A *Superior* Research Reader

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Photo Credit: Star Tribune (left), US Forest Service (middle and right)

Greetings and welcome to A *Superio*r Research Reader, a monthly reader on what we believe is current and relevant research to science and resource management on the Superior.

This Month's Edition: Wildlife

Wildlife is the focus of this month's Reader. Before those critters hibernate or head south for the winter, let's take the time to consider how all of the work we do can affect the habitat of different animal species on the Superior. In this issue, we've rounded up articles written by outside researchers that pertain to the species residing on our Forest. But there's a lot going on locally too! Check out the impressive work Superior National Forest's very own wildlife bios are doing to monitor white-nose syndrome in bats and to document record-breaking wood turtles!

Happy reading,

Pooja and Katie

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1. There is much talk about white-nose syndrome (see above) and how it might affect bat species in our region, particularly the northern long-eared bat. Russell and colleagues present research on why we should also be concerned about how this fungus will affect other bat species found on the Superior.

2. Where do loons go in the winter? Apparently to the same place each year! Read how this new research gives insight into how choice of overwintering destinations can impact loon health.

3. University of Wisconsin researchers demonstrate how forest management practices and "the human footprint" impact breeding birds in western Great Lakes forests.

4. A study conducted in Plumas National Forest empirically examines the impacts of landscape fuel treatments on the habitats of the spotted owl, songbird, and other small mammals.

Estimating the short-term recovery potential of little brown bats in the eastern United States in the face of White-nose syndrome

Russell et al. 2015. Ecological Modelling

ABSTRACT: White-nose syndrome (WNS) was first detected in North American bats in New York in 2006. Since that time WNS has spread throughout the northeastern United States, southeastern Canada, and southwest across Pennsylvania and as far west as Missouri. Suspect WNS cases have been identified in Minnesota and Iowa, and the causative agent of WNS (*Pseudogymnoascus destructans*) has recently been detected in Mississippi. The impact of WNS is devastating for little brown bats (*Myotis lucifugus*), causing up to 100% mortality in some overwintering populations, and previous research has forecast the extirpation of the species due to the disease. Recent evidence indicates that remnant populations may persist in areas where WNS is endemic. We developed a spatially explicit model of little brown bat population dynamics to investigate the potential for populations to recover under alternative scenarios. We used these models to investigate how starting population sizes, potential changes in the number of bats overwintering successfully in hibernacula, and potential changes in demographic rates of the population post WNS may influence the ability of the bats to recover to former levels of abundance. We found that populations of the little brown bat and other species that are highly susceptible to WNS are unlikely to return to pre-WNS levels in the near future under any of the scenarios we examined.

Winter site fidelity and winter movements in Common Loons (*Gavia immer*) across North America

Paruk et al. 2015. The Condor

ABSTRACT: In many avian species, breeding site fidelity has been more thoroughly investigated than winter site fidelity, yet the latter may have a greater impact on survivorship. The Common Loon (*Gavia immer*) is an example of a species whose breeding site fidelity has been well established, but whether it exhibits winter site fidelity remains unknown. Because Common Loons primarily winter in marine waters off coastal shores, winter site fidelity has been challenging to document. We investigated winter site fidelity in Common Loons across North America using satellite transmitters, recaptures, and resightings of previously color-marked individuals. Color-marked adults returned in consecutive years to the same coastal wintering locations in California, Washington, Louisiana, Maryland, and Massachusetts, USA. We estimated adult annual apparent survival as 77% (0.48–0.93) and adult winter site fidelity as 85% (0.35–0.98). This finding has important conservation implications in the aftermath of recent marine oil spills; if Common Loons return to the same contaminated wintering areas annually, decreased fitness and survivorship could result in population-level effects.

Sensitivity of breeding birds to the "human footprint" in western Great Lakes forest landscapes

Giese et al. 2015. Ecosphere

ABSTRACT: Breeding birds in forest ecosystems are generally diverse, habitat selective, and easily sampled. Because they must integrate environmental variables over space and time, local populations of forest birds (like other animal and plant taxa) may provide meaningful signals of local forest health or degradation. We evaluated 949 breeding bird surveys in areas ranging from degraded urban/suburban forest remnants to relatively pristine old growth forests in the western Laurentian Great Lakes region of North America. The "human footprint" across this landscape was represented by a one-dimensional numeric gradient derived from land cover variables, forest fragmentation metrics, and publicly available data on housing density and transportation corridors. We used an iterative, maximum likelihood approach to quantify species-specific responses to this human disturbance gradient. Many species showed significant directional responses, consistent with known life history attributes. Other species were most commonly detected at intermediate levels of anthropogenic disturbance, yielding unimodal responses. Relationships between the "human footprint" and occurrences of 38 bird species were illustrated by general Gaussian functions that represented both unidirectional and unimodal patterns. These biotic response (BR) functions were combined into a bird-based index of ecological condition (IEC) ranging from 0 (maximally degraded) to 10 (minimally degraded). We described a successful application of the IEC method at the Wild Rivers Legacy Forest (WRLF), a >260 km^2 conservation landscape in northeastern Wisconsin, USA, managed primarily under a working forest conservation easement established in 2006. In general, areas within the WRLF yielded high IEC values (7.0–9.0), but nearby forest areas not under the conservation easement were characterized by significantly lower IEC values based on breeding bird assemblages.

California Spotted Owl, Songbird, and Small Mammal Responses to Landscape Fuel Treatments

Stephens et al. 2014. BioScience

ABSTRACT: A principal challenge of federal forest management has been maintaining and improving habitat for sensitive species in forests adapted to frequent, low- to moderate-intensity fire regimes that have become increasingly vulnerable to uncharacteristically severe wildfires. To enhance forest resilience, a coordinated landscape fuel network was installed in the northern Sierra Nevada, which reduced the potential for hazardous fire, despite constraints for wildlife protection that limited the extent and intensity of treatments. Small mammal and songbird communities were largely unaffected by this landscape strategy, but the number of California spotted owl territories declined. The effects on owls could have been mitigated by increasing the spatial heterogeneity of fuel treatments and by using more prescribed fire or managed wildfire to better mimic historic vegetation patterns and processes. More landscape-scale experimentation with strategies that conserve key wildlife species while also improving forest resiliency is needed, especially in response to continued warming climates.