Addressing a landscape problem at the local scale: Managing invasive plants on Kenai National Wildlife Refuge

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INTRODUCTION

Invasive plants threaten Kenai National Wildlife Refuge’s legislative mandate to conserve the natural diversity of fish and wildlife populations and habitats. The 2 million-acre Kenai NWR is more vulnerable than other Alaska refuges because it is on the road system, receives >1 million visitors annually, has 5 decades of commercial resource extraction, and has a rapidly increasing urban interface with a 2.2% residential population growth rate. The 56-mile human footprint within the refuge consists of 22 miles of the Sterling Highway, 262 miles of trails with 29 trailheads, 13 campgrounds, 15 cabins, 2 visitor centers, the Moose Research Center, infrastructure associated with 13,252 acres of active oil and gas leases on 3 units, and 1,800 miles of seismic lines. Here, we describe our transition from the first exotic plant survey in 2005 to a partnered Integrated Pest Management (IPM) approach to control, eradicate, and eradicate the most invasive and injurious plant species on and off the refuge.

METHODS

Spatially-hierarchical Surveys

Landscape. In 2004 and 2006, we cooperated with the USDA Forest Inventory & Analysis program to quantify native and exotic flora on 256 permanent plots distributed systematically at 5-km intervals across the refuge.

Human footprint. In 2005, exotic plants on 269 temporary plots within the human footprint were surveyed by a Miami University graduate student to assess the magnitude of the problem. With the AK Natural Heritage Program, we used BAER funds to survey historical cabin sites after the 2004 Glacier Creek Fire. In 2006, we surveyed the 20-mile Hansen Horse Trail and cooperated with Colorado State University to establish 74 permanent monitoring plots distributed randomly within the human footprint.

Project-specific. We sampled 30 refuge trail heads and boat launches, and 63 oil and gas pads in the 6,000-acre Swanson Oil & Gas Unit in 2007 and again in 2009 to assess occurrence and spread of exotic plants before herbicide use.

Planning & Permits

Our 2009 Comprehensive Conservation Plan called for developing an IPM plan for invasive weeds. We completed NEPA documentation and USFWS Pesticide Use Permits to use chemical treatment. Refuge staff were certified by AK-DEC as pesticide applicators. We partnered with the Kenai Peninsula Cooperative Weed Management Area (KP-CWMA). We sponsored community weed-pulls, training workshops & local conferences, wrote newspaper articles, and published brochures. Chevron gave a $36K CCS match to treat the Swanson Unit.

RESULTS

The refuge interior is still undeveloped and relatively pristine, while the parts of the Refuge within the human footprint are highly contaminated with invasive plant species. Only 4 exotic species were found on 3% of 256 interior plots at the landscape scale. However, 67 exotic species were found on >93% of plots within the human footprint, some of which are highly invasive: reed canopy grass (Phalaris arundinacea), white sweetclover (Melilotus officinalis), yellow hawkweeds (Hieracium caespitosum, H. umbellatum), scotchbroom (Cytisus scoparius), and bird vetch (Vicia cracca). We found the first Alaska specimen of German maddown (Asperugo procumbens) and the only specimen of Columbia ragwort (Senecio integerreinus var. exaltatus). Exotic plants occurred on all 63 pads within the Swanson Oil & Gas Unit including yellow sweetclover, meadow hawkweed, and common tansy (Tanacetum vulgare), which have been documented nowhere else on the refuge. Alarming, reed canopy grass was found within 50 meters of the Swanson River, a significant Coho salmon stream that originates in Congressionally-designated Wilderness.

Integrated Pest Management

Mechanical Treatment. Routine grading of roads and pads by Chevron within the Swanson Unit was done to reduce germination and flowering. Several oil and gas lease roads that access non-producing and reclaimed pads were closed to minimize seed dispersal. We facilitated hand pulling of target species at strategic access points by staff, Youth Conservation Corps, and Friends of Alaska Refuges.

Chemical Treatment. We treated 80 acres in past 3 years with glyphosate (Roundup®, Aquamaster®) and clopyralid (Transline®). Backpack spot-spraying was conducted at critical access points (trailheads, boat launches, hangar, and administrative facilities) by DEC-certified refuge staff. A commercial pesticide applicator was contracted to treat large infestations in the Swanson Unit.

Revegetation. We plan to rehabilitate areas denuded by herbicides with bluejoint (Calamagrostis canadensis), a native invasive grass. Seeds will be acquired from Alaskan vendor and by refuge staff with a power handheld seed stripper.

PARTNERSHIPS & OUTREACH

- Published 2 brochures: Invasive Flora of the Kenai Peninsula and Responsible Home Landscaping For South-central Alaska.
- Hosted and contributed to 10 community weed-pulls with Kenai Watershed Forum and Friends of Alaska Refuges.
- Wrote >6 invasive species articles in the Refuge Notebook, a weekly column in the local newspaper Peninsula Clarion.
- Hosted 2 workshops to train public in identification of invasive weeds.
- Significant cooperators with AK Natural Heritage Program - contributor to AKEPIC database, identification of new weeds, BAER-funded post-fire surveys, and weed ID workshops.
- Gave >$30K to KP-CWMA for IPM efforts on non-Federal lands.
- Presented findings at annual conferences of Alaska Committee for Noxious & Invasive Plant Management (CNIPM) and KP-CWMA.

DISCUSSION

Unlike refuges in other states, Alaska refuges are mostly pristine. Early detection at multiple spatial scales is critical for a truly adaptive management response. In addition to current actions, we are designing boot-brush stations & explanatory signage to complement chemical and mechanical treatment at refuge access points, and may mandate weed-free forage on horse trails. Despite our rapid response to invasive weeds, we are uncertain about long-term success: >110 exotic species already occur on the Kenai Peninsula, and both increasing vectors and climate change modeling suggest the war may already be lost. We are approaching a decision point where there needs to be a peninsula-wide strategy to protect remote watersheds rather than the current paradigm of treating all populations everywhere. Alaska land managers should begin the regulatory process NOW for chemical treatment to ensure a full tool box and potential for rapid response, work with partners outside their boundaries to address the issue, critique their own in-house operations, continue with early detection, and advocate for new legislation.