



Bees on the Brink

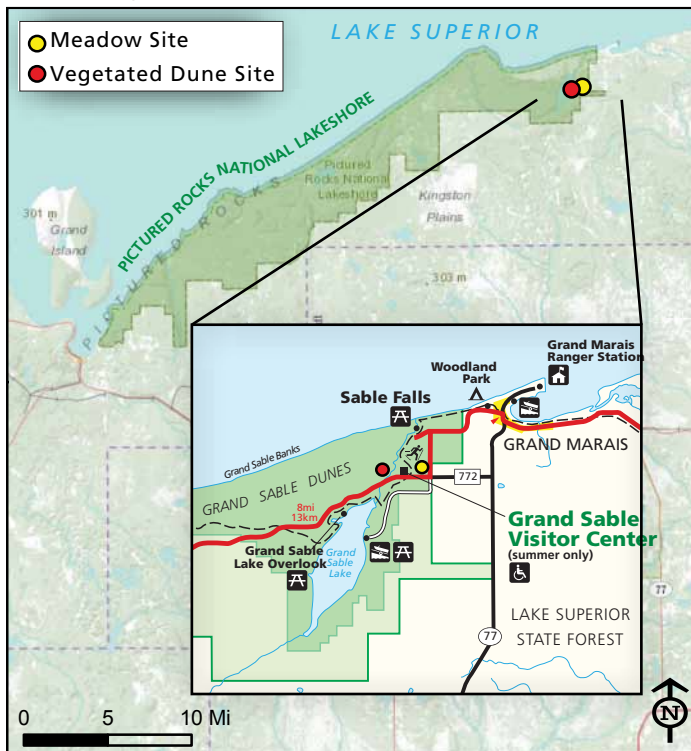
Research at Pictured Rocks National Lakeshore

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. Coastal areas are particularly vulnerable to effects from climate change, and sand dunes are often hot spots for rare and/or endemic bee and plant species. Pictured Rocks National Lakeshore 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. Comparing these different habitats within each park will reveal if there are rare and/or endemic bee species associated with sensitive areas which might be vulnerable to processes such as species loss, population decline, and disruption of pollination networks in response to climate change. These areas can then be targeted for future monitoring, and where appropriate, for active management.

Sampling Location



Augochlorella aurata, a common green metallic sweat bee, found in the park.
Photo: © 2006-2010 John Ascher



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 site was located on a vegetated dune at the eastern end of the Grand Sable Dunes. The paired common site was approximately one kilometer to the east in an old field near the road. 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 were attracted to the color. Six samples were taken between May and September, 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.



Dune Site
at the eastern end of the Grand Sable Dunes.



Meadow Site
approximately one km to the east of the vegetated dune site in an old field.

Results

A total of 584 bees were collected in 2011. More than six times as many bees were captured at the vulnerable dune site as at the common meadow site (510 vs. 74 individuals). The dune site also yielded many more species than the meadow site (31 vs. 21 species). Just two species unique to the dune site (*Lasioglossum pilosum* and *Perdita swenki*) dominated the dune fauna, representing well over half (291) of the captured individuals! Ten species were found at both sites (see bar graph below).

The dune site had a very strong “sand signal” in its species composition. Sand-associated species which were found either solely or in far greater abundance at the dune site included: *Agapostemon splendens*, *Lasioglossum pilosum*, *Lasioglossum sheffieldi*, *Osmia kenoyeri*, and *Perdita swenki*. The first two of these species are found in a variety of sandy areas, but the remainder are uncommonly collected species and more restricted to large, deep sandy areas.

Lasioglossum sheffieldi is a recently described dune specialist. It is known primarily from dunes in the maritime provinces of Canada, but there are also single records from dunes on Lake Michigan and in Manitoba. The presence of *L. sheffieldi* in the dunes at Pictured Rocks NL represents a new state record.



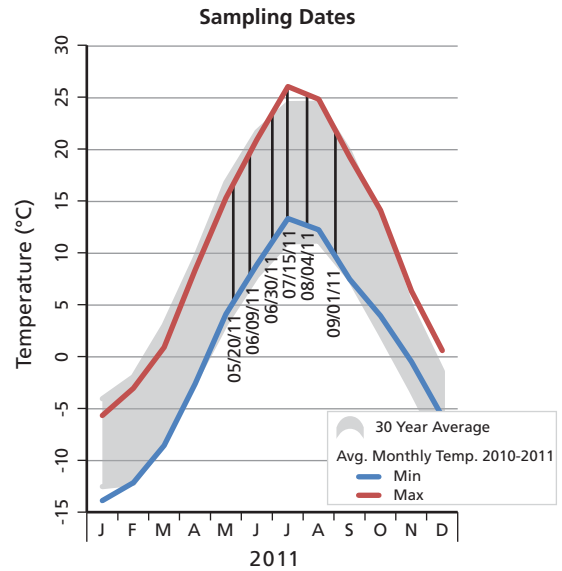
Lasioglossum pilosum, another sand-associated species, and the second-most commonly collected bee in this study. It was found only at the dune site. Photo: © 2010 Tom Murray



A male sweat bee, *Agapostemon splendens*. This sand specialist was found only at the dune site. Photo: © 2006-2010 John Ascher



The tiny miner bee, *Perdita swenki*, measures just 6 mm in length. This species is rarely collected, but where it occurs, it can have very high population densities. It was by far the most abundant species in the study, with 181 bees captured in August and September at the dune site. Photo: © 2006-2010 John Ascher



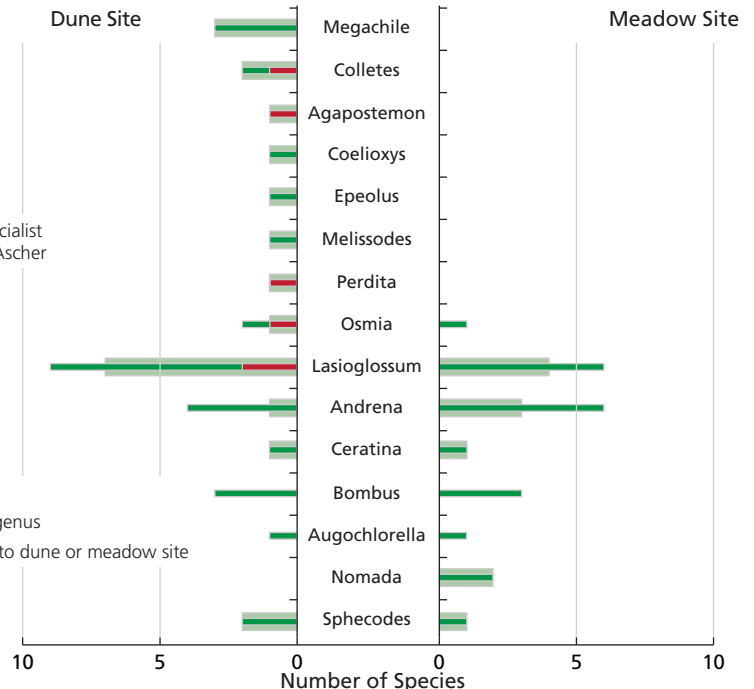
Average monthly min/max temperatures compared to the 30-year average temperatures for the six 2011 bee

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

The mason bee, *Osmia kenoyeri* has been collected on the active dunes at Pictured Rocks NL previously. It is known to nest in the rootlet systems of bunch grasses, and uses *Fragaria* (strawberry) leaves to build brood cells. The species is distributed across northern North America (Yukon to Maine) and while it is associated with deep sandy areas, these need not be dunes.

The tiny miner bee, *Perdita swenki*, is uncommonly collected. It has been found in deep sand areas on Long Island, as well as in the Great Lakes and Great Plains regions. Where it occurs, *P. swenki* can be at high population densities, as we see here at Pictured Rocks NL.

Comparison of bee species richness within genera in dune and meadow sites in Pictured Rocks National Lakeshore



■ # sand specialists
■ # species within genus
■ # species unique to dune or meadow site

Bee Species List

National Park Service
U.S. Department of the Interior

Pictured Rocks National Lakeshore



Bee Species found at Pictured Rocks National Lakeshore

Pictured Rocks National Lakeshore is one of 48 national park units surveying the distribution of bee species in vulnerable habitats such as coastal dunes, inland dunes, and alpine areas. At Pictured Rocks National Lakeshore, a total of 584 bees were collected between the months of May and September in 2011 at two different sites. Below is a list of the species found during the project and identified by the Patuxent Wildlife Research Center (USGS Maryland). For more information and related documents please visit <https://irma.nps.gov/App/Reference/Profile/2221029>

<i>Agapostemon splendens</i>	<i>Lasioglossum near admirandum*</i>
<i>Andrena barbilabris</i>	<i>Lasioglossum perpunctatum</i>
<i>Andrena carlini</i>	<i>Lasioglossum pilosum</i>
<i>Andrena erigeniae</i>	<i>Lasioglossum sheffieldi</i>
<i>Andrena erythronii</i>	<i>Lasioglossum species*</i>
<i>Andrena nivalis</i>	<i>Lasioglossum versans</i>
<i>Andrena sigmundi</i>	<i>Lasioglossum versatum</i>
<i>Andrena wilkella</i>	<i>Megachile latimanus</i>
<i>Augochlorella aurata</i>	<i>Megachile melanophaea</i>
<i>Bombus borealis</i>	<i>Megachile mendica</i>
<i>Bombus ternarius</i>	<i>Melissodes wheeleri</i>
<i>Bombus vagans</i>	<i>Nomada bidentate</i>
<i>Ceratina calcarata</i>	<i>Nomada maculata</i>
<i>Ceratina dupla/mikmaqi*</i>	<i>Osmia kenoyeri</i>
<i>Coelioxys rufitarsis</i>	<i>Osmia simillima</i>
<i>Colletes americanus</i>	<i>Perdita swenki</i>
<i>Colletes inaequalis</i>	<i>Sphecodes autumnalis</i>
<i>Epeolus scutellaris</i>	<i>Sphecodes davisii</i>
<i>Lasioglossum acuminatum</i>	<i>Sphecodes ranunculi</i>
<i>Lasioglossum admirandum</i>	
<i>Lasioglossum coriaceum</i>	
<i>Lasioglossum cressonii</i>	
<i>Lasioglossum leucomomum</i>	
<i>Lasioglossum leucozonium</i>	

*Species level identification in progress.