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**Route To:**

**Subject:** Evaluation of risk of introduction of Port-Orford-cedar root disease at Cedar Basin RNA (FPM Report N02-03)

**To:** Sharon Heywood, Forest Supervisor, Shasta-Trinity National Forest  
Bob Hammond, District Ranger, SMMU

## Introduction

On several occasions over the past two years, Dave Schultz (entomologist) and I have visited the Cedar Basin Research Natural Area (RNA) and discussed with Peter Van Susteren management options to reduce the risk of introduction of Port-Orford-cedar (POC) root disease into the area. At its most basic, reducing the risk of disease introduction involves separating Port-Orford-cedar, water (which carries fungal spores to host trees) and disease vectors (humans, and in particular, vehicles). The main point of potential disease introduction is near the outlet of Cedar Lake. At this point, the 4WD access road from FS Road 26 to Cliff Lake crosses the outlet of Cedar Lake at a ford, which is surrounded by Port-Orford-cedar. Water flows through the area at almost all times of the year. Mud that is contaminated with spores of *Phytophthora lateralis*, the fungus that causes Port-Orford-cedar root disease, may easily be washed off as vehicles, trail bikes, horses and hikers cross the wet area. With the increased incidence of POC root disease along the lower Sacramento River at and below Dunsmuir, and the recent discovery of a POC root disease infestation at Scott Camp Creek (in a different drainage, but only about six miles from Cedar Lake), it has become imperative that immediate action be taken to minimize the potential for disease introduction into the RNA.

In 2000, I wrote a service trip report (FPM Report N00-8) documenting observations that Dave Schultz (entomologist) and I made during a visit on September 6 of that year. At the time, options that were considered included improving the Cedar Basin access road at the outlet to Cedar Lake, installing a gate to restrict vehicle traffic at the junction of FS Road 26 and the Cliff Lake access road, or installing a gate across the Cliff Lake access road north of the outlet from Cedar Lake. At the time, we recommended the third option, that a gate be placed north of the outlet from Cedar Lake. However, further discussions with Peter Van Susteren and Bob Hammond demonstrated the difficulties of making the gating alternative work. The difficulties included opposition to reduced access by the public, potential vandalism of the gate, difficulties enforcing the road closure, the time delay involved with invoking the NEPA process for the road closure, finding a suitable place to install a gate so that vehicles can't drive around it, the obligation of the Forest Service to provide access to the owner of an inholding within the RNA, and opposition (both public and within the Forest Service Administration) to creating a "private enclave" for the inholder. It was decided that the best course of action was to improve the Cliff



Lake access road at the outlet from Cedar Lake. In 2001, Forest Pest Management Suppression/Prevention funds were acquired for project, but because of a lack of consensus on the proposed action between Regional RNA Committee and Shasta-Trinity NF staff, the project was shelved and the funds were spent elsewhere.

Dave's and my most recent visit to Cedar Basin RNA was on October 11, 2001. We were accompanied by Hugh Safford, the Region 5 Regional Ecologist and Regional RNA Coordinator. Once again, several options were discussed. Hugh's recommendations were outlined in a 4063 report dated January 2, 2002. While his report supported improving the road crossing at the outlet of Cedar Lake, he also suggested that the District strongly consider closing vehicle access to the RNA. Because of continued concern by the SMMU land managers regarding the feasibility and effectiveness of a road closure, I was asked to reconsider the various options and provide an analysis of the potential for each alternative to reduce the risk of introduction of POC root disease. The following analysis considers the pros and cons of each option and provides my opinion of the relative effectiveness of each.

### **Cedar Basin RNA POC Root Disease Risk Analysis**

**1. Objective:** To reduce the probability of introduction of POC Root Disease to acceptable levels, maintain reasonable access to recreational users and the inholding landowner, and maintain the research/administrative functions of Cedar Basin RNA.

#### **2. Management Alternatives:**

**A. Current Situation-** Under this option, no special management actions are taken.

**Advantages-** Public access is maintained and no immediate costs are incurred.

**Disadvantages-** The presence of water and POC at the intersection of the Cliff Lake access road and the Cedar Lake outlet provides a perfect opportunity for POC root disease introduction. As the disease continues to spread along the Sacramento River and other drainages, the potential for disease introduction will continue to rise. Once introduced into an area, POC root disease is very difficult to eradicate. At that point, the only possible alternative other than allowing the disease to run its course is to cut all POC in an eradication zone around the point of introduction and allow the fungus time to die out (about 4-7 years). Effectiveness of this approach largely depends on how soon after disease introduction the treatment is done. In any case, if the RNA becomes infested, large numbers of POC would be lost.

**B. Restrict Vehicle Access-** Under this option, a locked gate would be placed across the Cliff Lake access road near the entrance to Cedar Basin RNA at FS Road 26. The inholding landowner would be provided with a key to access his property. Visitors to the area would have to park near FS Road 26 and walk or ride a trail bike or horse into the area.

Advantages- Dave Trevisan (SMMU Recreation Management Officer) and SMMU road engineers estimate that during the late spring and summer months, approximately 3-4 cars visit the RNA each day during the week and 10-12 visit each day on weekends. However, due to the rough 4WD condition of the road, only about half of these vehicles actually go up the access road to Cedar Lake or beyond to Cliff Lake. About 1-2 trail bike riders visit each weekday and 5 or more visit each day on weekends. About 2-4 horse visits occur each spring/summer month. Because vehicles have the greatest potential for carrying and depositing infested mud, restricting access to the RNA to foot, horse or trail bike traffic would reduce the potential for *P. lateralis* to be brought in.

Disadvantages- This alternative does nothing to prevent visitors on foot, trail bikes or horses from depositing infested mud along the access road. Additional problems include opposition to reduced access by the public, vandalism of the gate and enforcement of the closure, the time delay involved with invoking the NEPA process for the road closure, finding a suitable place for a gate so that vehicles can't drive around it, the obligation of the Forest Service to provide access to the owner of an inholding within the RNA, and opposition (both public and within the Forest Service Administration) to creating a "private enclave" for the inholder. All of these problems reduce the potential effectiveness of the gating option.

C. Improve The Access Road Near The Outlet Of Cedar Lake- Under this alternative, a raised roadbed of coarse aggregate would be built where the Cliff Lake access road crosses the outlet to Cedar Lake. The length of raised roadbed would be approximately 60 yards. Two or three culverts of sufficient size would be installed to keep water below the road. Transport of aggregate into the area would require widening and improving the Cliff Lake access road between the Cedar Lake and FS Road 26. In order to keep vehicle access to a minimum following the treatment, the road would be returned to a "high clearance" 4WD condition.

Advantages- In Cedar Basin RNA, the intersection of the Cliff Lake access road and the outlet of Cedar Lake is the only place where disease vectors, water and POC come together in one place. Because of this, improvement of the crossing will significantly reduce the potential for POC root disease introduction by making it impossible for water to wash mud from vehicles, trail bikes, boots and horses. It will also make it more difficult for any mud that happens to fall to be washed down to nearby POC.

Disadvantages- Improvement of the access road at the crossing will not prevent introduction of POC root disease by visitors that leave the road and go into wet areas with POC. Strategic placement of boulders along the access road can limit the ability of vehicles to leave the road. Strategically placed signs that describe the POC root disease situation can help the situation by discouraging driving into the area, encouraging drivers, bicyclists, and horseback riders to stay on the access road, and asking visitors to wash boots, horse hooves and trail bikes before entering.

As stated above, construction of the raised roadbed will require improving the access road between the crossing and FS Road 26 so that dump trucks may enter the area. Depending on where the trucks have been in the recent past, they have the potential to carry *P. lateralis*

into the RNA. To reduce this potential, construction will need to be done during the dry season (approximately June through October), and all trucks that enter the RNA will need to be washed prior to entry. Following the improvement of the crossing, the Cliff Lake access road back to FS Road 26 will have to be returned to a “high clearance” 4WD condition.

D. Roadside Sanitation- This alternative consists of removing uninfected POC from alongside the Cliff Lake access road. The general buffer width recommendation is to cut all POC in a buffer zone 25 feet above the road (or less if there is a steep cutbank), 25 feet below the road, and 50 feet below the road where it crosses a drainage. At Cedar Basin RNA, the only area with POC that are this close to the Cliff Lake access road are in the vicinity of the outlet of Cedar Lake.

Advantages- Observations to date have indicated that almost all new disease introductions occur immediately adjacent to a road or trail. Removal of POC from alongside the access road will reduce the probability of infested mud landing near a susceptible host.

Disadvantages- Because POC seeds prolifically, continued removal of all POC seedlings within the “sanitation zone” is required. Removal of large POC next to the road may be objected to by the public. While this treatment reduces the probability of disease establishment where most people pass, it does not affect the probability when people leave the road.

3. Risk Comparison: The table at the end of this letter rates the effectiveness of the four management alternatives in reducing the risk of POC root disease introduction into Cedar Basin RNA. It also rates the effectiveness of three combined treatments (restricting vehicle access/improving the access road; restricting vehicle access/roadside sanitation; improving the access road/roadside sanitation). The relative risk levels represent my best estimate of the impact of each alternative on the potential for POC root disease introduction based on my knowledge of the biology and management of POC root disease. Two aspects of risk reduction associated each alternative are examined; whether the alternative minimizes the pickup/deposit of mud near POC and whether the alternative prevents the infection of POC once infested mud is dropped. To assist with the formulation of management recommendations, I’ve added the impact of each alternative on two additional objectives; to maintain public access while not encouraging additional use and to maintain the function of the area as an RNA. The impacts on public access and RNA function are not considered in the assignment of disease risk potential.

Under the current management situation, the relative risk of introduction of POC root disease into Cedar Basin RNA is high. The presence of POC and water along the access road at the outflow of Cedar Lake provides the perfect situation for disease introduction. As stated previously, this risk will only increase as POC root disease becomes more prevalent in the Sacramento River drainage.

The most effective single treatment is to improve the access road, which reduces the risk of disease introduction from high to low or very low. Raising the access road near the outlet of Cedar Lake and installing culverts provides a passive mechanism that keeps potentially infested mud from washing off of passing vehicles, trail bikes, horses and boots, and does it where it is

needed the most. The road improvement also requires very little maintenance to remain effective.

Restricting vehicle access by installing a locked gate at the entrance to the RNA would also provide effective protection against vehicle-borne POC root disease introduction. However, it does nothing to prevent disease introduction by trail bikes, hikers and horses. In addition, the overall effectiveness of the treatment in reducing vehicle entry is directly related to the degree to which the Forest Service is able to keep the closure from being circumvented. Rocks, ditches or other barricades will need to be erected to keep vehicles from going around the gate. Educational signs explaining why the road closure was implemented can help gain visitor support and acceptance. However, the presence of a landowner with near-exclusive vehicle access to the RNA may seriously undercut the acceptance of the closure. As a result of this, the gate and signs will have to be constantly monitored and maintained. Because of all of this uncertainty, I rated the relative risk of POC root disease introduction under this alternative as low to moderate.

Roadside sanitation (removal) of POC is a commonly used component of Port-Orford-cedar root disease management in uninfested areas. However, since POC seeds readily, repeated removals are required every two to four years for the treatment to maintain its effectiveness. For this reason, I rated the alternative as producing a low to moderate risk of disease introduction.

The combination of treatments that is most effective in reducing potential disease introduction is to improve the Cliff Lake access road and perform roadside sanitation. The risk rating for this combination was very low. This combination of treatments reduces both the possibility that infested mud will be deposited and the possibility that disease inoculum that is deposited will encounter a live POC host. Again, the sanitation treatment would need to be repeated to remain fully effective.

The combined treatment of restricting vehicle access and performing roadside sanitation is more effective than either of the two treatments alone (I rated the combination as low risk for disease introduction). Again, the limitations of each separate treatment (continued maintenance and public acceptance) can potentially reduce the effectiveness of the overall treatment.

Finally, it should be noted that the risk ratings for the “improve access road” alternative and for the combined “restrict vehicle access/improve access road” alternatives were the same (low to very low). This is because once the road improvements are installed, it makes little difference whether vehicles pass on the road or not. Raising the road and improving the drainage should make closing the access road unnecessary.

### **Management Recommendations**

The presence of POC along the Cliff Lake access road at the Cedar Lake outlet provides is a classic example of a site that has a high potential for POC root disease introduction. If this area becomes infested, options to prevent spread throughout the basin’s POC population become extremely limited. Fortunately, since the disease has not yet been introduced, the area can be fairly easily treated, reducing the risk of disease introduction to low-very low levels.

My recommendations for management actions to reduce the potential of POC root disease introduction are similar to those presented by Hugh Safford in his letter of January 2, 2002. They consist of several short-term and long-term recommendations as follows:

### Short-Term Recommendations

1. Proceed with the proposed road upgrade at the crossing of the Cliff Lake access road and the outlet of Cedar Lake. Any other muddy sites along the road within 25-50 feet of POC should be repaired at the same time. Work should be done during the dry period of the year (approximately June-October) and all vehicles will need to be washed before entering the RNA. When the upgrade is complete, return the road to a high clearance 4WD condition. Strategically place boulders and other barricades where necessary to prevent vehicles from driving within 25-50-feet of POC.
2. Perform roadside sanitation by cutting or removing all POC within 25-feet of the access road, and 50-feet below the road below any major drainages, including the Cedar Lake outlet. In practice, removals will only be done in the vicinity of the crossing.
3. Place signs describing the POC root disease situation and the importance of Cedar Basin as an RNA where visitors park near the junction of the Cliff Lake access road and FS Road 26. The signs should also discourage driving into the area and encourage drivers, bicyclists, and horseback riders to stay on the access road. Bicyclists should be asked to avoid or carry their bikes across any wet spots. Hikers should be asked to avoid wet spots as well. Visitors may also be encouraged wash boots, horse hooves and trail bikes before entering. Signs should also be placed along the Cliff Lake access road before the Cedar Lake outlet and at other strategic locations.
4. Discontinue promotion of Cedar Basin as a recreation area. Increased recreational use of Cedar Basin RNA means increases chances of introduction of POC root disease. To this end, the Shasta-Trinity NF should do the following:
  - A. Maintain the unmarked, 4WD character of the Cliff Lake access road. Signs discussing the POC root disease situation should not be visible from FS Road 26.
  - B. Front office reception staff should direct recreationists to other areas.
  - C. Attempt to convince Mount Shasta area tourism/fishing websites to remove Cliff Lake from their maps. This was already done for Cedar Lake.

### Long-Term Recommendations

1. Revisit the roadside sanitation removal area every 2-4 years and remove any POC that have seeded in.
2. Maintain the option to gate the RNA. Increased protection measures could be warranted if

recreational use significantly rises or if a change in the POC root disease situation in the surrounding area necessitates a reevaluation of the risk to the RNA.

3. Hold candid discussions with the inholding owner regarding potential willingness to transfer ownership of the property to the public sector, either by sale or land exchange.
4. The Protection and Management Standards (FSM 4063.3) in the Cedar Basin RNA Establishment Record should be reviewed to assure that the special values for which the area was designated are being preserved. The Shasta-Trinity NF Land and Resources Management Plan Standards and Guidelines direction is that a management plan will be developed for each RNA. In view of the recreational uses of the Cedar Basin RNA, a management plan should be written to address issues of access and recreational use and to assess their effects on the RNA. The management plan should also outline a strategic approach to the measures needed to protect the RNA.

A major difference between my recommendations and those of Hugh Safford is that I don't recommend installing a gate to restrict vehicle access. Gate installation and road closures are only recommended when the number and degree of high risk situations in the closed area make it difficult or impossible to reduce the risk by other treatments. At Cedar Basin RNA, this is clearly not the case. Once the Cliff Lake access road improvement and POC roadside sanitation measures are instituted, the addition of a gate will do little to reduce the risk. Restricting access will only provoke the public over a situation where it is unnecessary to do so, and will make it harder to place future closures in areas where they are really needed.

Another difference between my recommendations and those of Hugh Safford is that I recommend preventative roadside sanitation cutting of POC. This treatment will enhance the beneficial effects of the access road improvement by making it harder for *P. lateralis* spores to reach a susceptible POC host. We also call for the development of a management plan to address the issues of access, recreational use and overall protection of Cedar Basin RNA.

The only other potential risk of POC root disease introduction comes from 4WD vehicles, trail bikes, horses or hikers leaving the Cliff Lake access road and inadvertently depositing infested mud near POC. Gates only reduce the potential of 4WD vehicles to serve as POC root disease vectors. At the present time, only about one or two vehicles go up the access road on each late spring-summer weekday, and about five or six go up the road each day on weekends. Maintaining the high clearance 4WD character of the road and placing boulders or other barricades should be sufficient to minimize the ability of these vehicles to leave the road. As for the trail bikers, hikers and equestrians, educating them by installing signs and limiting their numbers by not actively promoting recreational use of the RNA is about all that can be reasonably done at this time. Periodic reevaluation of the need for vehicle restrictions is one of the many issues that may be addressed in a management plan for Cedar Basin RNA.

If you have any questions or comments regarding the risk evaluation or recommendations in this report, please feel free to give me a call. As always, I'm available to assist in any way that I can.

/s/ Peter A. Angwin  
Plant Pathologist  
N. California Shared Service Area

cc: Peter Van Susteren     `     John Kliejunas  
    Dave Trevisan                     Hugh Safford  
    Jim Harvey                         David Diaz  
    John Neisess                        Connie Millar

**Ranking of Relative Risk of POC Root Disease Establishment Presented by Alternatives  
for the Cedar Basin Research Natural Area**

| Current<br>Situation | Restrict<br>Vehicle<br>Access<br>(RVA) | Improve<br>Access<br>Road<br>(IAR) | Roadside<br>Sanitation<br>(RS) | RVA<br>+<br>IAR | RVA<br>+<br>RS | IAR<br>+<br>RS |
|----------------------|--|------------------------------------|--------------------------------|-----------------|----------------|----------------|
|----------------------|--|------------------------------------|--------------------------------|-----------------|----------------|----------------|

**OBJECTIVE**

1. Reduce Potential For Disease Introduction

|  |   |    |   |   |   |    |   |
|--|---|----|---|---|---|----|---|
| Minimize Pickup/<br>Deposit of Mud<br>Near POC | N | P* | Y | N | Y | P* | Y |
|--|---|----|---|---|---|----|---|

|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| Minimize Subsequent<br>Infection of POC | N | N | P | Y | N | Y | Y |
|---|---|---|---|---|---|---|---|

|  |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|
| 2. <u>Maintain Public Access<br/>At Current Levels</u> | Y | N | Y | Y | N | N | Y |
|--|---|---|---|---|---|---|---|

|  |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|
| 3. <u>Maintain Function<br/>As RNA</u> | N | Y | Y | Y | Y | Y | Y |
|--|---|---|---|---|---|---|---|

|                      |          |             |             |            |             |           |           |
|----------------------|----------|-------------|-------------|------------|-------------|-----------|-----------|
| <b>RELATIVE RISK</b> | <b>H</b> | <b>L-M*</b> | <b>L-VL</b> | <b>L-M</b> | <b>L-VL</b> | <b>L*</b> | <b>VL</b> |
|----------------------|----------|-------------|-------------|------------|-------------|-----------|-----------|

**Key:** N = Objective not met.

P = Objective partially met

Y = Objective met

\* = Effectiveness depends on degree of public compliance with road closure

H = High Risk

M = Moderate Risk

L = Low Risk

VL = Very Low Risk