

## NON-NATIVE INVASIVE SPECIES (NNIS)

### (1) Overview

#### Current Situation

Approximately 2000 acres of Non Native Invasive plant species (NNIS) occur on the Forest. Highest risk species include common buckthorn, leafy spurge, purple loosestrife, spotted knapweed (Figure 1), Canada thistle, rusty crayfish, and spiny water flea. Six lakes are infested with spiny water flea and at least four known lakes are infested with rusty crayfish. Existing NNIS populations are of obvious concern. However we are also very concerned about terrestrial and aquatic habitats at risk to future NNIS establishment and expansion. Correspondingly we have focused our detection efforts within these susceptible habitats particularly those adjacent to existing NNIS populations. A more complete list of NNIS on the Superior Forest is as follows:

#### **Figure 1. NNIS Species**

##### **PLANTS**

Garlic mustard (*Alliaria officinalis*)\*  
Goutweed (*Aegopodium podagraria*)  
Siberian Pea Bush (*Caragana arborescens*)  
Plumeless thistle (*Carduus acanthoides*)  
Spotted knapweed (*Centaurea biebersteinii*)  
Oxeye Daisy (*Chrysanthemum leucanthemum*)  
Common tansy (*Tanacetum vulgare*)

Canada thistle (*Cirsium arvense*)  
Bull thistle (*Cirsium vulgare*)  
Leafy spurge (*Euphorbia esula*)  
Cypress spurge (*Euphorbia cyparissias*)  
Orange hawkweed (*Hieracium auranticum*)  
Common buckthorn (*Rhamnus cathartica*)  
Spiny waterflea (*Bythotrephes cederstroemi*)

Yellow hawkweeds (*Hieracium floribundum*)  
St. Johnswort (*Hypericum perforatum*)  
Tatarian honeysuckle (*Lonicera tatarica*)  
Purple loosestrife (*Lythrum salicaria*)  
Eurasian watermilfoil (*Myriophyllum spicatum*)\*  
Curlyleaf pondweed (*Potamogeton crispus*)\*

##### **ANIMALS**

Rusty crayfish (*Orconectes rusticus*)  
Spiny Water Flea (*Bythotrephes cederstroemi*)  
Earthworms (Lumbricidae)

\*Infestations near Superior National Forest but not on Forest yet

## Partnerships In Place

We have partnered with Friends of the Boundary Waters for NNIS awareness/early detection training, and members of the MN Invasive Species Advisory Council. We are currently cooperating with the University of Minnesota-Duluth, Voyageurs National Park, and Quetico Provincial Park to initiate spiny water flea early detection surveys in the Rainy River Basin as well as to refine lake sampling and monitoring methodology.

## Prevention/Education Measures

- NNIS list and phenology chart developed in 2001, updated 2005.
- District NNIS training – ongoing.
- Road maintenance contracts – contractors must clean equipment before moving onto Forest.
- NNIS prevention training part of BWCAW minimum impact fire suppression techniques prescribed burns.
- Noxious weed poster developed and placed at BWCAW entry points in 2003.
- NNIS info in BWCAW permit packets.
- NNIS presentations provided for various community clubs, Ely Nature Talk Series, Friends of Boundary Waters.
- 2001 to present – hand pulling of spotted knapweed by Boy Scouts at Ojibway Gravel pit.

## Early Detection/Rapid Response

A Forest-wide NNIS baseline inventory outside the BWCAW was completed in 2004. This inventory focused on roadsides, recreation sites, gravel pits, admin sites, sampling of harvested stands. A prioritized inventory of the east side of the BWCAW was completed in 2005. In 2003 a plumeless thistle infestation (new species for SNF and county record) was detected on the Forest and treatments to eradicate this population were initiated.

Treatments of non-native invasive plant infestations over the past 3 years have included spraying, mowing, hand-pulling, and disking. 3-15 acres per year have been treated under a CE for recreation/admin site maintenance. A plan outlining control priorities for future NNIS treatments was developed in 2005. Moreover



*Spotted Knapweed*



*Example of habitat very susceptible to NNIS invasion*

practices to re-vegetate & restore treatment sites with local native grass and forb seed were also developed.

Spiny water flea surveys were initiated on the Superior National Forest in 2004 to detect the presence of populations in border lakes of the Boundary Waters Canoe Area Wilderness (BWCAW). Zooplankton tows occurred in two lakes including Sea Gull Lake and Lac La Croix. Spiny water flea was detected in Sea Gull Lake near the Gunflint Trail. No individuals were identified in Lac La Croix. In 2005, surveys occurred in 10 lakes on the Forest. Of the 10 lakes surveyed, spiny water flea was observed in samples from 4 lakes that were known to be infested including Greenwood, Pine, McFarland, and Saganaga. Although spiny water flea had been reported as present in Flour lake during previous surveys (Minnesota Department of Natural Resources Infested Waters List 2005), they were not observed in 2005.

Rusty crayfish surveys began on the Superior National Forest in 2003. Surveys occurred in 25 lakes that had recreational access to the BWCAW. Modified minnow traps were set overnight to assess relative abundance and species composition. In 2003, four crayfish species were captured in 20 of the 24 survey lakes. Rusty crayfish were captured in two lakes including Hungary Jack Lake (previously known population) and Gull Lake (new detection). In 2005, rusty crayfish surveys occurred on 17 lakes on the Forest. Rusty crayfish were present in five lakes including Dumbbell, Bearskin, Hungry Jack, Saganaga, and Gull Lakes. Rusty crayfish were observed for the first time in Bearskin and Saganaga Lakes.



*Completed zooplankton tow*



*Rusty crayfish captured in minnow traps*

## Control Measures



*Watercraft inspection*

## Priorities

Priorities for the Superior National Forest include: continuing education/awareness efforts for public and staff, completing NNIS inventories in both wilderness and non-wilderness areas of the Forest, completing NEPA for NNIS management and implementing prioritized NNIS treatment plan in 2006, developing partnerships for NNIS and establishing a CWMA, and continuing emphasis of prevention measures.

Spiny water flea and rusty crayfish population monitoring will continue to occur at established locations in future years. It is anticipated that this information will be useful for providing public education/information in an effort to control future invasions on the Forest and in northeastern Minnesota.



*Dark Lake purple loosestrife pull*



*Spotted knapweed before herbicide treatment*



*Same site after herbicide treatment*

## (2) Monitoring Activities

### **Monitoring Question**

**To what extent is Forest management contributing or responding to populations of terrestrial or aquatic nonnative species that threaten native ecosystems?**

**Monitoring Driver(s): Objective. O-WL-37.** Reduce the spread of terrestrial or aquatic non-native invasive species that pose a risk to native ecosystems.

<b>TERRESTRIAL</b>			
<b>Applicable Monitoring Activity, Practice, Or Effect Measured</b>	<b>Methods</b>	<b>When Monitored</b>	<b>Location or Project Area</b>
Acres of NNIS	For all data collection, use TERRA protocol to document nox weed occurrences (1) VEIS & Tomahawk Ch2. Invasive Plants Objective Methods: Monitor harvest units and newly constructed roads after harvest, site prep, or construction in order to determine if invasive plants have colonized areas where management activities have occurred. Provide training to sale administrators and forestry technicians to recognize invasive plants. (2) BW Fuels EIS. Ch2. 2.6.2. One site visit to selected sites, one year after the burn; and a follow-up visit in years 2 & 3. (3) Silver Island EA.NNIS Conduct searches near former, current, and future activity areas (along roads and trails). (4) Inga South & Devils Track OA's. Conduct searches for new sites.	June-August	(1) Virginia project area. (2) Tomahawk project area. (3) BWEIS. (4) Silver Island Project Area. (5) Inga South Project area. (6) Devils Track Project area.

<b>AQUATIC</b>			
<b>Applicable Monitoring Activity, Practice, Or Effect Measured</b>	<b>Methods</b>	<b>When Monitored</b>	<b>Location or Project Area</b>
Acres of NNIS or number of lakes occupied by NNIS.	Monitor presence/absence in waters not previously surveyed. Monitor relative abundance (catch per unit effort (CPUE) annually for known or existing populations. Identify infestations and potential vectors for new invasions. Cooperate with University of Minnesota and Quetico Provincial Park to establish long-term monitoring sites on the Forest and in borders waters between the United States and Canada.	Standardized 1-2 week period in July-September annually.	Establish monitoring sites in mid-level assessment areas or in known occupied locations, adjacent water bodies, or strategic sites for early detection.

**Monitoring Driver(s): Objective. O-WL-38.** Use Integrated Pest Management to: **a.** Eradicate any populations of new invaders. **b.** Contain or eradicate populations of recent invaders. **c.** Limit the spread of widespread, established invaders within the planning area.

Applicable Monitoring Activity, Practice, Or Effect Measured	Methods	When Monitored	Location or Project Area
Acres of NNIS Managed	Evaluate treatment records and calculate acres treated	August-Sept	August 2003 CE for weed treatment at rec and admin sites

### (3) Evaluation and Conclusions. *Achievement of Desired Conditions & Objectives*

#### **Desired Conditions/Objectives**

**Monitoring Driver(s): Objective. O-WL-37.** Reduce the spread of terrestrial or aquatic non-native invasive species that pose a risk to native ecosystems.

**2005 Accomplishment (Terrestrial). Silver Island: 2005** - Post-harvest monitoring identified 5 new NNIS sites totaling .008 ac. Not all units have been harvested, so whole project area not surveyed. New sites include landings and roadsides. However, no spread observed into forested stands, e.g. unit next to Sawbill Landing (heavy knapweed) thinned and burned, but no weed spread into unit. Represents fairly low level of weed spread. **BWCAW Fuels EIS: 2005** - No NNIS detected. **Virginia EIS**-1st units harvested in 2005, monitor for weed spread in 2006. **Tomahawk** - Not implemented.

#### **2005 Accomplishment Contribution Towards Desired Conditions & Objectives**

A. FOREST PLAN DIRECTION/FEIS CONDITION				
Record of Decision (7/04)	(DECADE 1)		2005 Accomplishments and/or Condition	
Existing Condition	FP Desired Condition, Objective, or S&G's	FEIS Projected or Proposed Condition	Actual Accomplishments implemented	Actual Accomplishments & Approved NEPA
1850 Acres		NNIS exist on SNF as minor ecosystem component.	<b>Silver Island:</b> 5 new NNIS sites totaling .008 ac <b>BWCAW Fuels EIS:</b> No new NNIS sites.	

B. ACHIEVEMENT OF FOREST PLAN DIRECTION/FEIS CONDITION			
% Achievement of Decade 1 Direction/Condition		Trend	
Actual accomplishments implemented	Actual Accomplishments & Approved NEPA Decisions	Actual accomplishments implemented	Actual Accomplishments & Approved NEPA Decisions
N/A	N/A	Stable to slightly increasing NNIS spread	

**2005 Accomplishment (Aquatic).** Recent monitoring of new and existing spiny water flea populations on the Superior National Forest suggests that this species current rate of invasion or spread may be stable or slowly increasing. Monitoring occurred on 13 lakes on the Superior National Forest in 2005. Spiny water flea was observed in 4 lakes. They were not observed in one lake in which the species was previously documented. A concern is that the potential invasion of Knife Lake, Basswood Lake, and Lac La Croix would pose a threat to Quetico Provincial Park and Voyageurs National Park. Continued monitoring in these water bodies will serve to provide early detection information.

Recent monitoring of rusty crayfish populations on the Superior National Forest suggests that we are not yet fully aware of all lakes currently invaded by this species. It is very possible that this species occurs in several lakes that have not yet been documented. Additionally, rusty crayfish populations may be spreading at an alarming rate that has not been documented on the Forest. In 2003, rusty crayfish populations were known to occur in 17 lakes within the Superior National Forest. Surveys conducted in 2003 documented an additional invasion in Gull Lake. In 2005, rusty crayfish were also documented in Bearskin Lake. Following the 2005 surveys, 19 lakes on the Forest are now known to be invaded by rusty crayfish.

**2005 Accomplishment Contribution Towards Desired Conditions & Objectives (Aquatic)**

<b>A. FOREST PLAN DIRECTION/FEIS CONDITION</b>				
<b>Record of Decision (7/04)</b>	<b>(DECADE 1)</b>		<b>2005 Accomplishments and/or Condition</b>	
Existing Condition	FP Desired Condition, Objective, or S&G's	FEIS Projected or Proposed Condition	Actual Accomplishments implemented	Actual Accomplishments & Approved NEPA Decisions
5 lakes occupied by spiny water flea. 17 lakes occupied by rusty crayfish  17 lakes occupied by rusty crayfish	- Reduce or limit the spread. Eradicate new populations.	NNIS exist on SNF as minor ecosystem component (D-WL-9)	-5 lakes likely occupied by spiny water flea. -19 lakes now known to be occupied by rusty crayfish.	<b>N-A</b>

<b>B. ACHIEVEMENT OF FOREST PLAN DIRECTION/FEIS CONDITION</b>			
<b>% Achievement of Decade 1 Direction/Condition</b>		<b>Trend</b>	
Actual accomplishments implemented	Actual Accomplishments & Approved NEPA Decisions	Actual accomplishments implemented	Actual Accomplishments & Approved NEPA Decisions
N/A	N/A	Stable to slightly increasing NNIS spread. Rusty crayfish may be expanding quickly.	Same.

**Monitoring Driver(s): Objective. O-WL-38.** Use Integrated Pest Management to: **a.** Eradicate any populations of new invaders. **b.** Contain or eradicate populations of recent invaders. **c.** Limit the spread of widespread, established invaders within the planning area.

**2005 Accomplishments.(Terrestrial Only).** Approximately 8 acres treated with either herbicide, mowing, or pulling. Monitoring of treatment sites showed good effectiveness of herbicide treatments - >90% decrease in cover of spotted knapweed at treatment sites. There were no aquatic NNIS populations contained or eradicated in 2005.

**2005 Accomplishment Contribution Towards Desired Conditions & Objectives**

<b>A. FOREST PLAN DIRECTION/FEIS CONDITION</b>				
<b>Record of Decision (7/04)</b>	<b>(DECADE 1)</b>		<b>2005 Accomplishments and/or Condition</b>	
Existing Condition	FP Desired Condition, Objective, or S&G's	FEIS Projected or Proposed Condition	Actual Accomplishments implemented	Actual Accomplishments & Approved NEPA Decisions
Acres of NNIS Managed		Acres of NNIS Managed	8 acres treated >90% decrease in cover of spotted knapweed.	Same

<b>B. ACHIEVEMENT OF FOREST PLAN DIRECTION/FEIS CONDITION</b>			
<b>% Achievement of Decade 1 Direction/Condition</b>		<b>Trend</b>	
Actual accomplishments implemented	Actual Accomplishments & Approved NEPA Decisions	Actual accomplishments implemented	Actual Accomplishments & Approved NEPA Decisions
N/A	N/A	Increasing trend in NNIS treated acres.	Same.

**Standards and Guides**

<b>Standard &amp; Guide Descriptor</b>	<b>Standard &amp; Guide Description</b>	<b>Compliance</b>	<b>Applicable Design Criteria or Other Necessary Follow up Action (If Any)</b>
G-WL-23	During project implementation, reduce the spread of non-native invasive species.	<b>YES</b>	Applicable design criteria being implemented in projects, e.g. see Virginia EIS, Tomahawk, Dunka, Inga South, Dark River Project.

#### (4) Necessary Follow-up and Management Recommendations

Aquatic NNIS monitoring will occur annually to evaluate new and existing populations of spiny water flea and rusty crayfish on the Superior National Forest and in border waters between the United States and Canada. The Forest will continue to collaborate with the University of Minnesota-Duluth, Quetico Provincial Park, and Voyageurs National Park to identify and monitor new and recent invasions of spiny water flea. Monitoring activities will primarily occur in water bodies adjacent to known infestations and in the Knife River, Knife Lake, and Basswood Lake region. A spiny water flea sampling protocol will be completed in 2006. Rusty crayfish surveys will be expanded to include central and western lakes of the Forest.

Monitoring Driver	Follow-up Actions
<b>O-WL-37 (Terrestrial)</b>	In 2006, continue monitoring BWCAW Fuels treatment units, Virginia treatment units, Tomahawk treatment units, Silver Island units, Dunka treatment units, Inga South Treatment units.
<b>O-WL-37 (Aquatic)</b>	There is a need to continue developing standardized monitoring protocols for spiny water flea and rusty crayfish in 2006. Monitoring in 2006 will include infested waters, adjacent water bodies, and establishment of monitoring sites for early detection and rapid response.
<b>O-WL-37 (Aquatic)</b>	There is a need to increase inter-agency and inter-governmental aquatic NNIS monitoring efforts. The SNF will seek additional monitoring partners in 2006 including Quetico Provincial Park, Voyageurs National, Park, and the Nature Conservancy.
<b>O-WL-37 (Aquatic)</b>	Monitoring protocol developed for spiny water flea – Will be completed in 2006. Continue monitoring for two species.

Monitoring Driver	Recommended Management Actions
<b>O-WL-38</b>	Recommend performing herbicide treatments earlier during growing season, preferably May –early July. <u>Supporting Rationale.</u> Late July –August is too late in growing season to get good kill b/c plants not growing anymore.

#### (5) Collaborative Opportunities To Improve Efficiency And Quality Of Program

The Fisheries and Aquatics Program will coordinate with other agencies, governments, and universities to monitor and document new and existing NNIS populations. Efforts will be made to coordinate future monitoring activities, share monitoring data, and potentially collaborate to fund future monitoring efforts. Superior National Forest temporary employees will be required to complete annual or at least bi-annual monitoring in June-September each year to meet Forest Plan monitoring objectives.

Collaborator/Partner	Monitoring Activity	Accomplishment
Friends of the BWCAW - University of Minnesota Duluth - Voyageurs National Park	NNIS monitoring - Spiny Water Flea - Potential future collaborative monitoring.	Number of BWCAW campsites & portages monitored. - Coordinated 2005 monitoring efforts. - Monitor Knife Lake populations.
-Quetico Provincial Park	- Potential future collaborative monitoring.	-Cache Bay, Ottertrack, Sucker, & Basswood Lakes.
-The Nature Conservancy	-Potential future collaborative monitoring.	-US and Canadian Borders Waters area.