

## **CAPE IVY US FOREST SERVICE LANDS - BIG SUR COAST**

*Jeff Kwasny, Los Padres National Forest, Big Sur, CA*

The Big Sur coast is centrally located between San Francisco and Los Angeles. The travelers' link between these two metropolitans is Highway 1. This highway provides a major vector for invasive plants from San Francisco, the largest hub of invasive species in California. As a result, lands adjacent to Highway 1 are a menagerie of exotic plants.

Cape ivy (*Delairea odorata*) is currently the number one threat to heterogeneity and species diversity along the Big Sur coast. Alvarez and Cushman (2002) found in plots along the northern California coastal regions that habitats containing Cape ivy contained 36% fewer native plant species when compared to non-invaded areas. In addition, they found a 31% decrease in species diversity as well as 88% decrease in the abundance of native seedlings. Native to the moist mountain forests of South Africa, it was introduced in the 1850s as an ornamental in the eastern U.S. and to California by the 1950s (Elliot 1994); by the 1960s it had naturalized in Golden Gate Park, San Francisco and Marin County (Archibald 1995). Individual plants grow year-round and expand vegetatively through prolific stolon production. Cape ivy has no taproot, only shallow fibrous roots that sprout from the stolons where the vine comes into contact with soil. Typical habitat for Cape ivy is coastal scrub and riparian areas; tolerant to salt spray, it occurs along the immediate coastline right down to the high tide line.

### **COMPETITIVE ADVANTAGES of CAPE IVY**

There are complex reasons why Cape ivy grows so well here; a few of the physiological competitive advantages discussed are: early flowering, growth form, and shading effect.

#### Early Flowering

Cape ivy flowers in December through February. Most native plants are dormant at this time or haven't sprouted yet. Seed is cast by March/April. This is a common advantage among many of California's nonnative invasive plant species.

#### Growth Form

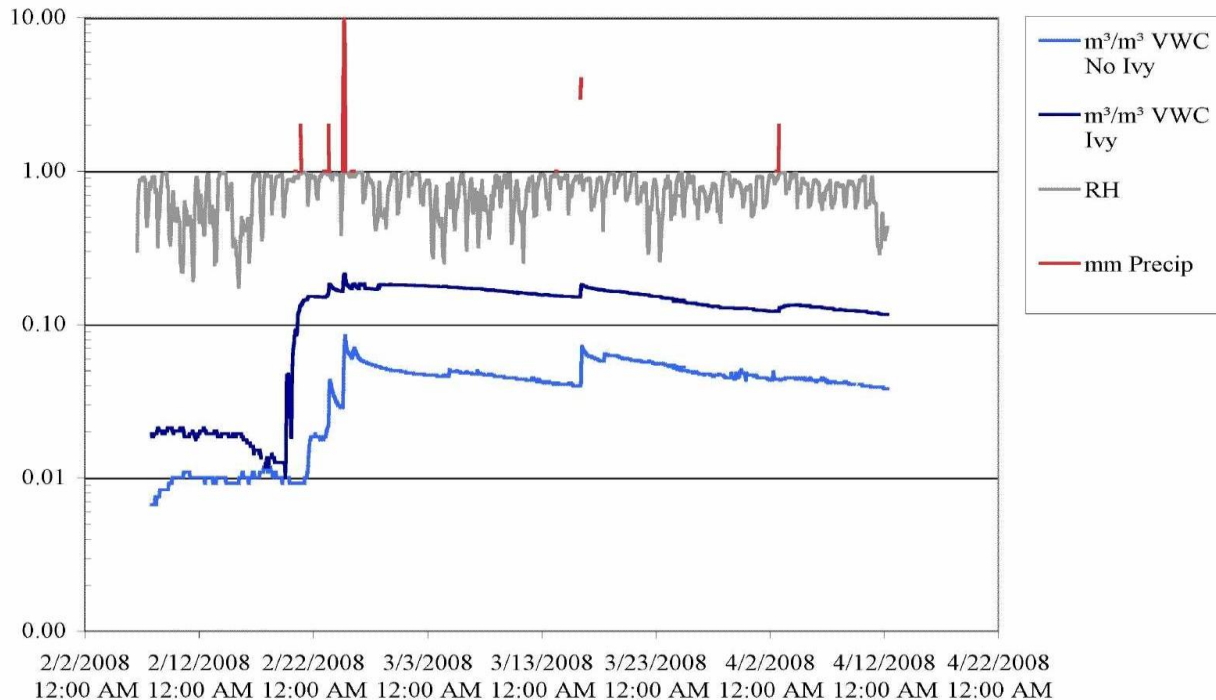
The invading vining growth form allows it to exploit resources by growing up shrubs and trees, while its stolons travel along the soil surface, sprouting roots on contact - a mobile and opportunistic system that is ideal for colonizing new areas.

#### Shading Effect

Cape ivy has the ability to protect the soil surface from loss of moisture by 'shading' the ground from sunlight and wind to keep the soil moisture higher than what is occurring naturally. This permits the soil under the ivy to store more moisture longer into the spring, and therefore

give Cape ivy an advantage over natives in growing rate and seasonal growth duration. Figure 1 illustrates the results of soil moisture probes placed in the soil under Cape ivy and adjoining soil cleared of the ivy within ten meters of each other. The probes measured volumetric water content at a soil depth of 10 centimeters (Chris Potter, NASA Ames Laboratory).

**Figure 1.**



## CONTROL METHODS

### Physical

The two most common methods are: hand pull vines and stack in piles for disposal or desiccation and the “Scorched Earth” tactic of pulling and hoeing all vegetation (natives and exotics) allowing for free access to remove re-emerging Cape ivy.

### Grazing with Goats

Goats have been used successfully on small sites. Recommended timing is between November and February before seeds ripen. The goats eat indiscriminately, consuming all vegetation equally, and generally leaving the root structure intact.

### Green Flaming

Pioneered by Ken Moore of the Wildlands Restoration Team, Santa Cruz, a propane torch is used to heat the ivy just enough to produce wilting. Flaming is a good choice for follow-up treatment.

## Chemical

Applied once a year as foliar spray in late-winter to early-spring when the ivy is photosynthesizing actively but past flowering. To achieve the desired efficacy, one to three consecutive years of treatment is necessary; three years for the older infestations and one year for spot treatment of new infestations.

In riparian areas, use 1½% solution of glyphosate (aquatic approved product) + 0.75% non-ionic nonylphenol polyethoxylate (NPE) surfactant [examples are R-11 (Wilbur-Ellis), X-77 (Loveland Industries)]. Non-target plants such as willows are dormant (some willow trees are leafless this time of year) during the winter months and are not affected by glyphosate. At Pfeiffer Beach in Big Sur the Forest Service treated Cape ivy with this solution. The first year we sprayed 600 gallons of solution, the second year we sprayed 500 gallons, and the third year we only needed to spray 18 gallons to seek and destroy new spot infestations.

In upland areas, there are two proven solutions to control Cape ivy: 1) 1½% solution of glyphosate (Roundup Pro®), or 2) a cocktail of 0.5% glyphosate (Roundup Pro®) + 0.5% triclopyr (Garlon 4®) + 0.1% silicone blend surfactant [examples: Sylgard 309 (Wilbur-Ellis), Silwet L-77 (Loveland and Helena), Freeway (Loveland Industries)]. The cocktail solution in some cases has shown to have less effect on non-target species than the glyphosate only solution. If there are no concerns about non-target species, Roundup Pro® is easier to use. Another product that I have heard is effective on upland sites is clopyralid.

Choice of control method depends on your site specific goals, strategy, issues/concerns, policy (if government agency), resource considerations, and funding/workforce.

**Figure 2. Estimated cost per acre to treat Cape ivy**

<b>Manual</b>	<b>Goat Grazing</b>	<b>Chemical</b>	<b>Flaming</b>
\$1800	\$1350	\$1300	\$1300

√ Manual based on actual costs incurred by USFS

√ Goat grazing based on contractor estimate

√ Chemical based on actual costs incurred by USFS

√ Flaming based on personal conversation with Ken Moore, Wildland Restoration Team (2006)

## **CONTROL STRATEGY**

At a minimum, your control strategy should include the following:

- 1) Spot infestations should be first priority for treatment.
- 2) Funding – you must have funding and/or workforce available for a minimum of three years.
- 3) Establish control lines. For landscape control I recommend a map of the infestation and established control lines.

**Figure 3**

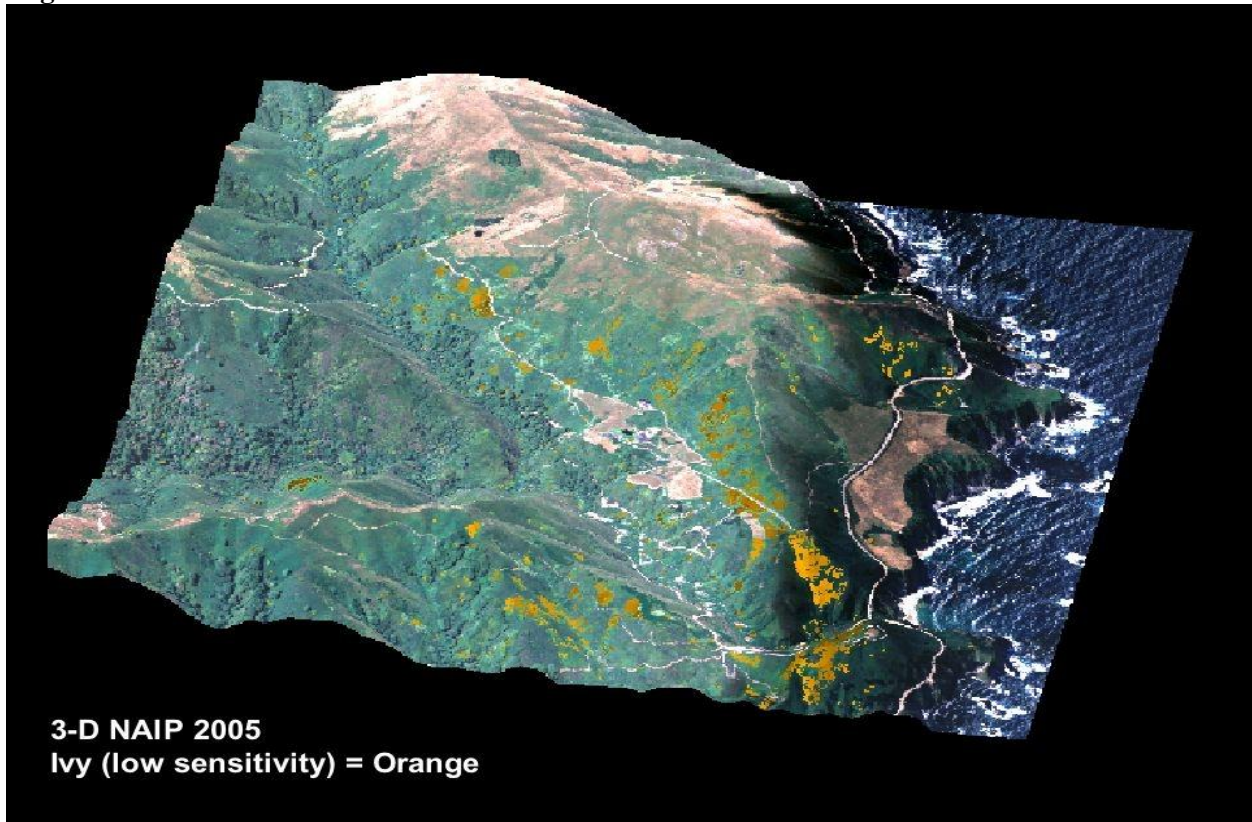


Figure 3 is an example of mapping Cape ivy infestations across the landscape using high-resolution satellite imagery (Seth Hiatt, San Francisco State University). In this example, roads are used as control lines.

Key to all non-native invasive weed control programs is persistence. Using the control strategies presented here today, the Forest Service has been and will continue to be diligent in their efforts to maintain native species diversity along the Big Sur coast.

#### **REFERENCES**

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