

## Cone Collection Standards:

These standards apply to all CAL FIRE collections, regardless of who is the collection supervisor.

### Description of Work:

Collect seed cones from general conifer populations. All collections must be approved PRIOR to collection by the CAL FIRE Seed Bank staff. Cone sacks, tags, and ties are provided by LAMRC.

All collected cones will be bagged, tagged, tied, and transported to LAMRC in Davis within 24 hours of collecting. If cones will not be delivered within 24 hours, they must be interim stored in a cool and ventilated environment and stand free from each other until they can be transported to LAMRC. During transport, cones must be protected and well-ventilated.

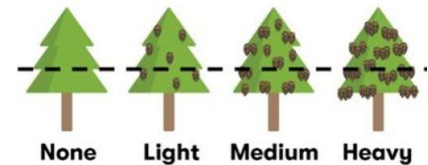
### Cone Collection Standards:

Prior to any collections, CAL FIRE staff or other previously determined Registered Professional Forester will assess the viability of a collection through cone cut tests and site assessment.

### Crop Rating and Stand Assessment:

- Each seed lot should have a **minimum** of 10 trees represented. The aggregation of these ten trees, within a 500' elevation band, will be referred to as a "stand."

- Crop ratings are to be given at the stand level. For example, if out of 10 trees there are 2 that have a heavy crop, but the rest are light, then the average rating for that stand will be light.



*Crop rating visual courtesy of American Forests*

- When evaluating crop rating, only the top third of the tree canopy is to be assessed. Any cone lower in the tree is likelier to have insect damage, if present, and is also much more difficult for climbers to access (not cost-efficient)

Crop rating	Bushel Volume	Gallon Equivalent	Visual Aid	Cost Economics
<b>Light</b>	<2 bu.	<16 gallons	Less than ↓	Not collectable
<b>Medium</b>	2 bu.	=16 gallons	~Three 5-gal buckets	Collectable
<b>Heavy</b>	>2 bu.	>16 gallons	More than ↑	Desirable

Note: None and light crop ratings are still survey options for data-collection purposes. Having survey data is preferable to having no data, which could be interpreted as having no eyes on the forest. Additionally, data regarding none and light crops can serve as part of a long-term data set.

- Collectable trees shall be dominant or co-dominant, disease-free, of cone-bearing age, at least 12" DBH, with good stem and crown form, no split tops, fast growth rate (inferred from spacing between branches), and other favorable phenotypic characteristics as determined by a Registered Professional Forester, environmental scientist, or other qualified staff.
- Seed trees shall be widely spaced and well distributed, generally not closer than 200' apart.
- Stands are separated by at least 200 yards.

**Viability:**

1. Cone cut tests are to be done to assess viability. This will be done by LAMRC Seed Bank staff in the field or in the lab when samples are mailed overnight. Cones from each sample tree should be marked and placed in separate paper bags to avoid sweating in transportation.
2. Cones and seed must be relatively free of insects. Cones of *Pinus* shall have at least 75% sound, filled seeds per cut surface; for all other species the minimum is 50% per cut surface.
3. Embryo length shall be at least 90% of the embryonic cavity for all species. *P. menziesii* seed - mature appearance with embryo → fully extended.  
B.C. Ministry of Forests. 1989
4. Megagametophyte shall be opaque, not translucent, and with a firm, nut-like texture.
5. Seed wings shall be separate from the scale and slightly brittle (like parchment paper).

**Collections:**

1. Trees should be flagged or identified before collections occur.
2. Douglas fir, incense cedar, white fir, red fir, coast redwood and other species with small or sensitive cones shall be bagged in the tree so as not to incur impact damage to the cones and seeds from free falling to the ground. Larger cone species may be dropped to the ground.
3. The peduncle shall be removed from redwood cone and sugar pine cones before bagging. This can be done with hand-held clippers.
4. Cone sacks shall be properly identified with one tag inside and one tag fastened to the outside with the species, lot number (assigned by Seed Bank Manager), seed zone & elevation, location (T R Sec) and date of collection on the front; the back of the tag shall have decimal degree coordinates (DD). Tags shall be marked with waterproof ink or sharpie.
5. Only one bushel of cones per sack allowed and secured at the top to allow for cone expansion. Fill line is clearly marked on CAL FIRE sacks.
6. Only current year or living cones are acceptable – cones must contain viable seed.
7. General collection trees may be climbed with ladders, ropes, or other methods that are not damaging to the trees. Spurs shall NOT be used for special collections, white pines, or thin bark species except for emergency life-saving rescue.
8. Collections shall contain at least 95% seed bearing cones by volume. Unacceptable material includes branches, large twigs and tufts of needles, rocks, cones of the wrong species, spent cones or other foreign matter.

**Estimated Start Date:** Varies by species, area, and elevation of the site.

**Permission & Insurance:** Collections require advance notice and agreement.