First off, I’d like to say that I have the privilege of working at Bird Studies Canada, a Canadian co-partner of BirdLife International. The other co-partner being Nature Canada. If you’re not familiar, Bird Studies Canada is the number one go-to organization for anything to do with bird monitoring and conservation in Canada. This is our national headquarters at Long Point in Ontario; we also have staff across the country.

Bird Studies Canada operates over 40 Citizen Science monitoring programs, but one of our most popular is the Marsh Monitoring Program or MMP for short. We started the MMP in different regions of Canada at different times shown here. The Great Lakes MMP, which operates in Ontario and the Great Lakes states, has run the longest, since 1995, and provided the marsh bird and frog data we will see in a few moments.

To give a sense of coverage, here’s the points that have been surveyed in at least one year by all of Bird Studies Canada’s regional MMPs. It’s an impressive number of points across a very broad area. About 60% of these points are surveyed annually.
Each of our regional MMPs closely follows the experimental design recommendations and field protocols of the North American Marsh Bird Monitoring Program. This means we can do Canada-wide analysis across all of our regional MMPs, or roll all of our Canadian MMP data up into the North American database. The Great Lakes MMP also monitors frogs, and as shown in the bottom left corner, we closely follow the guidelines of the North American Amphibian Monitoring Program.

Bird Studies Canada has used MMP data for various projects, some of which you see here. These include long-term population trends, habitat associations, and generating marsh bird indicators of wetland health, among a number of other topics useful for conservation of wetland birds and other wildlife.

The project I’m speaking about today uses Great Lakes MMP data to look at how conservation projects under the North American Waterfowl Management Plan influence occupancy of marsh breeding birds and frogs. And by conservation projects, I mean wetlands that have been secured and managed specifically for the benefit of waterfowl and other wetland wildlife.

To give a better sense of what this means, a typical conservation project wetland has flooding and de-watering via water control structures to mimic natural water level dynamics, and typically one or more of the following: cattle exclusion to prevent disturbance and nutrient loading, tree planting and retirement of agricultural land in surrounding uplands to buffer pollutants and runoff; and planting of wild rice (Zizania palustris) to enhance waterfowl forage; among other actions.
Here’s what I’d like to cover for this project: some background to set the stage; a brief mention of methods; major results; and a conclusion.

As many of you know, the North American Waterfowl Management Plan, affectionately known as NAWMP for short, has been enormously successful in conserving breeding, staging, and migrating waterfowl. Indeed, results from the “State of Canada’s Birds” report show waterfowl in purple as one of the few groups of birds that are increasing over time across Canada.

Although the focus of NAWMP has always been waterfowl, more recently the plan has taken an all-bird focus. This makes a lot of sense because there are many non-waterfowl marsh birds and various other wildlife that benefit from actions implemented under the plan. However, such benefits are infrequently measured and reported.

There are a handful of studies scattered throughout northeastern North America that have looked at this topic. The ones I’m aware of are shown here. These studies are valuable and tell us quite a bit. For instance, they show that some marsh birds and frogs are positively influenced by management under NAWMP. But in each case, they had at least some limitations.
These limitations include: small sample sizes; short time frames since initiation of management; small wetland sizes; limited spatial scales. Plus, almost none of the studies accounted for imperfect detection. By contrast, in this study, we were able to largely overcome all of these limitations.

First we selected all Great Lakes MMP bird or frog survey sites within conservation project wetlands within southern Ontario. Then we selected nearby sites within unmanaged wetlands for comparison. This gave us the study design seen here: 42 conservation project wetlands, shown by the black circles, and associated nearby unmanaged wetlands, shown by the open black diamonds. These wetlands contained a grand total of 434 Great Lakes MMP survey stations or sites in about equal allotments among the two categories. So a couple hundred survey sites spread throughout the 40+ wetlands in each of the two categories. Although this is not a true matched-pairs design, it does control to a certain extent for unknown confounding factors between conservation project sites and unmanaged sites.

And indeed, this appeared to be the case. We found no major differences between conservation project sites and unmanaged sites in any of 13 habitat and vegetation variables measured at various scales. And these variables included things like aerial coverage of different vegetation within 100 m of survey sites, and aerial coverage of different land use types within several kms of survey sites, among other measures. So all-and-all, the only obvious difference between the two sets of wetlands, to us at least, was whether management under NAWMP occurred or not.

The 42 conservation project wetlands were located within a diversity of land use designations, and were managed in partnership with Ducks Unlimited Canada. The designations included [read slide], so a nice cross-section of various modes of wetland conservation management under NAWMP from throughout southern Ontario represented here.
Surveys at each of the sites in each of the wetlands were completed by trained GLs MMP participants. For birds, 2-3 morning or evening surveys per year, timed to coincide with peak breeding times, and with call broadcasts to elicit responses from secretive species, and passive observation for other species. For frogs, 3 night time surveys per year, which were passive auditory surveys spread throughout the frogs’ breeding seasons and timed with respect to temperature to hit the peak calling of each of the species present.

We assessed eight different occupancy models for each of 15 bird and 7 frogs species. The models included various combinations of date and time-of-day as continuous covariates in the detection process for birds, continuous covariates of date and temperature in the detection process for frogs, and a categorical effect of management in the occupancy process for all of the species. Management appeared in the occupancy process of at least one of the well-supported models for each of the 22 species, suggesting that management was important in explaining occupancy of every one of the species. So for each species, we used the highest-ranking model that included management for further inference.

Here you see the main results for all of the 22 species as effect sizes. So what’s plotted for each species is the difference between estimated occupancy in conservation project wetlands and unmanaged wetlands, such that positive effect sizes mean the species had higher occupancy in conservation project wetlands, and conversely, negative effect sizes mean occupancy was higher at unmanaged sites. Species where occupancy was significantly higher in conservation project sites are shown with solid circles. As you can see, occupancy of all species except Mute Swan and E. Gray Treefrog was higher at conservation project sites compared to unmanaged sites, and in a little under half of the species, occupancy was significantly higher at conservation project sites compared to unmanaged sites.

Notably, five of the species showing higher, or significantly higher, occupancy at conservation project sites are listed as being at-risk or of conservation concern in Ontario, shown here with red blobs. And populations of all of these five species...
Plus another 4, shown here with lighter red blobs, for a total of 9 species, are known to be declining throughout the southern Great Lakes region. Therefore, conservation projects under NAWMP are likely especially useful for conserving and recovering populations of various declining, at-risk, and priority conservation concern marsh bird and frog species.

For instance, I recently found that occupancy of 60% of 15 marsh-nesting bird species significantly declined throughout the southern portion of the Great Lakes basin over the past couple of decades. Collectively, the many conservation project wetlands managed under NAWMP across the southern Ontario landscape and beyond are likely helping slow these declines.

Okay, we’ve covered a fair amount of material here, so with the little bit of remaining time, I’d like to quickly reiterate the main points. This study used Great Lakes MMP data to look at the influence of conservation projects under NAWMP on occupancy of marsh-breeding birds and frogs.

A handful of studies previously looked at this question, and their findings are quite valuable, but each of them had at least some limitations that we were able to overcome in this study.
Our approach was to model occupancy of 22 different bird and frog species at sites spread across many different conservation project and unmanaged wetlands throughout southern Ontario.

The main take home result is that occupancy of several marsh breeding bird and frog species, some of which are listed as at-risk or of conservation concern, was significantly higher at conservation project wetlands managed under NAWMP compared to unmanaged wetlands, suggesting that conservation projects under NAWMP are useful for slowing or perhaps even reversing declining trends in these species.

I'd like to thank my collaborators on this project, Owen Steele and Mark Gloutney who are coauthors on the paper describing this project, as well as Dave McLachlin, at Ducks Unlimited Canada, as well as a number of agencies that support the Great Lakes MMP. Thank so much for listening.