

NASA IMAGERY PROJECT PROVES PRESCRIPTION WEED CONTROL AND PREDICTS THE FUTURE

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The invasion of perennial pepper weed (tall whitetop) along the Truckee River and Pyramid Lake area of Nevada, north of Reno, is a prime example of how non-indigenous invasive plant species pose a major threat to ecosystems.

However, on a positive note, comprehensive land management activities in the area prove that invasive noxious weeds can be economically controlled with thorough planning and a prescription of mechanical, biological, and chemical measures.

"Tall whitetop simply forces out all other native plants. This land was so engulfed in noxious weeds that people thought it could never be restored to agricultural uses," says Bill Inman, S Bar S Ranch manager.

Inman initiated prescriptive weed control programs on the S Bar S Ranch near Wadsworth, Nevada. The ranch operation was overseen by the College of Agricultural, Biotechnology, and Natural Resources of the University of Nevada, Reno. The university operated the ranch under a trust fund until the end of 2003.

"We set out to change opinions with actual results instead of conducting weed symposiums," Inman says. "We proved what would work by writing prescriptions for land management from our experience, what we saw, what we knew about livestock grazing and what herbicide attributes were necessary. We herded cattle, sheep and goats, set controlled fires, drove mowers and strapped on backpack sprayers to show real results."

The herbicide portions of the prescriptions were developed with the support of DuPont vegetation management representative, Frank Aulgur. DuPont™ Escort® XP and Telar® DF herbicides had the best fit for tall whitetop control and were provided by DuPont as research demonstration material.

The results that Inman and ranch employees achieved along a section of the Truckee River were dramatic. That area became an oasis where tall whitetop was controlled in the midst of a desert of tall whitetop that had invaded the S Bar S Ranch plus adjacent ranches and Paiute tribal property.

"We had no choice but to wage war against the noxious weeds because invasion of these non-indigenous plants had diminished our productive pastures and fields from 287 acres to 47 acres," Inman said.

By the end of 2003, Inman had expanded his noxious weed control demonstration beyond the S Bar S Ranch onto the neighboring Copeland Ranch. A total of 620 acres were in different phases of restoration to agricultural use, and the noxious weed area had been reduced to 30 percent of the total acres.

This effective tall whitetop control caught the attention of more than the local ranchers and Paiute tribal leaders. The tall whitetop control was even obvious from outer space.

National Aeronautics and Space Administration (NASA) satellite imagery recorded the difference as part of research into remote sensing for mapping invasive weed species.

The project was done as part of DEVELOP, which is a collaboration between NASA, other federal agencies, state and local governments, academia and industries. College and high school students in the DEVELOP program conduct earth science application projects that benefit communities. Authors of the DEVELOP research report for the Truckee River and Pyramid Lake project are Douglas R. Gibbons, Utah State University, Jeremiah V. Knoche, Oregon State University, and NASA project coordinator Cindy Schmidt.

The project synopsis noted that, "The DEVELOP students at NASA, Ames Research Center, developed a methodology for the utilization of NASA's Earth Science Enterprise satellite

imagery to measure the extent of tall whitetop (*Lepidium latifolium*) invasion within the Pyramid Lake Paiute Indian Reservation and created a predictive model of future tall whitetop spread.”

In general, the model compares Inman’s results against allowing the tall whitetop to go untreated and progressively spread to engulf more and more acres.

The synopsis further states, “As expected, the untreated scenario resulted in continued drastic spread of the weed over a five-year period. Alternatively, the treated scenario demonstrated that the weed could be virtually eliminated over a fairly short period of time, but only if done on a comprehensive basis.”

The full report explains, “The evaluation of S-S [S Bar S] management practices offers useful insight. The S-S ranch management outlined an 18-month course of action, which has virtually extirpated monocultures of tall whitetop, returning them to irrigated crop and pasturelands.”

Tall whitetop is an aggressive competitor with native grass species. The plant grows a taproot that can reach water 15 feet below the surface. It destabilizes riverbanks and increases salinization of infested soils.

The explosive spread of tall whitetop along the lower Truckee River began in 1997 when the area was subjected to a flood. Tall whitetop seed and rootstock came from the upper river channel and settled flooded land along the river. Not only has it had devastating effects on agriculture, wildlife habitat, fisheries, scenic views and recreation, but also Indian culture and traditions.

Inman and his crew had to take control of the situation when the productive S Bar S Ranch land was so drastically reduced.

Inman outlines the basic methodology for tall whitetop weed control as follows:

- 1) Remove the dead weed matter by one or more options:
 - Hay cattle in the winter so that cattle hooves break up the thatch on the soil surface or any standing weed dry matter.
 - Mechanical mowing.
 - Controlled burning.
- 2) Grazing of new growth by sheep or goats.
- 3) Apply 2,4-D and Escort® XP at a rate of 1 2/3 ounces per acre in combination with spring and summer grazing.
- 4) Continue grazing or manually remove the biomass, especially in those areas close to water where only 2,4-D herbicide applications are made.
- 5) Fall apply 2,4-D, Escort® XP and Telar® DF when the plants are drawing reserves to their roots.
- 6) Plant competitive, desirable plant species.

Inman said it is necessary to take down the tall whitetop to uncover hidden obstacles. The plant grows four to eight feet tall and easily hides such things as abandoned cars, farm equipment, and washouts. It is not safe to implement mowing in some areas until all objects and obstacles are located.

“If a half-hearted or minimal effort is put into tall whitetop control, you can actually cause release of it to spiral into a much larger problem by encouraging its spread,” Inman said.

Burning alone without complementary control methods is an example because the tall whitetop grows more vigorously after burning than before, which means grazing sheep and goats become even more important. The number of sheep and goats has to be sufficient to properly graze the designated area.

In addition, disturbing soil, such as by disking, where tall whitetop is growing can cause the rhizomatous root system to sprout new tall whitetop plants.

Inman didn’t stop at controlling tall whitetop. His efforts to remove noxious weeds also included management of purple loosestrife, salt cedar, and Russian knapweed.

Per state law, it is the responsibility of landowners to control noxious weeds, but much of the western areas are Federal lands where noxious weeds are spreading rampantly. Also, funding for enforcement is not available.

"The paranoia of herbicides has limited some noxious weed control programs. People are very concerned when we mention herbicide control, and that is why we started with demonstrations," Inman explains.

Several tours and site presentations have been made at the S Bar S Ranch to all levels of local, regional, and Federal officials.

Inman sees limited herbicide use in a prescriptive approach, along with biological and mechanical control, as being the necessary, proven answer.

"Unfortunately, the Native Americans do not have the economic resources to combat tall whitetop, and there also has not been a model to follow in accomplishing long-term tall whitetop control," Inman said.

He sees hope in the near future as Cooperative Weed Management Areas (CWMA) are being formed through state, federal and county cooperation to pool funding for larger impact weed control programs. Forming such a CWMA for the area along the Truckee River and Pyramid Lake is extremely important.

As the NASA final report synopsis says, "Economic impacts are potentially severe for the Pyramid Lake Paiute tribe and other irrigators utilizing the Truckee River as a primary water source. Any degradation of the river channel and water resources has far reaching implications for the tribe."

Between the satellite imagery mapping and the demonstrated success of Inman's project, there can be a path forward. The synopsis concludes by saying, "The treated scenario demonstrated that the weed could be virtually eliminated over a fairly short period of time, but only if done on a comprehensive basis. These short-term predictions along with accurate maps of real distribution are very useful in determining the effectiveness of particular management methods, and for helping to coordinate local and regional interest groups policy and management strategies."

Inman's experience and philosophy have led him to establish his own vegetation management consulting and project management company, Preferred Natural Resources. He stresses the management strategies proven at the S Bar S Ranch in addressing noxious weed problems.

The article first appeared in the March/April 2004 issue of *Land and Water*.

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