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THE PLANTS: HOW TO REMOVE BAY AREA WEEDS

The weeds presented in this chapter are significantly affecting Bay Area ecosystems. Local landowners, conservation organizations, and volunteer weed workers have identified these plants as important to control in Bay Area watersheds. While other weeds also affect local natural areas, we have chosen to provide a comprehensive resource for these species in this book.

Each species account includes a description of the plant and its modes of reproduction, followed by its ecological impact, treatment options for removal, and notes on disposal and follow-up. A wide range of treatment options is presented so that you can select the approaches best suited to your site and resources. (Refer to chaper 5 for detailed descriptions of each of the control treatment options.) Each account also lists key factors of the plant's biology that are important to consider when planning a control program.

Following is a discussion of how biological characteristics—modes of reproduction and life cycles—affect choices and strategies for effective weed control efforts.

REPRODUCTION: HOW IT AFFECTS WEED REMOVAL

By definition, weeds are plants that reproduce very successfully in the habitats they invade. We should note that weediness is not a fixed characteristic of a plant, but a reflection of its impact in a particular environment. Some invasive plants are prolific seeders and early colonizers even in their native range, while others are surprisingly rare in their native range. For these plants, the absence of predators and diseases, recent or historical habitat alteration, or other ecological circumstances enable them to invade where they are introduced. In such cases weed removal may be only one component of habitat restoration. Whatever the factors that enable a plant to become a weed, understanding its modes of reproduction

and its life cycle will help you choose techniques, evaluate progress, and follow up appropriately until you succeed in controlling it.

Some plants reproduce exclusively from seed. Some are equally prolific by sexual and vegetative reproduction. Others reproduce almost exclusively vegetatively, and either rarely produce viable seed, or their seeds rarely encounter the right conditions to germinate. In sexual reproduction, male and female gametes combine and produce genetically different offspring through flowering, pollination, and seed production. In asexual (or vegetative) reproduction, new individuals—clones—can grow from a part of a plant, such as a node or a root.

Sexual Reproduction

Evolution has produced myriad ways by which seeds—those precious packets of genetic information—are dispersed. Some seeds drop close to the parent plant, while others are carried a considerable distance on the wind; some are eaten by birds and dropped even greater distances; others still are transported by flowing water. Perhaps the greatest aid to seed dispersal, however, is the movement of humans. (This is how many weeds were introduced in the first place!) Some seeds are transported by clothing, boots, and vehicles from mountain bikes to earth-moving equipment.

Effective control techniques are linked to these means of seed dispersal. For example, if a seed is transported by water, consider trying to control upstream infestations first to prevent continual re-invasion. If seeds come packaged in fruits that are eaten and dispersed by birds, consider trying to remove the plant before fruits ripen. When you don't have the resources to remove entire plants before seeds are produced, you may chose to remove just the seeds for that season if practical. Another important consideration is seed viability. Knowing how long seeds can persist as a viable seedbank will help you decide how many years you will need to follow up on removing seedlings after the initial removal of an infestation.

Vegetative Reproduction

Plants can produce new individuals by many means other than seed. Vines can cover a lot of ground simply by vegetative growth—not technically reproduction—before they ever flower. Bulbs, rhizomes, stolons, and runners are not roots, but shoot (stem) tissue that can give rise to new plants. Tillers and suckers are shoots that emerge directly from a part of the root, growing adjacent to or at some distance from the main stem of the parent plant. Some plants can produce shoots and roots directly from stem nodes or branch tips that touch the ground. Others can regrow from a cut stump or from parts of roots left in the ground. For our purposes, such regeneration can be considered vegetative reproduction, because without follow-up, it can produce a whole plant.

The amazing array of possibilities for vegetative reproduction gives rise to a long list of considerations for treatment and follow-up. Can the target weed

resprout from a cut stump? If so, you may choose to implement one or more of the following options until the species is controlled: cutting resprouts until energy resources are depleted, covering the stump with landscape fabric, treating with herbicide, or removing the stump and roots entirely. Can a patch continue expanding outward via rhizomes or tillers? If so, you may try to control the perimeter until you can remove the whole patch. Can small fragments of stems that contain a node produce an entire new plant? If so, you may find yourself regarding weed debris as hazardous waste when you contemplate disposal.

Life Cycles

In addition to differences in modes of reproduction, plants have different life cycles: annuals complete their life cycle in one year, biennials in two years, and perennials live for three or more years.

- **Annuals** reproduce exclusively by seed. An example is yellow starthistle, a winter annual that produces copious amounts of seed. (Winter annuals germinate in the fall, overwinter as seedlings, and die in the spring or summer soon after setting seed.) Because individual plants do not persist beyond one year, the main control concern with annuals is preventing seed production to minimize the number of future plants.
- **Biennials** develop strong roots during their first year, storing the energy they need to survive the winter. Bull thistle, like many biennials, overwinters as a basal rosette of leaves. This is a good time to pull plants up by hand as the taproot is relatively weak. In the second year, biennials bolt and flower. By this stage, not only is the taproot stronger and the plant more difficult to pull up, but soon the plant will produce seed.
- **Perennials** often reproduce both sexually and vegetatively, thus requiring a range of treatments to control or remove them. Perennials can be divided into woody perennials (trees, shrubs, and some vines) and herbaceous perennials (forbs, grasses, and some vines). Woody perennials have persistent, hardy stems. Herbaceous perennials often have stems that die back during the winter but roots that persist, with new stems growing from the root crown each spring. Treatments for perennial weeds are often designed to make an impact on their most resilient part—the roots. If the plant can regrow from stumps or roots, the control strategy may also include repeat treatments to exhaust the plant's energy stores.

The species accounts that follow are grouped by growth habit (vines, shrubs, trees). Herbaceous plants are further divided by life cycle (perennial or biennial forbs, annual forbs, perennial grasses, annual grasses.) Within each section, the plants are ordered alphabetically by common name. The illustrations that accompany each description are not to scale.