BASELINE BEE DATA FOR ALDER CREEK AND POTENTIAL PLANTS FOR POLLINATOR GARDEN

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Abstract

- Bee populations, which make possible an immense portion of the human diet, are declining.
- Bees and associated flora were identified at 8 sites along Alder Creek for baseline data on bees of the Chehalis River ecosystem.
- Local bee and gardening experts were interviewed to formulate a list of proposed plants for a pollinator garden.
- "Abundant" bee populations were only encountered at half the sites.
- A list of 16 plants was compiled. Future work will involve narrowing down said list and creating a pollinator garden at the GHC Fish Lab. The effects of the pollinator garden should be evaluated via continued monitoring of bees along Alder Creek.
- Research should be done on the possibility of honey bees developing natural immunity to varroa mites.

FIG 1 FIG 2 FIG 3

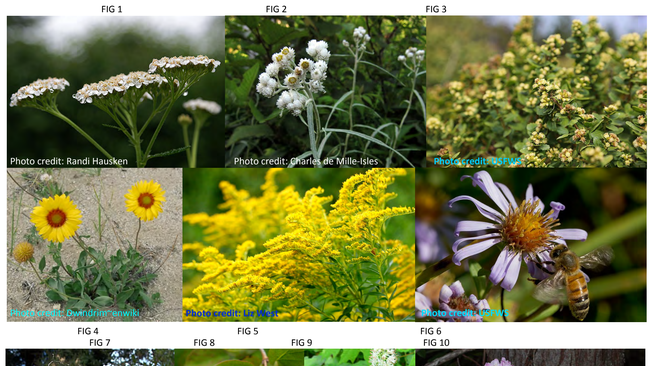

FIG 4 FIG 5 FIG 6
FIG 7 FIG 8 FIG 9 FIG 10

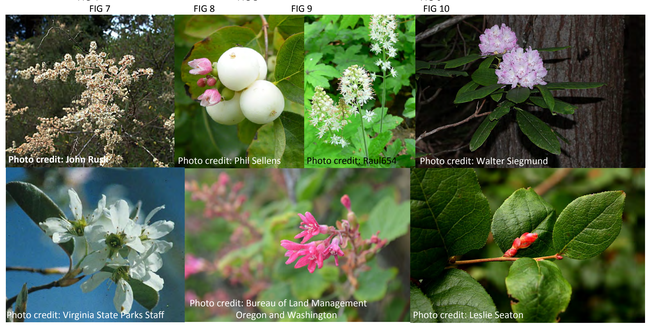

FIG 11 FIG 12 FIG 13

Introduction

Populations of both bees native to the Pacific Northwest and honey bees- are non-native, but introduced in the 1800's- are declining [2]. Considering that one third of food eaten by humans requires pollination before reaching our tables [2], the struggle of the bees is also the struggle of the humans. While bees face a plethora of threats [2], creating a pollinator garden to supply them with food is one way in which to aid them [6,7].

There is a deficit of research on the bees of riparian zones, especially in Washington State ecosystems, including that of the Chehalis River. This project will document the knowledge of bee experts in Grays Harbor, providing more easily accessible information on bees in the ecosystem. It will better the understanding of interactions between bees and nature and give information on how to cultivate pollinator gardens to draw bees to the Chehalis River ecosystem. Information becoming more available could lead to further, more specific research concerning the bees of the Chehalis River riparian zone ecosystems.

This project will consist of documenting the types and concentrations of bees present along Alder Creek, which is connected to the Chehalis River. The information gained will serve as baseline data in the monitoring of the affects of any restoration efforts that follow this project. Then, interviews will be conducted with bee and gardening experts local to Grays Harbor and the Chehalis ecosystem. The findings could give guidance as to how future restoration efforts should attend to the ecosystem's fauna. The information gathered may also be useful in adding a pollinator garden to the Grays Harbor College Fish Lab. To monitor the effects of the pollinator garden in the future, the documentation of types and concentrations of bees should be repeated annually.

Through the observation of bees along the Chehalis and interviewing expert beekeepers and gardeners from Grays Harbor- with special attention paid to information regarding bees' interactions with plants- information will be gained regarding the bees of the Chehalis River and how best to create a pollinator garden.

Methods

The oral history was compiled based on interviews with local bee and gardening experts. Janet Parker (GHC Groundskeeper), Jim Cowan (local beekeeper), Molly Marks (local outdoor enthusiast), Linda Brown (local gardener), and Dylan Weber (local bee expert) were consulted to develop methods and a list of plants for the pollinator garden. A literature review was then conducted to verify the information gained in the interviews when necessary.

Bees were observed at 8 sites along Alder Creek. At each site, it was noted which species of bees were present, along with the plant species present. The iNaturalist platform was used to identify organisms to the best of the researchers' abilities. Then, the prominence of each species was denoted as one of the following: few (1-3 organisms), many (4-10 organisms), or abundant (more than 10 organisms).

A list of possible plants to be used in the pollinator garden was compiled based on documents published by Oregon State University and those composed by expert gardeners. With the goal of minimizing the possibility of introducing an invasive species to the ecosystem, precedence was given to native plants, as well as those exotic plants which are already known to not be invasive. Janet Parker was then consulted to narrow down the list based on ease of cultivation, safety, and any other factors that she deemed relevant to yield a final list of plants that would be easily grown in the pollinator garden and have minimal negative effects upon involved humans and the environment.

Results

The following bee species are known to inhabit the Pacific Northwest: Honey bees, yellow bumblebees, yellow-faced bumblebees, tricolored bumblebees, long-horned bees, sand/mining bees, digger bees, mason bees, leaf-cutter bees, sweat bees, masked bees, sand/mining bees, cuckoo sweat bee, small carpenter bee [1,2].

The following bee species were identified along Adler Creek: Mason bees (fig 17), Honey bees (fig 18), Black-tail bumblebees (fig 19), Yellow-faced bumblebees (fig 20), and other bumblebees.

The following bee species were observed along Alder Creek in quantities denoted as "few": Mason bees (sites 4 and 6), Honey bees (sites 3, 4, 5, 6, 7, and 8), black-tail bumblebees (sites 3, 5, and 6), yellow-faced bumblebee (sites 3, 6, 7, and 8), and other bumblebees (Site 6).

The following bee species were observed along Alder Creek in quantities denoted as "many": Mason bees (site 7), honey bees (site 2), black-tail bumblebees (sites 1, 2, 4, and 8), yellow-faced bumblebees (sites 1, 2, and 4), other bumblebees (sites 1, 2, 3, 4, 5, 7, and 8).

The following bee species were observed along Alder Creek in quantities denoted as "abundant": Mason bees (site 8), honey bees (site 1), black-tail bumblebees (site 7), yellow-faced bumblebees (site 5).

TABLE 1

Genus Species	Site 1	2	3	4	5	6	7	8
Mason Bees								
Honey Bee								
Other Bumble Bees								
Black-Tailed Bumblebees								
Yellow-faced bumblebees								

KEY
Few 1-2
Many 3-10
Abundant >10

The following plants were identified near site 1, which had a honey bee population denoted as "abundant": Coastal Hedge-nettle, Stink Currant, Nipplewort (abundant), Western Hemlock, European holly, Pacific Crab Apple, Western Redcedar, Plume Thistles, New Zealand Flax (captive), Western Lily of the Valley (abundant), Red Elderberry, Red Huckleberry, Redwood-sorrel (abundant), White Clover, Western Skunk Cabbage, Neckera Douglas, Common Feather-moss, red Alder (few), Common Selfheal (few), Fragrant bedstraw (abundant), Western Sword Fern (abundant), Creeping Buttercup, Arctic Sweet Coltsfoot (Many), Mountain Sweet Cicely (abundant), Sitka Spruce, Devil's Club, Vine Maple, May Lily, Common Cat's Ear, Alsike Clover, Lady Fern, Ox-eye Daisy.

The following plants were identified near site 5, which had a yellow-faced bumblebee population denoted as "abundant": Red Alder, Fringed Willowherb, Grasses, Rose Spiraea.

The following plants were identified at site 7, which had a black-tail bumblebee population denoted as "abundant": English Ivy, White Alder, Canarygrasses, Unbranched Bur-reed, Water Parsley, Northern Water Plantain, Common Duckweed, Narrow-leaved Cattail, Himalayan Blackberry.

The following plants were identified near site 8, which had a mason bee population denoted as "abundant": lady Fern, Pines, Tule, Roses, Rusty Menziesia.

The following late-blooming, native plants were identified as candidates for the pollinator garden: Yarrow (fig 1), pearly everlasting (fig 2), coyotebush (fig 3), blanketflower (fig 4), goldenrod (fig 5), douglas aster (fig 6) [6].

The following native plants- blooming at various times of year- were identified as candidates for the pollinator garden: oceanspray (fig 7) [5,7], snowberry (fig 8), foam flower (fig 9) [7], pacific/coast rhododendron (fig 10), serviceberry (fig 11), red-flowering currant (fig 12), Salal (fig 13) [5].

The following exotic ornamental plants were identified as candidates for the pollinator garden: Lavender (fig 14), Russian Sage (fig 15), sunflower (fig 16) [5].

FIG 14 FIG 15 FIG 16

Discussion

Only a fraction of the bees native to the Pacific Northwest were identified along Alder Creek, and were only deemed "abundant" at half the sites. It will be interesting to see what changes, if any, occur in population diversity and size following the implementation of a pollinator garden.

There were very few plants that were found at more than one of the four sites with "abundant" bee populations, and none that appeared at more than two of those four sites. Lady fern was identified at sites 1 and 8. Red alder was identified at sites 1 and 5. Because lady ferns and red alders were only found at two of the four sites each, it is difficult to say whether their presence was significant or coincidental. Further research into the topic could be useful.

In the interview with Jim Cowan, the local beekeeper expressed concern about bees finding enough food in late summer and fall to survive the winter [3]. He noted that Japanese Knotweed (a highly invasive species [9]) had been responsible for his bees surviving many winters because it blooms so late [3]. He added that when Knotweed leaves fall into water, it can lead to that water becoming more acidic [3], which would have a negative impact on stream health. Finding a different plant that could sustain bees through the winter, therefore, could have a positive impact on the health of the Chehalis river because it could quell opposition to the removal of Japanese Knotweed. Thus, the pollinator garden portion of this project to shifted towards identifying late-blooming native plants.

Janet Parker agreed to work with the project concerning final plant selection in the near future, and provided the project with a list of plants from a seed packet directed at pollinators which she obtained through Washington State University. The list is as follows: Lance-leaved coreopsis, Purple coneflower, Sunflower, Perennial lupine, Annual lupine, Blanket flower, Crimson clover, Partridge pea, Mexican hat, Cosmos Sensation mix, Lacy phacelia, Plains coreopsis, Butterfly milkweed, Blue sage, Poached egg meadow-foam, Rocky Mountain penstemon, Lemon mint, Bee balm [4]. As this project moves forward, it is vital that those plants be considered for the pollinator garden. Information regarding whether each plant is native or exotic, as well as which pollinators each attracts will be crucial.

Dylan Weber expressed concern about varroa mites which attack bees, stating that the honey bees that are currently found in the Pacific Northwest are not immune to the mites [8]. Mason bees, however, are native to the Pacific Northwest and are naturally resistant to the varroa mite [8]. Cowan corroborated this information and suggested that our honey bees may one day develop an immunity to these varroa mites [3]. It would be interesting to track local honey bee populations to determine whether they are developing any resistance.

FIG 17 FIG 18 FIG 19 FIG 20

References

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10. L. Brown, personal communication.

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