



Bees on the Brink

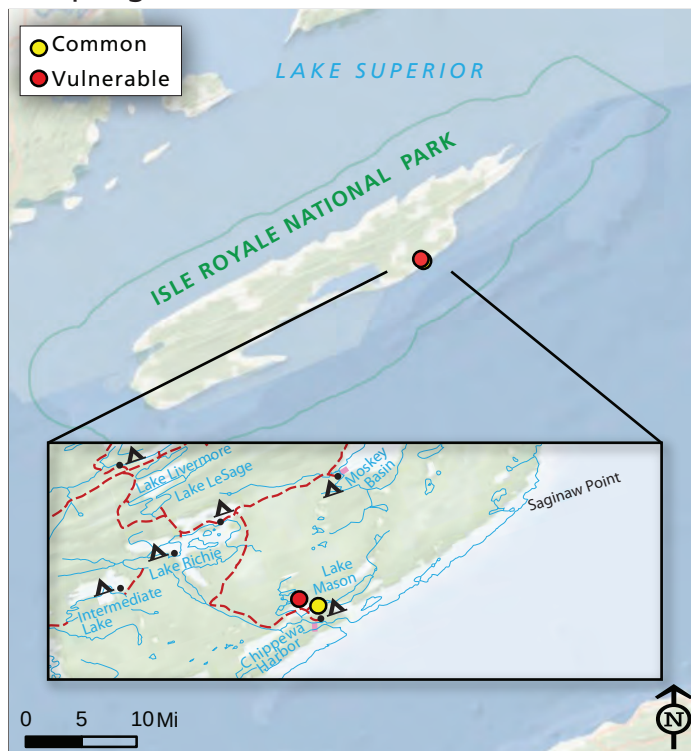
Research at Isle Royale National Park

Importance:

Pollinators at risk in a changing climate

Bees provide a critical ecosystem service, pollination, yet we know little about their abundance, diversity, and distribution across National Park Service (NPS) lands. We know even less about the possible effects of climate change on bee populations. Isle Royale National Park is one of 48 NPS units that are surveying the distribution of bee species in vulnerable habitats (coastal dunes, inland dunes, and alpine areas). The bee species within the targeted habitats are compared to bee species found in nearby, more common habitats. Although Isle Royale does not have any of the target habitats, there may be rare and/or endemic bee species associated with other sensitive habitats in the park which might also be vulnerable to processes such as species loss, population decline, and disruption of pollination networks in response to climate change. These sensitive areas can then be targeted for future monitoring, and where appropriate, for active management.

Sampling Location



A small carpenter bee (*Ceratina sp.*). Two similar-looking species, *C. calcarata* and *C. mikmaqi*, were found in the park.
Photo: © 2010 Tom Murray



Collecting bees: Pouring the contents from one of the 30 blue, yellow, and white “bee bowls” through a strainer, and then into a plastic bag for storage and shipping.

Methods

The vulnerable and common sites were located approximately 0.4 km apart, near Chippewa Harbor and Lake Mason. The vulnerable site was an interior boggy opening and the common site was an open area near the lakeshore. A transect of 30 small painted bowls spaced 5 m apart were laid out at each site. Bowls were filled with soapy water and left open for 24 hours on sunny days, collecting bees which are attracted to the color. Two samples were taken in August and September, 2010, and three more were taken between May and July, 2011, timed to coincide with peak bee activity. After each run, bees were collected (see photo above) and sent to a central processing facility at Patuxent Wildlife Research Center (USGS Maryland) for identification.



Vulnerable Site
an interior boggy
opening



Meadow Site
an open area near the
lakeshore near Chippewa
Harbor and Lake Mason

Results

A total of 163 bees were collected in 2010 and 2011. More than twice as many bees were caught in the common meadow site as in the vulnerable site (114 vs. 49 individuals). This difference was mainly due to the August 2010 sample, in which the common site had five times as many bees (93 vs. 18 bees in the vulnerable site). In addition to trapping more individuals, the common site also yielded more species (27) than the vulnerable site (22); 14 species were shared between the two sites (see bar graph below).

Overall, relatively few bees were collected at Isle Royale, and by late September, the sites yielded just two individuals. Catches were low compared to the other parks in the Great Lakes (Apostle Islands NL, Sleeping Bear Dunes NL, Indiana Dunes NL, and Pictured Rocks NL). These more northern sites on Isle Royale may represent a generally cold and unproductive system that supports fewer bees.

Low capture rates made it difficult to discern patterns, and overall there was little to differentiate the bee communities between the vulnerable and common sites. The sites both had species known to belong to a more northern Canadian fauna, such as: *Andrena nigrihirta*, *Lasioglossum sagax* (only recently described), *Osmia felti* (an uncommon species), and *Osmia tersula*. *Osmia michiganensis*, a species associated with sand dunes in the Great Lakes region, showed up in the common site. The bumble bee, *Bombus sandersoni*, is not commonly identified, but is expected in heavily wooded boreal areas.



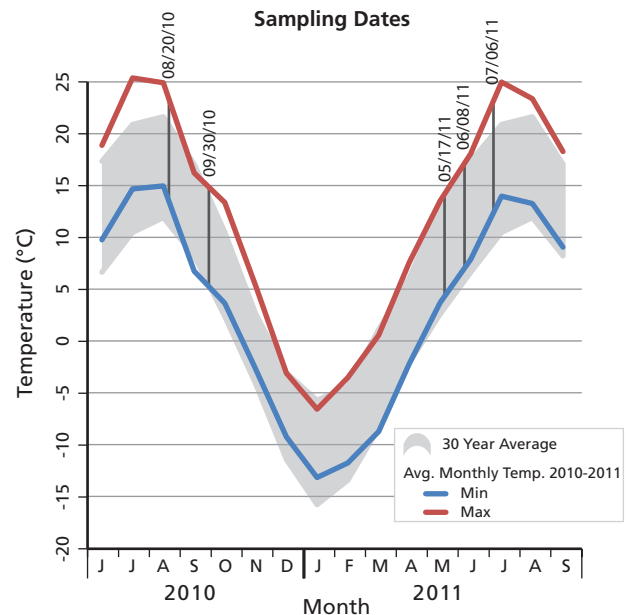
The bumble bee, *Bombus sandersoni*, is often found in northern and montane boreal forests of eastern North America. Photo: © Graham Snodgrass



The mining bee, *Andrena nigrihirta*. This species has a transcontinental distribution; east of the Rockies it is commonly found in the northern states and Canada. Photo: © USGS Native Bee Lab



The long antennae and yellow legs are diagnostic for a male of the species *Halictus confusus*, a sweat bee. This was the second most commonly-collected species overall in the survey, with 20 found at the common site and only one at the vulnerable site. Photo: © 2010 Tom Murray



Average monthly min/max temperatures compared to the 30-year average temperatures for the five 2010/2011 bee

Data source: PRISM Climate Group, Oregon State University, <http://prism.oregonstate.edu>, created January 2011.

The small black sweat bee, *Dufourea maura*, is primarily known as a western species, but was collected previously on Isle Royale in the 1980's, which was its easternmost occurrence. It is known to be associated with harebell, *Campanula rotundifolia*, a relatively common and widespread plant on Isle Royale in sandy or rocky areas. In the present survey, 15 of 17 individuals of *D. maura* were found at the vulnerable site.

There are likely more species of interest among the Isle Royale samples. Many species of *Lasioglossum* remain unidentified, and there is uncertainty regarding the taxonomy of their nest parasites, *Sphecodes*.

Comparison of bee species richness within genera in vegetated dune and meadow sites in Isle Royale National Park

