounced further inland.
- The presence of hemlock in stands can confuse disease detection.
- Trees on south-facing slopes are, generally, more negatively impacted by SNC.
- The coastal areas North of Hoquiam were particularly symptomatic of SNC.

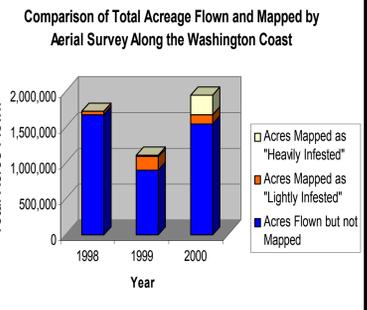
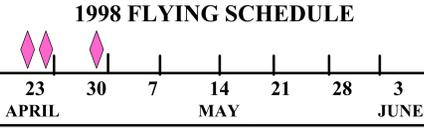
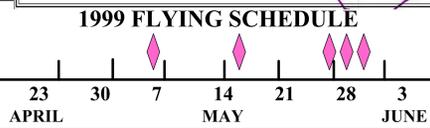
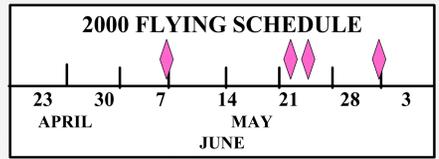


Heavily Infected Young Douglas-fir Stand Notice the Lack of Previous Year's Needle

Ground surveys confirm the presence of SNC in virtually all Douglas-fir stands in western Washington. In many places however, symptom expression has not developed to enable aerial detection.

Conclusion: Consistent with earlier surveys, SNC was observed throughout the Douglas-fir forests of western Washington. Based on the criteria of crown color, needle retention and height growth, disease severity across western Washington is currently light to moderate. Most stands are retaining three years worth of needles and are not being visibly damaged, despite the continued presence of the fungus. Investigations are currently underway to determine the growth impacts of SNC on Douglas-fir.

We would like to sincerely thank the USDA Forest Service Region 6 Forest Health for their financial support of this project and Keith Sprengel personally for his aid with flying the survey.



At first glance, it appears that Swiss Needle Cast is rapidly becoming a more serious problem for coastal Douglas-fir in Washington. However, this may not be case. In 1998, the aerial survey was completed by the end of April, but in 2000, it was not completed until June. Inclement weather hindered our ability to complete the survey in a timely manner.

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