

Prospectus - Motus Wildlife Tracking System Network for the West

Partners in Flight Western Working Group

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Background and Need

After more than a century of research, our understanding of the movement ecology of migratory animals is still surprisingly rudimentary. Yet understanding how animals move across the landscape, shifting from hemisphere to hemisphere, is critical to preserving them in an ever-more threatening, human-influenced world. Recent geolocation technological developments are allowing researchers to make rapid advancements in understanding spatial and temporal movement patterns, including migratory connectivity. However, geolocation technology remains limited for small animals and understanding the trade-offs between various geolocator tags is critical to designing sound studies. A new generation of highly miniaturized digital radio-telemetry systems is allowing researchers to track the movements of radio-tagged individuals across thousands of miles of distance, and months or years of time, with unprecedented temporal precision.

The Motus Wildlife Tracking System (Motus, motus-wts.org) is an international collaborative research network of automated radio-telemetry receiving stations. Spearheaded by Bird Studies Canada (BSC), Motus facilitates landscape-scale research and education on the ecology and conservation of migratory animals. The current receiver station array comprises more than 400 sites from the Canadian Arctic to South America (Fig 1), operated by more than 100 collaborators. Since 2013, more than 10,000 individuals of more than 100 species have been monitored using the system. Motus has been successfully used to answer research questions such as identifying important stopover sites, migratory routes, and post-fledging dispersal, among others (Taylor et al. 2017). Data collected from these stations feed into BSC's master database where it is archived, visualized, and distributed to researchers and the general public.

Despite the successes of Motus research throughout the existing network, there are notable and significant gaps across the western portions of North and South America. The lack of Motus stations in the west further exacerbates the migration ecology knowledge gap between eastern and western populations of small birds (Carlisle et al. 2009, Bayly et al. 2018). This may lead some land managers to misapply information gained from eastern migration studies to western migrants. Western North and South America is topographically diverse, resulting in extreme contrasts among adjacent habitat types. Most western migrants (unlike their eastern counterparts), typically do not make large overwater flights, often navigate through drier and lightly vegetated terrain, and may face more anthropogenic and natural obstacles compared to eastern migrants. Obtaining western specific post-breeding movement and migration information, especially identifying important stopover sites, is critical to the conservation of these species. Here, we strategize the priorities for establishing a network across the west.



Building on the success of the Motus Wildlife Tracking System Network in the east, we propose to expand the use of this technology to meet pressing information needs for western birds to inform conservation actions within the next decade.

The Western Motus Network

The geography of the western network will include western provinces and territories in Canada, eleven western states of the United States southward through the western states of Mexico, and the Pacific-slope regions of Central and South America. Because the network is made up of collaborators, the placement of stations will largely be determined by independent research goals. However, we also propose strategic placement of stations to address larger scale questions. Thus, collaborators can contribute to site-specific research needs, broad scale objectives, or both.



Figure 1. Motus stations (yellow dots) 2014-2017 in North, Central, and South America and proposed western network (blue line).

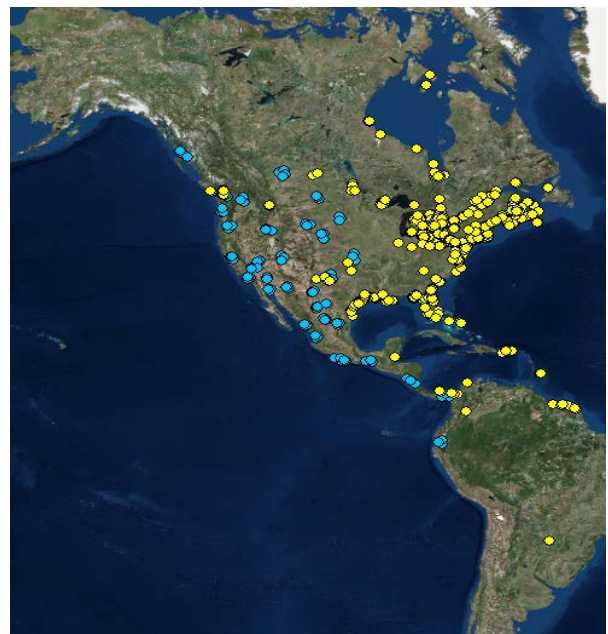


Figure 2. Projected Motus stations likely to be established by 2021 at the completion of Phase 1 (see below).

The Partners in Flight Western Working Group is well positioned to build the western Motus network, with a proven track record of westwide collaborative projects and international collaboration.





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Phase 1 (2019-2021)

Begin to build the network and meet short-term landbird and shorebird objectives. Expand the partnership to include bats and insects.

The short-term objectives will fill critical information gaps for priority bird species. Collaborators are currently considering integrating Motus technology into ongoing research programs for the following priority landbird and shorebird species: Bank Swallow, Common Nighthawk, McCown's Longspur, Chestnut-collared Longspur, Oregon Vesper Sparrow, Sagebrush Sparrow, Bell's Sparrow, Brewer's Sparrow, Tri-colored Blackbird, Sage Thrasher, Swainson's Thrush, Willow Flycatcher, Gray Flycatcher, Yellow-breasted Chat, Yellow Warbler, Yellow-billed Cuckoo, Western Sandpiper, Sanderling, Semipalmated Sandpiper, Semipalmated Plover, Dunlin, Short-billed Dowitcher, Snowy Plover, and Mountain Plover.

While specific research questions addressed by Motus will vary by species, the following six areas of study are needed for most landbirds and shorebirds:

1. Arrival and departure times on breeding grounds
2. Overwinter survival
3. Stopover duration
4. Regional and site level stopover and molt-migrant fidelity
5. Post-fledgling survival and dispersal
6. Breeding habitat use

In addition to erecting receiver stations to meet site-specific collaborator goals, the partnership will look for opportunities for establishing stations wherever possible in building the western network. For example, collaborators that manage land may be interested in establishing a station to contribute to the network and gather passive information about their site. Other collaborators may be interested in establishing a station for educational purposes.

We will explore funding strategies that are based on 1. Site-specific research goals, 2. Establishment of the network, and 3. Landowner objectives. This multi-faceted approach will allow us to achieve our short-term goals as well as provide the groundwork for the network.





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Phase 2 (2022-2027)

Fill spatial gaps, ensure longevity of the network, and meet long-term objectives.

Research needs at large spatial scales will require the network to be established. Following successful completion of Phase 1 (see Fig 2 for projected network map), we will expand the network to fill spatial gaps and focus on longevity to meet pressing research needs that are expansive either spatially or temporally. Research needs for seabirds, additional landbirds and shorebirds, and non-avian taxa will be developed in Phase 1 and included in Phase 2.

The following three areas of study have been identified as important for the conservation of migratory landbirds and shorebirds:

1. Migratory connectivity
2. Migratory timing and movements and how they relate to climate
3. Movements on wintering grounds

In addition to addressing current research objectives, we anticipate that the network will stimulate much needed migration research in the west. As has been demonstrated in the east, a collaborative network such as this can rapidly expand to efficiently achieve broad scale research that is imperative to reversing the declines of western birds.

How to get involved

Please join us! You can help support one of the largest migratory animal conservation science and research initiatives in the world. We welcome all collaborators, whether you are a researcher, land manager, organization, educator, or private landowner. This is an opportunity for outreach, education, and collaboration with people throughout the Americas. Please visit <https://motus.org> for more information.

Who to contact

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Citations

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