



Forest Health Protection Pacific Southwest Region



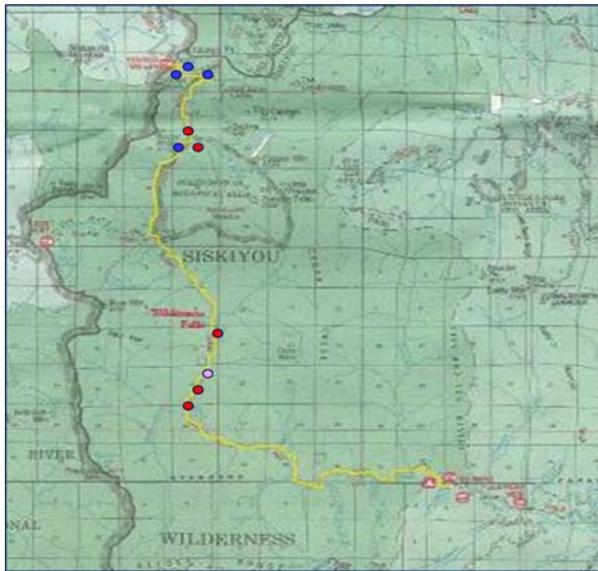
Date: October 19, 2010
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To: Patricia Grantham, Forest Supervisor, Klamath National Forest

Subject: Update on Port-Orford cedar root disease in the Clear Creek drainage within the Siskiyou Wilderness Area – Happy Camp Ranger District (FHP Report No. N10-010)

On July 26-29, 2010, Cynthia Snyder (Entomologist) from Forest Health Protection visited the Klamath National Forest to evaluate the current condition of the Port-Orford-cedar (POC) along the Clear Creek Trail between the Young’s Valley trailhead and the No Man’s trailhead, the Raspberry Lake Trail and along the unnamed creek linking Raspberry Lake and Clear Creek. Based on this information, I determined what influence these conditions have on management objectives and have provided recommendations as appropriate.

Background



Map 1. Port-Orford-cedar root disease located in the Clear Creek drainage by Schultz and Angwin, 2006.

In August 2006, Dave Schultz, FHP Entomologist, and Pete Angwin, FHP Pathologist, detected the presence of POC root disease in the Clear Creek watershed in the Siskiyou Wilderness Area (Map 1). Identification was made by removing bark from the roots and lower bole of fading POC to reveal diagnostic cinnamon-brown discoloration coming up from the roots. Subsequent PCR analysis by Oregon State University confirmed the presence of the pathogen *P. lateralis*. The first confirmed location was located 6.3 miles down from the Young’s Valley trailhead with additional confirmed locations further downstream (FHP Report No. N06-06).

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Improvements to reduce the likelihood of introduction of *P. lateralis* into the Clear Creek watershed had been made at the three trailheads entering the Wilderness Area prior to the 2006 discovery of POC root disease (Figure 1). Thus the initial source of introduction was subject to speculation. A second trip along the trail was conducted in September 2006 by Dave Schultz and Carol Sharp, Silviculturist, Happy Camp Ranger District, Klamath National Forest, concentrating on the area upstream of the confirmed find. No additional POC root disease was located between that point and the Young's Valley trailhead.



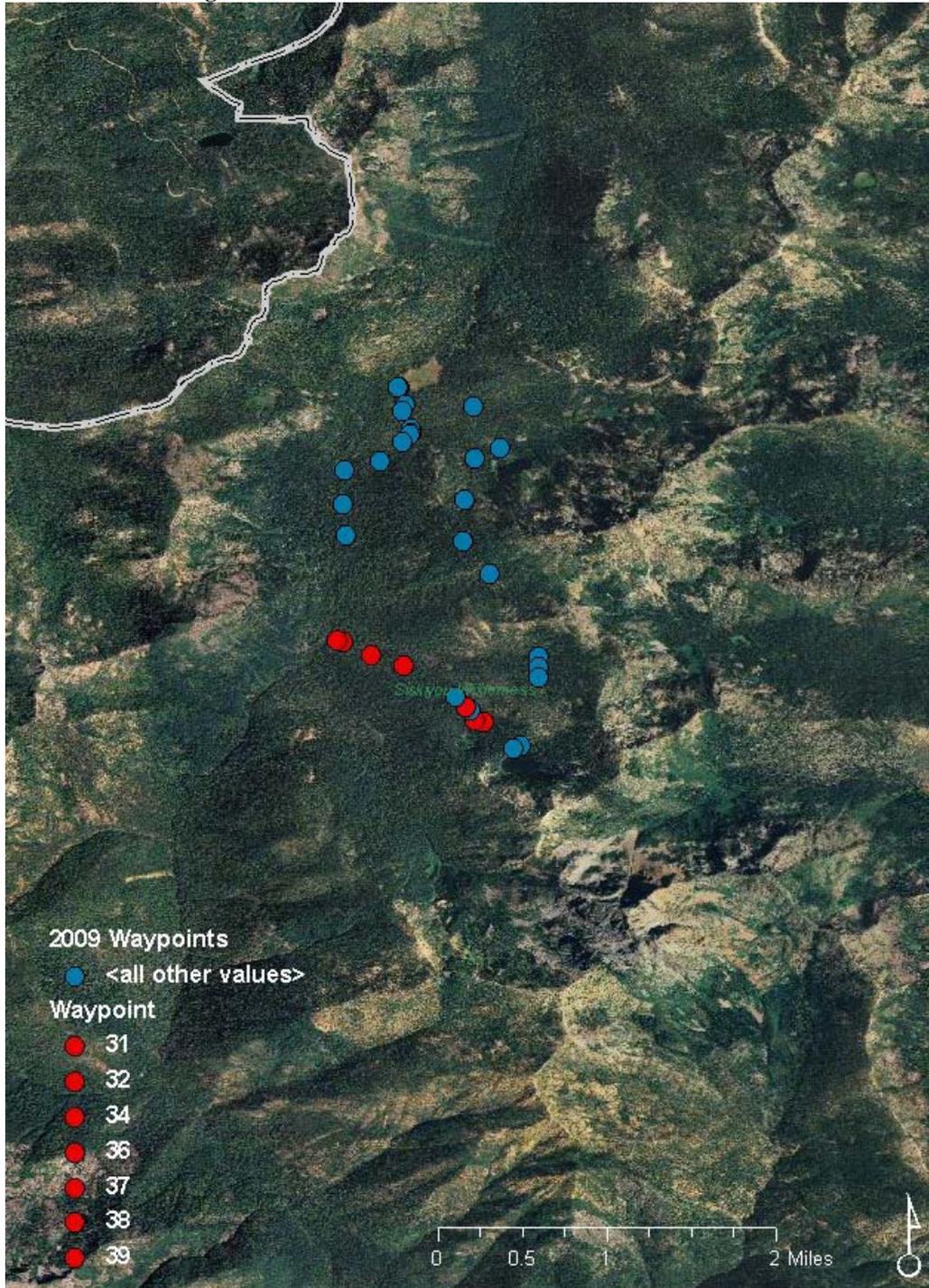
Figure 1. Trailhead moved and blocked to prevent the introduction of *Phytophthora lateralis* into Young's Valley and Clear Creek drainage.

In 2009, an ongoing interregional POC/*P. lateralis* mapping and inventory update entailing a detailed analysis of existing aerial photographs (circa 1999) for the Klamath National Forest) identified a typical POC root disease pattern along the stream channel about 1,500 feet downstream from Raspberry Lake within the Preston Peak Botanical Area. This initiated another trip into the Wilderness, this time by Cynthia Snyder, FHP Entomologist, to look at the POC along the Raspberry Lake trail and along the unnamed creek between Raspberry Lake and Clear Creek.

On July 22, 2009, Cynthia Snyder, accompanied by Jackie Duran, California Conservation Corps, hiked from Young's Valley to Raspberry Lake via the Raspberry Lake trail (Map 2). No POC root disease was located, although several locations along the trail were identified for improvement to protect the area from introduction of the disease (FHP Report No. N09-10).

The POC root disease center 1,500 feet below Raspberry Lake was confirmed with many large and medium sized, older-dead POC along a slow-moving off-shoot of the main creek flowing out of Raspberry Lake (Figure 2). The root disease center was approximately 5 acres in size (N41°51.117' W123°37.453') with dense standing dead

Map 2. 2009 Biological Evaluation of Port-Orford-cedar in Northern Siskiyou Wilderness Area, Clear Creek Drainage.



POC mixed with smaller apparently healthy POC, a few younger fading POC indicating active infection, and mixed aged white fir. The plant association is listed as POC-White Fir/Western Azalea in a late mature or mid-mature seral stage. Slow moving water hidden by thick rose and fern moved through the root disease center. Fading and recently dead POC exhibited the stain pattern typical of POC root disease. Dead POC also had evidence of amethyst cedar bark borer (*Semanotus amethystinus*).

The root disease center appeared to be quite old, but smaller, newer disease pockets with one or two dead or diseased trees are scattered down the length of the unnamed creek. Field tests performed using a pocket Elisa diagnostic kit (Forsite Diagnostics, York, UK) confirmed the presence of a *Phytophthora* in POC at the disease center. Samples of stained bark and wood were taken from four sites and sent to Oregon State University where polymerase chain reaction (PCR) DNA analysis confirmed presence of *P. lateralis*.



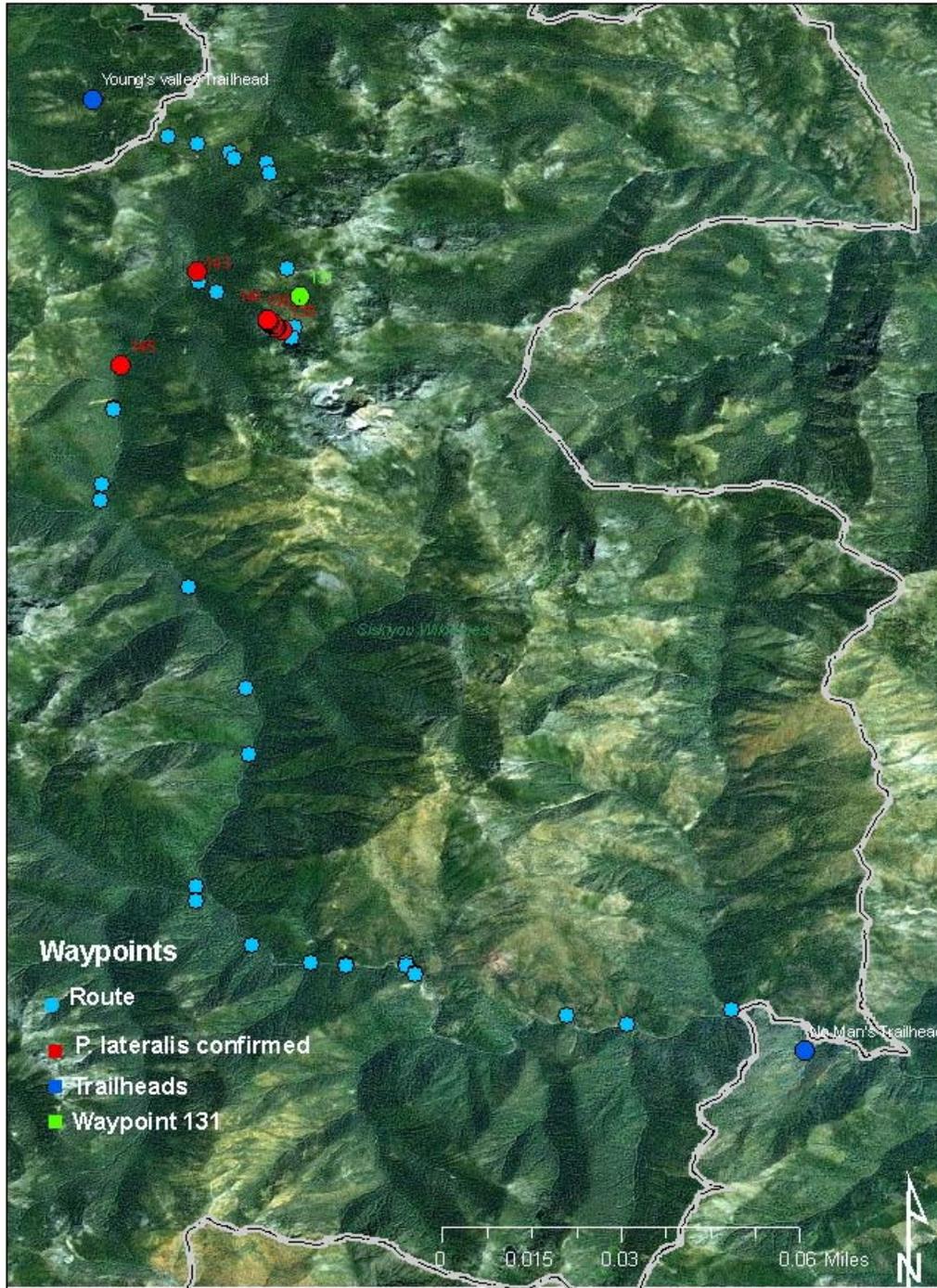
Figure 2. POC root disease center below Raspberry Lake.

While it was still unclear how the pathogen originally entered the Clear Creek watershed, it was thought that it may have originated in the stream between Raspberry Lake and Clear Creek. However, this stream does not currently have, nor does it appear to ever had, trail access.

On July 26-29, 2010, Cynthia Snyder revisited the Clear Creek drainage in the Siskiyou Wilderness Area to look for evidence of the origination point near the POC root disease center below Raspberry Lake, and to check for new infection centers between Young's Valley Trailhead and No Man's Trailhead (Map 3).

Observations and recommendations for the area are as follows:

Map 3. 2010 Biological Evaluation of Port-Orford-cedar in Northern Siskiyou Wilderness Area, Clear Creek Drainage



Clear Creek Drainage from Young's Valley Trailhead to Rattlesnake Meadows Trail

There is still no evidence of POC root disease along Clear Creek from the confluence of the unnamed creek from Raspberry Lake (at Rattlesnake Meadows Trail) to the Young's Valley Trailhead. Trail improvements have been made by the California Conservation Corps that will help to prevent the spread of the pathogen *Phytophthora lateralis* into Young's Valley. These improvements include rocking trail at creek crossings and the installation of causeways where creek crossings could not otherwise be improved (Figure 3). At each location the POC appeared healthy and disease-free.



Figure 3. Causeway to prevent spread of POC root disease via infected mud.

Raspberry Lake Trail and Unnamed Creek to Clear Creek

There is no evidence of infection along the Raspberry Lake Trail. However, fading POC can be seen from the trail approximately 50-100 feet below the trail at waypoint 131 (Map 3, marked green). Springs flow from above the trail though this point down to the bench where POC root disease was detected last year. A sample was taken from a small fading POC near the trail in the springs. This is no evidence of infection going into Raspberry Lake. The bench with the original infection was again looked at and waypoints taken to help determine the size of the infection.

POC Eradication Zone at the Confluence of the Unnamed Creek and Clear Creek

In 2006, a host eradication zone was created by removing all POC in a ½-acre area surrounding an identified *P. lateralis* infection center at the confluence of the unnamed creek and Clear Creek. This infection center was the first one identified in the Clear Creek drainage and the furthest upstream (FHP Report No. N06-06). The eradication zone was created to prevent further upstream movement of the pathogen in Clear Creek. Annual removal of POC ingrowth in the eradication zone has been maintained by Forest Service and CCC crews into 2010. No new evidence of POC root disease was found surrounding the eradication zone.

Rattlesnake Meadows to No Man's Trailhead

No new evidence of POC root disease along Clear Creek from the confluence of the eradication zone at Rattlesnake Meadows Trail to the No Man's Trailhead. Although some pockets of POC root disease were found during the 2006 trips, the affected areas appear to have been successfully treated by the Forest Service and CCC crews to prevent further spread of the disease. There are some areas that may still warrant additional work (Table 1).

Table 1. Waypoint locations with comments of current condition or suggested trail improvements.

<u>Waypoint Number</u>	<u>Coordinates</u>	<u>Comments</u>
123	N41 53.384 W123 39.280	Young's Valley Trailhead and barrier
124	N41 53.013 W123 38.523	Trail improvements, POC appear healthy
125	N41 52.930 W123 38.222	Trail improvements, POC appear healthy
126	N41 52.842 W123 37.891	Young's Valley camp. Bear circled camp all night.
128	N41 52.736 W123 37.519	Trail improvements, POC appear healthy
129	N41 52.636 W123 37.499	Bear! 2-year-old, probably last night's visitor.
130	N41 51.675 W123 37.320	Mine site
131	N41 51.386 W123 37.182	~100 foot stretch of wet trail over POC roots. POC appear healthy, sample taken on single fader in spring. Springs lead down to POC mortality pocket confirmed in 2009.
132	N41 51.344 W123 37.179	Creek crossing POC roots, POC appear healthy. Evidence of past fire.
133	N41 51.076 W123 37.234	Springs crossing trail. No POC at trail, POC below trail appear healthy.
134	N41 50.977 W123 37.271	Raspberry Lake. No POC at lake.
135	N41 51.044 W123 37.361	First encounter with POC along unnamed creek from Raspberry Lake – 4 dead, 2 appear healthy.
136	N41 51.073 W123 37.414	Edge of POC mortality pocket confirmed in 2009.
137	N41 51.086 W123 37.438	Spring coming downhill through mortality pocket.
138	N41 51.105 W123 37.447	Fading POC in spring inside mortality pocket, sample taken.
139	N41 51.123 W123 37.493	Downstream edge of mortality pocket confirmed in 2009.
140	N41 51.138 W123 37.503	Small mortality pocket along unnamed creek, tested positive for <i>P. lateralis</i> in 2009, in spring coming from uphill toward Raspberry Lake Trail.
141	N41 51.155 W123 37.513	POC mortality pocket with oldest mortality uphill in spring.
142	N41 51.430 W123 38.025	Other side of unnamed creek – POC appear healthy even in springs and still water areas.

143	N41 51.546 W123 38.209	Rattlesnake Meadows connection, fading POC in unnamed creek.
144	N41 51.639 W123 38.219	Trail improvements, POC appear healthy.
145	N41 50.689 W123 38.990	Fading POC near clear creek, sample taken.
147	N41 50.623 W123 39.034	Camp.
148	N41 50.264 W123 39.064	Trail improvements, POC appear healthy.
149	N41 50.244 W123 39.066	Trail improvement. Flagged POC#76. POC appear healthy.
150	N41 49.498 W123 39.186	Stream crossing, POC appears healthy.
152	N41 48.451 W123 38.315	Trail improvements (bridge/causeway), POC appear healthy.
153	N41 47.423 W123 37.735	Rattlesnake!
154	N41 46.766 W123 37.699	Rattlesnake in creek! POC appear healthy.
155	N41 45.428 W123 38.232	Muddy seep in trail, POC appear healthy. Recommend trail improvement here.
156	N41 45.281 W123 38.242	Trail improvement, POC appear healthy.
158	N41 44.648 W123 37.073	Trail improvements, POC appear healthy.
159	N41 44.634 W123 36.725	Trail improvements, POC appear healthy.
161	N41 44.647 W123 36.118	Camp at beach.
163	N41 44.543 W123 36.019	YCC camp. Company and coffee.
164	N41 44.526 W123 36.019	Wet spots on trail, POC appear healthy. May warrant some trail improvement.
165	N41 44.121 W123 34.491	Wet spots on trail, POC appear healthy. May warrant some trail improvement.
166	N41 44.031 W123 33.882	Wet spots on trail, POC appear healthy. May warrant some trail improvement.
167	N41 44.175 W123 32.839	Wilderness boundary between 10-mile Creek and 10-mile Camp.
168	N41 43.755 W123 32.086	No Man's Trailhead.

Summary

Current trail improvements include a small eradication zone, moving the trailheads, rerouting certain sections of trail and building stream crossings, causeways and waterbars on the Clear Creek trail and connecting trails within the Clear Creek watershed. Current trail improvements and maintenance of the *P. lateralis* eradication zone will help to minimize further POC root disease spread in the Clear Creek watershed. Trail improvements at the remaining recommended waypoints (155, 164, 165, 166) should be implemented as soon as possible to minimize the risk of further POC root disease spread in the Clear Creek watershed. Any trail crossing of an infested stream needs to be armored so hikers or horseback riders do not get their feet or hooves

into the streams. Signing each of these areas would be helpful in explaining the situation to wilderness users

There will be additional *P. lateralis* infection along the unnamed creek and throughout the downstream portion of Clear Creek; it's just a matter of time. I suggest that a GIS exercise be run to see how many acres and what plant communities will be affected. Depending on what plant associations are affected, there will be water quality impacts and potentially adverse effects on listed fish stocks that may occur in the Clear Creek drainage.

The POC-white fir/western azalea plant association has approximately 49% POC canopy. It will take many years for the white fir and Douglas-fir to fill in for the dead and dying POC canopy, but eventually it will.

While it is still not known how *P. lateralis* came into the unnamed creek between Raspberry Lake and Clear Creek, it appears to be the most likely source of the initial introduction. Further investigation into the history of vehicle travel that may have occurred in or near the springs that cross the Raspberry Lake Trail at waypoint 131 would likely help answer this question.

If you have any questions regarding this report and/or need additional information please contact Cynthia Snyder at 530-226-2437 or Pete Angwin at 530-226-2436.

/s/ Cynthia Snyder

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