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## Best Practices for Invasive Species Management in Garry Oak and Associated Ecosystems: Scotch Broom (*Cytisus scoparius*)

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Assess the site characteristics and your available resources to help you decide where to take management action, what action to take, and when. These decisions should be made within the context of the overall restoration objectives (and restoration plan, if one exists).

### *a) Deciding where to take action*

#### **Factor 1: Broom density**

Survey the areas in the GOE where broom occurs. Outline and label these areas "zone 1", "zone 2" or "zone 3" on your sketch map. Use the following descriptions:

- Zone 1 isolated plants, small isolated patches, and low-density edges around larger, denser broom areas
- Zone 2 medium-density areas
- Zone 3 high-density areas

(Use the density diagrams from Question 2 for guidance. )

Where to focus your effort? Follow the **Priority Principle: contain the invasive species first, then reduce its amount!** The highest priority is to prevent further spread of broom. Only take action to reduce the "footprint" of the broom invasion after it is contained. Therefore Zone 1 areas should be your first priority, and you should only move into Zones 2 areas when broom has been successfully removed from Zone 1. Leave Zone 3 areas for last! Zone 3 will often require the greatest amount of resources and effort. (Sometimes concerns about species at risk should override this zone prioritization. For example if a population of a species at risk is directly and imminently threatened by broom this should be a top priority. Such decisions should be made in consultation with species at risk experts.)

#### **Factor 2: Ecological quality**

To help you prioritize areas *within* Zones, consider GOE quality, presence of species of concern, and broom vulnerability. First priority areas should be those of highest ecosystem value, especially where species at risk are threatened by a broom invasion. Within such areas, start where the conditions for broom are marginal and their tolerance is lowest - this is where they will be most vulnerable and most likely to be affected by your control actions. Focus first in dry areas, then areas with deeper soils, and then in Douglas-fir areas.

#### **Factor 3: Accessibility**

Broom management will require repeated efforts, as regeneration from re-sprouting and from seeds already in the soil (the "seed bank") is inevitable. Focus action first in areas that can practically be accessed for repeat treatments.

**b) Deciding what action to take, and when**

Circumstances	Method	When	Caveats
<b><i>In Low or Medium Density Broom Areas:</i></b>			
<ul style="list-style-type: none"> <li>Broom stem is smaller than pencil size, <b>AND</b></li> <li>No rare plants are in immediate vicinity</li> </ul>	Pulling	Late fall (after rains start) to end of January	<ul style="list-style-type: none"> <li>The plant should pop out readily without taking any soil; otherwise choose another method</li> <li>Do not use a regular weed wrench to pull the plant out. You may use a "mini" weed wrench but if that will not work, the plant is too big for this method; consider <i>cutting with loppers</i></li> </ul>
<ul style="list-style-type: none"> <li>Broom stem is bigger than pencil size, <b>OR</b></li> <li>Rare plants are in the immediate vicinity</li> </ul>	Cutting with loppers	After broom plants flower but before the seed pods ripen	<ul style="list-style-type: none"> <li>If you find it a struggle to cut through the stem, the plant is too big for this method; consider using a hand saw</li> <li>Cut at or slightly below the ground level</li> <li>Be careful; wildflower species may be in bloom at this time and vulnerable to trampling</li> </ul>
<b><i>In High Density Broom Areas:</i></b>			
<ul style="list-style-type: none"> <li>Broom plants are young</li> <li>No rare annuals present</li> <li>Ground is dry</li> </ul>	Mowing	Dry season, when other plants are not blooming	<ul style="list-style-type: none"> <li>Can only be done where mower access is feasible and where the terrain permits (not too steep or rocky)</li> </ul>
<ul style="list-style-type: none"> <li>Any age/size of broom plant</li> </ul>	Brush saw	While seed pods are forming or area still small and green	<ul style="list-style-type: none"> <li>Ensure safety training for saw operators</li> <li>Do not use in rocky terrain (sparks can cause a fire)</li> </ul>
<ul style="list-style-type: none"> <li>Dense stands of seedlings (may happen after initial control treatments)</li> </ul>	Weed eater	Fall	<ul style="list-style-type: none"> <li>Only after native forbs and grasses have died back, and after whatever natural mortality may occur to seedlings over the summer</li> </ul>
<ul style="list-style-type: none"> <li>Area is very disturbed</li> <li>Patch is very dense (&gt;1000 seedlings/m<sup>2</sup>)</li> <li>Other methods have been ineffective</li> </ul>	Herbicide	Depends on herbicide; consult expert	<ul style="list-style-type: none"> <li>Only with extreme caution, and by (or advised by) experts</li> <li>May be restricted (legally) in some jurisdictions</li> </ul>
<ul style="list-style-type: none"> <li>Explosion of seedlings</li> <li>Low fuel-load on site</li> <li>Small confined area</li> </ul>	Selective flaming	Any time except dry season	<ul style="list-style-type: none"> <li>Only with extreme caution, and by (or advised by) experts</li> <li>Small danger of fire spread</li> <li>May require permission in some jurisdictions</li> </ul>
<ul style="list-style-type: none"> <li>No fuel-load on site</li> </ul>	Fire	Before seeds set	<ul style="list-style-type: none"> <li>Only with extreme caution, and by (or advised by) experts</li> <li>Most effective, and risky, in dry season</li> <li>Will trigger germination of seeds in seed bank; therefore requires follow up treatment appropriate for new seedlings</li> <li>May be restricted in some jurisdictions</li> <li>May trigger germination of other weeds</li> <li>May harm some species at risk; get expert advice</li> </ul>

In deciding which method(s) to choose, also consider:

- Your budget to acquire the necessary tools and equipment for the methods chosen (e.g. "mini" weed wrenches, loppers, hand saws, brush saws, mower, or weed eater),
- Your budget to acquire the necessary protective clothing and equipment (e.g. gloves, safety goggles),
- The need to comply with Workers Compensation Board regulations, and
- The number and skill level of the people that will be assisting you.

Consider following up on any of these control methods with a planting or seeding treatment in order to speed up re-establishment of native species. The need for this will depend on what bulbs and seeds already exist in the soil, light conditions, and how well they germinate and sprout when the broom is removed. You may wish to first monitor the site after the control methods have been implemented, and then plant or seed later if the desired native plants do not appear or are sparse. If you are going to plant native species, consult with someone knowledgeable about this first, ensure that your plant and seed stock originate from sources that follow ethical guidelines, and take genetic issues into consideration.

### ***c) Deciding how to dispose of dead plant material***

If you choose any mechanical removal method, you must think about what to do with the plant material that you have cut or pulled. It is not acceptable to leave large piles of broom on site, as it may be a fire hazard, or may smother native plants underneath. There is also concern that broom contains phytotoxins (poisonous plant chemicals) that may leach into the soil and contaminate it. Consider the following options, based on the amount of dead broom you expect to remove from the areas you plan to target:

Material	Removal from site	Disposal
Large amount of dead broom, <b>OR</b> any volume of dead broom with seeds present, <b>AND</b> burning not feasible or permitted on site	Remove from site on tarps or makeshift "stretchers", being very careful to not spread seeds to other sites en route to nearest access road	<ul style="list-style-type: none"> <li>• Cover and transport to a location where it can be safely burned</li> <li>• Composting is risky, as the seeds may not be destroyed by the composting process</li> </ul>
Large amount of dead broom, <b>OR</b> any volume of dead broom with seeds present, <b>AND</b> burning feasible and permitted on site	Move to bonfire or burning barrels on tarps or makeshift "stretchers", being very careful to not spread seeds to other sites en route	<ul style="list-style-type: none"> <li>• Burn safely; transport ash offsite when cool</li> <li>• Consult BC government's <i>Open Burning Smoke Control Regulation</i>: <a href="http://www.toffan.com/clear/OBSCR.pdf">www.toffan.com/clear/OBSCR.pdf</a></li> </ul>
Small amount of dead broom without seeds	Not necessary	<ul style="list-style-type: none"> <li>• Leave on site, scattered or mulched, or deposit in densely shaded area under conifers where there is no ground vegetation</li> </ul>

### ***d) Recognizing uncertainty***

In making these decisions, there will be things you are unsure about. This is normal, and should not cause undue concern. The important thing is to be *aware* of the things you are most uncertain about, document them, and plan your actions in a manner that will help you learn and reduce this uncertainty.

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