Eastern Invasives Management Network
Hickory Nut Gorge

Threat Abatement Priorities and Strategies

Key Ecological Factors

List and briefly describe the "key ecological factors" necessary for long-term viability of up to 3 or your most important system targets (communities, matrix communities) that are threatened by invasive plants.

I only listed the key ecological factors that could be altered by invasive species. Otherwise, there are many key factors that are in as natural state as possible and are, for the most part, intact and functioning (e.g. topography, environmental & ecological connectivity, hydrology, soil composition).

1) Rich Cove Forest-gap phase regeneration (tree fall gap patterns), presence & distribution of characteristic species, nutrient cycling, plant species reproduction.
2) Montane Oak-Hickory Forest- gap phase regeneration (tree fall gap patterns), presence & distribution of characteristic species, nutrient cycling, plant species reproduction.
3) Granitic/Rock Outcrop Communities-hydrology, solar radiation influx, soil erosion & accretion, native seed regeneration (rain of exotic seed creating competition in an already stressful environment with limited soil and water resources).

Threat Abatement Priorities

List current priorities for taking action against invasive plant threats at your conservation area. Indicate how your priorities are tied to your conservation targets and ecological factors.

Using TNC's Site Weed Management Plan and advice from NHP ecologists, invasive species found in Hickory Nut Gorge (HNG) (13 plants), and invasive species that threaten HNG because they are found in neighboring areas (3 plants), were ranked from highest to lowest priority for control and stewardship expenditure. The invasives were grouped into four levels of decreasing priority (See Table 1).

Level I species can do harm by altering population processes of natural plants by competing with established native individuals and even more by filling gaps and sites in which natives would otherwise reproduce. All Level I species are invaders of disturbed sites in HNG whether the disturbance is natural (e.g. blow down from storms, or pine beetle death) or anthropogenic (e.g. logging or clearing for development). Both types of disturbance occur in HNG. Also, all of our forest targets (see question #1) have gap phase regeneration of canopy trees as part of their ecological process and thus are constantly threatened by Level I tree invader species. Herbs growing in forest gaps are affected when *Microstegium* invades a gap (and it often does).

Not only do the Level I species affect our forest targets, but *Ailanthus* and *Paulownia* survive and thrive on rock outcrops. Usually, rock outcrops have a component of environmental harshness and stress driving population processes, but what is the impact of two invasive species to this environment? One threat postulated by biologists at the Great

Table 1.

	Weed	**Management Goal**
Level I	*Ailanthus altissima*/Tree-of-Heaven	Eradicate in RCF, MOHF, MRCHW & granitic communities. Need to map.
	Paulownia tomentosa/Princess Tree	Eradicate on granitic communities; control in forests as found. Need to map.
	Microstegium viminieum/Japanese stilt grass	Control pop. found in undisturbed areas with no corridors. Keep out of RCF b/c of spring ephemerals.
		Need to map in undisturbed areas. No action on pop. along river and on roads.
Level II	*Celastrus orbiculata*/Oriental bittersweet	Control pop. found along river. Tolerate no spreading into forest. Vigilent watch. Control on Pack tract
	Pueraria lobata/Kudzu	Keep out! No Kudzu. Vigilent watch. Control population along river.
	Hedera helix/English Ivy	Keep out of RCF because of rare spring ephemerals. Control where found In RCF first, outliers second
	Wisteria sp./Wisteria	Control pop. found along river. Tolerate no spreading into forest.
	Lonicera japonica/Japanese honeysuckle	Keep BC pop. at or under current extent. Check RB pop. so it doesn't "break out".
	Rhubus phoenicolasius/Wineberry	Keep out of RCF because of rare spring ephemerals & off of boulders in RCF.
Level III	*Rosa multiflora*/Multiflora rose	Eradicate as found
	Ligustrum sinense/Privet	Eradicate as found
	*Albizia julibrissin/*Mimosa	Eradicate as found

	Miscanthus sinensis/Miscanthus	Eradicate as found
	Alliaria petiolata/Garlic Mustard	Eradicate as found & map as soon as discovered & continue to monitor
	Polygonam cuspidatum/Japanese knotweed	Eradicate as found & map as soon as discovered & continue to monitor
	Lythrum salicaria/Purple loosestrife	Eradicate as found & map as soon as discovered & continue to monitor

*Levels and individual invasives are arranged in decreasing order of threat

RCF=Rich Cove Forest
MOHF=Montane Oak-Hickory Forest
MRCHW=Montane Red Cedar-Hardwood Woodland
BC=Bat Cave preserve
RB=Rumbling Bald preserve

Smoky Mountains National Park is the shading of shade intolerant species found on granitic communities. What about the affect of root systems of invaders on granitic communities?

Level I species affect both target groups, they can invade and take over canopy gaps and rocky areas and are prolific seed bearing plants. Although current impact is high and potential impact is high, control possibilities are high. *Ailanthus* and *Paulownia* can be seen fairly easily (especially as large trees) and the techniques used to control these species can be done with limited time and personnel (e.g. painting cut stumps with herbicide). *Microstegium* is a different story (see Table 1 for management goals).

Level II species have a current low to medium impact mainly because they are only found in one to five places in small patches. The potential impacts (especially of the rapidly growing, vining species) is high. The control possibility of these species is medium to high for the same reasons that makes their impact low to medium (see Table 1 for management goals).

Level III species currently have a low impact due to small populations that don't damage targets at current levels or they are not yet found in HNG. The potential impact of some of the invaders (e.g. Garlic mustard, Japanese knotweed) is high. The control possibility of these species on TNC preserves is currently high.

Threat Abatement Strategies

Describe strategies that you have developed thus far for abating high priority invasive plant threats. Include any strategies designed to prevent new invasions or to quickly detect and control new species or populations that become established. Pay particular attention to how you plan to work with partners, describing any innovations you have used and any important challenges you have surmounted or still face in finding or engaging partners.

a. **Prioritize by areas of control (until we get a comprehensive survey) or by targets:** We can control invasives along property boundaries, interior trails and other known locations. We know these areas are infested (by survey) and intuitively, because we know invasive species are often found in disturbed areas (trails, utility lines, property boundaries with developments, old logging trails, ATV trails, etc.). Control measures implemented by volunteers on workdays or summer interns. **OR** We could control invasives in prioritized conservation targets. Since we have determined that Rich Cove Forest, Montane Oak-Hickory Forest and Granitic/Rock outcrop communities are our 3 most threatened targets, we could decide to control exotics (with a management goal for each exotic found in the target) in the most threatened target (Rich Cove Forest) first and then move to the other two targets in order of most threatened as abatement strategies are evaluated in the first target community.

b. **Continue to prioritize invasive threats to targets by getting more information on population location and size (data collection):** We need a comprehensive survey for at least the Level I species in HNG (and potentially Kudzu and Oriental Bittersweet because of their epidemic potential). How do we get this? My current thought is to outline a research project using HNG as an example of preventative invasive strategy.

The invasives we have, do not cover acres (yet), with the exception of Kudzu (although, not on our preserves). So, a research project could look at the question: If you have x invaders at x levels (which I think in the grand scheme of things is smaller numbers than others face around the country) and you expend x effort, can you control/eradicate these species? Would this get at some threshold questions too? Survey invasive species, location, percent coverage (one year) and based on survey design and management goals for conservation area implement control for two years. Re-survey in the third year and evaluate control measures based on management goals.

c. Preventative techniques: Searching for and documenting invasions of new exotics. Attacking these immediately. Use volunteer observers to do this. Provide them with weed identification training and a pocket identification "cheat sheet" for the field. Although, this process will only cover established trails. We really need a survey for undisturbed areas.

d. Working with partners (education):

1. Chimney Rock Park (neighbor in HNG)-work with them on their native plant nursery to provide education material to public on invasives. Use TNC information and templates.
2. Upper Broad River Protection Program-work to get UBRPP to promote native species for erosion control. Supply with list of native species.
3. Conservation easement grantors-produce list of invasives that cannot be planted on a CE. Make sure one of the restrictive rights is to not plant any invasives species from our "bad" list. Discuss native landscaping with CE grantors. Decide how to manage (or if to) manage invasives on conservation easements.

e. Challenges: I am mind-boggled by the Oriental bittersweet, *Ailanthus* and *Paulownia* that line the major roadways that surround Hickory Nut Gorge (e.g. Interstates 26 & 40, Highway 64/74-A). What's the point of controlling invaders in HNG if all these populations exist with no control?

Describe you vision of success for your strategies to abate invasive plant species threats. If they succeed, what will your conservation area be like?

Pristine! After mapping of invasive species, have a weed "hit" team that controls/eradicates Level I and Level II. This "hit team" would work for two years, then re-survey the third year. Measure success and keep going. *Ailanthus*, *Paulownia*, Kudzu and Oriental Bittersweet gone from the conservation area. Educational efforts would get people to eradicate invasives on their properties and along highways leading into HNG. Microstegium would probably still be along the river, but you can't have everything.

I would really like to see the creation of a HNG Invasives Concerned Citizen's type of group. A group composed of stakeholders in HNG (TNC, Chimney Rock Park, local land trusts, town of Lake Lure, local citizens, etc.) that work on invasives management--an entity beyond TNC. Out of this group the following could evolve:

a. degree of invasive threats on different properties
b. compilation and sharing of abatement strategies

c. agreement to implement best abatement strategies
d. joint seeking of funding for invasive control
e. organized workdays at various stakeholders properties—shared stewardship
f. website for information sharing/dissemination
g. education of the vast public about invasive species damage to native plants and ecological systems