Invasive Plant Prioritization
Workshop Report

Bear Lake National Wildlife Refuge
and
Oxford Slough Waterfowl Production Area

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1.0 Introduction

1.1 Background

Invasive plants are one of the most frequently cited threats to biological integrity, diversity, and environmental health within the National Wildlife Refuge System (NWRS) because of their negative impact on habitat structure, species composition, and overall function of ecological communities. Many National Wildlife Refuge (NWR) personnel report that managing invasive plants consumes a large proportion of their annual budget (USFWS 2003, USFWS 2013). In fiscal year 2011, the NWRS spent $15.8 million directly on related management activities; yet, only about 10% of infested acres were treated (USFWS 2013). Although invasive plants are considered a top priority for many National Wildlife Refuges and considerable resources are expended to manage them each year, funding and staff to control established infestations or prevent new infestations are limited. This may be why many stations plan their control, eradication, and management strategies with little to no *a priori* information. Thus, the re-examination and prioritization of existing and potential invasive threats, followed by practical inventory and early detection efforts, can ensure that the highest priority species and areas are targeted since "managing all non-native species is impractical and unnecessary" (Hiebert and Stubbendieck 1993).

Bear Lake National Wildlife Refuge (Bear Lake NWR) and Oxford Slough Waterfowl Production Area (WPA), in southeastern Idaho, face these invasive species challenges as staff work to meet their management goals and objectives. The Refuge and WPA encompass approximately 18,000 acres of cattail marsh, open water, flooded meadows, and scattered grasslands and mountain slopes. Because it is important for the conservation of waterfowl and colonial nesting birds, efficient and effective habitat management through strategic invasive species control is vital.

1.2 Refuge Invasive Plant Management History

Invasive plants and animals represent the greatest immediate threat to the Refuge's wildlife and habitat. Control of invasive species such as *Phragmites australis s* (common reed) and other State and County-listed noxious weeds, has been a high priority management activity. Non-noxious weeds, that is, species which are not regulated by law, such as *Phalaris arundinacea* (reed canarygrass) also impede the refuge's ability to meet Comprehensive Conservation Plan habitat-based objectives.

Many factors constrain the Refuge's ability to effectively control invasive plant populations, including limitations in funding, staffing, influences beyond the Refuge's borders, varying treatment windows, and environmental change. Consequently, the development of an adaptive invasive plant management strategy is necessary to manage invasive plant threats.

1.3 Invasive Plant Management Model

The USFWS Region 1 Invasive Plant Management Model involves three elements: planning, assessment, and implementation. Once a prioritization workshop is conducted (planning), the refuge is eligible to receive funding through the Legacy Region 1 Invasive Species Small Grants program to assess the distribution and abundance of priority invasive species in priority areas. Refuge staff use these data to identify and document optimal strategies for managing priority invasive plant threats (assessment). SMART objectives (specific, measurable, achievable, relevant, and time-bound) are then crafted to document desired outcomes of both short- and long-term strategies. Implementation is tracked to record what and where management actions are performed and where, and monitoring is applied to assess the effectiveness of those actions towards meeting objectives.

The Bear Lake NWR staff invited the regional Branch of Refuge Biology (Branch) to work with them in identifying species and area priorities for inventory and monitoring efforts via an Invasive Plant Prioritization Workshop, which serves as the initial step in developing an Invasive Plant Management Plan (**Figure 1**).

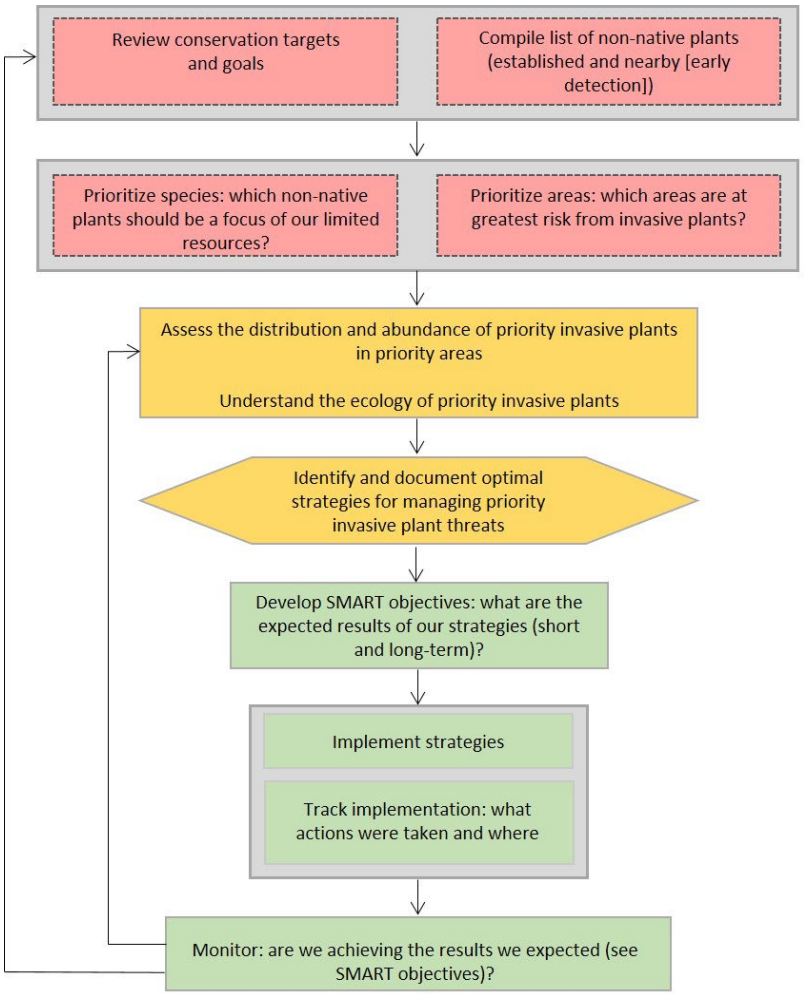

Figure 1. Phases of Invasive Plant Management

2.0 Weed Prioritization Workshop

2.1 Workshop Preparation

The process of developing a weed prioritization list includes compiling existing data, identifying refuge and partners to participate, planning and implementing the three-day workshop, interpreting and fine-tuning of results based on local expertise, and reporting.

In preparation for the workshop, Branch staff gathered resources such as refuge conservation priorities and invasive plant management history and created a comprehensive non-native plant list. We constructed the list from refuge records, the National Wildlife Refuge System Pesticide Use Proposal System (PUPS), other refuge plant species lists (documented and undocumented), and noxious weed lists from the state of Idaho and Bear Lake County. We utilized EDDMapS (2019), the USDA PLANTS Database (2013), and the Oregon Department of Agriculture's weed species fact sheets (2019) for additional weed species information. We standardized plant scientific names using the Integrated Taxonomic Information System (http://www.itis.gov). We subsequently narrowed the initial list of 41 species down to a working list of 29 species for the workshop using local and state partner input.

Branch and Refuge staff collected the following information:

- ✓ Refuge spatial data: boundary, infrastructure, sensitive natural resource locations, topography/elevation
- ✓ Reports with refuge plant information and conservation targets (location, abundance, trends, habitats)
- ✓ Non-native plant lists: documented and undocumented

The pre-workshop species review removed species that are native, considered agricultural or public use nuisances that pose little to no threat to the refuge, are not known to occur or be spreading in areas adjacent to the refuge (**Table 1**).

Table 1. Invasive species evaluated and excluded from the species prioritization list.

Common Name	Scientific Name
brome species	*Bromus spp.*
thistle species	*Cirsium spp.*
orchardgrass	*Dactylis glomerata*
perennial ryegrass	*Lolium perenne*
timothy	*Phleum pratense*
tall fescue	*Schedonorus arundinaceus*
hardstem bulrush	*Schoenoplectus acutus var. acutus*
California bulrush	*Schoenoplectus californicus*
bulrush species	*Scirpus spp.*
cattail species	*Typha spp.*
common mullein	*Verbascum thapsus*

Workshop planning involves ensuring that relevant partners will be present during the species prioritization process, and species and area data are available for decisions to be made during the workshop. It is essential that neighboring landowners and invasive plant experts from neighboring land management agencies, organizations (e.g., Cooperative Weed Management Areas) and the counties be involved to provide information relevant to the prioritization process (e.g., closest known infestations of species not currently found on the refuge, invasive species priorities across borders, etc.).

2.2 Workshop Implementation

2.21 Workshop Overview

A project team built from Refuge and Branch staff, as well as local weed experts met virtually on January 12-14, 2021 to prioritize refuge species and define and prioritize areas within the refuge for future invasive plant inventory (See **Appendix A. Workshops and Participants** for participant list). Weed species lists were finalized and prioritized using the entire project team during the first two days of the workshop, while Refuge areas were finalized and prioritized with Refuge and Branch staff during the third day.

2.22 Prioritization Tool Methods

The Invasive Plant Inventory and Early Detection Prioritization Tool (IPIP) uses a variety of criteria to rank areas and species for inventory. It is comprised of three main sections: 1) Species Prioritization, 2) Area Prioritization, and 3) Optional: Area-Species Link (ranks species within specified areas rather than on a refuge-wide scale).

For the prioritization of Bear Lake NWR, only the first two sections were completed. The Area-Species Link tool was not used as the species and area prioritization lists were consistent with Refuge staff expectations. The Area-Species Link could be incorporated in the future if refuge staff decide that the added information it would provide would be of benefit.

The IPIP tool is an Access Database in which the user responds to multiple-choice questions, grouped within categories to characterize a species or area that best describe the situation **(Table 2)**. Each descriptive answer correlates to a numerical value; the scores for a species or area are then summed to provide a total score. The higher the total score, the higher the priority for that species or area for future inventory. In the final step, species and areas are ranked according to their scores.

Table 2. Categories and criteria used by IPIP for (a) species and (b) area prioritization, as well as optional (c) species-area links. Standard definitions of the criteria can be found in Appendix B. Standard Criteria Descriptions.

(a) Species Prioritization	
Category	**Criterion**
Invasiveness	Invasiveness rank
Status and Habitat Suitability	Proximity
	Abundance (perceived)
	Distribution (perceived)
	Potential to spread
Ecological Impacts	Ecological impacts (current)
	Ecological impacts (potential)
Legal Mandates	Larger landscape management importance
(b) Area Prioritization	
Area Description	Ecological integrity
	Innate resistance to invasion
	Area size (does not affect score)
	Importance to other priority natural resources of concern
Invasion Risk	Terrestrial pathways
	Aquatic pathways
	Transport vectors
	Anthropogenic disturbance
Invasive Plant Status	Inventory and monitoring data
	Infestation levels (perceived)
	Number of invasive plant species (perceived)

(c) Species-Area Link (Optional)	
Species Presence/Proximity	Presence (perceived)
	Status and distribution (perceived)
Species Habitat Suitability	Potential to spread

2.221 Customized Criteria Definitions

Standard definitions for each criterion are described in **Appendix B. Standard Criteria Descriptions**. In order to capture the unique management needs of the Refuge lands and species, standard definitions in IPIP can be adjusted to meet the needs of the Team. **Table 3** summarizes changes made to the criteria to make it more applicable to Bear Lake NWR. Select definitions were customized to meet the needs of the Refuge, and were defined as follows:

Importance to Federal or State-listed Species remained unscored

The threatened or endangered species criteria for areas is not applicable to Bear Lake NWR since it does not host any of these species. Therefore, the team decided to leave this criterion blank and manually adjust the Area Description scoring formula to account for this (total values of Ecological Integrity, Innate Resistance to Invasion, and Importance to Other Priority Natural Resources of Conservation Concern/3 * 0.4). Therefore, it is important to note that the total area scores within the IPIP database itself are not accurate.

Table 3. Category definitions and modifications

Category	Standard Meaning	Bear Lake Modification
Species Prioritization		
Legal Mandates	Identified on a county or state noxious weed list	Identified by county representative as a priority
Area Prioritization		
Ecological integrity	Emphasis on natural processes	An ecosystem that mimics natural processes
Innate resistance to invasion	Emphasis on native plants	Substitute “native” with “desirable”
Importance to federal or state-listed species	Emphasis on the presence or absence of T/E species	No T/E on refuge

Importance to other priority natural resources of conservation concern.	Emphasis on the presence or absence of determined species, guilds, communities, or ecosystems.	Diving ducks, Canada goose, colonial nesting birds (white-faced ibis, herons, Franklin's gull, Forster's tern)

2.22 Finalizing and Prioritizing Species List

The project team agreed on the final working list that contained 29 species, including several early detection rapid response (EDRR) species to be prioritized using IPIP (**Table 4**).

Table 4. Species list used for the weed prioritization workshop.

Common Name	Scientific Name	Invasiveness Ranking[1]	Refuge Presence
hoary alyssum	*Berteroa incana*	Medium-Low	
cheatgrass	*Bromus tectorum*	Medium	X
flowering rush	Butomus umbellatus	Medium	
musk thistle	*Carduus nutans*	High-Medium	X
spotted knapweed	*Centaurea stoebe*	High	
rush skeletonweed	*Chondrilla juncea*	Medium-Low	
Canada thistle	*Cirsium arvense*	High-Medium	X
bull thistle	*Cirsium vulgare*	Medium	X
houndstongue	*Cynoglossum officinale*	Medium	X
Fuller's teasel	*Dipsacus fullonum*	Medium-Low	X
Russian olive	*Elaeagnus angustifolia*	High-Medium	X
hydrilla	*Hydrilla verticillate*	High-Medium	
black henbane	*Hyoscyamus niger*	Medium-Low	X
Dyer's woad	*Isatis tentoria*	Medium	X
whitetop	*Lepidium draba*	Medium	X
perennial pepperweed	*Lepidium latifolium*	High-Medium	X
Dalmatian toadflax	*Linaria dalmatica ssp. Dalmatica*	Medium	
yellow toadflax	*Linaria vulgaris*	Medium	

Common Name	Scientific Name	Invasiveness Ranking[1]	Refuge Presence
purple loosestrife	*Lythrum salicaria*	High-Medium	
Eurasian watermilfoil	*Myriophyllum spicatum*	High-Medium	
Scotch thistle	*Onopordum acanthium*	Medium	
reed canarygrass	*Phalaris arundinacea*	High-Medium	X
phragmites	*Phragmites australis*	Medium	X
curlyleaf pondweed	*Potamogeton crispus*	Medium	X
Russian knapweed	*Rhaponticum repens*	Medium	X
sow thistle	*Sonchus arvensis*	High-Medium	X
medusahead rye	*Taeniatherum caput-medusae*	Medium	
saltcedar species	*Tamarix spp.*	High-Medium	X
hybrid cattail	*Typha X glauca*	Medium	X

[1] Scores are based on a species' mode of reproduction, innate potential for long-distance dispersal, potential to be spread by human activities, allelopathy, competitive ability (dependence on disturbance), and growth habit.

2.23 Finalizing and Prioritizing Refuge Areas

Prior to and during the area workshop, Refuge and Branch staff developed a strategy for identifying the scale of defined areas based on management units, refuge units, habitats, etc. The group had a discussion of the refuge-specific considerations (e.g. staffing structure at Refuge vs. Complex scale, management capacity/accessibility limitations). Based on this information, the team subdivided the Refuge into distinct areas for inventory. The final list of areas were defined by units and habitat types, yielding 28 in total (**Appendix C: Habitat Acreage at Bear Lake NWR**). Areas with high ecological integrity, low resistance to invasion, high importance to conservation priorities, high density of vectors or vector pathways, and low perceived abundance of invasive plants are a higher priority for inventory and thus receive the highest area prioritization scores.

3.0 Results: Inventory Targets (Species and Areas)

3.1 Species Prioritization

Species-level criteria are focused on invasiveness, proximity to the project scope, current and potential distribution, ecological impacts, and any legal mandates for each species that occurs within or adjacent to the project scope **(Appendix D: Species Criteria Rankings).**

The species prioritization list for species found within the boundaries of the Refuge can be found in **Table 5**. Of the 29 weed species ranked, *Tamarix spp.* (saltcedar) was ranked highest. This species can create dense stands, reduce biodiversity, and alter soil chemistry. A more comprehensive breakdown of species scores can be found in **Appendix D: Species Criteria Rankings**.

Table 5. Species prioritization list for 18 species and associated general habitats found on Bear Lake NWR.

Common Name	Prioritization Score	General Habitat(s)
saltcedar spp.	9.4	Dry meadows, riparian, playas. Moist soils (seasonally saturated), sides of dikes
phragmites	9	Roadside ditches, wetlands, depressions in and around wetlands. Disturbed and undisturbed communities.
perennial pepperweed	8.1	Subirrigated meadows, diketops, roadsides, greasewood, playas. Does not endure prolonged flooding.
Russian knapweed	8.07	Dry meadow, sagebrush, burned areas, agricultural fields, roadsides.
Dyer's woad	7.7	Agricultural fields, dry rangelands-requires a deep water table.
reed canarygrass	7.1	Saturated to nearly saturated soils for majority of growing season.
curlyleaf pondweed	7.1	Shallow/deep, still/flowing water. Tolerant of disturbance.
hybrid cattail	7.1	Shallow wetlands, encroaches wet sedge habitats. Semi-permanent and seasonal wetlands.

Common Name	Prioritization Score	General Habitat(s)
Canada thistle	5.9	Pastures, croplands, riparian and other wet areas with fluctuating water levels.
musk thistle	5.37	Drier, deeper soils ranging from mesic meadows to dry. Dike habitat.
Russian olive	5.37	Riparian, wetland borders- mesic conditions, dikes.
whitetop	5.37	Temporarily flooded and agricultural fields. Creeps into uplands.
cheatgrass	4.97	Dry sites- included because it is hindering farm field restoration.
sow thistle	4.77	Temporarily flooded meadows with sparse vegetation and drier portions of meadows.
Fuller's teasel	4.5	Wet and dry meadows, riparian, springs, disturbed areas, dry hillsides, seeps, ditches, wetland swales.
bull thistle	4.37	Disturbed roadsides. Temporary hydroperiod.
houndstongue	4.37	Disturbed areas along wetter edges of dikes, rarely in fields.
black henbane	3.97	Dry meadows, uplands. Fences, roadsides, disturbed areas.

In addition to the species found on Refuge lands, weed species found in surrounding areas were also prioritized (**Table 6**). This list provides an opportunity to highlight EDRR species on adjacent lands and waters and which may threaten the Refuge in the future.

Table 6. Prioritization list of weed species found outside of the boundary of Bear Lake NWR.

Common Name	Prioritization Score	Miles from Refuge Boundary				
		<1	<10	<50	<100	>100
Eurasian watermilfoil	8.3	X				
purple loosestrife	7.9		X			
flowering rush	7.1			X		

Common Name	Prioritization Score	Miles from Refuge Boundary				
		<1	<10	<50	<100	>100
spotted knapweed	7.1		X			
hydrilla	6.2					X
Dalmatian toadflax	6.1		X			
yellow toadflax	6.1		X			
medusahead	5.6			X		
Scotch thistle	4.9		X			
rush skeletonweed	3.5			X		
hoary alyssum	2.5			X		

3.2 Area Prioritization

The area prioritization list for Bear Lake NWR can be found in **Table 7**. A more comprehensive breakdown of area scoring can be found in **Appendix E: Area Criteria Rankings**. This list highlights areas where inventory and EDRR needs can be focused during future assessments. Meadow and Wetland within the Rainbow Complex were identified as highest priorities, while uplands of the North Meadows Complex and Oxford Slough scored the lowest **(Table 7)**.

Table 7. Prioritization of areas identified in the workshop for Bear Lake NWR.

Habitat	Prioritization Score
Rainbow Complex- Meadow	7.32
Rainbow Complex- Wetland	7.16
Crop Fields	6.75
Oxford Slough- Open Water	6.37
Rainbow Complex- Open Water	6.33
Oxford Slough- Wetland	6.23
Thomas Fork Unit- Wetland	6.23
Dike System	5.94

Habitat	Prioritization Score
Thomas Fork Unit- Meadow	5.93
West Canal Complex- Meadow	5.93
West Canal Complex- Wetland	5.86
Oxford Slough- Meadow	5.77
Mud Lake/Merkley Lake Complex- Open Water	5.73
West Canal Complex- Wooded Riparian	5.73
North Meadows Complex- Meadow	5.70
West Canal Complex- Open Water	5.63
Mud Lake/Merkley Lake Complex- Upland	5.28
Mud Lake/Merkley Lake Complex- Meadow	5.03
Mud Lake/Merkley Lake Complex- Wetland	4.83
Thomas Fork Unit- Wooded Riparian	4.37
Mud Lake/Merkley Lake Complex- Wooded Riparian	4.33
Oxford Slough- Wooded Riparian	4.30
West Canal Complex- Upland	4.27
Thomas Fork Unit- Upland	4.14
North Meadows Complex- Wetland	4.13
Rainbow Complex- Upland	4.07
North Meadows Complex- Upland	3.57
Oxford Slough- Uplands	3.27

4.0 Next Steps

Through use of weed and area prioritizations, Bear Lake NWR has completed the initial planning phase of the Invasive Plant Management Model (see **Appendix F. Stages of Invasive Plant Management Plan** for steps completed). The second element, assessment, can now be completed with the prioritized species and area information found in this report. Baseline inventories and early

detection efforts will 1) assist in developing management strategies, including prevention, eradication, suppression and restoration, 2) provide baseline information for future comparisons, 3) model future distribution and identify patterns of spread and environmental relationships. Examples of these efforts include adopting standardized survey techniques such as grid monitoring, patch, linear or polygon mapping, habitat-based monitoring, transects, or an exhaustive inventory in high priority areas. Refuges who complete the weed prioritization efforts are also eligible for funding through the Legacy Region 1 Invasive Species Small Grants program to assess the distribution and abundance of priority invasive species in priority areas. Assessments produce information that will inform the development of optimal strategies for managing priority invasive plant threats. The crafting of SMART objectives based on those strategies will lead to the implementation phase, during which management actions are conducted and efficacy monitoring is used to assess their effectiveness in meeting objectives.

Literature Cited

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D. Hiebert and J. Stubbendieck . 1993. Handbook for Ranking Exotic Plants for Management and Control. Natural Resources Rep. NPS/NRMWRO/ NRR-93/08. Denver, CO: United States Department of the Interior National Park Service Natural Resources Publication Office. 30 p.

US Department of Agriculture, Natural Resources Conservation Service. 2019. The PLANTS Database National Plant Data Team, Greensboro, NC 27401-4901 USA. http://plants.usda.gov, accessed 2020.

Appendix A. Workshop Participants

The following is a list of individuals and organizations who participated in the Bear Lake NWR invasive plant prioritization virtual workshop held January 12-14, 2021.

Organization	Name
USFWS Southeast Idaho National Wildlife Refuge Complex	Jeremy Jirak
	Deo Lachman
	Dan McDonald
	Kenneth Scheffler
	Andrea Kristof
	Ty Matthews
USFWS Interior Region 9/12 Branch of Refuge Biology	Jess Wenick Rob Taylor
USFWS Interior Region 11	Aaron Martin
	Lisa Dlugolecki
	Ben Wishnek
USFWS Interior Region 8	Bethany Derango
Idaho Department of Fish and Game	Maria Pacioretty
Idaho Department of Agriculture	Madi Patterson
Bear Lake County	Todd Transtrum
USFS Caribou National Forest	Chase Scheffler
Utah Department of State Lands	Matt Coombs
Bear Lake Watch	David Cottle

Appendix B. Standard Criteria Descriptions

Area Prioritization

Ecological Integrity

The structure, composition, and functions of an ecosystem(s) within the bounds of natural or historic disturbance regimes (Rocchio and Crawford 2011).

Areas with high ecological integrity are relatively unimpaired across a range of ecological attributes and spatial and temporal scales (De Leo and Levin 1997). Areas with relatively high ecological integrity often have high conservation value and are a priority for preventing or reducing human-induced threats such as invasive species.

Scale Definition	Scale	Score
Ecosystem(s) of the area believed to be, on a global or range-wide scale, among the highest quality examples with respect to major ecological attributes functioning within the bounds of natural disturbance regimes. Characteristics include: the landscape contains natural habitats that are essentially unfragmented (reflective of intact ecological processes) and with little to no human-induced threats (e.g., contaminants, invasive species); vegetation structure and composition, soils and hydrology are within natural ranges of variation; invasive species are essentially absent or have negligible negative impact; key native plant and animal indicators are present.	Very Good	10
Ecosystem(s) of the area is not among the highest quality, but exhibit favorable characteristics regarding major ecological attributes functioning within the bounds of natural disturbance regimes. Characteristics include: largely natural habitats with minimal fragmentation and few human-induced threats (e.g., contaminants, invasive species); vegetation structure and composition, soils and hydrology are within natural ranges of variation; invasive species are uncommon/rare and/or have minimal negative impact; many key plant and animal indicators are present.	Good	7
Ecosystem(s) of the area contains a number of unfavorable characteristics in terms of major ecological attributes and natural disturbance regimes. Characteristics of this ecosystem would include: moderately fragmented natural habitat with several human-induduced threats; biotic and abiotic factors are outside their natural range of variation; a moderate number of human induced threats are present; invasive species are moderately abundant and/or have moderate negative impacts; many of the key plant and animal indicators are absent. Management is needed to maintain or restore major ecological attributes.\	Fair	3
Ecosystem(s) of the area is severely altered with respect to major ecological attributes. Characteristics include: little natural habitat and very fragmented; biotic and abiotic factors are severely altered well beyond their natural range of variation; a relatively high number of human induced threats are present; invasive species exert a strong negative impact; most (if not all) key plant and animal indicators are absent. There may be little long-term conservation value	Poor	1

without intense management and restoration, and such restoration may be difficult or uncertain.		
The ecological integrity of the area is unknown.	Unknown	3

Innate Resistance to Invasion

The innate capacity of an ecosystem to resist establishment of invasive plant species.

Areas with low innate resistance to invasion are a priority for early detection and rapid response. Factors that can influence resistance include native plant cover and diversity, abiotic conditions (such as nutrient levels, soil or water quality, hydrology) and natural disturbance regimes (such as flooding, fire). Areas where native plants occupy most bare ground or capture almost all light at the soil surface can limit establishment of invasive plants (Hobbs and Huenneke 1992). Areas with greater plant diversity occupy a greater variety of resources and thereby can limit the ability of non-native species to obtain resources that are not already occupied or used (Naeem 2000, Lockwood et. al. 2010). Areas with relatively extreme abiotic conditions (e.g., highly saline, low nutrient levels) can limit invasive plant establishment. Disturbance, whether natural or human-caused often facilitates or creates opportunities for invasion (Lockwood et. al. 2010). Here, we are focused on natural disturbance regimes. Human-induced disturbance factors are addressed in another section of IPIP.

Scale Definition	Scale	Score
Two or more of the following characteristics are present: Low plant species richness, >50% bare ground, high frequency and intensity of natural disturbance events (e.g., fire, hurricanes, extreme tides) and relatively non-stressful abiotic conditions.	Low	10
Two or more of the following characteristics are present: moderate plant species richness, 10-50% bare ground, moderate frequency and intensity of natural disturbance events, neutral abiotic conditions.	Moderate	5
Two or more of the following characteristics are present: high plant species richness, <10% bare ground, low frequency and intensity of natural disturbance events, abiotic conditions stressful (e.g., high salinity, low nutrient levels, regular flooding).	High	1
The innate resistance to invasive plants is unknown.	Unknown	5

Size

Total spatial area of target area for inventory prioritization. This factor will not receive a score and is informational in nature.

Importance to Federal or State-listed Species

The relative importance of the area to federal or state listed endangered or threatened species as it relates to the presence or proximity of a species or its habitat.

Areas important to listed species are a high priority for detecting and removing threats such as invasive plants.

Scale Definition	Scale	Score
The area contains listed species habitat AND one or more listed species have been documented in the area in the last 10 years.	High	10
The area contains listed species habitat or is adjacent to areas that support listed species, but listed species have not been documented in the area in the last 10 years.	Medium	5
The area does not support listed species or listed species habitat.	Low	0
It is unknown whether the area contains listed species habitat or when listed species have been documented in the area.	Unknown	5

Importance to Other Priority Natural Resources of Conservation Concern

The relative importance of the area to other natural resources of priority conservation concern as it relates to the presence or proximity of a natural resource. This includes species, communities or ecosystems that are designated as species of special conservation concern by local, regional, state, national or international organizations.

Areas important to priority natural resources of conservation concern are a high priority for detecting and removing invasive plants.

Scale Definition	Scale	Score
The area currently supports natural resources of priority conservation concern.	High	10
The area does not support priority resources of conservation concern but is immediately adjacent to areas that do.	Medium	5
The area does not support priority resources of conservation concern and is not adjacent to areas that do support priority resources of conservation concern.	Low	0
It is unknown whether the area supports natural resources of conservation concern.	Unknown	5

Terrestrial Pathways

The distribution and density of terrestrial pathways such as roads, trails, levees, berms, parking areas.

Terrestrial pathways provide a means for transport, establishment, and spread of invasive plants. Areas where terrestrial pathways are widely distributed and occur at high density are at high risk for invasion and are therefore a high priority for invasive plant detection and removal.

Scale Definition	Scale	Score
No occurrence of terrestrial pathways within the area.	No Terrestrial Pathways	0
Terrestrial pathways spatial coverage and/or density is low relative to other areas within the project scope.	Low Coverage and/or Density	3
Terrestrial pathway spatial coverage and/or density is medium relative to other areas within the project scope.	Medium Coverage and/or Density	7
Terrestrial pathway spatial coverage and/or density is high relative to other areas within the project scope.	High Coverage and/or Density	10

Aquatic Pathways

The distribution and density of aquatic pathways such as rivers, sloughs, streams, lakes and reservoirs.

Aquatic pathways provide a means for transport, establishment, and spread of invasive plants. Areas where aquatic pathways are widely distributed and occur at high density are at high risk for invasion and are therefore a high priority for invasive plant detection and removal.

Scale Definition	Scale	Score
No occurrence of aquatic pathways within the area.	No Aquatic Pathways	0
Aquatic pathway spatial coverage and/or density is low relative to other areas within the project scope.	Low Coverage and/or Density	3
Aquatic pathway spatial coverage and/or density is medium relative to other areas within the project scope.	Medium Coverage and/or Density	7
Aquatic pathway spatial coverage and/or density is high relative to other areas within the project scope.	High Coverage and/or Density	10

Transport Vectors

The presence, frequency, and duration of human-mediated transport vectors in the area. Transport vectors provide the means for transporting invasive plant propagules along terrestrial and aquatic pathways (Lockwood et. al. 2007). Vectors here include any means of human-mediated transport of invasive plant materials such as vehicles, boats, bicycles, clothing/shoes and construction equipment. Areas that experience frequent or long duration vector events are at high risk to invasive plant introduction and spread and are therefore a high priority for invasive plant detection and removal. Vector events are occurrences where a vector enters the area (e.g., for public use, management, inventory and monitoring).

Scale Definition	Scale	Score
Human-mediated vectors are absent OR human- mediated vectors operate within the area but frequency and duration of vector events is low relative to the other areas in the project scope.	No Vectors or Low Vector Frequency / Duration	1
Human-mediated vectors operate in the area AND frequency and duration of vector events is moderate relative to the other areas in the project scope.	Medium Vector Frequency / Duration	5
Human-mediated vectors operate in the area AND frequency and duration of vector events is high relative to the other areas in the project scope.	High Vector Frequency / Duration	10

Anthropogenic Disturbances

The intensity, duration, and frequency of human-caused disturbance events.

Disturbance facilitates invasive plant invasions and can be described as a "relatively discrete event in time that disrupts ecosystem, community, or population structure and changes resources, substrate availability, or the physical environment" (Lockwood et. al. 2007, White and Pickett 1985). Here we are focused on anthropogenic disturbances such as restoration/enhancement activities, regular maintenance activities resource extraction and toxic spills. Areas that are exposed to intense, frequent, or long-duration disturbance events are at high risk for invasion and therefore should be a priority for invasive plant detection and removal.

Scale Definition	Scale	Score
The area has experienced high levels of anthropogenic disturbance (e.g., high intensity, duration, or frequency) relative to other areas within the project scope in the last 10 years.	High Anthropogenic Disturbance	10
The area has experienced moderate levels of anthropogenic disturbance (e.g., moderate intensity, duration, or frequency) relative to other areas within the project scope in the last 10 years.	Medium Anthropogenic Disturbance	5
Anthropogenic disturbance has not occurred in the last 5 years or the area experiences low levels of anthropogenic disturbance (e.g., low intensity, duration, or frequency) relative to other areas within the project scope in the last 10 years.	Low Anthropogenic Disturbance	1

Invasive Plant Status Inventory and Monitoring

The status of invasive plant inventories or monitoring in the area.

An invasive plant inventory documents the presence, abundance, and distribution of invasive plant species at a particular time. Invasive plant monitoring involves repeated surveys to document changes in invasive plant presence, distribution, or abundance. Invasive plant survey information is critical to effective and efficient management of invasive plants. For example, survey information provides the means for detecting, eradicating, or containing invasive plant populations before they become a problem and inform decisions about how to optimally allocate treatment resources. Areas with little or no inventory or monitoring information are considered a high priority for inventory or early detection.

Scale Definition	Scale	Score
Data on the distribution and abundance of priority invasive plants has not been collected in the area in the last 10 years.	No information in the last 10 years	10
Data on the distribution and abundance of priority invasive plants have been collected in the last 10 years but the effort was not comprehensive (e.g., limited in spatial scope, single species focus, etc.) and/or survey effort was not well documented.	Past 10 years, but not comprehensive or well documented	7
Data on the distribution and abundance of priority invasive plants has been collected in the area in the last 10 years and the survey effort was comprehensive and well documented	Past 10 years, comprehensive and well documented	3
Data on the distribution and abundance of priority invasive plants has been collected in the area in the last 5 years and the survey effort was comprehensive and well documented	Past 5 years, comprehensive and well documented	1

Infestation Level

The status of invasive plant infestations in the area based upon area-specific knowledge or past inventory data. The value of collecting information on invasive plant abundance and distribution is lower in areas already heavily infested by one or more invasive plant species. The value of collecting information is higher in areas specified as 'clean' or with minimal invasion because the information can be used to direct eradication efforts and prevent future economic and ecological harm.

Scale Definition	Scale	Score
Invasive plant species are not known to occur in significant amounts in the area.	Trace (<1%)	10
1-5% of the area is infested by one or more invasive plant species.	Low (1-5%)	7
6-25% of are is infested by one or more invasive plant species.	Moderate (6-25%)	3
>25% of area is infested by one or more invasive plant species.	High (>25%)	1
The status of invasive plant species in the area is unknown.	Unknown	3

Number of Invasive Species

The approximate number of invasive plant species infesting the area based upon area-specific knowledge or past inventory data.

The value of collecting information on invasive plant status is lower in areas already heavily infested by one or more species. We assume here that early detection and rapid response of all invasive plant species is a priority, therefore, areas that have fewer types of invasive plant species will rank higher.

Scale Definition	Scale	Score
Invasive plant species are not known to occur in the area.	None	10
1-5 unique species occur in the area.	1 to 5 Species	7
6-10 unique species occur in the area.	6 to 10 Species	3
>10 unique species occur in the area.	>10 Species	1
The number of invasive plant species in the area is unknown.	Unknown	3

Species Prioritization

Species Invasiveness (Custom System)

Species invasiveness scores are generated from one of five existing ranking systems: California Invasive Plant Council (Cal-IPC 2006), Invasiveness Ranking System for Non-native Plants of Alaska (Carlson et. al. 2008), Ranking Invasive Exotic Plant Species in Virginia (Heffernan et al. 2001), NatureServe (NatureServe Explorer 2009), and Invasive Non-native Plants that Threaten Wildlands in Arizona (AWIPWGroup 2005). Criteria used to characterize invasiveness vary among systems, but common criteria include: 1) ecological impacts (e.g., to wildlands or natural abiotic processes), 2) biological characteristics including dispersal ability (e.g., reproductive capacity), and 3) distribution (see Appendix C, Table C-1). Factors unique to one or more of the ranking systems include ease of control and scientific documentation. If a species has not been previously ranked by one of these systems, other sources of information, such as expert opinion, may be used. Alternatively, if time and resources permit, an invasiveness ranking may be calculated using the NatureServe invasive species assessment protocol (Morse et al. 2004).

Species considered highly invasive by state or larger landscape ranking systems have the potential to cause significant ecological and economic harm at a local scale and should be considered a high priority for detection and subsequent eradication or control.

Proximity

The proximity of the invasive species relative to the project scope. Select the statement that best describes the proximity of the species to the project area.

Invasive species that are already documented in the project scope, or in close proximity, should be considered as a target for inventory or early detection.

Scale Definition	Scale	Score
The species has not been documented or is not believed to occur within 100 miles of the project scope.	>100 miles (>160 km)	1
The species has been documented or is believed to occur within 100 miles of the project scope.	<100 miles (<160 km)	3
The species has been documented or is believed to occur within 50 miles of the project scope.	<50 miles (<80 km)	5
The species has been documented or is believedto occur within 10 miles of the project scope.	<10 miles (<16 km)	7
The species has been documented or is believed to occur within 1 mile of the project scope.	<1 mile (<2 km)	9
The species is documented or is believed to occur within the project scope.	Within the Project Scope	10

Current Abundance

The documented or estimated abundance of the species within the project scope.

A species with low abundance would score higher. Detecting and eradicating an invasive species at the early stages of invasion prevents future economic and ecological harm.

Scale Definition	Scale	Score
<10% of the project scope is infested by the species.	Low abundance	10
10-25% of the project scope is infested by the species.	Moderate abundance	7
>25-60% of the project scope is infested by the species.	High abundance	5
>60% of the project scope is infested by the species.	Very high abundance	1
The abundance of the species w/in the project scope is unknown	Unknown abundance	7

Habitat Suitability

The proportion of additional suitable habitat within the project scope within which a species could spread under management practices. For species not documented or unknown to occur within the project scope, the estimated amount of available suitable habitat within the project scope if it were introduced.

Areas containing suitable habitat for an invasive species, but are not yet occupied, are a higher risk for invasion and should be considered a priority for detection and subsequent eradication or control. Species with higher levels of unoccupied habitat will score higher.

Scale for species that occur within the project scope:

Scale Definition	Scale	Score
No further suitable habitat present within the project scope, or all available habitat is occupied.	No additional habitat	0
Additional suitable habitat is limited (<10% of project scope); species not likely to spread further.	Low available habitat	3
Additional suitable habitat for further spread is moderate (10-30%).	Moderate available habitat	7
Suitable habitat exists throughout the project scope (>30%) for further spread.	High available habitat	10
Unknown percent of available habitat for further spread within the project scope.	Unknown available habitat	7

Scale for species that do not occur within the project scope:

Scale Definition	Scale	Score
No suitable habitat present within the project scope.	No habitat	0
Limited suitable habitat within the project scope (<10% of scope).	Low suitable habitat	3
Moderate amount of suitable habitat within the project scope (10-30% of scope).	Moderate suitable habitat	7
High amount of suitable habitat within the project scope (>30% of scope).	High suitable habitat	10
Unknown amount of suitable habitat within the project scope.	Unknown suitable habitat	7

Current Ecological Impacts

The abiotic and biotic impacts to natural resources of conservation concern within the project scope where the species occurs. This criterion applies only to species known to occur within the project scope.

Species that already have a high negative effect are higher priority for inventory and management. Examples of negative impact on abiotic processes: changes fire frequency or intensity; alters hydrologic regimes; effects a change in salinity, alkalinity, or pH; changes erosion and sedimentation rates, etc. Examples of negative impact on community structure of composition: covers canopy or creates new canopy; competition and/or suppression with native vegetation, etc.

Scale Definition	**Scale**	**Score**
No current negative effect.	None	0
No current perceivable, or very minimal, negative impact on abiotic processes and community structure and composition.	Low	1
The species has a mild negative effect on abiotic processes and community structure and composition.	Medium	3
The species is currently causing significant alteration of abiotic processes and community structure and composition.	High	7
The species is currently causing major alterations or disruptions to abiotic ecosystem processes and community structure and composition.	Very High	10
The current negative effect of the species on priority resources or abiotic processes is undocumented or unknown	Unknown	7

Potential Ecological Impacts

The expected abiotic and biotic impacts to natural resources of conservation concern were the species to become established within the project scope. This criterion applies only to species with the potential to occur within the project scope (early detection).

Areas containing habitat for a species are at greater risk of ecological harm if the species were to establish. Harm can be estimated from knowledge of similarly invaded environments.

Scale Definition	Scale	Score
No expected impact if the species were to establish within the project scope.	None	0
Minimal expected negative impact on abiotic processes and community structure and composition if the species were to establish within the project scope.	Low	1
Mild negative effect on abiotic processes and community structure and composition would be expected if the species were to establish within the project scope.	Medium	3
Significant alteration of abiotic processes and community structure and composition expected if the species were to establish within the project scope.	High	7
Major alterations of disruptions to abiotic ecosystem processes and community structure and composition if the species were to establish within the project scope.	Very High	10
The projected negative impact of the species is unknown	Unknown	3

Legal Mandates

Consider whether the species has a noxious or other regulatory designation at a larger landscape scale (e.g., county, state) or is a priority for EDRR on lands surrounding the project scope (e.g., early detection networks, wee management area, etc.).

Species designated as noxious species or considered a high management priority by other local organizations (e.g., weed management areas) are believed to have a high potential for economic or ecological harm. As such, these species are a high priority for detection and subsequent eradication or control.

Scale Definition	Scale	Score
This species is on the state or county noxious weed list OR is considered a high management priority by a local weed management area, early detection network, or other cooperative partnership.	Yes	10
	No	0

Appendix C: Habitat Acreage at Bear Lake NWR

Habitat	Subhabitat	Acres							
		North Meadows Complex	Bunn Lake Complex	Bloomington Complex	Rainbow Complex	Mud Lake Complex	Thomas Fork Unit	Oxfod Slough	Total
Open Water		**60**	**212**	**216**	**345**	**4,167**	**28**	**43**	**5,071**
	Open Water	40	144	159	170	4,055	28	36	4,632
	Submergent	20	68	57	175	112	0	7	439
Wetland		**1,268**	**3,054**	**1,939**	**1,628**	**3,186**	**245**	**721**	**12,041**
	Deep Emergent	174	1,603	1,133	802	1,501	35	511	5,759
	Shallow Emergent	1,094	1,451	806	826	1,685	210	210	6,282
Meadow		**327**	**183**	**193**	**100**	**321**	**621**	**732**	**2,477**
	Wet Meadow	202	81	23	44	150	358	237	1,095
	Alkali Meadow	1	5	23	1	23	32	376	461
	Meadow Grass	124	97	147	55	148	231	119	921
	Hayed Meadow								0
Wooded Riparian		**2**	**8**	**3**	**10**	**26**	**41**	**2**	**92**
Uplands		**104**	**115.3**	**152.1**	**25**	**363**	**70.3**	**293.2**	**1122.9**
	Alkali Upland Meadow	92	47	123	24	28	2	127	443
	Mixed Shrub	12	0	4	1	335	24	87	463
	Ag Upland Crops	0	68.3	25.1			44.3	79.2	216.9

Appendix D: Species Criteria Rankings

Scores of species criteria and explanations (handbook)

Common Name	Invasiveness	Status and Habitat Suitability			Ecological Impacts	Legal Mandates	Total Score
		Species Proximity	Current Abundance	Habitat Suitability			
black henbane	Med-Low	Present	Low	Low	Low	No	3.97
bull thistle	Med	Present	Low	Low	Low	No	4.37
Canada thistle	High-Med	Present	Low	Mod	Med	No	5.90
cheatgrass	Med	Present	Low	Low	Med	No	4.97
curlyleaf pondweed	Med	Present	Low	High	High	No	7.10
Dalmatian toadflax	Med	<10 miles	NA	Low	High	Yes	6.10
Dyer's woad	Med	Present	Low	Mod	High	Yes	7.70
Eurasian watermilfoil	High-Med	<1 mile	NA	High	High	Yes	8.30
flowering rush	Med	<50 miles	NA	High	High	Yes	7.10
Fuller's teasel	Med-Low	Present	Low	Mod	Low	No	4.50
hoary alyssum	Med-Low	<50 miles	NA	Low	Low	No	2.50
houndstongue	Med	Present	Low	Low	Low	No	4.37
hybrid cattail	Med	Present	Low	High	High	No	7.10
hydrilla	High-Med	>100 miles	NA	Low	Very High	Yes	6.20
medusahead rye	Med	<50 miles	NA	Low	Very High	No	5.60
musk thistle	High-Med	Present	Low	Low	Med	No	5.37
perennial pepperweed	High-Med	Present	Low	Mod	High	Yes	8.10
phragmites	Med	Present	Low	High	Very High	Yes	9.00
purple loosestrife	High-Med	<10 miles	NA	High	High	Yes	7.90

Common Name	Invasiveness	Status and Habitat Suitability			Ecological Impacts	Legal Mandates	Total Score
		Species Proximity	Current Abundance	Habitat Suitability			
reed canarygrass	High-Med	Present	Low	Mod	High	No	7.10
rush skeletonweed	Med-Low	<50 miles	NA	Low	Low	Yes	3.50
Russian knapweed	Med	Present	Low	Low	Very High	Yes	8.07
Russian olive	High-Med	Present	Low	Low	Med	No	5.37
saltcedar	High-Med	Present	Low	High	Very High	Yes	9.40
Scotch thistle	Med	<10 miles	NA	Low	Med	Yes	4.90
sow thistle	High-Med	Present	Low	Low	Low	No	4.77
spotted knapweed	High	<10 miles	NA	Low	High	Yes	7.10
whitetop	Med	Present	Low	Low	Low	Yes	5.37
yellow toadflax	Med	<10 miles	NA	Low	High	Yes	6.10

Invasiveness. Established systems exist (i.e., Cal-IPC, Alaska, Virginia, NatureServe, Arizona), yet none adequately capture the nature of invasive species within Region 1 refuges. Therefore, a custom ranking system was created that considers a species' mode of reproduction, innate potential for long-distance dispersal, potential to be spread by human activities, allelopathy, competitive ability (dependence on disturbance), and growth habit. Each score (1-10) is then translated to the appropriate IPIP category (Low-Very High). Rankings are then reviewed and verified by experts at the workshop.

Status and Habitat Suitability. This category considers the status and potential for spread of invasive species within the project scope or with the potential to occur within the project scope (early detection species). Criteria for this category consider species distribution or distance from the project boundary and its potential for further spread. If a species is known to occur within the project scope, questions focus on the level of infestation and the potential for further spread within the project scope. For species not known to occur within the project scope, the nearest distance band is selected (e.g., <50 miles, >100 miles). Habitat suitability is then assessed. Species that are found on the refuge at low infestation levels will score equally to species that are found in close proximity to the refuge because of the innate bias of IPIP towards early detection and rapid response.

Ecological Impacts. This category consists of a single criterion used to assess the ecological impacts, or potential impacts, of a given species within the project scope. Among the most useful indicators

of whether a species will have ecological impacts at a certain location is its history of invasiveness in other, similar environments, so it is important to not dismiss species because they are not currently found within the project scope or not currently a problem. In addition, a site may have unique environmental characteristics that exacerbate ecological impacts of a particular species (e.g., flood irrigation and reed canarygrass).

Legal Mandates. Because noxious weed and invasive plant designations and regulations vary across geopolitical boundaries, workshop participants are asked to consult relevant weed lists. In the case of Bear Lake NWR, state and county representatives assisted in providing an updated status for each species.

Appendix E: Area Criteria Rankings

Area	Ecological Integrity	Innate Resistance to Invasion	Importance to Key Wildlife Spp	Terrestrial Pathways	Aquatic Pathways	Transport Vectors	Anthro Disturb	I&M (yrs)	Infest Level	# Invasive Spp	Score
Crop Field	Good	Low	High	Med	No	Med	High	<10, not comp	High	1-5	6.75
Dike System	Poor	Mod	Med	High	Med	High	High	<10, not comp	Low	6-10	5.94
Mud Lake/Merkley Complex-Wetland	Good	Mod	Low	Low	High	Med	Low	<5, comp	Trace	1-5	4.83
Mud Lake/Merkley Complex-Meadow	Good	High	Med	Low	Med	No	Low	<10, not comp	Trace	1-5	5.03
Mud Lake/Merkley Complex-Open Water	Poor	Low	High	Low	High	Med	Low	<5, comp	Low	1-5	5.73
Mud Lake/Merkley Complex-Upland	Good	Mod	Low	High	No	High	Low	<10, not comp	Low	1-5	5.28
Mud Lake/Merkley Complex-Wooded Riparian	Fair	Low	Low	No	High	No	Low	<10, not comp	Mod	1-5	4.33
North Meadows Complex-Meadow	Good	High	High	Med	Med	Med	Low	<5, comp	Trace	1-5	5.70
North Meadows Complex-Upland	Fair	Mod	Low	Med	Low	Med	Low	<10, not comp	Mod	6-10	3.57
North Meadows Complex-Wetland	Good	High	Med	Low	Med	Med	Low	<5, comp	Trace	>10	4.13
Oxford Slough- Meadow	Fair	High	High	Med	Med	Med	Low	<10, not comp	Trace	1-5	5.77
Oxford Slough- Open Water	Fair	Low	High	No	High	No	Low	<10, not comp	Trace	1-5	6.37
Oxford Slough- Upland	Fair	Mod	Low	Med	Low	No	Low	<10, not comp	Mod	6-10	3.27
Oxford Slough- Wetland	Good	High	High	Low	High	No	Med	<10, not comp	Trace	1-5	6.23
Oxford Slough- Wooded Riparian	Poor	Mod	Low	Med	Med	Med	Med	<10, not comp	Mod	1-5	4.30

Area	Ecological Integrity	Innate Resistance to Invasion	Importance to Key Wildlife Spp	Terrestrial Pathways	Aquatic Pathways	Transport Vectors	Anthro Disturb	I&M (yrs)	Infest Level	# Invasive Spp	Score
Rainbow Complex- Meadow	Very Good	Mod	Med	High	High	Med	Med	<10, not comp	Trace	1-5	7.32
Rainbow Complex- Open Water	Very Good	Mod	High	Low	Low	Med	Low	<5, comp	Trace	1-5	6.03
Rainbow Complex- Upland	Fair	Mod	Low	Med	Low	No	Low	<10, not comp	Low	1-5	4.07
Rainbow Complex- Wetland	Very Good	Mod	High	Med	High	Med	Med	<5, comp	Trace	1-5	7.16
Thomas Fork Unit- Meadow	Good	High	High	Low	High	Med	Low	<10, not comp	Low	1-5	5.93
Thomas Fork Unit- Wooded Riparian	Poor	Mod	Med	No	High	Med	Low	<10, not comp	Mod	1-5	4.37
Thomas Fork Unit- Upland	Poor	Low	Low	Med	No	Med	Low	<10, not comp	Mod	1-5	4.14
Thomas Fork Unit- Wetland	Good	High	High	Low	High	Med	Low	<10, not comp	Trace	1-5	6.23
West Canal Complex- Meadow	Fair	Mod	High	Med	High	Med	Med	<5, comp	Low	1-5	5.93
West Canal Complex- Open Water	Fair	Mod	High	Med	High	No	Low	<5, comp	Trace	1-5	5.63
West Canal Complex- Upland	Poor	Low	Low	Med	Med	Med	Low	<10, not comp	Mod	6-10	4.27
West Canal Complex- Wetland	Good	Mod	High	Med	High	No	Med	<5, comp	Low	1-5	5.86
West Canal Complex- Wooded Riparian	Very Good	High	High	Low	High	No	Low	<5, comp	Trace	1-5	5.73

Appendix F. Stages of Invasive Plant Management Planning

Planning Component	**Complete?**
Species prioritization	X
Area prioritization	X
Update species occurrence data (inventory)	
Identify general strategies per species-area combination	
Develop SMART objectives/thresholds for action	
Develop EDRR monitoring plan	
Develop monitoring plan for high priority existing species	
Invasive plant management plan completed (including BMPs to avoid non-target effects)	
Commencement of annual work planning	