

April 4, 2005

Re: Survey of *Ribes* species in the Cathedral Spires area, Custer State Park, SD,  
RCSC-10-05

To: Richard Miller, Park Superintendent, Custer State Park

Cc: Bill Hill, Ron Walker, John Ball, Blaine Cook, Frank Cross, Jeri Lyn Harris, Brian Geils,  
Kurt Allen

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White pine blister rust (*Cronartium ribicola* J. C. Fisch. ex Rabenh.) was introduced into both eastern and western North America in the early 20th century, and has spread throughout the range of five-needle pines. This rust fungus was first reported in 1992 on limber pine (*Pinus flexilis* James) and wax currant (*Ribes cereum* Douglas) at the Cathedral Spires (Lundquist et al. 1992). The Cathedral Spires population is the only known location of native limber pine in South Dakota, and limber pine is the only native tree species susceptible to this disease in South Dakota.

White pine blister rust kills five-needle pines by forming cankers that girdle and kill the main stem (trunk). This fungus has five spore forms and two different hosts in its life cycle. Two spore forms occur only on five-needle pines and three spore forms occur on currant and gooseberry (*Ribes* spp.). The disease cannot spread from pine to pine, but is transmitted to pine by spores produced on *Ribes* leaves, and is transmitted to *Ribes* by spores produced on pine stems and branches. Therefore, both *Ribes* species and five-needle pine species are required for this fungus to complete its life cycle.

A survey of *Ribes* species in the Cathedral Spires area was conducted on July 8, 2004 (**Fig. 1**). The survey consisted of counting all *Ribes* stems within 30 transects of 1 X 40 m, giving a total sampled area of 1,200 m<sup>2</sup>. Transects were established near the white pine blister rust Pest Trend-Impact Plot Systems (PTIPS) plot, which is one of a series of permanent plots for the long-term monitoring of pest trends (**Fig. 1**).

The most common *Ribes* species found was northern gooseberry (*R. oxyacanthoides* L. subspecies *setosum*), which made up 84% of the *Ribes* species or approximately 492 stems/hectare (1 hectare ~ 2.5 acres). Another subspecies of northern gooseberry (*R. oxyacanthoides* (L.) Mill. subspecies *oxyacanthoides*) made up 15% of the *Ribes* species or approximately 83 stems/hectare. Wax currant, also called Western red currant, (*Ribes cereum* Dougl.) made up 1% of the *Ribes* species or 8 stems/hectare. There may be other *Ribes* species in the area at lower frequencies. White pine blister rust was not observed on the *Ribes* plants on July 8, but sporulation is usually more apparent in late summer and early fall. *Ribes* species differ in their susceptibility to this disease. However, the relative susceptibility of the three *Ribes* species/subspecies found in this area is not known.



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**Management strategies for white pine blister rust disease control:** These three management strategies can be used in combination or individually. Incorporating all three options would provide the best protection.

- *Disease resistance.* A long-term approach would be to identify and collect seed from the local limber pines that have demonstrated resistance to the rust. This would allow for the selection and development of blister rust resistant limber pine for planting in the future. Resistant varieties of five-needle pines have been developed, but there are no commercially available limber pine resistant to the rust. The natural occurrence of blister rust-resistant limber pine is likely, given that natural resistance to the rust occurs in other native five-needle pines. Collection and storage of seed will help conserve the genetic stock of this unique limber pine population, and provide local seed if needed in the future.

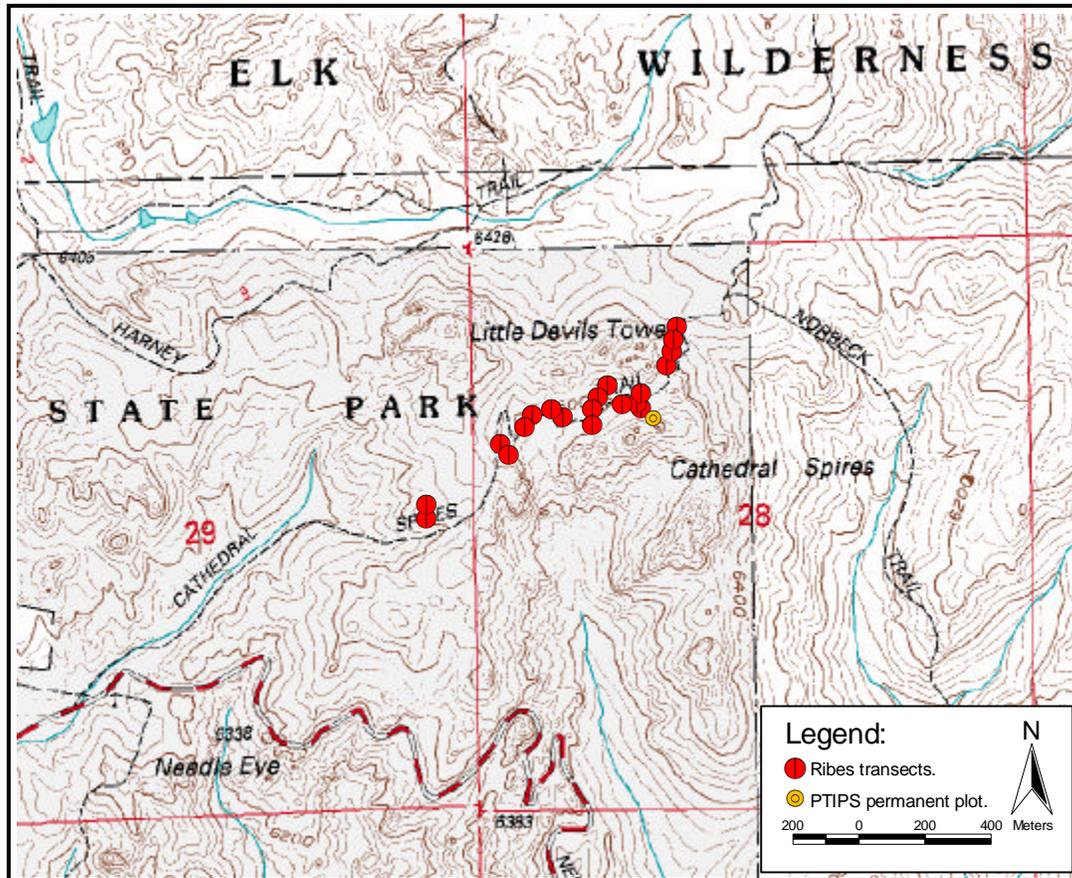
- *Blister rust canker removal to remove the disease.* Branches with cankers 4 inches or more from the stem should be removed, no matter where they occur in tree crowns. This prevents cankers from reaching the main stem and killing trees. Pruning cuts should be made immediately outside the branch collar. Trees with blister rust cankers on the main stem or with cankered branches within 4 inches of the main stem would be difficult to save. It has been suggested that excising stem cankers might be a viable option. This would involve removing bark 4 inches around stem cankers and around cankered branches that are within 4 inches of the main stem. This method is intended to prevent canker spread, since the fungus spreads through the bark.

- *Controlling the Ribes.* Several *Ribes* plants and species were observed in the area. The spores that come from *Ribes* plants infect pines. These spores are highly susceptible to drying and ultraviolet radiation from the sun. Therefore, the spores that infect pines do not travel long distances, and do not survive for long periods after being released from *Ribes*. Removing *Ribes* plants around five-needle pines and immediately around a stand has been proven effective at controlling white pine blister rust in the Lake States, but the methods have never been tested in the Rocky Mountain Region.

### **Mountain pine beetle:**

In addition to concerns about white pine blister rust and *Ribes* species, this unique limber pine population may soon be challenged by mountain pine beetle (*Dendroctonus ponderosae* Hopk.). This beetle is active in the area (Schaupp and Johnson 2004). Limber pine is an excellent host for mountain pine beetle, and there is a positive correlation between mountain pine beetle incidence and both branch canker severity and stem canker incidence of the rust (Blodgett et al. 2005). Schwandt and Kegley (2004) found that mountain pine beetles might prefer trees infected with rust at low beetle populations, but beetles appeared to prefer trees with little or no rust at higher beetle populations. Monitoring of this situation is recommended. Further action may be needed.

If you have any questions about this survey, please contact Jim Blodgett, Rapid City Service Center. For general forest health questions regarding South Dakota State Park lands please contact John Ball (605-688-4737).



**Fig. 1.** Location of *Ribes* transects and white pine blister rust Pest Trend-Impact Plot Systems (PTIPS) permanent plots.

Sincerely,

*/s/ James T. Blodgett*

James T. Blodgett

Plant Pathologist, Rapid City Service Center

#### Reference:

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