# INVASIVE SPECIES -- AN EMERGING ISSUE FOR MINING AND RECLAMATION[1]

J. Scott Boyce[2]

**Abstract.** The impact of invasive species on agriculture, fisheries, natural systems, human health and the economy is gaining increased attention worldwide. The increased movement of people and goods around the globe has greatly increased the impact of this long-standing problem. Executive Order 13112 established the National Invasive Species Council and directed Federal agencies to take appropriate action using relevant programs and authorities to control the economic, ecological, and human health impacts of invasive species. The proper role of the Office of Surface Mining and State agencies in reducing the negative impact of invasive species remains to be determined. If a regulatory response is required to address the potential spread of invasive species through mining and reclamation, the regulatory approach will likely be different than the approach that is currently used to control the other environmental impacts of mining.

Additional Key Words: noxious plants, regulations, weeds.

## Introduction

Executive Order (EO) 13112, which was signed by President Clinton, February 3, 1999, addresses the need to prevent the introduction of invasive species, provide for their control, and minimize their economic, ecological and human health impacts. Section 2(a) requires that Federal agencies "use relevant programs and authorities to: (1) prevent the introduction of invasive species; (2) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (3) monitor invasive species populations accurately and reliably; (4) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (5) conduct research on invasive species and develop

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[2] J. Scott Boyce, Agronomist, Office of Surface Mining, 1951 Constitution Ave., Washington, DC, 20240.

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technologies to prevent introduction and provide for environmentally sound control of invasive species; and (6) promote public education on invasive species and the means to address them."

The Executive Order indicates that the Federal Government is to give considerable attention to the issue of invasive species and establishes an Invasive Species Council. Quoting from Executive Order 13112 "An Invasive Species Council (Council) is hereby established whose members shall include the Secretary of State, the Secretary of the Treasury, the Secretary of Defense, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce, the Secretary of Transportation, and the Administrator of the Environmental Protection Agency. The Council shall be co-chaired by the Secretary of the Interior, the Secretary of Agriculture, and the Secretary of Commerce. The Council may invite additional Federal agency representatives to be members, including representatives from subcabinet bureaus or offices with significant responsibilities concerning invasive species, and may prescribe special procedures for their participation. The Secretary of the Interior shall, with concurrence of the co-chairs, appoint an Executive Director of the Council and shall provide the staff and administrative support for the Council."

OSM's regulations do not directly address the issue of invasive species or noxious weeds; rather they defer to existing Federal and State laws and regulations. The Federal regulations at Section 816.111(b) Revegetation: General requirements, state: "The reestablished plant species shall-- (1) Be compatible with the approved postmining land use; (2) Have the same seasonal characteristics of growth as the original vegetation; (3) Be capable of self-regeneration and plant succession; (4) Be compatible with the plant and animal species of the area; and (5) Meet the requirements of applicable State and Federal seed, poisonous and noxious plant, and introduced species laws or regulations." (emphasis added)

**Impact of invasive species:**

Harmful, non-native plants, animals, and microorganisms, are found throughout the United States causing billions of dollars of damage annually to crops, rangelands and waterways. (United States General Accounting Office, July 2001.) Pimentel et al. (2000) estimate environmental damage and losses adding up to more than 138 billion dollars per year. Additionally, they report that about 400 of the 958 species that are listed as threatened or endangered under the Endangered Species Act are considered to be at risk primarily because of

competition with and predation by non-indigenous species. Historically, we have given the most attention to organisms that threaten agricultural production or cause disease. However, most of us are aware that invasive species are a problem in a broader context and have some knowledge of the impacts of organisms such as zebra mussels, starlings, and kudzu. It is organisms in the latter category, plants, that pose the greatest potential problem from the perspective of mining and reclamation. The emphasis in this paper is on non-native plants. However, movement of organisms native to the United States to regions where they do not occur naturally may cause similar problems.

Exotic plants that do not cause problems in their native setting may become invasive when introduced into a new environment. The absence of natural predators, insect grazers, and diseases that held a specific plant in check in its native environment may allow the plant to become invasive in its new environment. And in fact, successful biological control has been established in some cases by importing natural predator insects that feed on invasive plants. Allelopathic effects of some species may allow it to be more competitive and become established or invasive tendencies may be because the new environment is free of the allelopathic chemicals that tended to hold it in check in its native environment (Callaway and Aschehoug, 2000).

Dalmation toadflax provides an example of the kinds of problems an invasive species may cause when it exploits an opportunity created through mining and reclamation. Dalmatian toadflax (Linaria genistifolia (L.) Miller) is a perennial plant from southeastern Europe that grows up to 1 meter tall. Toadflax has an extensive and deep root system and waxy leaves that make it difficult to control with chemicals or mechanically. It is more competitive than the native plants and has limited forage value for livestock and wildlife. However, livestock will utilize the plant in its early growth stages under rangeland conditions.

Westbrooks (1998) reported that over the past 15 years dalmatian toadflax has begun to spread throughout the Raymond Mountain Wilderness Study Area near Border Junction, Wyoming. The source of the infestation is thought to be a phosphate mine that was operated for three years in the 1970's on private land at the base of Raymond Mountain just outside of the Wilderness Study Area. During the time the mine operated trucks and heavy equipment are believed to have transported seeds of Dalmatian toadflax to the mine area. During the 1980's toadflax thrived in the mine area and spread to adjacent private and public land. By 1991 the infested area had increased to about 26 hectares (63 acres) within the Wilderness Area and about

60 hectares (148 acres) of adjacent private land. As of 1998 toadflax was continuing to spread and had infested land areas in a 16 kilometer (10 mile) radius around the mine site. Elk are believed to be a prime vector for movement of the plant to uninfested areas as indicted by the presence of the plant on elk bed grounds. The value of the Wilderness Study Area is being diminished and forage for wildlife and livestock is being lost.

Once an invasive species is established, the problems caused by it and the costs associated with it will likely go on long-term. Invasive species infestations can seriously affect the economic value of land. One example is the impact of leafy spurge (Euphorbia esula L.) on the Taylor Ranch in Klamath County, Oregon. In the mid-1980's the 551 hectare (1,360 acre) ranch was abandoned due to non-productivity caused by leafy spurge. The value of the ranch dropped from $170,000 to $27,500, a loss of 83% in value. The current owner is requesting an adjustment in the tax valuation of the property. The reason leafy spurge is so devastating lies in the fact that cattle refuse to graze in areas with a 10-20% leafy spurge cover. The milky sap is a digestive tract irritant to cattle and will also cause lesions around the eyes and mouth (Westbrooks 1998). The plant can be controlled, but the cost is high relative to the value of the forage produced.

The potential problems caused by invasive species on mined lands are analogous to the problems caused by acid mine drainage. The problem once established will persist for a long time, there will likely be off-site impacts, and the impacts will largely affect third parties.

## Regulatory Considerations

On August 30, 2001, OSM headquarters sent a memo to Regional Directors and Field Office Directors highlighting certain requirements of EO 13112 Invasive Species, asking specific questions concerning control of invasive species in the Regions and States, and soliciting their views, and State regulatory authority views, on control measures appropriate to mining and reclamation. Feedback in response to the memorandum indicates that conditions vary widely from state to state and on Indian lands. The thrust of existing state programs is largely aimed at limiting the negative impact of weeds on agriculture and the programs are run by agricultural agencies. However, many states currently require use of certified seed on mine reclamation projects to prevent the introduction of undesirable plants and some states have requirements in place, or are moving in the direction of establishing requirements, for reducing the spread of

undesirable plants through mulch. No respondents reported requirements for sanitation of mining equipment although one State reported sanitation requirements for agricultural equipment. Opinions varied as to what would constitute appropriate levels of control of undesirable plants and what would constitute appropriate mechanisms of control. Some respondents suggested that noxious weeds and invasive species endemic to the mining area should be controlled on reclaimed land but new noxious weeds or invasive species found on mine lands should be eliminated prior to bond release.

In my view, a reasonable policy on invasive species would minimize the probability of introducing new species to the reclaimed area and accommodate the fact that control is the best that can be expected for species already established in the region surrounding the reclaimed mine land. Such an approach might include equipment sanitation requirements during mining and reclamation and final bond release standards would vary depending on the final land use and the status of invasive species in the region. For example, on reclaimed pasture land control of an invasive thistle endemic to the area would be appropriate, but a species of invasive thistle new to the area should probably be extirpated. However, the question of how to handle new invasive species introduced through the mining and reclamation process could be problematic. Extirpation of an invasive organism can be very difficult and very expensive, but may be justified in certain circumstances. Extirpation of a plant population may be particularly difficult as most invasive species, once established, will create a seed bank in the soil from which seedlings will emerge for many years. There is a clear advantage in preventing the initial establishment of undesirable plants.

Many value judgments will need to be made as we address the issue of preventing the spread of noxious weeds and invasive species through mining and reclamation. How these judgments are made will depend to a large degree on the risk associated with the introduction of new species. Ultimately, the mining and reclamation community will have to get involved. The fact that mining and reclamation provide opportunity for invasive species to be spread across state lines argues for regulatory standards at the Federal level. It falls to OSM to work with the Invasive Species Council to assure that the invasive species issue is identified and addressed in reclamation guidelines and regulations.

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