



Integrated Weed Management Strategy Focusing on Early Detection/Rapid Response for the Kenai Peninsula - Cooperative Weed Management Area¹

December 2007² (Revised September 2020)

I. INTRODUCTION:

A common operating approach to the management of noxious weeds and other invasive plants is to focus strictly on specific sites. Infestations may be treated, but the relationship of the treatment to the entire problem in an area is not addressed. In addition, individual landowners and managers in a given area attempt to manage invasive plant species based on narrowly defined objectives, independent of each other.

Treatment of specific invasive plants and sites remains a critical component of an effective strategy. However, successful long-term solutions to the problem of invasive plants and noxious weeds must include a broad-scale approach to weed management. A cooperative weed management area is a broad-scale, landscape approach that places specific species and treatment sites in context with geographic distribution of invasive plants, susceptible habitats and feasibility of management. The focus of the weed management area is to find solutions to invasive plant problems across a landscape, rather than strictly focusing on treatments within specific land ownerships.

The Kenai Peninsula - Cooperative Weed Management Area (KP-CWMA) was convened in 2003 by Soil and Water Conservation Districts on the Peninsula in partnership with US Forest Service – State and Private Forestry. The CWMA is composed of all relevant and interested agencies, organizations, tribal landowners and other groups throughout the Peninsula through a signed cooperative agreement, referred to as the Memorandum of Understanding (MOU), which formally recognizes the organization and intent of the group. The following plan further outlines the strategic, landscape approach with an emphasis on early detection and rapid response to specific invasive plant species on the Kenai Peninsula in Southcentral Alaska.

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II. PURPOSE:

The KP-CWMA is intended to bring together those responsible for invasive plant management within the region to develop common management objectives, set realistic management priorities, facilitate effective treatment, and coordinate efforts along logical geographic boundaries with similar land types, use patterns, and problem species.

III. COOPERATIVE WEED MANAGEMENT AREA GOALS:

The following are the four primary goals of the KP-CWMA:

1. Prevent the introduction, reproduction and spread of designated noxious weeds³ and other invasive⁴ plants into and within the KP-CWMA.
2. Reduce the extent and density of plants identified as primary concern and newly established invasive plants to minimize spread and damage to natural resources.
3. Implement the most economic, effective, and safe integrated pest management techniques to control priority species, as identified by the KP-CWMA.
4. Facilitate cooperation among those working to manage invasive plants on the Kenai Peninsula and throughout the communities within the CWMA.
5. Provide educational opportunities and resources to increase awareness of invasive species early detection and rapid response.

IV. ADVISORY COMMITTEES:

Cooperators of the weed management area currently include agencies, non-profit organizations, tribal entities and other interested and concerned groups. When necessary, ad hoc advisory committees will be organized from interested cooperators to jointly accomplish the following:

- Develop and maintain an up to date, comprehensive inventory of invasive plant species recorded on the Peninsula;
- Establish control priorities and develop specific management objectives;
- Develop priorities for area-wide informational, educational, and public awareness material;
- Coordinate the efficient use of resources and personnel to treat designated infestations; and
- Ensure science-based management of designated invasive plants utilizing an integrated approach.

V. COOPERATIVE WEED MANAGEMENT AREA BOUNDARIES:

The initial group involved in development of the CWMA agreed that it should include the entire contiguous Kenai Peninsula. Although a large area, the Peninsula is a discrete region, bounded by natural barriers to weed invasion on nearly all sides by the Cook Inlet, Turnagain Arm, Blying Sound and Prince William Sound. This includes the communities, and state/federal/private lands

³ Noxious weeds are problematic species listed by various US states and by the Federal Noxious Weed Act of 1974.

⁴ Invasive species are defined by Executive Order 13112.

across Kachemak Bay. Consequently, including the entire Peninsula in the CWMA encompasses all areas of immediate concern, allowing for maximum impact of time invested in planning and helping to prioritize limited resources. To facilitate the management of information and cooperation among landowners, the CWMA is divided into logical management units based on Federal land management boundaries and Soil and Water Conservation District boundaries which include Borough, State, tribal and private lands.

These units are:

Chugach National Forest
Kenai National Wildlife Refuge
Kenai Fjords National Park
Homer Soil and Water Conservation District
Kenai Soil and Water Conservation District
Alaska Soil and Water Conservation District

Recognizing that different regions within the Peninsula may have different specific invasive plant problems and slightly different scopes of interest, regional units within the CWMA will provide localized support and coordination in order to maintain long-term stewardship for a particular area. A map of the CWMA and associated management units is included in Appendix A.

VI. INVASIVE PLANTS CURRENTLY RECORDED WITHIN THE KENAI PENINSULA – COOPERATIVE WEED MANAGEMENT AREA

A number of non-native plant surveys have been completed within the KP-CWMA, focusing primarily on disturbed habitats along roadways and trails where non-native species are likely to establish and other aquatic sites susceptible to invasion (Duffy 2003; DeVelice 2004; Carlson and Cortes-Burns 2005; Chumley & Klausner 2005; Grimes 2006; Barnett and Simonson 2007; Morton et al. 2007; Spellman Homer SWCD 2009; Martin 2011; Resurrection Bay Conservation Alliance and US Fish and Wildlife Service 2013; Bowser and Morton 2015; Anderson 2015; Kenai Watershed Forum 2015; Geier and Kriedeman 2018). Additionally, efforts have been made to sample backcountry sites on the Peninsula and to extract records from existing vegetation datasets (US Fish and Wildlife Service, 2006). Although most current survey data are somewhat biased towards areas of likely establishment and have been completed using both systematic and non-systematic methods - they provide a reasonable baseline on which to prioritize regional management activities. Survey results and other non-native plant records are currently available through the Alaska Exotic Plant Inventory Clearinghouse (AKEPIC) database at <https://accs.uaa.alaska.edu/invasive-species/non-native-plants/>.

For the purposes of this plan, a current list of non-native plant species recorded on the Peninsula was prepared from the database source listed above. “*Invasive species*” is defined as *non-native to the ecosystem under consideration and whose introduction is likely to cause economic or environmental harm, or harm to human health* (USDA [Executive Order 13112](#)). A list of invasive plants for the KP-CWMA (Appendix B) was created from those non-native plant species listed to be “of the greatest concern for Alaska” (AKEPIC, 2005 & 2019), and updated in 2020 to include those ranked at 50 or higher on the Alaska Invasiveness Scale ([AK Invasiveness](#)

[Ranking System, 2019](#)). A few species were also included because of their particular biology, status as a noxious weed elsewhere, or due to the potential for spread in habitats common to the Peninsula. The purpose of the invasive plant list in Appendix B, and the intent of this plan, is to narrow the list of species for coordinated management to those that are considered highly invasive (Table 1) and of limited distribution. This is meant to be a living document, to be updated every 5 years. A comprehensive list of non-native species recorded on the Kenai Peninsula is available on the KP-CWMA website (kenaiweeds.org) and AKEPIC (<https://aknhp.uaa.alaska.edu/apps/akepic/>).

VII. INTEGRATED MANAGEMENT SYSTEM FOCUSING ON EARLY DETECTION AND RAPID RESPONSE:

Integrated weed management "... is a system for the planning and implementation of selected methods of management for preventing, containing, or controlling undesirable plant species or group of species using all available strategies and techniques," (Federal Noxious Weed Act, 1974.)

Together these strategies and techniques are economically and environmentally more effective than any single option. Control methods are available and prescribed on a species/infestation specific basis. Elements of integrated management included in this plan are: prevention and education/awareness, early detection and rapid response, inventory, treatment, and monitoring.

A. Prevention and Education/Awareness

Prevention measures are practices that reduce the potential for the introduction, establishment and spread of weeds. Because prevention is the most cost effective and successful way to manage noxious weeds. It is considered a high priority for strategic planning. The following list of land management activities are key areas to implement prevention methods, including, but not limited to:

- Timber management
- Road and railroad construction/reconstruction and maintenance
- Construction and use of sand and gravel extraction sites
- Range management activities
- Recreational activities (including construction and maintenance of recreational sites, and areas of concentrated use such as campsites, trailheads and trails, and off-road vehicle use)
- Mining activities
- Wildlife management and enhancement projects
- Fire suppression and rehabilitation
- Farm management

Education and awareness programs foster public understanding of the threat that invasive, non-native plants pose to the diverse natural resources of the Kenai Peninsula. Education can also help describe the techniques used to manage weeds and the role humans can play in the dispersal and establishment of invasive weeds. Education also includes the training

of district and agency personnel, private landowners, and the general public in weed identification, management techniques, monitoring protocols and other skills needed for the management of noxious and invasive weeds. Awareness provides an important first step in the detection of new invaders. Education efforts for the KP-CWMA will focus on new and potential invaders (Table 2) to improve awareness of these species and facilitate public reporting of early infestations as part of an early detection network.

B. Early Detection/Rapid Response

After prevention activities, early detection and rapid response is considered the next highest priority to mitigate the introduction and spread of invasive weeds. The goal for early detection and rapid response is to find incipient populations of invasive plants and eradicate them before they begin to spread. This approach, as defined by the National Invasive Species Council (2003), is the most effective means for eradicating invasive species and is intended to be the keystone of invasive plant management within the KP-CWMA. Many of the necessary elements of an early detection and rapid response system currently exist for the Peninsula. This includes several baseline inventories for non-native plants within the KP-CWMA and tools for assessing current and future weed infestations such as species-specific invasiveness rankings.

C. Inventory

The collection, documentation, and storage of information (i.e. inventory) of the extent and location of invasive weeds within the KP-CWMA are a critical part of integrated management. A current inventory of weed species provides necessary information for establishing site-specific and regional priorities, management objectives, and for prescribing treatment methods.

D. Treatment Methods

Under the integrated approach, all control methods are considered. It is typically the use of all appropriate options, with respect to a particular species, in combination that results in the most successful control program. Specific treatment prescriptions are determined by the biology of the particular plant species, site characteristics and management objectives. Successful management and eradication of invasive plant infestations typically require several years of treatment and follow-up monitoring. The following management techniques of noxious weed control will be considered on a site-specific and plant species basis:

Physical/Mechanical: The use of physical or mechanical methods for weed control can be effective on small infestations of annual or biennial species. Hand grubbing, mowing, tilling, and burning are commonly used to physically destroy weeds or interfere with their reproduction. To be effective, treatment must typically take place before seed production. Plants that have flowered must be removed from the site and destroyed. Repeated mowing or tilling during the

growing season is required with most weed species. Generally this approach is not recommended as a sole method for control of species that spread vegetatively.

Chemical: Herbicides are an effective and efficient tool for the control of invasive plants when used appropriately. Chemical control methods, along with appropriate cultural practices, are likely to be the best option for larger infestations and for tough-to-control perennial species. Herbicide application and rates are dependent on specific site characteristics, target plant, location, non-target vegetation, and land use. Herbicides are a particularly important method of treatment when complete eradication of a plant population is the management objective. Treatment at the earliest stage of invasion will greatly reduce the future need for additional herbicide applications. It is critical to follow all label instructions, site-specific directions and safety precautions when using any herbicide. Repeatedly applying the same herbicide can cause resistance to occur in some species. To prevent resistance build-up, herbicides from different classes should be used on a rotational basis (Weed Science Society of America 2020).

Cultural/Land Use: Cultural practices are activities that purposefully enhance and maintain the growth of desired vegetation. Practices that retain, enhance, or introduce desirable plant species that out-compete non-native plant species can serve as important prevention and control measures. Examples that are applicable include seeding, planting, fertilizing, and retaining brush and tree canopy cover where appropriate. Grazing prescriptions that are designed to maintain or enhance perennial vegetation in a healthy state or maintain soil cover is an important practice in slowing the spread of invasive plants. Minimizing the extent and duration of exposed soil during management actions can also reduce the risk of weed establishment.

Biological: Biological weed control involves the deliberate introduction and establishment of natural enemies to reduce the target plant's competitive or reproductive capacities. Insects are the most common agent released against noxious weeds. Plant pathogens, such as fungi, are increasing in use. Sheep and goats have also been effective in reducing densities and limiting spread of specific weed species. Biological control can be a slow process, often requiring 10 to 20 years to be effective. Its purpose is not eradication but a reduction in densities and rate of weed spread to an acceptable level. It is most effective on dense weed infestations over large areas. As such, this is not expected to be a treatment option in the near future for the KP-CWMA.

E. Monitoring

Monitoring is the collection of information to determine the effectiveness of management actions in meeting the prescribed objectives. Noxious weed management focuses upon density and rate of spread of invasive non-native plant species and the effect these aggressive plants have on natural resources. If eradication is a management goal, monitoring of the site for several years following treatment is essential. A species is

considered to be locally eradicated when the seed bank, based on persistence reported in scientific literature, has been extinguished. Persistent species will likely take five or more years of follow-up control and monitoring.

Cooperators are also interested in the effectiveness of prescribed actions on the target plant and the response of desirable vegetation. Monitoring will help determine if treatments and management activities are accomplishing the goals and objectives established by KP-CWMA partners.

VIII. SPECIES CLASSIFICATION, PRIORITIZATION AND MANAGEMENT OBJECTIVES:

The following species classifications are based on current inventory data collected within the KP-CWMA. This list will be updated as needed by an ad hoc committee, with a final approval of the KP-CWMA partnership and revised at a minimum every five years.

A. Invasive and Noxious Weed Classification:

- **Primary Concern, *New Invaders*:** Invasive plants found to occur in the KP-CWMA with very limited distribution and density. For these species, eradication from the entire Kenai Peninsula CWMA is currently considered a feasible goal.
- **Secondary Concern, *Established Invaders*:** Invasive plant species firmly established and somewhat wide-spread throughout the KP-CWMA. Management efforts will vary by location.
- **Potential Invaders:** Invasive plants not known to be located within the KP-CWMA geography but occurring in other regions of Alaska or considered to have imminent potential for introduction. These species are considered to pose a future threat to resources.

**Table 1: INVASIVE AND NOXIOUS WEED SPECIES CLASSIFICATION
(UPDATED April 2020) ¹AKNHP Invasiveness Ranking included**

Table 1 is not an all-inclusive list of invasive species, potentially invasive, and established invasive species within the KP-CWMA geography. Rather, this list reflects partner priorities for treatment actions and awareness at this point in time. A more comprehensive list can be found in Appendix B.

Primary Concern (New Invaders, Eradicate from KP-CWMA)	Secondary Concern (Established Invaders, localized eradication)	Potential Invaders to the KP-CWMA
Cheat grass** (78) <i>Bromus tectorum</i>	Narrowleaf hawksbeard (56) <i>Crepis tectorum</i>	Garlic mustard (70) <i>Alliaria petiolata</i>
Elodea spp. (79) <i>canadensis, nuttallii</i>	Quackgrass* (59) <i>Elymus repens</i>	Spotted knapweed (86)* <i>Centaurea stoebe ssp. micranthos</i>
Creeping thistle* (76) <i>Cirsium arvense</i>	Hempnettle* (50) <i>Galeopsis spp.</i>	Crownvetch (68) <i>Coronilla varia (aka Securigera varia)</i>
Bull thistle (61) <i>Cirsium vulgare</i>	Orange hawkweed* (79) <i>Hieracium auranticum</i>	Scotchbroom (69) <i>Cystis scoparius</i>
Wild buckwheat, black bindweed* (50) <i>Fallopia convolvulus</i>	Meadow hawkweed (79) <i>Hieracium caespitosum</i>	Knotweed Species (87) <i>Fallopia bohemicum; F. japonica; F. sachalinensis</i>
Sweetclover (81) <i>Melilotus alba & officinalis</i>	Mouse ear hawkweed (63) <i>Hieracium pilosella</i>	Ornamental jewelweed (82) <i>Impatiens glandulifera</i>
Tansy ragwort (63) <i>Senecio jacobaea</i>	Narrowleaf hawkweed (51) <i>Hieracium umbellatum</i>	Broadleaved pepperweed* (71) <i>Lepidium latifolium</i>
Perennial sowthistle* (73) <i>Sonchus arvensis</i>	Fall Dandelion (51) <i>Leontodon autumnalis</i>	Purple loosestrife* (84) <i>Lythrum salicaria</i>
Common tansy (60) <i>Tanacetum vulgare</i>	Oxeye daisy (61) <i>Leucanthemum vulgare</i>	Eurasian water-milfoil (90) <i>Myriophyllum spicatum</i>
Bird vetch* (73) <i>Vicia cracca</i>	Butter and eggs* (69) <i>Linaria vulgaris</i>	Curly leaved pondweed <i>Potamogeton crispus</i>
	Reed canarygrass (83) <i>Phalaris aurundinacea</i>	Himalayan blackberry (77) <i>Rubus discolor</i>
	Euro. bird cherry/Chokecherry (74) <i>Prunus padus & P. virginiana</i>	Spartina species (86) <i>Spartina alterniflora, S. anglica, S. densiflora, S. patens</i>
	Tall buttercup (60) <i>Ranunculus acris</i>	Western salsify (50) <i>Tragopogon dubius</i>
	Creeping buttercup (72) <i>Ranunculus repens</i>	

*Currently listed as a prohibited or restricted noxious weed by Alaska State Statute (11AAC 34.020)

** Historical record from Kenai National Wildlife Refuge herbarium, 1958. Infestation at Portage Alaska Wildlife Conservation Center, currently managed by Chugach National Forest Service.

¹AKNHP Ranking is an Alaska-specific invasiveness ranking (a high rank indicates greater invasiveness) provided by the Alaska Natural Heritage Program. Current ranking and methodology available at: https://accs.uaa.alaska.edu/wp-content/uploads/Invasiveness_Ranking_System_for_Non-Native_Plants_Alaska.pdf

Currently, Federal land management agencies within the KP-CWMA are at various stages in the process of planning invasive plant management efforts.

The US Forest Service has been applying herbicide (Roundup®, Milestone®) since 2014 and will add five other chemicals (Triclopyr, Clopyralid, Sulfometuron Methyl, Imazapyr and 2,4-D) in 2020. The focus of the program has been to halt the spread of invasives into the backcountry and manage already established infestations. Key sites that are treated or monitored yearly are developed recreation areas (trailheads, campgrounds, cabins) and administrative sites. Gravel pits are also treated in an effort to provide weed free material for construction projects. Priority species are all those with an AKNHP rank of 70 or higher. Lower ranked species are treated depending on location and severity of the infestation.

The National Park Service has developed an Alaska Region Invasive Plant Management Plan that provides guidance for an integrated approach to invasive plant control in Kenai Fjords National Park. Overall strategies include preventing the spread of invasive plants into undeveloped areas of the park, treating small distinct populations, and containing and reducing the density of large populations of invasive plants in the backcountry. Species with a high invasiveness, as well as small, remote populations are a high priority for control efforts. The park uses a mix of both hand pulling and herbicide treatment methods guided by an Integrated Pest Management Decision Tree.

The interior of Kenai National Wildlife Refuge (KNWR) has seen relatively few invasive terrestrial plants when surveyed as part of the Long-term Ecological Monitoring Program. However, the refuge has seen many more invasive species along the interface of areas with greater amounts of foot, boat, and vehicle traffic. Consequently, KNWR has been applying herbicide (Roundup®, Milestone®) since 2008. The goal of this plan is to protect the interior of the refuge from invasive plants by keeping trail heads, public boat launches, the Refuge's heavy equipment yard on Ski Hill Road, the Refuge's hangar at Soldotna municipal airport, and the float plane launch on Headquarters Lake free of invasive plants. Additionally, the refuge continues to work with the industrial operators of the Swanson and Beaver Creek oil and gas units to contain and, in some cases, eradicate invasive plant species (J. Morton, pers. comm.). Long-term monitoring of many vegetation plots throughout the Refuge allow staff to assess efficacy of treatments over multiple spatial and temporal scales (Kenai National Wildlife Refuge Website 2020).

The KNWR, cooperating with many partners of the Kenai Peninsula Cooperative Weed Management Area, is actively working to eradicate *Elodea* sp. from the Kenai Peninsula. After developing an Integrated Pest Management Plan, fluridone (Sonar Genesis®, SonarONE®) and diquat (Reward®, Littora®) were used to treat Beck, Daniels and Stormy Lakes in Nikiski in 2014–2015. *Elodea* sp. has not been detected in these three lakes since September 2015. Hilda-Seppu Lake and Sports Lake were treated in 2017 and appear to be eradicated as of September 2019. However, a sixth elodea infestation was found in Sandpiper Lake in September 2019. Consequently, plans are underway for treatment of this infestation in 2020. In short, five of six infestations have been

successfully eradicated from the Kenai Peninsula. Combined with outreach, institutional/agency support, and monitoring for early detection of novel infestations, it may be possible to keep *Elodea* sp. at bay on the Kenai Peninsula. Refuge biologists continue to monitor short-term efficacy of treatments and work with organizations in other parts of the state to eliminate this plant from Alaska.

Additional invasive plant prevention measures being taken by the Refuge include requirements for certified weed-free hay and feed to be used by horse packers and for sled dogs. Finally, the Refuge requires the use of weed-free gravel on all construction projects. These aforementioned prevention measures and many others will be integral moving forward in maintaining and enhancing the biological integrity, diversity and environmental health of KNWR.

The eradication priorities in Table 1 have been proposed based on current survey data and are intended to guide management activities within the KP-CWMA. It is recognized that land management agencies will independently develop future invasive plant plans for management within their boundaries. This plan does not directly affect the development of agency management objectives and priorities.

However, the intention of the KP-CWMA and this plan is that proposed priorities and objectives will be adopted by land management agencies and other partners for coordinated management across the peninsula. This will help focus resources where they are the most effective and to manage the following species and other future incipient invaders for Peninsula-wide eradication. The 10 species identified as primary concern, for Peninsula-wide eradication are either thought to have been recently eradicated or are currently so restricted in distribution that eradication is considered a viable goal. The secondary species identified are primarily restricted to developed areas (butter and eggs, oxeye daisy, quackgrass) or to specific watersheds (reed canarygrass; see RCG strategic plan). The default management goal for any non-native plants new (or newly-reintroduced) to the Kenai Peninsula is assumed to be eradication by the most appropriate method(s).

B. General Management Priorities for the Kenai Peninsula Cooperative Weed Management Area:

1. Prevent the establishment of potential invaders (refer to Table 1 for classification of species as established, new and as potential invaders).
2. Eradicate primary concern (new invader) species and any species subsequently introduced from the list of potential invaders (early detection/rapid response).
3. Treat transportation corridors and areas of concentrated activities, such as roads, trails, campgrounds, trailheads parking lots and gravel pits and/or treat satellite infestations.

4. Reduce the density or slow the spread (i.e. contain) of widespread established secondary concern (invader) species.

C. Management Objective Definitions:

- Eradicate. The noxious or invasive weed species is eliminated from the KP-CWMA, including all viable seeds and/or vegetative propagules.
- Control. Seed production is prevented throughout the target patch, and the area coverage of the weed is decreased over time. Prevent the weed species from dominating the vegetation of the area but accept low levels of the weed.
- Contain. Weeds are geographically contained and are not increasing beyond the perimeter of the infestation. Treatment within established infestations may be limited, but populations are controlled or eradicated outside those areas. If satellite infestations appear beyond the containment line, the management objective is to eradicate.

While setting management objectives it is important to have objectives meet SMART (Specific, Measurable, Achievable, Results-oriented, Time-bound) criteria based on thresholds from published literature or best professional judgement. Example of a SMART objective would be “reduce coverage of Reed Canarygrass by 70% in patches less than an acre across all high priority sites on the northern 1/4 of Kenai NWR utilizing mechanical and chemical control methods by the end of the 2022 calendar year.

Because of the vast geographic scope of the KP-CWMA, localized infestations of established invasives are considered of secondary concern, and will be dealt with on a case-by-case basis, in consultation with KP-CWMA partners. Specific management plans will vary depending on site location, species, and infestation characteristics. Collaborative management objectives and efforts for eradication, containment and control will be identified and prioritized through annual workplans developed by the CWMA partnership.

IX. SPECIFIC MANAGEMENT RECOMMENDATIONS:

A. Education/Awareness

Creating awareness of the threat to Kenai Peninsula resources and the need to manage weeds will provide the foundation for active treatments, early alert programs, and prevention practices. Continued education of practitioners may ensure that effective strategies and new technologies will be incorporated into management actions. Efforts should generally focus on those species that are new or potential invaders to increase the likelihood of identifying and eradicating infestations early in their establishment. The following Education/Awareness focus will be incorporated into the KP-CWMA strategy for managing noxious weeds, and incorporate multi-taxa invasive species education when appropriate:

1. Conduct annual invasive weed workshop and tours.
2. Develop and maintain a weed management display for public gatherings such as fairs, expos, conventions, and shows. Current focus includes Kenai Peninsula State Fair, Kenai River Festival and various garden and home shows.
3. Develop interpretive signs to alert the general public of the threat of weeds and the efforts in the CWMA.
4. Post weed identification signs and other outreach materials at trailheads, road turnouts, and other public places.
5. Conduct periodic weed pull events that include groups such as garden clubs, Boy Scouts, and recreation clubs.
6. Provide presentations to classrooms and special interest groups such as horse council, Off Highway Vehicles (OHV) groups, fishing groups etc.
7. Develop brochures and pamphlets specific to the CWMA. Examples include weed-free feeds, early alert posters, and local overview of existing weeds.
8. Facilitate communication and coordination of cooperators and partners in the CWMA.
9. Develop demonstration plots for treatment and management techniques of species of primary concern/priority species.
10. Develop annual accomplishment reports about current projects and programs to share with partners and potential funders.

B. Recommended Prevention Strategies

Cooperators will strive to integrate appropriate prevention measures into management activities and promote the use of practices that reduce rates of weed spread throughout the KP-CWMA. Cooperators will work with agencies, organizations, and individuals in the development and implementation of prevention practices that could be effective in reducing dispersal and establishment. The following measures are provided as examples. Adopted practices need not be limited to those listed below.

1. Minimize disturbance in areas or habitats highly susceptible to weed invasion.

2. Use and promote the use of native plant species when practicable and when conditions are not favorable for natural succession to a vigorous native plant community following disturbance.
3. Encourage the use of high quality seed that is free of noxious weeds. Consider having the seed tested for “all state noxious weeds”, prior to planting.
4. Promote and support the use of “certified weed-free” and/or other weed free forage, straw, and seed mix products.
5. Keep gravel pits free of weeds. Noxious weed risks should be considered during new pit and/or road construction. The placement of gravel from infested pits should be mitigated through early monitoring and necessary treatment. Additionally, promote and support the use of “certified weed-free” gravel.
6. Clean equipment and vehicles, by washing or the use of compressed air, when transporting between sites (including logging equipment if the equipment is to be used off road).
7. Manage high human use areas, such as campgrounds, trailheads, turnouts, parking lots, equipment yards, scaling sites, in a weed-free state.
8. Maintain existing weed-free areas.
9. Maintain rangeland and open forest sites in healthy condition.
10. Maintain existing tree and brush cover, where practicable and appropriate.
11. Limit access through heavily infested areas, where feasible.
12. Maintain road shoulders or drainage ditches that are covered by desirable herbaceous cover. If disturbed, they should immediately be reseeded with an appropriate, weed-free seed mix, sourced from Alaska.
13. Provide guidance for road maintenance practices, such as mowing prior to seed set to prevent the spread of noxious weeds.
14. Avoid use of sites infested with invasive weeds as staging areas for large projects such as fires, construction, landings, gravel stockpiles, etc.
15. Provide invasive and noxious weed identification training and discuss the connection between weed spread and human activities.

16. Reduce risk of transporting invasive and noxious weed seed via livestock by:

- Placing livestock in a transition pasture free of designated weeds for at least 14-20 days prior to moving animals to non-infested areas. Maintain the transition pasture in a weed free state.
- Moving animals to weed free areas after the animal has shed.
- Hosing down the legs of livestock as they move through a handling corral.
- Avoid moving livestock through infested areas.
- Grazing livestock in weed infested areas when weeds are not flowering or producing seeds.

17. Reduce risk of spreading weeds by pack and saddle stock.

- Feeding pack and saddle stock “certified weed free” feed for at least two to three days prior to traveling in the backcountry.
- Brushing stock to remove any weed seed.
- Excluding stock from dense weed sites, where the risks are high that the animals will spread the weeds off site.
- If certified weed free feed is unavailable, the next best source is Alaska Grown feed, because purchasing out-of-state feed may introduce new invasive plants to Alaska (i.e. prohibited weed lists for weed-free certification vary greatly between states).

18. Maintain an early alert program where cooperators and interested public communicate the location of potential invasive plants or locations of new invasive plant infestations.

19. Develop and maintain an inter-agency team that can appropriately respond to incipient infestations from the list of new and potential invaders.

20. Promote the ‘Clean, Drain, Dry’ messaging to the public recreating within the KP-CWMA.

C. Inventory

A coordinated weed inventory should be maintained for the entire management area as funding and personnel allow. At a minimum, the inventory will include information required to meet standards of the Alaska Exotic Plant Information Clearinghouse (AKEPIC Collaborators Manual, 2005). The agencies involved will be responsible for furnishing necessary maps for the lands under their jurisdiction. All cooperators will offer input into the location and types of infestation.

The Alaska Exotic Plant Information Clearinghouse (AKEPIC) will house geospatial data of invasive and noxious weeds recorded within the KP-CWMA. Cooperators should include their inventory and treatment efforts to this resource on an annual basis at minimum to facilitate sharing of information among those working to identify and manage infestations within the KP-CWMA.

Appendix B summarizes the current list of invasive and noxious weeds recorded by inventories by a variety of agencies throughout the CWMA since 2003. The information can also be accessed at <https://accs.uaa.alaska.edu/invasive-species/non-native-plants/>. The summary provides an initial assessment of the extent and distribution of problem weeds within the management area. This inventory will be continually updated with new reports of weed infestations, inventories and management efforts on public lands.

D. Species Management Objectives

It is assumed that the elements of education, prevention, early detection, and inventory will be integrated concurrently with specific control actions.. The objectives are developed in context with the geographic distribution, habitat relationships, invasiveness, relative abundance and treatment feasibility of specific weeds.

Established and widespread weed species within the management area may be stratified into management zones. Zones with low population levels of the target plant would be managed for eradication. Those with moderate to high population levels of target plants would focus on containment and other sites maintained as weed-free.

1. Long-Term Spread of Invasive Plants:

Monitoring of invasive plant spread and/or suppression will be accomplished through existing database tools and GIS layer through the Alaska Exotic Plant Information Clearinghouse. Inventory to re-map infestations should be completed every five years to compare with previous surveys. Yearly treatment summaries will also be used to assess invasive plant spread. All management activities should be included in AKEPIC under the “control” attribute, listing the type of control as: manual, mechanical; broadcast, spot or aerial herbicide, or other (see AKEPIC Users Manual, 2019). https://accs.uaa.alaska.edu/wp-content/uploads/AKEPIC_UserManual.pdf

2. Post-treatment Monitoring:

Treatments will be monitored and assessed following two general intensity levels as permitted by funding and personnel.

a. Visual: Personnel will conduct visual reconnaissance of the treated area after chemical application to determine the presence or absence of target plants, and/or desirable vegetation.

b. Systematic: Within selected infestations sample plots will be established to document changes in target plant densities, and species composition and cover of desirable vegetation.

3. Biocontrol Agents:

Biocontrol agents are generally considered only for very large and densely infested areas. The release of a biocontrol agent is a complex and laborious process requiring extensive review and is very difficult to accomplish successfully. It is not expected for biocontrol to be part of management activities in the KP-CWMA in the near future.

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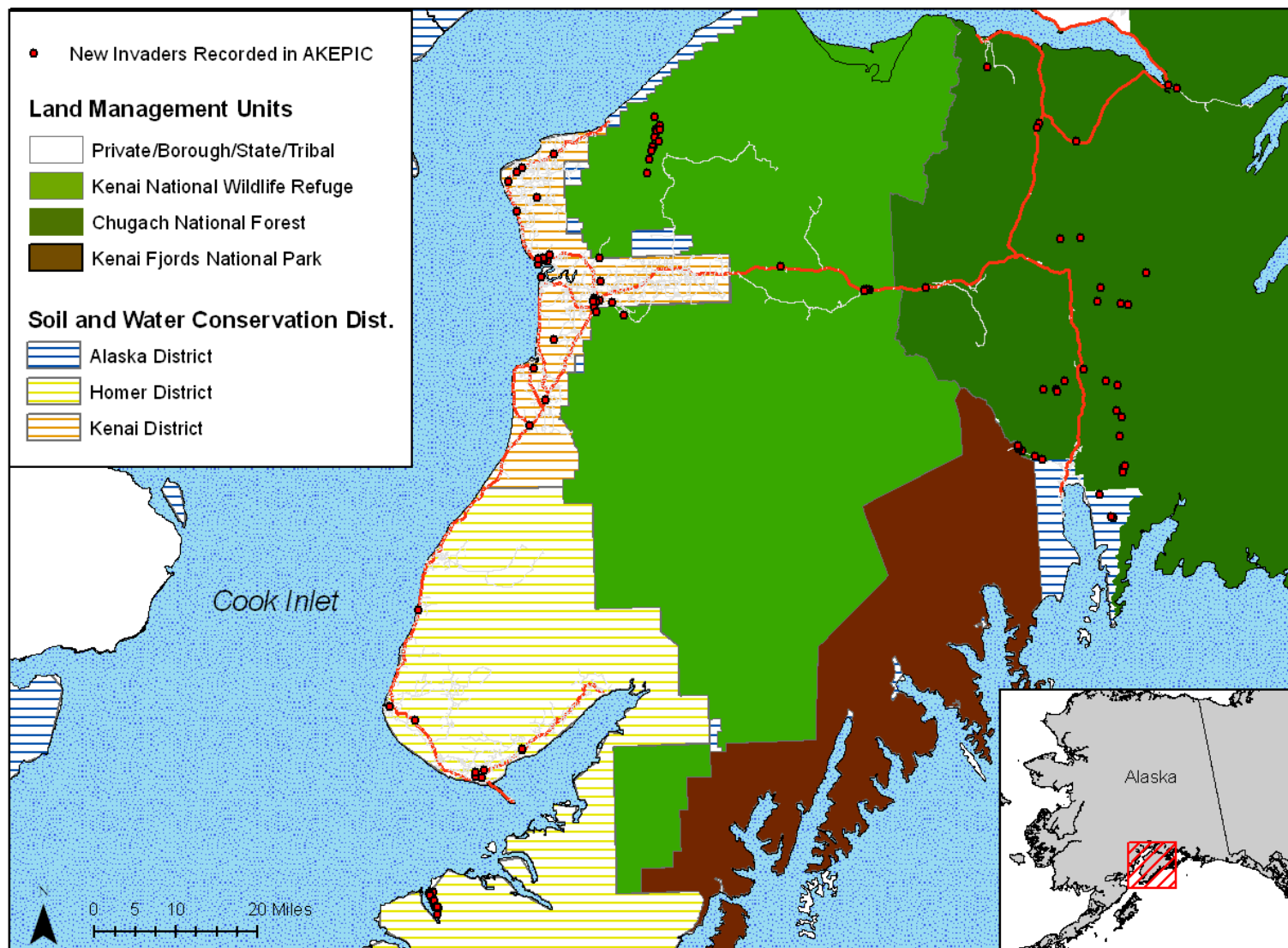
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This plan was developed using the Idaho State Department of Agriculture's Cost Share Handbook template for CWMA Strategic Plans (Exhibit 6) available at:
<http://www.idahoag.us/Categories/PlantsInsects/NoxiousWeeds/costshareapp.php>

APPENDIX A: MANAGEMENT UNITS WITHIN THE KENAI PENINSULA – COOPERATIVE WEED MANAGEMENT AREA



New Invaders in AKEPIC Database
Recorded on the Kenai Peninsula, Alaska 2007

Homer Soil & Water Conservation District
4014 Lake St., Suite 201
Homer, AK 99603



APPENDIX B. NON-NATIVE PLANT SPECIES RECORDED ON THE KENAI PENINSULA with Alaska invasiveness ranking of at least 50 and/or noxious weed rating (UPDATED MAY, 2020)

Invasive plants in Alaska are ranked by local ecologists on an invasiveness scale of 0—100. Invasiveness ranks take into account a species’ ecological impacts, biological characteristics (ability to reproduce and spread), and the feasibility of control. This system is described in the Invasiveness Ranking System for Non-Native Plants of Alaska (Carlson et al. 2008).

How invasive is a plant on the list? Ranks of:

- **80 or higher** are considered “Extremely invasive”
- **70---79** – “Highly invasive”
- **60---69** – “Moderately invasive”
- **50---59** – “Modestly invasive”
- **40---49** – “Weakly invasive”
- **39 or lower** – “Very Weakly Invasive”

According to the Invasiveness Ranking System for Non-Native Plants of Alaska, species ranked 70 and higher are considered to be very threatening to Alaska. Species ranked 50-69 also pose significant risks to Alaska’s ecosystems. Species ranked below 50 are not thought to significantly alter ecosystem processes and plant communities. Only those non-native plants ranked below 50 with a noxious weed designation are included in the table below.

USDA CODE	Latin Name	Noxious Weeds ¹	AK Noxious Weed ²	Common Name	AKNHP RANKING ³
ALPR3	<i>Alopecurus pratensis</i> L. (52)			meadow foxtail	52
BRRA	<i>Brassica rapa</i> L. (50)			field mustard	50
BRINI	<i>Bromus inermis</i> ssp. <i>Inermis</i> (62)			smooth brome	62
BRTE	<i>Bromus tectorum</i> ** (78)	✓		cheatgrass	78
CARA	<i>Campanula rapunculoides</i> L. (64)			rampion bellflower	64
CAAR18	<i>Caragana arborescens</i> (74)			Siberian peashrub	74
CEBI2	<i>Centaurea stoebe</i> ssp. <i>Micranthos</i> (86)	✓		spotted knapweed	86
CIAR4	<i>Cirsium arvense</i> (76)	✓	✓	Canada thistle	76
CIVU	<i>Cirsium vulgare</i> (61)	✓		bull thistle	61
CRETE3	<i>Crepis tectorum</i> (56)			narrowleaf hawkweed	56
CYSC4	<i>Cytisus scoparius</i> (69)	✓		scotch broom	69
DAGL	<i>Dactylis glomerata</i> (53)			orchard grass	53
DIPU	<i>Digitalis purpurea</i> L. (51)			purple foxglove	51
ELODE	<i>Elodea Michx.</i> sp. (79)			elodea waterweed	79
ELRE4	<i>Elymus repens</i> (59)	✓	✓	quackgrass	59
ELSI	<i>Elymus sibiricus</i> L. (53)			Siberian wildrye	53
FACO	<i>Fallopia convolvulus</i> (L.) A. Love (50)			black bindweed	50
jFAJA2	<i>Fallopia japonica</i> (Houtt.) Ronse Decr. (87)			Japanese knotweed	87
GABI3	<i>Galeopsis bifida</i> (50)			splitlip hempnettle	50
GATE2	<i>Galeopsis tetrahit</i> (50)		✓	brittlestem hempnettle	50
HEMA3	<i>Hesperis matronalis</i> L. (41)	✓		dames rocket	41
HIAU	<i>Hieracium aurantiacum</i> (79)	✓		orange hawkweed	79
HICA10	<i>Hieracium caespitosum</i> (79)	✓		meadow hawkweed	79
HIPI	<i>Hieracium pilosella</i> L. (63)	✓		mouseear hawkweed	63
HIUM	<i>Hieracium umbellatum</i> (51)			narrowleaf hawkweed	51
HOJU	<i>Hordeum jubatum</i> (63)			foxtail barley	63

IMGL	<i>Impatiens glandulifera</i> (82)	✓		ornamental jewelweed	82
LEAU2	<i>Leontodon autumnalis</i> L. (51)			fall dandelion	51
LEVU	<i>Leucanthemum vulgare</i> (61)	✓		oxeye daisy	61
LIVU2	<i>Linaria vulgaris</i> (69)	✓	✓	butter and eggs	69
LOPEM2	<i>Lolium perenne</i> spp. <i>Multiflorum</i> (52)			Italian rye grass	52
LOCO6	<i>Lotus corniculatus</i> L. (65)			bird's-foot trefoil	65
LUPOP2	<i>Lupinus polyphyllus</i> Lindl. ssp. <i>Polyphyllus</i> (71)			bigleaf lupine	71
MESAF	<i>Medicago sativa</i> L. ssp. <i>falcata</i> Arcang (64)			yellow alfalfa	64
MEOF	<i>Melilotus officinalis</i> & <i>alba</i> (69)			sweetclover	69
MYSC	<i>Myosotis scorpioides</i> L. (54)	✓		true forget-me-not	54
PHAR3	<i>Phalaris arundinacea</i> (83)			reed canarygrass	83
PHPR3	<i>Phleum pratense</i> (54)			timothy	54
PLMA2	<i>Plantago major</i> (44)		✓	common plantain	44
POAN	<i>Poa annua</i> (46)		✓	annual bluegrass	46
POPRI2	<i>Poa prantensis</i> ssp. <i>Irrigata</i> (52)			spreading bluegrass	52
POPRP2	<i>Poa prantensis</i> ssp. <i>Pratensis</i> (52)			Kentucky bluegrass	52
POTR2	<i>Poa trivialis</i> L. (52)			rough bluegrass	52
PRPA5	<i>Prunus padus</i> (74)			European bird cherry	74
RAACA3	<i>Ranunculus acris</i> var. <i>acris</i> (54)			showy buttercup	54
RARE3	<i>Ranunculus repens</i> (54)	✓		creeping buttercup	54
RORU	<i>Rosa rugosa</i> Thunb. (72)	✓		rugosa rose	72
RUAC3	<i>Rumex acetosella</i> (51)	✓		sheep sorrel	51
RUCR	<i>Rumex crispus</i> (48)	✓		curly dock	48
SEJA	<i>Senecio jacobaea</i> L. (63)	✓		tansy ragwort	63
SEVU	<i>Senecio vulgaris</i> (36)	✓		common groundsel	36
SILAA3	<i>Silene latifolia</i> ssp. <i>alba</i> (42)	✓		bladder campion	42
SOAR2	<i>Sonchus arvensis</i> (73)	✓	✓	perennial sowthistle	73
SOAU	<i>Sorbus aucuparia</i> (59)			European mountain ash	59
TAVU	<i>Tanacetum vulgare</i> (60)	✓		common tansy	60
TAOFO	<i>Taraxacum officinale</i> spp. <i>Officinale</i> (58)			common dandelion	58
TRDU	<i>Tragopogon dubius</i> Scop. (50)			yellow salsify	50
TRHY	<i>Trifolium hybridum</i> (57)			alsike clover	57
TRPR2	<i>Trifolium pratense</i> (53)			red clover	53
TRRE3	<i>Trifolium repens</i> (59)			white clover	59
TRPE21	<i>Tripleurospermum perforata</i> (48)	✓		scentless false mayweed	48
VETH	<i>Verbascum thapsus</i> L. (52)	✓		common mullein	52
VICR	<i>Vicia cracca</i> (73)		✓	bird vetch (tufted vetch)	73

¹ **Noxious Weeds** – Species currently listed as noxious weeds by one or more states in the US (outside of Alaska) according to the USDA Plants Database at <http://plants.usda.gov>

² **AK Noxious Weeds** – Also currently listed as a noxious weed by Alaska State Statute (11 AAC 34.020)

³ **AKNHP Ranking** is an Alaska-specific invasiveness ranking (a high rank indicates greater invasiveness) provided by the Alaska Natural Heritage Program. Current ranking and methodology available at: <http://aknhp.uaa.alaska.edu/botany/akepic/non-native-plant-species-list/#content> .

APPENDIX C. REVISIONS.

A. The following revisions to the strategic plan were made April 2010.

Updates to table 1 pages 4 and 5.

The following plant species were added to table:

<i>Achillea ptarmica</i>	<i>Polygonum aviculare</i>
<i>Anthemis cotula</i>	<i>Prunus padus</i>
<i>Bromus inermis ssp. inermis</i>	<i>Ranunculus acris var. acris</i>
<i>Capsella bursa-pastoris</i>	<i>Ranunculus repens</i>
<i>Caragana arborescens</i>	<i>Rumex acetosella</i>
<i>Cerastium fontanum spp. vulgare</i>	<i>Rumex crispus</i>
<i>Chenopodium album var. album</i>	<i>Rumex longifolius</i>
<i>Crepis tectorum</i>	<i>Senecio vulgaris</i>
<i>Dactylis glomerata</i>	<i>Silene latifolia ssp. alba</i>
<i>Hordeum jubatum</i>	<i>Silene noctiflora</i>
<i>Lepidium densiflorum</i>	<i>Sorbus aucuparia</i>
<i>Lolium perenne ssp. multiflorum</i>	<i>Spergula arvensis</i>
<i>Matricaria discoidea</i>	<i>Stellaria media</i>
<i>Phleum pratense</i>	<i>Taraxacum officinale ssp. officinale</i>
<i>Plantago major</i>	<i>Trifolium hybridum</i>
<i>Poa annua</i>	<i>Trifolium pratense</i>
<i>Poa compressa</i>	<i>Trifolium repens</i>
<i>Poa pratensis ssp. irrigata</i>	
<i>Poa pratensis ssp. pratensis</i>	

Centaurea biebersteinii was updated to *Centaurea stoebe spp. micranthos*. And its AKNHP Ranking was updated from 88 to 86.

Galeopsis bifida and *Galeopsis tetrahit* AKNHP Ranking was updated from 43 to 40.

Hieracium aurantiacum and *Hieracium caespitosum* ANKNP ranking was updated from 71 to 79.

Hieracium pilosella was removed from the table.

Melilotus officinalis and *alba* were combined into one row.

Table 2 page 9

Vicia cracca was updated from New Invader to Potential Invader.

Centaurea biebersteinii was updated to *Centaurea stoebe spp. micranthos* and from New Invader to Potential Invader.

Cytisus Scoparius was updated from New Invader to Potential Invader.

Table 3 pages 13 and 14.

Scientific names were added to all plants species.

Melilotus officinalis and *Melilotus alba* were combined into one row.

The following changes were made under the corresponding heading -

Chugach National Forest – *Vicia cracca* was updated from eradicate to contain.

Kenai Soil and Water Conservation District –

Tanacetum vulgare was updated from eradicate to control.
Tripleurospermum perforata, *Cytisus scoparius*, and *Centaurea stoebe ssp. micranthos* were removed, as they were eradicated from the management unit.
Melilotus officinalis was added as eradicate.

Alaska Soil and Water Conservation District –

Vicia cracca added as control.
Galeopsis spp. added as eradicated.
Leucanthemum vulgare added as control.
Elymus repens added as control

B. The following revisions to the strategic plan were made April & May 2013

Table 1 was updated to reflect the current noxious standing and AKNHP rankings of listed plants.

The original version of Table 3, which split the management area into six management units with different priorities and objectives, was replaced with a streamlined Table 3 that identifies the most important invasive plants to be addressed and how they will be managed across the entire management area. The heading for this table was changed and a brief description was inserted prior to the table.

Adjustments were made on pages 11 & 12 regarding regional management units, as well as updated area practices, goals and activities. Adjustments were made to the first two paragraphs of section D. Species Management Objectives (p. 18) to reflect the change in Table 3 and corresponding area strategy.

Throughout the document, internet addresses were updated to reflect the current URL of those resources.

C. The following revisions were made in January and February 2017

Unknown. Assume Plant tables were updated, but unsure.

D. The following revisions were made in September 2020

Technical Advisory Committee was dissolved to reflect the reality of “Ad Hoc” Committees that form on an as-needed basis.

“Invasive Species” was defined within the document, and the term “non-native” replaced all instances of “exotic” except when referring to AKEPIC.

All three federal agencies provided updated summaries of their invasive plant management on respective federal lands.

The non-native plant list was moved to Appendix B and updated with all AK EPIC data recorded within the KP-CWMA and plants with invasiveness ranking of at least 50. Noxious

weed status was also updated. A comprehensive non-native list for the entire Kenai Peninsula was added to the kenaiweeds.org website.

Plant table 2 was revised into primary and secondary species classification; *Polygonum* genus species were updated to *Fallopia* genus. Table was renamed to “Table 1.” Plant table 3 was eliminated in order to streamline management efforts to focus on primary species of concern.

The following plants were removed from Table 1:

Tripleurospermum perforatum does not seem to be aggressively spreading outside of disturbed land, and the CWMA does not anticipate allocating resources toward control of this plant.

Vicia villosa was removed from the “Potential Invader” list because it is ranked < 60 on the invasiveness scale and has only been found in Juneau.

The following plants were added to Table 1 and/or changed in priority:

Primary Species

Cirsium vulgare
Elodea spp.
Senecio jacobaea

Secondary species

Prunus virginiana
Ranunculus repens
Ranunculus acris

Potential Invaders

Securigera varia
Lepidium latifolium
Myriophyllum spicatum
Potamogeton crispus
Spartina spp

Justification

Any non-native plants historically found within the KP-CWMA geography, that are ranked >60 on the invasiveness scale were added to Table 1. Exceptions included ornamentals that do not seem to be aggressively spreading beyond yards/disturbed areas and threatening native habitat, which is based on personal observation of partners at this point in time. These include: Siberian pea shrub (*Caragana arborescens*), rugosa rose (*Rosa rugosa*), rampant bellflower (*Campanula rapunculoides*), bigleaf lupine (*Lupinus polyphyllus* Lind.), birdsfoot trefoil (*Lotus corniculatus*), European mountain ash (*Sorbus aucuparia*), St. Johnswort (*Hypericum perforatum*), marsh forget-me-not (*Myosotis scorpioides*), and common mullein (*Verbascum thapsus*).

Non-natives that are being promoted as forage crops by the Plant Material Center (*Elymus sibiricus*, *Medicago satvia*, *Bromus inermis*) are excluded from the table because they are not aggressive invaders and have potential to be the largest producers of forage in Alaska. *Hordeum jubatum* was excluded because it does not seem to be spreading aggressively, although it does cause harm to hayfields.

The partnership recognizes the above plants have the potential to become more aggressive and harmful, and thus populations should be monitored in case they become problematic in the future.