

Gearhart Foredune Woody Vegetation Management

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Purpose

The purpose of this paper is to provide the City of Gearhart and residents with an understanding of dune ecology and vegetation management options for the foredune, west of the residential area, with three management options, a no action option, a woodland option (leaving some woody vegetation), and a grassland option (mowing all woody vegetation).

The area discussed in this paper is bordered by 7th Avenue on the north end, the



Necanium Estuary on the south, residences on the east side, and the Dune Hazard line on the west side. See map for reference, showing City of Gearhart property overlays in green, on aerial of foredune, 2014.

Introduction

Dunes in Gearhart, Oregon have undergone rapid changes in the past two hundred years, transforming from diverse prairies to grass monocultures. Today, the dunes are grasslands. Remnants of the historic, diverse dune prairie live in small patches, well back from the present foredune near the west line of buildings.

At the same time, land management practices changed from small, fairly regular fires to largely suppressed fire. This allowed both native and introduced woody species to rapidly colonize soils behind the outermost dune.

Sediment management at the Columbia River Entrance also changed, and altered the sand accretion rate from several millimeters per year to many feet per year. In the 1950s there were no dunes west of the west line of residences. Accretion of sand formed a series of dunes westward. European beachgrass (*Ammophila arenaria*) and other plants moved naturally into these new dunes.

This presents several management situations for the City of Gearhart.

- First, the volume of wood that can fuel wildfires has increased significantly as shore pine, Sitka spruce, Scots broom and other woody species spread.

- Second, some plant species are state-listed noxious species that should be controlled.
- Third, food resources and cover have been created for many animals, including Roosevelt Elk and Black-tailed Deer, so that these species live immediately adjacent to and in the urban residential areas. Interactions with these species have increased.
- Fourth, the young coastal forests present increased opportunities for human-human and human-wildlife interaction hazards. Public safety has declined.
- Fifth, for coastal residents, visitors and others in the City of Gearhart, ocean views are vanishing into the new coastal forest.

The following matrix compares ecological values and Gearhart community values for three management options.

Gearhart Ecological and Management Options Matrix	No Action: Woody species dominate	Partial Clearing: Some woody species remain in clusters	Maintain Grassland, no woody species
Large Animals	High usage	High usage	High to moderate usage
Small Animals	Moderate to high usage	High usage	Moderate usage
Birds	Moderate usage	High usage	Moderate usage
ESA-listed Species	NA [young forest]	NA	Low, unless prairie is created in grassland areas
ESA-listed Species	Low [old forest, > 100 yrs old]	Low [old woodland conditions]	Low, and see comment above
Plant Diversity	Low [forest conversion]	Moderate	Moderate to high; highest if coastal dune prairie species are used
Noxious Plants	High	Moderate to high	Low
Wetlands	NA	NA	NA
Human-Animal Hazardous Interactions	High [cover for many animals]	High to moderate [some cover]	Low [no cover]
Human-Human Hazardous Interactions	High	High to moderate [some cover]	Low [no cover]
Adjacent Resident Hazards	High	High [some cover]	Low [no cover]
Woody fuel for fire	Highest woody fuel level	High to moderate fuel level	Low woody fuel level [also maintain mown strip each summer]
Potential for fire to move into residential areas	Highest	High to moderate	Moderate to low [maintain mown strip each summer]
Ocean views	Low to no viewscape potential	Low to some viewscape	Highest viewscape potential

Past Conditions

Historically, the dunes in Gearhart were a fire-maintained landscape. In this climate, except on very wet or very thin dry soils, prairie and grassland plant communities naturally advance to forest. Fire is the key disturbance to this process that resets plant communities to prairie or grassland conditions.



Aerial of City of Gearhart, 1950, shows small area of foredune west of city, and wide summer beach to west, composed of open sand. A small remnant prairie composes the vegetation west of the city in 1950, with forest on the east side of town.

This region is part of the Coastal Temperate Rainforest Biome, a conifer-tree-growing region that grows trees more rapidly than most of North America, and stores more carbon in the soil, on the surface and in standing living and dead trees, than all other forest types in the world. It is also part of the largest, most diverse belt of conifers in the world, extending from Mexico to Alaska. Left to grow without disturbance (wind throw, logging, fire), conifer trees flourish here.

The Clatsop Tribe lived on the Plains for thousands of years, and had summer villages in several locations, typically close to freshwater streams. Keeping the Plains in prairie vegetation kept elk and deer close to the villages, and also promoted useful plant species

for food, fiber and medicine that prefer prairie conditions. Fire was their management tool. Occasional wildfires in the forests also occurred, probably started by lightning during dry seasons. The result was a patchwork of old growth and young forests in the hills, and coastal dune prairie along the ocean beaches.

Early 19th century explorers noted extensive “undulant grasslands” backed by dense forests in the hills to the east, and extolled the virtues of the Clatsop Plains for agriculture in letters, journals, reports and books, including members of the Lewis & Clark Expedition, James Dana of the Wilkes Expedition, and James Graham Cooper, naturalist and physician with the Northern Pacific Railway Survey. Cooper was the first early visitor to see the coastal dunes in May and June, when in full flower, and he wrote about it in glowing terms.

The outermost dunes supported wildflowers, sedges and grasses, growing in a luxuriant mixture. In late spring to early summer, this area was covered with wildflowers. A few hundred yards east of the beach, other grasses formed a denser meadow, growing with taller wildflowers over several dune ridges. This mix of grasses and wildflowers continued to the forest edge. Late 19th and early 20th century botanical explorers, including Lewis Henderson, T.J. Howell, Morton Peck and others wrote about this diversity and collected plants in the historic dune prairies along the North Coast.

Prior to jetty construction at the Columbia River Entrance early in the 20th century, sand accretion on ocean beaches was measured in millimeters per year. Afterwards, it was and is measured in tens of feet per year, occasionally alternating with periods of erosion, or retrograde movement of the beach face east into the dunes. This situation will persist so long as sediment management continues for the shipping channel in the river, and the jetties remain intact. The foredune west of the City of Gearhart will to continue to build west as long as near-shore sand from the Columbia River is available in the surf zone.



September 1971, looking southwest towards Tillamook Head, foredune area is now grassland with a few small pines. West edge of city is still unforested.

Present Conditions

Fire suppression is now the normal condition for the foredunes. This means that woody species, including shore pine (*Pinus contorta* var. *contorta*), Sitka spruce (*Picea sitchensis*), and introduced shrubs such as Scots broom (*Cytisus scoparius*), evergreen blackberry (*Rubus armeniacus*), and many native shrubs, thrive between homes and ocean beach. See Appendix One for a plant list for the present foredune area.



This image, left, shows the present foredune and city. Dark green areas are trees in foredunes and in the city. The canopy linkage between these areas is increasing. Reducing woody fuel is now important. Areas that are light green-beige from the westernmost line of homes to the beach are locations where trees have already been removed.

Broom patches do not show in this image, but reducing this shrub is particularly problematic for fire management, because it is nearly as combustible as gorse (*Ulex europeaus*), and grows in dense stands, shading out many other species and providing, in the case of wildfire, a fuel link between grasslands, homes and forest areas.

Rapid accretion of sand has continued to this day, and provides European beachgrass with ideal conditions to continue to dominate the western foredune.

As the vegetation line moves west, older soils to the east mature enough to support woody species, including shore pine, Sitka spruce, black twinberry (*Lonicera involucrata*),

Pacific wax myrtle (*Myrica californica*), evergreen huckleberry (*Vaccinium ovatum*) and red alder (*Alnus rubra*). These species form the first, young coastal forest in the dunes. This forest is wind, salt and drought tolerant. It is also capable of regenerating after fire.

With increasing cover by woody vegetation comes an important public safety issue: Predators and people can hide more easily in dense cover than in open grasslands. Perception of safety in public areas varies with age and sex, and is a subconscious decision that we all make all the time when in public spaces. The most important test of safety for a community is to know where women with young children do and do not feel safe. They will not enter an unsafe area, unless there is no other option. Elders with diminished physical capacity have a similar reaction. This standard is used by planners world wide to design and improve public areas for their communities.

Options For Foredune Management–

No Action—Management Notes

The foredune near the western edge of the city is a patchwork of Scots broom, blackberry thickets, and young coastal forest, with some areas of mixed grasses among these patches. It is transitioning from woodland (mostly open land between patches of trees) to forest (densely covered with trees, with little to no open land).

There are animals that thrive in dense forests, but many species prefer a more open, woodland condition. At this time, the transitional woodlands are optimal for elk, deer and other large animal species.

The greatest impacts for city residents are increased wildlife interactions, increased fire hazard, and impaired public safety, followed by loss of ocean views. Animal-human interactions are becoming more frequent as people, in yards and in the dunes, encounter wildlife in the densely vegetated areas. Negative human-human interactions are also more likely as cover increases in the wooded areas.

Uncontrolled fires are a significant safety hazard. During my site visits over the past few years, it is apparent that many residents have taken some steps to reduce wood fuel near residences, but this is not consistently applied across the dune landscape. See the last figure on page 6, which shows clearly which areas have been kept clear of woody species and which have not. The young forest is dark green, and patches of dark green show up throughout the foredune near residences.

At the least, a fire safety buffer should be implemented between western residences and wooded areas, where all woody species are removed. See the third option, Maintain Grassland, page 9 below, for specifics on fire safety buffers.

Partial Clearing—Woody Vegetation Management Notes

There are several ways to manage woody vegetation. A key reason to undertake woody species management is to improve fire safety and public safety. No woody vegetation

should grow within fifty feet of structures. Beyond this perimeter, trees should be limbed to reduce the ability of a grass fire to move into a tree canopy, and trees should be thinned, to reduce the ability of a canopy fire to move from tree to tree. There should be a canopy break between foredune forests and urban trees in the city, so that fires cannot easily spread into the city.

The foredune area provides habitat for many animals. Management activities in fall and winter generally reduce disturbance to animals.

The approach to management depends on the community's needs. For the partial clearing option:

Reduce fuel loads by thinning trees so that their canopies do not touch, cutting at ground level, then limbing up a minimum of six to eight feet. This method creates and maintains a woodland of widely spaced trees, instead of clusters of very dense forest. Limbing opens up the trees, spatially separating the canopies from the grassland. It creates a landscape where people feel safe: they can see easily through the trees, and the trees are widely spaced. Fires that start in the grass may reach some tree canopies, but with well-spaced trees, fires cannot spread easily from tree to tree.

If all woody vegetation is to be removed:

1. Remove tall woody species throughout the site by cutting down trees, removing logs more than 8 inches in diameter, chipping logs and branches under 8 inches in diameter, and grinding stumps. Bringing in any equipment from other sites carries the risk of introducing new weedy species if equipment is not properly cleaned between sites. See Equipment and Vectoring in of new species, below, and the brochure about cleaning vehicles and equipment.
2. Downed wood can be chipped on site, or removed. Chip layers should not exceed six inches in depth when initially spread, and no logs should be left on site. The cleared forest area should be well separated from the residential area: A minimum of two hundred feet is probably a safe distance. Chipping is best done with a chipper on site to reduce traffic in the foredune. There are already trees with diameters of more than twelve inches in the foredune [circumference of 38 inches or more at 4.5 ft from the ground, or DBH—diameter at breast height].
3. Fire is an alternative to reduce the volume of wood to chip. Use controlled burning to reduce standing wood, then clear out the dead wood afterward. This may reduce the standing volume of woody debris by half or more, and if hot enough, will almost completely remove small trees. The same cautions about clean equipment and vehicles apply. In addition, if partially burned wood is handled, workers must protect their lungs from fine soot particles and sooty dust. However, this brings smoke hazards to local residents and anyone downwind of the fire.
4. Where trees are young, under four feet tall, they can be mown with a tractor based flail mower ("brush-hog") or clipped at ground level. Mowing is particularly useful if young trees are mixed with Scots broom, as both can be mown at the same time.

5. Stump grinding will ensure that future mowing can be done safely in the formerly timbered areas. As with other equipment, it's important that each grinder be cleaned before coming to this site to reduce introduction of new noxious species.

6. Isolated low shrubs of native plant species may be retained in the foredune for bird and small mammal habitat.

Maintain Grassland Option—Management Notes

Dry season fires are an all too common hazard for dune residents. Important guidelines for improving fire safety are to remove all woody plants within fifty feet of structures, creating a fire safety zone, and to mow that fire safety zone each year at the start of the dry season.

This reduces available fuel for fires moving east from open land to buildings, and improves the odds that fire protection teams can arrive in time to keep structures from burning. Mowing a summer fire-safety buffer—fifty feet from structures to grasslands—should be done as the dry season starts and grasses slow their growth.

Outside the fire safety buffer, mow regularly to reduce Scots broom and other woody species. Timing for this mowing is important. Ground-nesting birds and mammals have active nests and young during spring and summer. This area should be mown only in fall or winter—October to early March.

. There are two approaches:

1. Mow all of the foredune grassland areas once every three years. The areas to mow are where Scots broom, or other woody species grow, including shore pine. Leave the foredune alone for two years; then mow again. There is no need to mow areas that have only wildflowers and grasses.
2. Mow one third of this foredune grassland area every year, leaving two thirds alone each year. As with #1, mow only those areas with woody species.

Both approaches allow perennial wildflowers to grow and flower in the grassland, and give resident birds and animals refuge areas in two out of three years during spring and summer. The areas to mow are those with numerous tree seedlings, blackberry thickets and Scots broom patches. There may be other areas (including those with Canada and bull thistle) that should also be mown regularly to make other control methods more effective. Work with Clatsop Soil and Water Conservation District on optimal control methods for these species, patch by patch.

Noxious and Problematic Plants

Several state-listed noxious species, and problematic plant species are already present in the foredune area. Noxious woody species include Japanese knotweed, Scots broom and others. Herbaceous species include tansy ragwort, Canada thistle, bull thistle, and

blackberries. Most species are best mown or cut down in winter, and treated with herbicides in summer. Work with Clatsop Soil and Water Conservation District on optimal control methods for this site.

Knotweeds are capable of completely excluding native species, including trees, and form dense thickets that spread outward in all directions each year. Gearhart should work with the conservation district to remove this species from the foredune, and monitor this area to keep it from returning.

Scots broom grows in dense thickets, shading out most plants. A typical broom thicket has mosses and a few grasses growing on the ground. It is a fire hazard. Broom seeds live fifty to seventy years, so keeping this woody shrub down is a long-term project. Seeds are explosively thrown from pods in mid to late summer, carried off and cached by mice and voles in underground stores, and also in buildings. Minimizing disturbance to the upper soil layer helps reduce seed germination once the mature shrubs are gone.

Tansy ragwort (*Jacobaea vulgaris*) is toxic to livestock and wild grazing species, including deer and elk. There are insect biological controls being used in Oregon, but these are not always effective along the immediate coast. In the foredune area, the most effective control method is to pull plants when in flower and before seed set, and dispose of them in municipal waste. They should not be composted. Drying stalks with ripening ovaries can still mature seeds. Like other daisies, ragwort seeds have plumes that loft in the air to disperse them.

Canada thistle (*Cirsium arvense*) and bull thistle (*Cirsium vulgare*) are stout perennial thistles that grow in dense thickets, and like ragwort, have plumed seeds spread through the air. Native species that grow in the dunes are edible or Indian thistle (*Cirsium edule*) and short-styled thistle (*Cirsium brevistylum*). The latter two species grow as single stems or very small clumps, and are not management problems, and all species are easily identified when flowering. The native thistles should be left to live in the dunes. Canada thistle and bull thistle will become more and more dominant if not removed. Work with the local conservation district to find effective control methods for these species.

Atlantic ivy (*Hedera hibernica*), the larger-leaved cousin to English ivy (*Hedera helix*), is a pest of woodlands adjacent to urban areas. Ivy vines circle tree trunks, slowly killing trees through girdling. Mature vines occupy the upper tree canopy, shading the tree's leaves, and flowering. Fruits are edible to birds, which spread seeds widely. Forest Park, Portland, has a No Ivy League that has been clearing canopies and digging out roots for many years. Ivy is salt tolerant, and grows on seacliffs, shrubs and trees along the dunes in many places on the Pacific Northwest coast. I did not see ivy during visits to the Gearhart foredunes, but it is important to keep watch for it, and remove it when it appears.

Introduced blackberries in the dunes include Himalayan blackberry (*Rubus armeniacus*) and cut-leaf blackberry (*Rubus laciniatus*). Both grow in dense thickets of arching vines, heavily armed with spines, and produce edible berries that birds, deer, coyotes and other

animals eat. Seeds live a few years in the soil, so these species may reappear years after parent plants were removed. Mowing followed by herbicides on sprouting crowns is an effective control method. Past years' woody vines may take several years to decompose, so thickets can be important fire fuel locations. Many small animals use thickets for cover, and elk and deer browse the young leaves. Birds use the thickets in winter for shelter. Himalayan blackberry is a listed noxious species.

Problematic Species (not yet listed as noxious by the state):

1. Cotoneasters (*Cotoneaster* sp.) are a large genus of ornamental woody shrubs with small showy flowers and edible fruits. Birds eat the fruits and spread the seeds. Several species have naturalized in this area, and some look very like evergreen huckleberry when not in flower. They can grow into dense thickets, and like Scots broom, will exclude other plant species. No cotoneasters have achieved noxious weed status in Oregon yet, though several species are approaching a formal listing. Hand pulling small plants, and use of herbicides on stumps and larger plants is effective. Seeds may live a few years in the soil, so complete removal may take some time. There are several patches of cotoneaster in the foredunes.

2. English holly (*Ilex aquilifolium*) is an evergreen tree with fruits that birds eat and disperse. The leaves have sharp spines; leaves on young plants have more spines than on older plants. Holly stumps re-sprout when cut down, so herbicides or stump pulling are used to remove them. There are several holly trees in the foredunes.

3. Cherry Laurel (*Prunus lauroceras*) is an evergreen tree with fruits that birds eat and disperse. Deer and elk browse the leaves. Trees grow forty feet wide and high. This species is a popular hedge material due to its fast growth, but because it has edible fruits, it spreads easily into open areas, where it quickly forms dense clumps. I removed a seedling during my site visit in August 2016.

It is likely that other problematic species are now living in the foredune area, and should be included in long-term management of this area.

Improving Native Species Diversity

Removal of listed noxious plant species and regular mowing to reduce woody introduced shrubs will maintain the foredune as grassland. To promote other native prairie species, consider spreading seeds of flowering species already present in the foredune area, including yarrow (*Achillea millefolium*), pearly everlasting (*Anaphalis margaritacea*), and seaside tansy (*Tanacetum camphoratum*). See Appendix Three for a list of native species to consider for dune prairie planting.

The restoration of a low open highly diverse prairie community is a time consuming undertaking. First, the beachgrasses and other patch-forming introduced grasses will need to be removed. At this time, the recommendation is to control the woody species, and

promote tall, vigorous wildflowers that can compete with European beachgrass, mentioned above.

Timing of Control Methods to Protect Wildlife

Wildlife, including insects, mammals and birds that live in the foredune area, reproduce each spring and raise young during the summer. This means that control activities should take place outside this period, in fall and winter.

Equipment and Vectoring in of new Plant Species

See pamphlet from NOAA on cleaning vehicles.

Appendix One: Common Plant Species of the Gearhart Foredune

List compiled from site visit, August 2016; this is not a complete species list for the foredune area.

Introduced species (*)

Grasses, rushes, sedges

Aira caryophyllea, silky hair grass (*)
Aira praecox, common hair grass (*)
Ammophila arenaria, European beachgrass (*)
Ammophila breviligulata, American beachgrass (*)
Anthoxanthum odoratum, sweet vernal grass (*)
Carex brevicaulis, short-stemmed sedge
Carex macrocephala, big-headed sedge
Carex obnupta, slough sedge
Carex pansa, sand-dune sedge
Dactylis glomerata, orchard grass (*)
Festuca rubra, red fescue
Holcus mollis, creeping velvet grass (*)
Juncus balticus, Baltic rush
Juncus falcatus, sickle-leaf rush
Juncus bufonius, toad rush
Juncus leseuerii, salt rush
Leymus mollis, American dune grass

Woody Plants (trees and shrubs)

Alnus rubra, red alder
Arctostaphylos uva-ursi, kinnikinnick
Crataegus monogyna, European hawthorn (*)
Cytisus scoparius, Scots broom (*)
Fallopia japonica, Japanese knotweed (*)
Hedera helix, English ivy (*)
Hedera hibernica, Atlantic ivy (*)
Ilex aquifolium, English holly (*)
Lonicera involucrata, black twinberry
Malus fusca, Pacific crabapple
Malus x domestica, apple (*)
Myrica californica, Pacific wax myrtle
Picea sitchensis, Sitka spruce
Prunus lauroceras, cherry laurel (*)
Pinus contorta var. *contorta*, shore pine
Rubus armeniacus, Himalayan blackberry (*)
Rubus laciniatus, cut-leaf blackberry (*)
Rubus spectabilis, salmonberry
Rubus ursinus, Pacific blackberry
Sambucus racemosa, red elderberry

Thuja plicata, western red cedar
Vaccinium ovatum, evergreen huckleberry

Perennials (herbaceous, including wildflowers)

Abronia latifolia, yellow sand-verbena
Achillea millefolium, yarrow
Anaphalis margaritacea, pearly everlasting
Armeria maritima, sea thrift
Cardionema ramosissima, sand bur
Fragaria chiloensis, beach strawberry
Hypochaeris radicata, hairy cat's-ear (*)
Lathyrus japonicus, beach pea
Lupinus littoralis, beach lupine
Maianthemum dilatatum, Pacific lily of the valley [woodland-forest species]
Polygonum paronychia, black knotweed
Solidago canadensis, Canada goldenrod
Solidago simplex var. spathulata, coast goldenrod
Sonchus species, sow-thistle (*)
Spiranthes romanzoffiana, ladies twisted stalk
Symphyroicarpos subspicatus, Douglas aster
Tanacetum camphoratum, dune tansy
Vicia gigantea, giant vetch

Appendix Two: Noxious and Nuisance plants of the Gearhart Foredune

Contact Clatsop Soil and Water District about control methods; some may require herbicides in addition to or instead of mowing. This is a preliminary list. Other noxious plant species may be present in the foredune area.

Noxious Plants

Cirsium arvense, Canada thistle

Cirsium vulgare, bull thistle

Cytisus scoparius, Scots broom

Fallopia japonica, Japanese knotweed

Hedera hibernica, Atlantic ivy

Jacobaea vulgare, tansy ragwort [formerly *Senecio jacobaea*]

Rubus armeniacus, Himalayan blackberry

Rubus laciniatus, cut-leaf blackberry is not listed as a noxious weed, but has the same behavior as *R. armeniacus*

Nuisance Plants

Cotoneaster species

Ilex aquifolium, English holly

Prunus lauroceras, cherry laurel

Appendix Three: Perennials native to coastal dune prairie, Gearhart and Clatsop Plains

Use this list as a reference for planting to increase diversity of herbaceous species.

✓ indicates species is present in Gearhart foredune area.

Grasses, rushes and sedges

Agrostis exarata, spike bentgrass
Agrostis scabra, rough bentgrass
Calamagrostis nutkensis, Pacific reedgrass
Carex brevicaulis, short-stemmed sedge ✓
Carex pansa, sand-dune sedge ✓
Danthonia californica, California oatgrass
Festuca rubra, red fescue ✓
Leymus mollis, American dunegrass ✓
Poa confinis, dune bluegrass
Poa macrantha, seashore bluegrass

Perennials

Achillea millefolium, yarrow ✓
Allium cernuum, nodding onion
Anaphalis margaritacea, pearly everlasting ✓
Angelica hendersonii, sea-coast angelica
Agoseris apargioides, seaside agoseris
Armeria maritima, sea thrift
Artemisia campestris, silky field wormwood
Artemisia suksdorfii, coast wormwood
Aster chilensis, California aster
Cardionema ramosissima, sand-bur ✓
Castilleja affinis,
Cerastium arvense, field chickweed
Cirsium brevistylum, short-styled thistle
Cirsium edule, edible thistle
Erigeron glaucus, beach fleabane, or beach daisy
Fragaria chiloensis, beach strawberry ✓
Fritillaria affinis, chocolate lily
Lathyrus japonica, beach pea ✓
Lotus formosissimus, seaside birds-foot trefoil
Piperia elegans, coast piperia
Polygonum paronychia, black knotweed ✓
Ranunculus occidentalis, western buttercup
Solidago canadensis, Canada goldenrod ✓
Solidago simplex var. spathulata, coast goldenrod ✓
Spiranthes romanzoffiana, hooded lady's-tresses ✓
Tanacetum camphoratum, dune tansy ✓
Trifolium wormskjoldii, coast or springbank clover
Triteleia coronaria, harvest brodiaea
Triteleia hyacinthina, white brodiaea
Vicia americana, American vetch
Vicia gigantea, giant vetch ✓