

Introduction

Invasive species are typically recognized as non-native species that once introduced accidentally or on purpose, spread beyond control to affect natural and agricultural resources or human health. Not all non-native species are invasive, and many are highly beneficial for agricultural or ornamental purposes. An imported or established species has a higher probability to become invasive when the species is considered invasive in other parts of the world (Daehler et al 2004). Agricultural pests, in the context of this strategic plan, are considered native or non-native species that cause harm to agricultural resources of the state, including timber and non-timber forest products of the state.

Invasive plants and agricultural pests cause significant economic losses to agriculture and wild lands across North America. As of 2005, economic impacts to agriculture and wild lands in Montana from Spotted knapweed (*Centaurea stoebe*) were estimated to cost approximately \$42 million annually (Sheley et al. 2005). In Alaska, Spotted knapweed and many other notorious invasive agriculture and wild land weeds are not present, have a very limited distribution in the state, or have yet to invade natural areas (Table 1). However, several invasive weeds such as Canada thistle (*Cirsium arvense*), perennial sowthistle (*Sonchus arvensis*), and orange hawkweed (*Hieracium aurantiacum*) are presently impacting agricultural and/or wild lands (Table 1).

In Alaska, invasive insects and diseases are also present, and cause severe damage to forests. Some insect pests such as Spruce Bark Beetle are native to Alaska. Monitoring for non-native insect and disease pests in Alaska began in the early 2000s. These monitoring efforts have not detected any established non-native destructive beetles or wood boring insects (Division of Forestry 2010). However, increased trade and inspection activities have demonstrated the potential for exotic pest movement through discoveries of Asian Gypsy Moth egg masses on vessels arriving from Asian ports. Fur-

ther insect and disease damage to Alaska forests is tracked each year and these surveys have found over 600,000 acres of forest affected by insect and disease activity from at least 16 different pests (Appendix E, U.S. Forest Service 2011). With these pest interceptions and widespread activity of forest insects and diseases continued monitoring for the introduction and establishment of non-native insect and disease pests is imperative.

In Alaska, plant biologists and natural resource managers are tracking 332 non-native plants for potential invasiveness (AKEPIC download http://akweeds.uaa.alaska.edu/akweeds_tracking.htm 10-12-2010) that occupy an estimated minimum cumulative total of 19416 acres (computed from AKEPIC download <http://akweeds.uaa.alaska.edu/index.htm> 10-12-2010). The number of tracked species is large however, a small proportion of those species may establish in natural areas, and an even smaller portion will cause significant ecological harm (Williamson 1996). Predicting which of these species will cause significant ecological harm is difficult, and can lead to mistakes, making monitoring of most non-native species important to natural resource protection.

Invasive weeds and agricultural pests are introduced to an area in a variety of ways. Hay imported to Alaska can carry significant numbers of weeds (Conn 2006). Horticultural products can carry seeds of weeds, presently the amount of seed carried varies with the type of product (Conn et. al. 2008). Invasive species can also be introduced in ballast, on vehicles, shoes, firewood, wood packaging materials, gravel, and pets. Recent research indicates an increase in the rate of non-native plants recorded (from one per year to almost three per year) as part of the Alaska flora which corresponds to the increase in commerce, development and tourism (Carlson and Shephard 2007).

Ideally an invasive species is managed when it first arrives before it has impacted resources (Figure 1 Lag Phase). This strategy for management is also known as Early Detection

Table 1. Selected invasive plants known to invade natural areas or currently confined to the human footprint in Alaska

Invading natural area	Rank*	Confined to human footprint	Rank*
Canada thistle, <i>Cirsium arvense</i>	76	Giant hogweed, <i>Heracleum mantegazzianum</i>	81
European bird cherry, <i>Prunus padus</i>	74	Garlic mustard, <i>Alliaria petiolata</i>	70
Narrowleaf hawksbeard, <i>Crepis tectorum</i>	54	Himalayan blackberry, <i>Rubus armeniacus</i>	77
Orange hawkweed, <i>Hieracium aurantiacum</i>	79	Japanese knotweed, <i>Polygonum cuspidatum</i>	87
Purple loosestrife, <i>Lythrum salicaria</i>	83	Scotchbroom, <i>Cytisus scoparius</i>	69
Reed canarygrass, <i>Phalaris arundinacea</i>	83	Spotted knapweed, <i>Centaurea stobe</i>	86
White sweetclover, <i>Melilotus officinalis</i> (formerly <i>alba</i>)	81	Yellow toadflax, <i>Linaria vulgaris</i>	61

*Rank represents the relative invasiveness from 0-100 where 100 is most invasive (Carlson et al. 2008).

Table 1 shows a subset of plants that are known in Alaska to invade natural areas, and a subset of invasive plants that are present in Alaska, but are currently confined to the human footprint.

and Rapid Response (EDRR). For example, only two infestations of garlic mustard (*Alliaria petiolata*) are known in Alaska, both in Juneau, and managed by the Juneau CWMA and Tongass National Forest. Other invasive species like spotted knapweed (Figure 2) with only five remaining known infestations are in the same category for management.

Figure 1. Typical species invasion curve

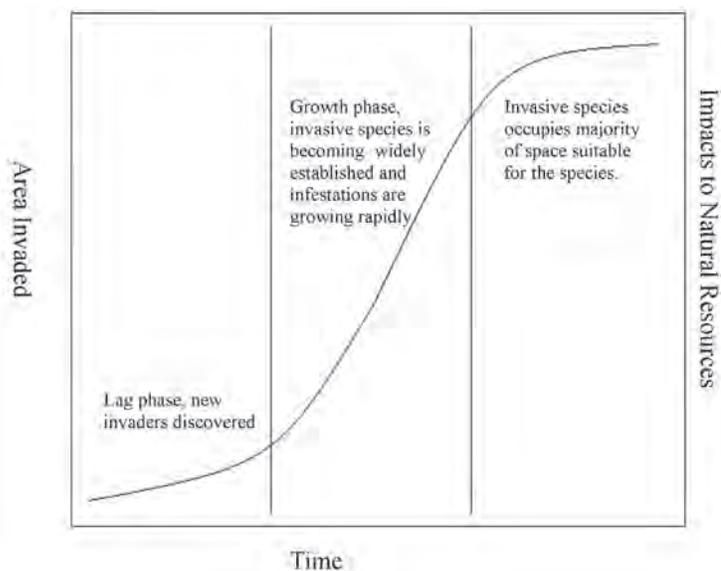


Figure 1 illustrates the typical species invasion curve. During the lag phase, fewer impacts are seen to natural resources and invasive species have a high probability of eradication. A population of invasive species enters the growth phase, and begins to spread rapidly, impacting natural resources. At some point the introduced species will reach its ecological amplitude where it occupies all the space available to the species, and has maximized impacts to resources.

Several invasive weeds, in Alaska, have begun to spread rapidly and impact native vegetation. The most widely recognized example involves white sweetclover, which was first introduced in 1913 for agricultural purposes (Irwin 1945).

Herbarium records indicate sweetclover was first recorded as present in Alaska outside cultivation in 1931 (<http://arctos.database.museum/SpecimenSearch.cfm> Search for *Melilotus* 7-28-2009). Now, nearly 100 years after the first recorded introductions, sweetclover has spread to several river floodplains in Alaska where it reduces the survival of establishing native plants (Spellman 2008). Ideally sweetclover and other invasive weeds and agricultural pests are recognized and managed before they become problematic (Figure 3).

Invasive weeds and agricultural pests are managed by a variety of entities in Alaska including state, federal, borough, private land managers, non-profits and the general public. Coordination of management is critical because invasive weeds and agricultural pests spread beyond management boundaries. To address coordination issues, the Alaska Committee for Noxious and Invasive Plant Management (CNIPM), Alaska Invasive Species Working Group (AISWG), Alaska Pest Risk Assessment Committee (AKPRAC) and local Cooperative Weed Management Areas (CWMA) were established to address statewide and local issues. Many Soil and Water Conservation Districts (SWCD) are also very active in invasive weeds and agricultural pest management and education. Despite these coordination groups very few agency staff members have substantial duties related to the issue of invasive weeds and agricultural pests in Alaska resulting in inadequate attention to the issue.

The state strategic plan for invasive weeds and agricultural pest management is intended to help guide the various land managers, natural resource managers, and other groups involved in invasive weeds and agricultural pest management. A clear need for state leadership on management of invasive weeds and agricultural pests was identified by the 2008 Alaska State Legislature, who delegated the role of providing leadership and strategic planning to the Department of Natural Resources ([AS 03.05.027 Appendix C](#)).

Figure 2. Spotted knapweed



Figure 2. Spotted knapweed infests a limited number of locations in Alaska (left), but has great potential to affect natural resource production and ecosystem services. Shown on the right is a spotted knapweed infestation in Montana where impacts to agricultural and natural resources from the weed are prevalent.

Photos courtesy of Michael Rasy, University of Alaska, Bugwood.org (left) and L. L. Berry, Bugwood.org (right).

Figure 3. Examples of invasive species with apparent impacts

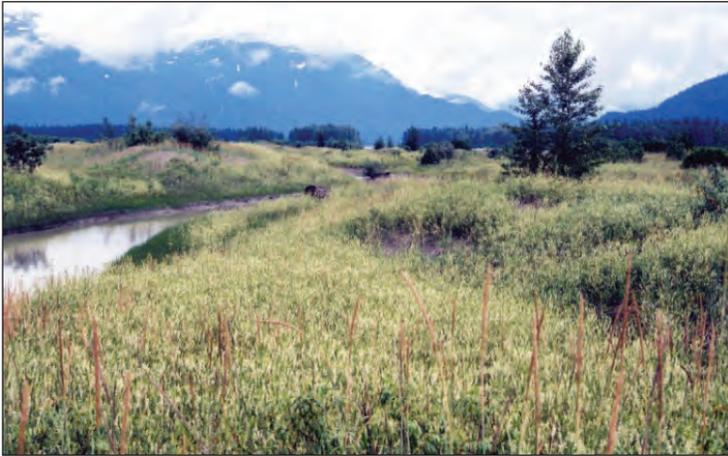


Figure 3. Shown on left is white sweetclover, *Melilotus officinalis*, (Photo courtesy Michael Shephard, USDA Forest Service, Bugwood.org) and on the right orange hawkweed, *Hieracium aurantiacum*, (Photo courtesy Bill Pyle, USFWS). Both these weeds were introduced to Alaska many years ago, and are now invading wild lands. Management of these species prior to their wide establishment in urban and natural areas may have prevented the current problematic invasions.

Purpose of the Strategic Plan

This strategic plan for invasive weeds and agricultural pest management was written to help guide prevention and management of these invasive species by the DNR and its partners. The plan allows for flexibility in implementing action strategies and identification of emerging issues that may warrant action before a new plan is written. The strategic plan provides overall direction to the Division of Agriculture, DNR, partners, and stakeholders in invasive weeds and agricultural pest management.

What is the Plan

This strategic plan is a guiding document for the Division of Agriculture (DOA) and its partners to utilize when managing invasive weeds and agricultural pests. The plan will include three components: the strategies outlined in the plan, the Annual Implementation plan for the DOA, and an Annual Report.

Strategic plan

The strategic plan was developed with the partners of the DOA. After planning and receiving input from the public and partners the DOA identified objectives, and outlined action strategies. The objectives and action strategies will help guide the DOA and its partners in developing annual goals. The strategic plan may also be used as a supporting document when partners are trying to garner funds from various sources to accomplish projects aligned with the plan.

Annual operating plan

The DOA will develop an annual operating plan from the objectives and action strategies outlined in the plan. The annual operating plan will match identified priorities with budget initiatives and other resource allocations. The annual operating plan will be developed by the invasive weeds and

agricultural pest management coordinator, other staff working with the DOA, and partners.

Annual report

Around the end of each calendar year, the invasive weeds and agricultural pest management coordinator will develop an annual report of the accomplishments for that year and priorities for the coming year. The annual report will cover the fiscal year from July through June.

Annual review and emerging issues

The strategic plan will be reviewed annually by the DOA while generating the annual report and annual operating plan. The annual review will identify which action strategies are of the highest priority for implementation that year, and which are complete. Annual review will allow for identification of emerging issues not already addressed in the plan. These emerging issues will be discussed in the annual report and considered for inclusion in the annual operating plan or the next strategic plan.

What the Plan is Not

The objectives and action strategies in the plan reflect new initiatives identified as priorities by the DOA and its partners for invasive weeds and agricultural pest management. The plan is not a list of all the activities that the DOA or its partners will accomplish over the five year life of the plan. Other activities are presently carried out by the DOA and its partners that are of equal importance to those identified in this plan. The plan is not intended to take the place of local planning efforts of land managers or organized weed management areas. The plan does not include invasive species that fall under the management purview of ADFG (e.g. rats and northern pike) and DEC (e.g. bed bugs). Overlap may exist for animal diseases or introduced animal species that adversely affect agricultural production or natural resources.

Scope, Mission & Vision

Scope of Plan

This strategic plan for invasive weeds and agricultural pest management applies to all terrestrial invasive weeds and agricultural pests other than exotic small and large game species, which the Alaska Department of Fish and Game has management authority. The plan, however, does include action strategies that are best suited for agencies other than the DNR to implement. Research goals, objectives, and action strategies for example are best lead by the USDA Agricultural Research Service and the University of Alaska. Such goals, objectives and action strategies are included in this plan to support efforts of other entities in furthering invasive weeds and agricultural pest management needs.

Mission Statement

“The Department of Natural Resources manages noxious weeds, invasive plants, and agricultural pests to maintain uninterrupted productivity of natural and agricultural resources.”

Vision Statement

“The Department of Natural Resources envisions continued natural resource productivity and public use of natural resources, uninterrupted by noxious weeds, invasive plants and agricultural pests.”

Photo: Tom Huette, USDA
Forest Service, Bugwood.org

