Migrating Songbirds on Block Island
Key findings from ongoing research into stopover ecology

The Nature Conservancy has named Block Island one of the “Last Great Places” in the Western Hemisphere. A diversity of habitats here supports a diversity of wildlife, including a vast array of songbirds. With the passing of autumn cold fronts, Block Island receives hundreds of thousands of birds as they migrate along the New England coastline—creating a living laboratory for biologists.

Years of research have revealed how songbirds use Block Island. And, more generally, this work has shown how migrating songbirds choose the foods so important to their flights, how they decide when they are prepared to continue their journeys, and how they move through the regional landscape. This document summarizes major findings to date from the McWilliams lab at the University of Rhode Island.

A sweet suite of options—Block Island offers a rich berry menu for migrating songbirds

Researchers on Block Island first documented that many insect-eating and seed-eating birds shift to feasting on fruits during fall migration. Such “diet-switching” has since been widely observed and understood as a strategy to use nutritious, and seasonally abundant, fruits to prepare for migration. Further research on Block Island has shown that fruits help birds fatten for their flights, and that the type of fruits that birds select matters, for important nutritional reasons.

Building fat stores of good quality is necessary for animals that must burn large amounts of high-energy fuel to complete their migrations (McWilliams et al. 2004. Journal of Avian Biology 35:377-393). Studies show that the fruit-rich habitats of Block Island produce birds with higher fattening signatures in their blood than similar, but fruit-poor, habitats on the mainland (Smith & McWilliams. 2010. Auk 127:108-118).

Fruit consumption monitoring on Block Island indicates which fruits wild birds decide to eat; chemical analyses of those fruits even suggest how birds are making those dietary decisions. Arrowwood Viburnum fruits are highly prized on Block Island, presumably due to their unique combination of abundant, high-quality fats and many antioxidants, compounds that protect birds’ cells from damage during endurance exercise like migratory flights (Pierce & McWilliams. 2014. Integrative & Comparative Biology 54:903-912).

Native fruits commonly eaten by migratory songbirds on Block Island, ranked by consumption rate:

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Nutrient Content¹</th>
<th>Antioxidant Content²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrowwood Viburnum</td>
<td><strong>Viburnum dentatum</strong></td>
<td>High High</td>
<td>High High</td>
</tr>
<tr>
<td>Virginia Creeper</td>
<td><em>Parthenocissus quinquefolia</em></td>
<td>Med High</td>
<td>Med</td>
</tr>
<tr>
<td>Winterberry</td>
<td><em>Ilex verticillata</em></td>
<td>Low High</td>
<td>Low</td>
</tr>
<tr>
<td>Northern Bayberry</td>
<td><em>Myrica pensylvanica</em></td>
<td>High High</td>
<td>Med</td>
</tr>
<tr>
<td>Black Chokeberry</td>
<td><em>Aronia melanocarpa</em></td>
<td>Low High</td>
<td>Low</td>
</tr>
</tbody>
</table>

¹Nutrient Content for fat and carbohydrate is “High” if > 40% dry wt, “Med” if bw 20-30%, and “Low” if < 5%. ²Anthocyanin content is “High” if ca. 7% W/W by the pH-differential method, “Med” if ca. 2%, and “Low” if < 1%; vitamin E (alpha-tocopherol) content is “High” if > 100 µg/g dry wt and “Low” if < 100 µg/g.

Protein content is adequate for all species (Langlois & McWilliams. 2010. Auk 127:850-862).
Get ready, get fat, go! Body composition & migratory songbirds’ stopover decisions

Besides investigating what birds choose to eat on stopover, understanding migration physiology also requires studying the condition of migrating birds, and how their energy stores affect their behavior and chemical makeup. Recent experimental evidence with radio-marked Hermit Thrushes (left, top panel) shows that movement activity among lean birds intensifies as the migration season progresses, presumably as they increase foraging in response to declining fruit resources, and fat birds leave Block Island sooner than lean birds (Smith & McWilliams. 2014. Behavioral Ecology 25:1423-1435). In both groups of birds, activity is greatest on the first day of stopover and decreases thereafter, as birds become more familiar with the location of resources.

Also, fat birds appear to accumulate higher levels of antioxidants in their blood than lean birds. Ongoing blood-sampling research shows that long-distance migrants on Block Island, such as Blackpoll Warblers and Red-eyed Vireos, build their ability to combat oxidative damage as they build their fat stores (left, bottom panel; Skrip et al., in prep).

For more information, contact:
Dr. Scott McWilliams
University of Rhode Island
105 Coastal Institute in Kingston
1 Greenhouse Rd., Kingston, RI 02881
webpage: http://web.uri.edu/nrs/scott-mcwilliams/
e-mail: srnmcwilliams@uri.edu
phone: (401) 874-7531

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Special microphones along the southern Rhode Island coast and Block Island recorded the nocturnal vocalizations of ≥ 22 bird and ≥ 7 bat species, during their fall migrations.