



The “Dirty Dozen” of Cape Cod

This third edition compilation is intended to raise awareness of problematic, aggressive non-native vegetation. Native plants co-evolved as food sources for native insects and animals. This transformation of carbohydrates to protein is a core habitat value. Introduced, non-native plants are unable to perform this core function, because they characteristically grow without being consumed. Lacking the balance of ecological controls, Invasive vegetation characteristically dominates available space, light, moisture and nutrients without contributing to native food webs. When comparing Native and Invasive vegetation, we can usually notice that one is a food source while the other is not. Here are thirteen easy to identify offenders on Cape Cod and a few of our herbicide-free techniques for use in managing Invasive Vegetation.

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1. Why Do We Care?

Healthy communities need healthy natural resources. The Cape Cod habitats we cherish are stabilized and protected by native vegetation communities. Healthy habitats provide Social, Economic and Ecological value. Changes in this habitat, for any reason, may have Social, Economic and Ecological consequences.

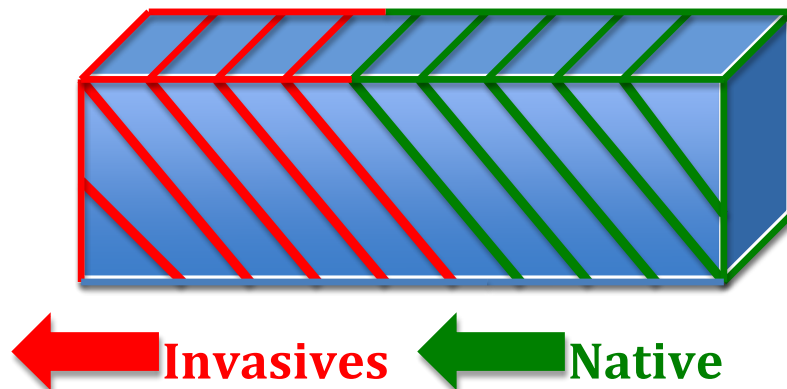
When plants are removed from native habitat, by natural (fire, storm, disease) or human activity, faster growing, invasive plants may attempt to replace our slower growing, native species and monopolize available sunlight, moisture, and nutrients. Certain invasive plants (known as allelopathic) chemically inhibit competition from native plants. This physical and chemical behavior, creates growth patterns (known as feedback loops) displacing native plant biodiversity and favoring invasive monoculture. Invasive monocultures characteristically prevent light from reaching ground level. The lack of light excludes stabilizing, native groundcover vegetation. The lack of groundcover contributes to erosion, resulting in the loss valuable nutrients, seeds and microorganisms from surface soils.

Native vegetation supports significantly higher native animal populations and diversity than invasive vegetation. When native plant species become displaced, they may not have the ability to reestablish on their own. Reduced plant biodiversity results in reduced animal and insect biodiversity. The continued loss of diversity may stress the sustainability of food webs. Habitat systems stressed beyond recovery (tipping point) experience a negative cascade of biological energy with far reaching ecological consequences. Removing the cause of stress at that point, will not reverse the habitat decline.

2. *What Can We Do?* With Invasive Vegetation Management, the lowest hanging fruit is prevention, to deter establishment of invasive vegetation. When native vegetation has been removed or disturbed, for any reason, we recommend replanting with native soils and native plants. Many native plants are available as transplants, plugs, seeds, or sourced from your local nursery. Healthy, adjacent habitat can be a guide for replanting diversity and density. We also recommend removal of native vegetation and soils prior to construction projects for storage on site and reuse following completion of construction.

Removal options where Invasive Vegetation is established?

- *For small-scale areas:* 100% removal of invasive vegetation. Follow up with replanting of native vegetation. Planting options should include transplants; plugs; seeds; and potted plants. Many are available at your local nursery.
- *For large-scale areas:* Where invasive vegetation is already established, a transition from invasive to native vegetation should be implemented over several years.
- *Develop a careful, long term strategy:* “Conservation of Biomass”



The core value of this strategy reduces habitat stress by balancing Invasive plant removal techniques and protocols with Native plant replacement techniques and protocols. This protects the net ecological energy flow through the system. Using the “Conservation of Biomass” strategy contributes to site stability, controls erosion and protects emerging habitat values.

3. *How Can We Do It?*

Management Tool Kit: A combination of methods to manage invasive vegetation may be most effective.

A) Mechanical Control:



1. *Physical removal:* For small patches of invasive plants, we physically remove roots or use the weed wrench. This avoids excavation in sensitive areas. Care should be taken to include all roots if possible and to dispose of with incineration. Never compost invasives; many can re-sprout or spread seeds (e.g. Japanese Knotweed). We dispose of aggressive plants and all parts in black plastic bags. We leave the black bags in the sunlight for several days to “cook” the plants and seeds. They can then be disposed of with household trash on Cape Cod, all trash goes to an incineration facility to produce electricity.
2. *Tarping:* Smother the plants during their growing season. Effective for low growing and herbaceous (non-woody) invasive plants. Cover the area completely with black plastic and secure with landscaping staples. This will also elevate temperatures high enough to partially cook the plants. May take from 3-6 months for complete die off.
3. *Day lighting:* Where native plants are already established but over run by invasives, we remove invasive top cover, a technique we refer to as “skylighting”. We also remove invasive side cover, which we refer to as “sidelighting”. Both techniques provide more sunlight to restore native plants.
4. *Cutting:* This is a multi phase strategy. In the spring, when invasive vegetation is shooting upwards, we will cut growth off at the lower stem.

This stimulates growth hormones, creating accelerated regrowth. After a brief period of new shooting, we recut again, robbing the root energy of reserves. Sometimes we will repeat this and sometimes we will integrate strategies by dripping our “fruit cocktail” of white vinegar, lemon juice and Kosher salt into the open stem. We also target invasive vegetation in the fall, or before seed release, when their carbohydrate cycle is weak, and regrowth is slow. As previously mentioned, we dispose of aggressive plants and all parts in black plastic bags. We leave the black bags in the sunlight for several days to “cook” the plants and seeds. For large species like the mature Norway maple, cut down and grind out the stump or clip off re-growth. Girdle tree by cutting through the bark and growing layer (cambium) all around the trunk. Girdling is most effective in spring.

5. *Mowing*: Mowing down plants should be repeated often. This is effective with low growing invasives. Mow before plants go to seed.
6. *Burning*: For large areas, controlled burning of the invasive plants may be incorporated. The use of a hand torch is recommended for sensitive or small areas.

B) Biological:

1. *Insect introduction*: the use of natural predators has been proven successful with some invasive plants
2. *Animal grazing*: Grazing by goats or sheep has been found to retard growth of invasive plants. Local farmers and/or environmental professionals may make rental animals available.

C) Chemical Methods:

1. *“Burn-Out”*: A lemon and vinegar mixture wiped or sprayed on leaves, encourages dehydration.
2. *Cut & drip*: Cut invasive plant stalk and drip with a kosher salt solution.
3. *“Fruit cocktail”* a mixture of white vinegar, lemon juice and Kosher salt, which can be injected or dripped into stems.
4. *Detergent Wipe*: Detergents are designed to make lipids soluble in water. Since biological membranes are made of both lipids and water soluble materials, they are disrupted by detergents.

D) *Eating*: “If you can’t beat ’em, eat ’em.”

1. *Many creative recipes* have been inspired by the abundance of invasive vegetation; and think of the satisfaction! See:
<http://www.csmonitor.com/Environment/LivingGreen/2009/0903/invasive-plants-from-pest-to-pesto>
2. *Some more recipes* <http://nbiin.ciesin.columbia.edu/ipane/weedwisdom/recipe.htm>
3. *The Invasive Species Cookbook: Conservation through Gastronomy* J.M. Franke. 2007. Wauwatosa, WI: Bradford Street Press. Paper, \$24.95. 111 pages.

E) *We recommend a combination* of these practices, along with a multi-year management plan including the reestablishment of native species. Refer to the recommended management controls and growth cycle timing listed for each invasive species.

F) *Links for more information*:

- <http://plants.usda.gov/java/noxious?rptType=State&statefips=25> lists approximately 150 weeds considered noxious
- USDA- invasive species management:
<http://www.invasivespeciesinfo.gov/plants/controlplans.shtml>
- Native plant re-establishment website: www.naturalbiodiversity.org
- The Nature Conservancy- Globally invasive plants:
<http://www.invasive.org/gist/esadocs.html>
- University of Rhode Island-offers certification programs:
http://www.uri.edu/cels/ceoc/ceoc_programs_clp_imcp.html
- NPS Alien Plants Page: www.nps.gov/plants/alien/index.html
- Invasive Plant Atlas of New England: www.invasives.eeb.uconn.edu/ipane
- USFWS website for invasives: www.fws.gov/invasives



Asian Bittersweet or Oriental Bittersweet

Celastrus orbiculatus

Introduced to U.S. in 1876

Identification- A tangled or high-climbing vine with nearly circular leaves, climbs to 60'. Buds small, pointed, sharply set nearly at right angles to stems. Stems round, hairless, thornless, brown. Leaves 2"-5". . Flowers small, green, clustered. Bloom time: May-June. Fruits ornamental clustered orange-colored pods that open to reveal scarlet seed-coverings, Sept.-Dec. or longer.

Ecology- Found as scattered plants to extensive infestations in forest openings, margins, and roadsides as well as in meadows. Colonizes by prolific vine growth and seedlings, and spreads by bird- and other animal-dispersed seeds and collection by humans for decorative purposes (wreaths, etc.)



Autumn Olive

Elaeagnus umbellata

Introduced to U.S. in 1830

Identification- A shrub marked with distinctive rusty and silvery scales. Leaves 1"-5", height to 12', egg-shaped to elliptic, green above, silver brown and scaly below. Smooth to wavy-edged. Twigs may be somewhat spiny and marked with brown and silver scales. Flowers silvery yellow, fragrant. Bloom time: June-July. Fruits reddish and juicy, small, elliptic, fleshy and edible, but dry July-Oct.

Ecology- Grows well in a variety of soils including sandy, loamy, and somewhat clayey textures with a pH range of 4.8-6.5. It has nitrogen-fixing root nodules which allow it to thrive in poor soils. Drought tolerant and may invade grasslands and sparse woodlands. Typical habitats are disturbed areas, roadsides, pastures and fields.



Japanese Honeysuckle

Lonicera japonica

Introduced to U.S. in 1806.

Identification- An aggressive imported vine forming dense tangles climbing over underbrush or sprawling over open ground. Twigs and leaves densely hairy, green on both sides, and purplish beneath. Upper leaves not united; lower leaves often lobed, such as white oaks. Foliage often evergreen, leaves 1 1/2" – 3 1/2". Flowers 1/2"- 1", mostly single white or yellowish, hairy inside, bloom time: April-July. Fruits black berries, Sept.-Nov.

Ecology- Colonizes disturbed areas including roadsides, open banks, old fields, forest edges, and managed forests. Tolerant of a wide variety of soil conditions and is especially aggressive in disturbed bottomlands and floodplains. It invades native plant communities after natural or human disturbances such as wind throw, insect outbreaks, road building and logging.



Common Reed

Phragmites australis

Date of introduction to U.S. undetermined

**Eurasian genotypes considered exotic and invasive, North American types considered native

Identification- A tall perennial grass that grows up to 16 feet, with creeping rhizomes that may make a dense vegetative mat. The leaves are rolled in the shoot, no auricles are present, and the ligule is a fringe of hairs. Leaf blades around 1/2' wide, up to 1 1/2' long, flat, and glabrous. The leaf margins are rough and the sheaths are overlapping. The panicle is large and showy, but plants rarely produce viable seed. Most reproduction occurs vegetatively.

Ecology- Tidal and non-tidal brackish and freshwater marshes, river edges, shores of lakes and ponds, roadsides, disturbed areas. This plant tends to dominate coastal salt marshes when native grasses have been stressed from man made dikes.



Tree of Heaven

Ailanthus altissima

Introduced to the U.S. in 1748

Identification- A fast growing small to large tree with very large leaves having 11-41 leaflets. Leaflets not toothed, except near base. Twigs hairless, yellow-brown, stout with continuous yellowish pith. Buds small, brown-woolly: end buds false. Leaf scars very large, somewhat triangular, with numerous bundle scars. Bark gray-brown, smooth, or with narrow light-colored grooves. Leaves 12"-24" or more. Height 80'-100'; diameter 1'-2'. Flowers small, yellowish, clustered, male blossoms with foul odor bloom time: June-July. Fruits dry, narrow, 1-seeded, winged, Sept.- winter.

Ecology- A common tree in disturbed urban areas, where it sprouts up just about anywhere- including alleys, sidewalks, parking lots, and streets. Seedlings are known to pop up by the hundreds in recently planted fields and as persistent thickets in rocky, un-tillable areas.



Cypress Spurge

Euphorbia cyparissias

Introduced to U.S. in 1860's

Identification- An erect herbaceous to semi-woody perennial plant in the Spurge (Euphorbiaceae) family that grows 6-12" in height. Whorled bright green leaves, .4-1" and wide. Flowers bright yellow green turning purple-red as they mature. Bloom time: May through August. Fruit is three lobed and contains 1-3 egg shaped smooth gray seeds which splits and explodes, sending seeds to over 16 feet. Reproduces vegetatively through lateral root buds with a taproot that may reach 10 feet.

Ecology- Presently occurs in a wide range of sunny or partly shaded environments. Prefers dry to moist sandy, gravelly, or calcareous soils. Can be found in meadows, pastures, road edges, cemeteries (often called graveyard weed or graveyard spurge), and other disturbed areas. In natural settings, it thrives in dunes, panes, coastal heathlands, grasslands, and calcareous glades. Biocontrol has been successful. Eleven species of European insects were released in North America. Rhode Island has successfully used five chrysomelid beetles in the genus *Aphathona* and one cecidomyiid fly gall midge, *Spurge esulae* Gagne.



Japanese Knotweed

Polygonum cuspidatum

Introduced to U.S. late 1800s

Identification- Stems are stout, cane-like, hollow between the nodes, somewhat reddish-brown, 5 to 8 feet tall and profusely branched. Leaves are thick and tough in texture, with short petioles, 2 to 7 inches long and about two-thirds as wide, spade-shaped with a truncate base and an abruptly narrowed leaf tip. An identifying character is the lack of hairs on the leaf undersides. Instead of hairs, there are low, bump-like structures (scabers) visible on the veins with a hand lens. Flowers small, creamy white to greenish white, and grow in showy plume-like, branched clusters from leaf axils near the ends of the stems. The fruit is 3-sided, black and shiny.

Ecology- Tolerates a variety of adverse conditions including full shade, high temperatures, high salinity, and drought. Found near water sources, such as streams and rivers, in low-lying areas, waste places, utility rights-of-way, and around old home sites. **Also known as fleeceflower, Himalayan fleece vine, monkeyweed, Hancock's curse, elephant ears, pea shooters, donkey rhubarb, sally rhubarb, Japanese bamboo, American bamboo, and Mexican bamboo.

www.bumblebeeblog.com



Purple Loose Strife

Lythrum salicaria

Introduced to U.S. in early 1800s

Identification- Wildflower with whorled, entire leaves. Purple flowers in a dense spike. Flowers showy, 1/2"- 3/4" wide, with 5 or 6 petals. The leaves are lance-shaped, somewhat clasping the stem, and grow in pairs or sometimes in whorls of 3. Fruit small 3–4 mm capsule with many tiny seeds. Bloom time: throughout the summer. Once seeds mature, leaves often turn bright red from dehydration in early autumn; color may last for almost two weeks.

Ecology- Invades many wetland types, including freshwater wet meadows, tidal and non-tidal marshes, river and stream banks, pond edges, reservoirs, and ditches. Chokes water flow and most notably outcompetes native cattails. **Plants under the name "European wand loosestrife" (*L. virgatum*) are same species. www.naturalbiodiversity.org



Black Swallow-wort

Cynanchum louiseae

First found in U.S. in 1854

Identification- Vine with entire leaves, dark-purple, fragrant flowers, about 1/4” wide in small clusters in the axils. Five petals in a star shape with small, white hairs. Leaves 3-4” long and 2-3” wide, egg-shaped with pointed tips, in pairs or sometimes whorled . Fruit, pods similar to those of the Milkweeds, 2”-6” long, rang in color from green to light brown. Bloom time: late spring and flowers through June and July.

Ecology- Found exclusively in upland areas and tolerant of a range of light and moisture conditions. It has been reported to occur above the high tide line of some rocky coastal areas where it can tolerate relatively high salt concentrations. May also be found in abandoned fields, hedgerows, brushy areas, woodlands, river banks, transportation corridors, quarries, agricultural fields, and gardens. Considered a weed in gardens. Direct relationship of seedpods to light exposure: the more light, the more seed pods and vice versa. www.shortcourses.com



Common Buckthorn

Rhamnus cathartica

Introduced to U.S. early as 1849

Identification- A European medium-sized to large shrub with twigs ending in sharp spines. Leaves elliptic, hairless, fine-toothed. A few may be alternate rather than opposite. Twigs dark and unlined, buds have several scales. Inner bark yellow. Leaves 1 1/2"- 2". Height up to 16'. Flowers small, greenish clustered. Bloom time: May-June. Fruits dark and berrylike.

Ecology- Prefers lightly shaded conditions. Invades mainly open oak woods, and deadfall openings in woodlands. Tolerant of many soil types, well drained, sand, clay, poorly drained calcareous, neutral or alkaline, wet or dry.



Queen Anne's Lace

Daucus corota

Date of introduction to U.S. undetermined

Identification- Wildflower with alternate, divided leaves. White flowers in umbels. Stem covered with bristly hairs; bracts beneath the umbel deeply and narrowly lobed. Flower umbels 2"-4" wide, with (usually) 1 purple floret in the center; become concave in fruit to form a "bird's nest" 1'-3' high. Plant usually grows up to 1 meter tall. Bloom time: summer and fall. Similar in appearance to poison hemlock, distinguished by mix of leaflets on either side of the stem in pairs and threes, fine hairs on stems and leaves, root that smells like carrots and occasionally the single purple floret at its center.

Ecology- Invades virtually all types of habitats, especially, recovering grasslands and can be persistent on clay soils. Persists in the soil seed bank for two to five years. Will decline in abundance as native grasses and herbaceous plants become established.



Jimson weed

Datura stramonium

Date of introduction to U.S. undetermined

Identification- A coarse weed with large (2 1/2-4" long) funnel-shaped flowers. The color of the flowers varies from white to violet to lavender. Leaves are egg-shaped, pointed, coarsely toothed, 2-8" long. Fruit a spiny pod, 2" long. Ill-smelling and poisonous. Part of the Nightshade family, of which all parts are toxic. Bloom time: summer and fall

Ecology- Grows in warm to moderate conditions. Often found in waste places, on the side of highways and high traffic roads due to its high tolerance for disturbance. Seeds believed to be consumed by birds and distributed in their droppings. Can lay dormant underground for many years and germinate once soil is disturbed. Also known as Thorn Apple, Flowering Tobacco, Angel's Trumpet, devil's trumpet, jamestown weed, loco weed, moonflower.



Norway Maple

Acer platanoides

Introduced to U.S. in 1756

Identification- A large, deciduous tree with a broad, rounded crown. Introduced from Europe; resembles Sugar Maple but has more leaf teeth. Field mark: milky sap evidenced when leafstalk is broken. Buds large (over 3/16”), green or reddish, and blunt. Leaves 2-8”, Height 40’-70’; diameter 1’-2’. Bark is gray-brown with shallow grooves and unlike most maples, mature trees don’t tend to develop a shaggy bark.

Ecology- Spreading from planted areas to upland areas. Grows in upland and wetland habitats, especially common in woodlands with alluvial soils. A generalist that can grow in full sun or complete shade and in dense sand.

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Specific Plant Actions:

Note: The most recent science on invasive plant control underscores the importance of well-timed management treatments. Cutting will be scheduled when carbohydrates have been transferred from the roots to the above-ground portion of the plant, thus causing the most damage to the target plant and eliminating carbohydrate stores, which weaken the plant over time. Cutting will also be phased in order to steadily select out the invasive species in favor of more suitable native plants. A program of selective herbicide application will be instituted during time periods when the plants will translocate the herbicide most efficiently and destroy materials. As the carbohydrate transfer is dictated primarily by weather, the management timeline is specified by season only, necessitating field expertise to initiate timely management procedures.