

NON-NATIVE INVASIVE SPECIES (NNIS)

Monitoring Conducted

Occurrence

Approximately 2,046 acres of terrestrial Non Native Invasive Plant Species (NNIP) occur on the Forest. The majority of these acres are made up of infestations of orange and yellow hawkweeds and oxeye daisy, which are found along nearly every roadside. Approximately 922 new infestations comprising 22.8 acres of terrestrial NNIP were found during 2007 (Table 1). This compares to 623 new infestations comprising 25 acres of terrestrial NNIP found during 2006, and 420 new infestations on 12 acres found in 2005. In 2007, the first occurrence of garlic mustard, a highly invasive annual of forest understories, was found. In addition to garlic mustard, the highest risk species on the Superior include common buckthorn, leafy spurge, purple loosestrife, spotted knapweed, Canada thistle, Tartarian honeysuckle, and goutweed.

Table 1. NNIP Infestation Detected During 2007.

- (1) Border Midlevel area – 362 sites totaling 2.6 ac of NNIP
- (2) Clara Midlevel area – 28 sites totaling 4.22 ac of NNIP
- (3) Lima Green Midlevel area – 60 sites totaling 0.2 ac of NNIP
- (4) Virginia EIS sale units – 22 sites totaling 0.1 ac of NNIP
- (5) Rusty Diamond EA sale units – 2 sites totaling <0.01 ac of NNIP
- (6) Rusty Diamond EA/Griddle burn units – 1 site totaling <0.01 ac of NNIP
- (7) BAER projects (Cavity, Ham Lake, East Zone complex) – 67 sites totaling 0.43 ac of NNIP
- (8) LaCroix RD portion of BWCAW - 53 sites totaling 0.12 ac of NNIP

NNIS Summary Points

- * Monitoring detected the first infestation of the highly invasive plant garlic mustard on the Superior in the Cavity Lake burn, and purple loosestrife populations on the Forest rapidly expanded last year with low water levels.
- * Approximately 81 acres of terrestrial NNIS were treated, up from 8 acres treated during 2005. Treatments were 65% effective on average at controlling sites. There is room for improvement in this number.
- * Total terrestrial NNIS acres on the Forest continued to climb, up to 2,046 acres in 2007.
- * Monitoring showed that design criteria for minimizing weed spread were successful.
- * New and existing spiny water flea populations on the SNF suggest that this species current rate of invasion is increasing.
- * The number of lakes where rusty crayfish has been detected has increased each year since 2003 and it is likely that new infestations will be documented with increased survey and monitoring.
- * There were no aquatic NNIS populations contained or eradicated in 2007.
- * New collaborative public information/education campaigns including the “Stop Aquatic Hitchhikers” Program will help to increase public awareness and help to reduce the spread of NNIS species on the SNF.

Spiny water flea, an exotic zooplankton native to Europe, are now known to occur in 10 lakes on the SNF including Lake Saganaga, Gunflint, Flour, Caribou, Pine, Greenwood, McFarland, and Devil Track Lakes in Cook County and Little Vermillion and Crane Lakes in St. Louis County (MNDNR 2007a, MNDNR 2007b). It is likely that additional rusty crayfish infestations will be identified with continued survey and monitoring efforts.

Existing NNIS populations are of obvious concern. However, there is also much concern about terrestrial and aquatic habitats at risk to future NNIS establishment and expansion. Correspondingly, detection efforts are being focused within these susceptible habitats, particularly those adjacent to existing NNIS populations. See Appendix H for a complete description of NNIS on the SNF.

Prevention/Education Measures

- Poster display and invasive species educational material distributed at Cook Timber Days and St. Louis County Fair.
- Ham Lake Fire – Provided recommendations for gear cleaning and aircraft water dipping and scooping operations in suspected spiny water flea infested waters (e.g. Lake Saganaga). Recommended avoiding Lake Saganaga as a water source during suppression activities.
- NNIS booklet completed in partnership with Friends of BWCAW and REI (**Photo 1**).
- The USFS Region 9 partnered with Wildlife Forever, MNDNR, USFWS, and several other State and local partners to implement the 2007 Invasive Species Threat Campaign. The 2007 Threat Campaign included television, print, billboards, and airport dioramas. One new billboard was constructed on Interstate 35 between Duluth and Minneapolis (**Photo 2**).
- Equipment cleaning clause – timber sale and road maintenance contracts.
- District NNIS training – ongoing.
- NNIS workshops and presentations for garden clubs, Minn. Forest Resource Council, cooperator groups, and the public.

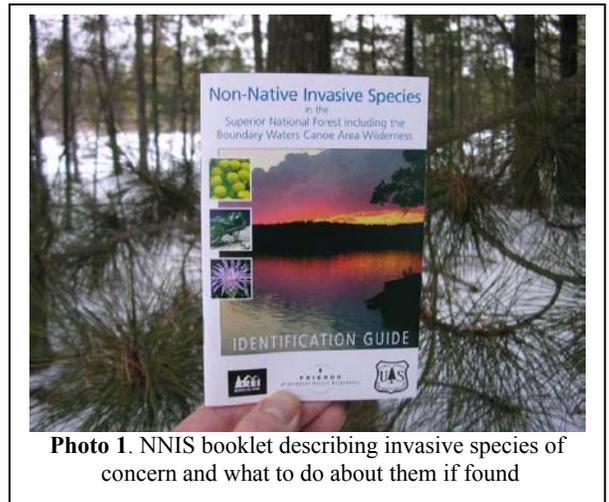


Photo 1. NNIS booklet describing invasive species of concern and what to do about them if found



Photo 2: Stop Aquatic Hitchhikers Billboard. 2007 Threat Campaign. Photo Credit: Wildlife Forever

Early Detection/Rapid Response

Terrestrial

In 2007, a non-native invasive plant (NNIP) inventory was completed for priority sites within the BWCAW on the LaCroix District. This inventory resulted in NNIP being found at 53 out of the 135 (39%) sites that were checked. A total of 0.12 acres of weed infestation were documented.

Previous year NNIP inventories within the BWCAW occurred within burned areas including the Turtle Fire, Cavity Lake Fire, Ham Lake Fire, and Famine/Redeye wildfires. In addition, inventories were completed outside the BWCAW in the Border, Lima Green, and Clara mid-level project areas.

Within the burned areas, low to moderate levels of weed spread occurred with wind dispersed species like Canada thistle being most common. Weed discoveries of most concern in the BWCAW were the first garlic mustard population (found in the Cavity Lake Fire area) and the new or expanded purple loosestrife populations found on 5 BWCAW lakes. Outside the BWCAW, the majority of new weed acres for 2007 were found in the mid-level project areas, where a large amount of weed spread had taken place since the last weed inventory.



Photo 3. Clean boat trailers before leaving a lake

Since 2001, several species new to the Superior NF have been detected by Forest employees or other partners. These include: plumeless thistle (2003), Japanese knotweed (2005), meadow knapweed (2005), wild parsnip (2006), and garlic mustard (2007). Control actions were taken on all these species either by the SNF or MNDOT. Early detection of these species will help prevent them from establishing across a widespread area.

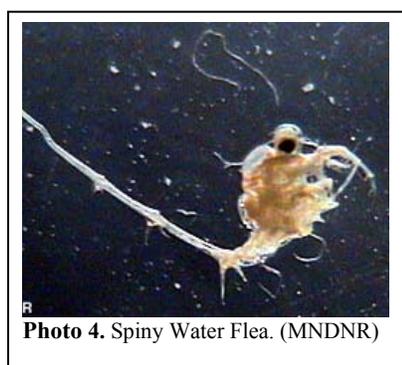
Aquatic

Spiny water flea surveys have occurred on the SNF since 2004. To date spiny water flea has been observed in 5 of 17 lakes surveyed. Table 2 displays lakes where spiny water flea was detected. See Appendix H for complete list of surveyed lakes.

Rusty crayfish surveys began on the SNF in 2003. To date this species has been observed in twenty lakes on the Forest. Table 3 displays lakes surveyed and spiny Rusty crayfish presence.

Year Survey and Spiny Flea Presence				
Lake	2004	2005	2006	2007
Greenwood		X		
Pine		X		
McFarland		X		
Saganaga		X		
Crane			X	

Year Survey and Rusty Crayfish Presence				
Lake	2003	2005	2006	2007
Hungary Jack	X	X		
Gull	X	X		
Bearskin		X		
Dumbell		X		
Saganaga		X		
Snowbank			X	
Crane			X	
Burntside			X	
Bass			X	
Cedar			X	
Gardem			X	
Fall			X	
Tofte			X	
Melon				X
Seed				X
Carp				X
Knife				X
Birch				X
Farm				X
White Iron				X
Knife River				X



In 2007, a more intense survey regime was used on the White Iron Chain to understand spatial patterns and distributions of rusty crayfish (Garden, Farm, South Farm, White Iron, and Birch Lakes). This effort included 49 modified minnow traps that corresponded to sites used by DNR fisheries for lake assessments. Fall and Garden Lakes, where populations of rusty crayfish have been recorded several years prior, were dominated by the species (100% relative abundance). Sites on Farm Lake (25% relative abundance) and White Iron Lake (38% relative abundance) were intermediate in rusty crayfish abundance and may indicate a more recent invasion. Birch Lake had a localized population of rusty crayfish near the South Kawishiwi River outlet but had overall low relative abundance (11%). No rusty crayfish were found in South Farm Lake in 2007.

Operational Standards and Guides (Formerly Design Standards)

To assess our design criteria to control terrestrial weed spread during timber harvest in 2007, monitoring of a sample of 17 harvested stands treated under the Virginia EIS (Laurentian Ranger District) found 0.1 acres of new infestations on landings or skid trails in 15 of the harvest units, but no infestations within the regenerating

stands themselves. All of the monitored stands were summer harvests. Although a high percentage of stands had new infestations caused by the timber harvest, the amount of new weed acres was still quite low. This indicates that the timber harvest weed spread mitigations were successful at reducing weed spread.

Control Measures

The success of our weed control treatments was monitored in 2007. 560 treatment sites representing 79.1 acres of treatments were visited to assess treatment success, and the average control at these sites was 65%. Skips in the spray coverage accounted for most of the lowered effectiveness. There is room to improve this number in 2008. Most small NNIS infestations that were first treated in 2006 were not present in 2007, indicating that the 2006 treatments achieved good control. For larger infestations that were first treated in 2006, the 2007 treatments caught any areas that were missed during 2006 spraying. For the Denley and Tomahawk Roads (Kawishiwi RD) which have been sprayed two years in a row, most NNIS are gone from these roadsides except for the few small new infestations that have popped up since treatments began.



Photo 6 Pulling tansy at Disappointment Lake campsite.

Evaluation and Conclusions

Occurrence and Control Measures

Terrestrial. The total infested area on the Forest has been slowly increasing. This increase is primarily attributed to enhanced inventories and discoveries and not population expansion. Table4 shows infestation acres from 2004 through 2007.

Table 4. Total forest-wide NNIP acres				
Year	2004	2005	2006	2007
Acres of weed infestation	1850	2000	2025	2046

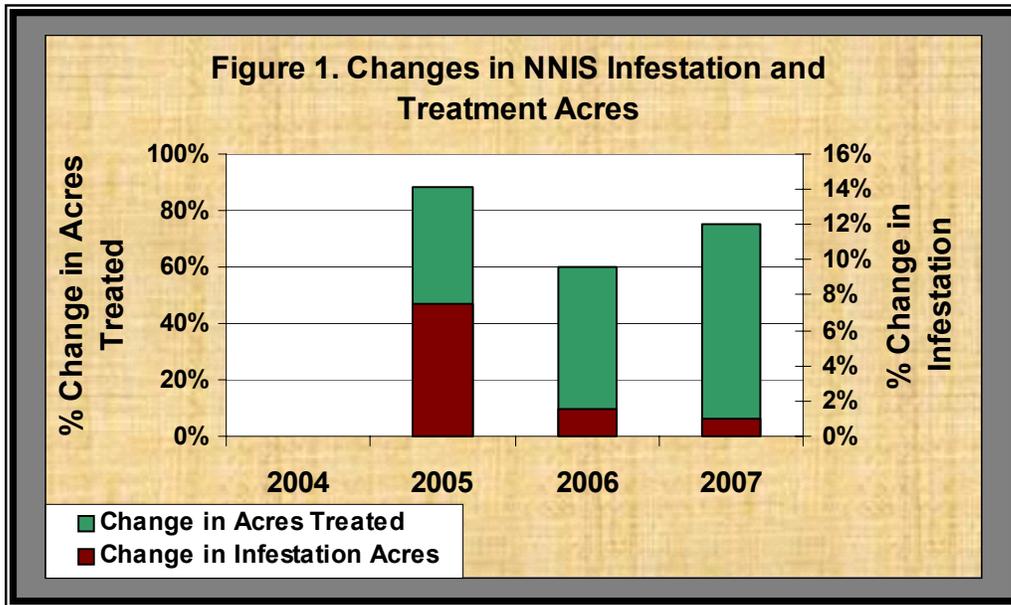
Once high risk terrestrial species were identified, rapid treatments were implemented. In 2007, 81 acres were treated, up from approximately 20 acres in 2006, up from 8 acres treated during 2005. Weeds targeted include: spotted knapweed, Canada thistle, bull thistle, St. Johnswort, tansy, purple loosestrife, plumeless thistle, leafy spurge, oxeye daisy, and orange hawkweed. Treatments included pulling and herbicide treatments and were successful in reducing infestations (See Photos7 and 8). Despite an increase in documented infestations since 2004, the rate of treatment is greater than the rate of NNIS increase. Infestation acres grew 7.5% between 2004 and 2005, 1.5% between 2005 and 2006, and 1% between 2006 and 2007. However the amount of acres treated increased 88% between 2004 and 2005, 60% between 2005 and 2006, and 75% between 2006 and 2007.



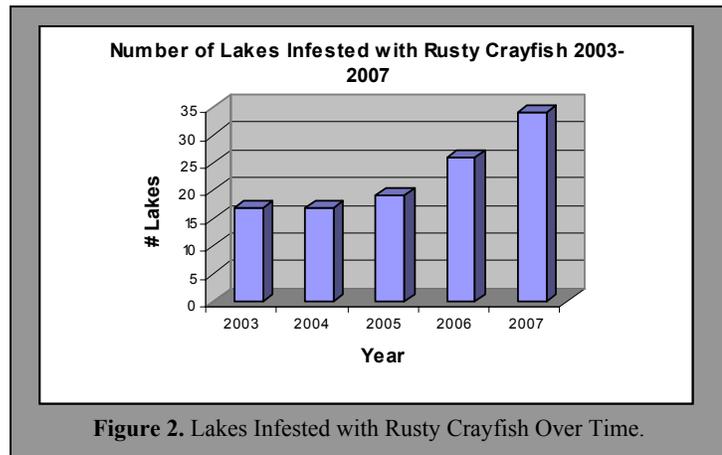
Photo7 Spotted knapweed Before herbicide trtment



Photo8 Spotted knapweed after herbicide treatment



Aquatic. Recent surveys and monitoring efforts by the USFS, MNDNR, and others indicates that the spiny water flea has continued to invade new lakes in northeastern Minnesota. This exotic zooplankton species has recently been reported to be expanding to other large, deep lakes that surround the initial invasion hub of Saganaga Lake (Branstrator 2006). There is some evidence that successful introductions and range expansion in northeastern Minnesota may be controlled by local fish communities (Lindgren 2006) and lake habitat conditions (Branstrator 2006). There remains a concern that additional lakes within the BWCAW including those along the US-Canadian border may become infested. Future survey efforts within BWCAW and Border Lakes Area will be important for identifying and monitoring new invasions and identifying vectors for invasion.



The number of lakes known to be occupied by rusty crayfish has increased since 2003 (Figure 2). In 2003-2007, rusty crayfish were documented in 17, 17, 19, 25, and 34 lakes, respectively (Figure 2). It is likely that new infestations will continue to be documented in the future with continued survey efforts.