

[Kayt] Considered one of the most biologically diverse of all ecosystems, wetlands play a vital role in filtering groundwater, controlling runoff, easing flooding, and protecting native plants and animals.

In today's episode, we'll hear about the many benefits wetlands provide, the species that rely on them, why they're declining, and how we're working to protect and restore them.

I'm Kayt Jonsson bringing you today's episode of a Talk on the Wild Side.

[Intro Music]

{SALTMARSH SPARROW}

Hi my name is Kate O'Brien and I'm a wildlife biologist at Rachel Carson National Wildlife Refuge in southern Maine. Hi my name is Aimee Weldon and I coordinate the Atlantic Coast Joint Venture.

[Kayt] The Atlantic Coast Joint Venture is a partnership working to restore and sustain native bird populations and habitats from Maine to Florida, and focuses mainly on coastal marshes, or wetlands.

So for people who aren't really familiar with what a wetland is, wetlands are kind of these soggy areas that have a very specific type of hydrology, meaning water flow and dampness that creates a really particular set of plants that are specially adapted to live in these wet and soggy areas.

[Kayt] Wetlands can take many forms, like freshwater, brackish, or saltmarsh. And it isn't just plants that have adapted to live in these areas, small mammals, fishes, insects, marine invertebrates, and birds rely on these areas as well. Today, Kate and Aimee are going to introduce us to a small bird who calls a certain type of wetland, the salt marshes, home.

So, salt marsh sparrows are a sparrow that lives exclusively in coastal salt marsh habitat. It cannot nest any other place. It's behavior is unusual for a bird - it's often referred to as a marsh mouse with wings. They spend a lot of time walking around in the salt marsh. It spends its entire life in the salt marsh from breeding, to migration, to wintering, that's its home.

The salt marsh sparrow has developed a strategy that has worked really well for over 10,000 years where it actually builds a nest just inches above the high tide line and it

completes its nest building and its egg laying and its young fledging all within the two lunar tides.

They are really adapted to flooding, and so they are able to, when the floods come up, the eggs can actually float up in the nest for a couple of hours at a time and then when the tide recedes, then the female comes and warms the eggs back up again and they're fine and when the chicks are about 5 or 6 days old they can even climb out of the nest during a flooding event up into the grasses and wait it out on top until the waters receded and then climb back down into the nest.

[Kayt] The high marshes, where the salt marsh sparrow nests normally only flood a couple times a month during lunar tides or storm events, but now the salt marshes are experiencing quite a bit of stress. Salt marshes have been modified by people - historically for agriculture and livestock grazing, and more recently for development. They're also facing rising seas and more powerful storms.

With sea level rise causing the tides to be higher, the nest are flooding much more frequently than they used to be.

This bird is experiencing some significant nest flooding and so it's often not able to raise its family before the nest gets washed out. Recent publications are showing that the bird is actually declining at a rate of about 9% a year, so it's a fairly steep rate of decline.

They've lost more than 85% of their total population since the 1990s and we really don't have a lot of time to figure out what to do to change the situation given how quickly they are losing population.

It's considered the canary of the salt marsh; if the sparrows are not doing well, there's a good chance the salt marsh community as a whole is not doing well.

[Kayt] With increased flooding, the grasses of the salt marsh can't keep their roots above water leading to thinning, stressed plants. In some places, salt marshes may even convert to mud flats.

One of the really interesting things about the salt marsh sparrow is that it has an incredible community of conservationists and researchers that have been studying the sparrow for quite some time now.

That includes a very strong focus on implementing management action in the salt

marsh system that can either build the resiliency of the current marsh that we have where salt marsh sparrows are breeding, or restore the function of marsh that is degraded but not too far gone that we can't do anything, and also help create new marsh in areas we are expecting marshes to be migrating inland.

What we are doing to help the sparrow become more successful and increase the resiliency of salt marshes, which means in some situations we may be trying to get water off of the marsh.

[Kayt] This can be accomplished by digging runnels, which are miniature ditches that help move water off a flooded marsh.

We're also working with partners and communities to explore novel approaches to improving our salt marshes, such as doing thin layer deposition in some areas to raise the elevation of our salt marshes up so they'll do a better job with keeping pace with sea level rise.

There's other things that we are exploring that have not been extensively tested like using existing tide gate infrastructure to dampen those highest spring tides. We know when those are going to be because they're tied to the lunar cycle, then if we can use those tide gates to kind of dampen the amplitude of that tide, then theoretically we can protect all the nests behind that tide gate from flooding.

So there's a whole variety of things we can do and we're working with our partners across that entire region so that we can quickly figure out what works, what doesn't work, and then focus on those things that are most likely to produce the kind of habitat that is needed to result in population growth.

So I get asked the question a lot about rare and declining species, you know, why should I care, what does this species mean, how does it impact society as a whole. And it's a really difficult question to answer. The species has been around probably for 10,000-13,000 years and we have the opportunity to help it be around for a much longer time as well, so there's a little bit of the if we can save it, should we? And if we decide to write it off, you know, what does that mean about us as a society. And then, if we lost the salt marsh sparrow, it is a very good indication that we have lost the high marsh ecosystem.

[Kayt] As we've heard in other episodes, protecting and preserving these ecosystems don't just help a single species. Many other plants and animals depend on these places to survive - and so do people.

The resiliency of the coastal salt marsh for the bird community is also the same resiliency that we depend on, since a large percentage of Americans live within, you know, a few miles from the coast, and they really depend on the protections that these marsh habitats provide and it's been shown in numerous studies including post hurricane super storm Sandy studies that show that those areas that have retained marshes do much better in storm and flood events than the areas that are kind of bare and unprotected by that natural system.

I am very hopeful about the saltmarsh sparrow. I think about all the conservation challenges that we have faced before, from piping plovers to California condor; I mean we have faced some really amazing conservation challenges and we've been able to meet many of them - in fact, most of them.

The answer is yes, we are hopeful; we wouldn't be doing it if we didn't have hope. If we just thought it was a lost cause we'd probably focus our resources elsewhere, but this isn't just about the salt marsh sparrow. This is just the first in a suite of birds that rely on the tidal marsh system that are declining as well. If we can get it right for this first species, which is a great representative of the high marsh habitat, then we're going to get it right for everything.

[Kayt] An important aspect of wetland conservation is knowing what we have and what may be putting pressure on those areas. And the best way to know what's out there on the landscape? Maps.

{NWI}

My name is Bill Wilen. I've worked for the National Wetland inventory for 40 years. Back in 1975 the National Wetland Inventory project was one of the projects that was part of the new Fish and Wildlife Service's office of Biological Services. The mission of the office of Biological Services was to supply information and methodologies on key environmental concerns.

[Kayt] Wetlands were a big concern. Studies around that time estimated more than 50% of the wetlands in the lower 48 had been lost since the 1780s. It was important to create maps of these remaining wetlands to understand the changes happening on the landscape.

Photo interpreters used photographs and a stereoscope – two photos of the same area taken at slightly different angles – and all a stereoscope did was to force each eye to only look at one of the two photos. The images seen by your eyes are combined in your

brain and allows you to see width, height, and depth. The boundaries of the wetlands are drawn and the wetlands were coded on an overlay attached to one photo, the information from that photo as transferred by image to a stable base USGS topographic map using a zoom transfer scope. It was a device that allowed for simultaneous viewing and matching of scale, position, and orientation of two different sources.

[Kayt] By transferring information from these photos, one by one, onto a topographical map, wetlands could be catalogued in great detail. It was a tedious, time consuming, and complex process.

More than 40,000 wetlands maps were produced using this technology and that covered about 2 million square miles of the conterminous unites states. All these maps, paper maps, were sent to the library of congress and reproducible copies were sent to the National Archives.

[Kayt] If you needed a map of an area, you could call a 1-800 number, and you could purchase reproductions that looked similar to engineering blueprints. Over the course of 11 years, from 1979 to 1990, 1 million maps were reproduced, a huge milestone for the NWI.

We had a big celebration about producing the millionth map, some months later a delegation of Russian scientists were visiting that national wetland inventory center. The banner celebrating the millionth map was still up. One of the scientists asked about the banner.

[Kayt] Bill proudly told him about the project and reaching such a big milestone. The visiting scientist replied only 199 million to go.

He was right. Everybody in the United States needed access to these maps and the information they contained, and that one statement, that one event is an important driving influence in my career.

Maps are wonderful. I love maps, and it's the reason I ended up in this field. They allow the user to get visible context of the location of a feature on the landscape, the relation to other features on the landscape, and some information about what those features are. But they're limited by the interpretation of that information by the user and the static nature of maps.

I am Mitch Bergeson from the U.S. Fish and Wildlife Service, and I am the data steward for the National Wetlands Inventory data set, that is the primary person that does the care and feeding and the stewardship of that data layer.

The data set is extremely large, it's the largest polygonal data sets in the public sector, where nearly 35million different wetlands polygons across the nation, and that data collection effort has taken some time. The program has been around for over 40 years.

[Kayt] Making the move from print to digital mapping started in the mid-1980s, but it lagged a bit because users weren't as familiar with GIS, so they continued requesting the paper maps.

In the '90s the geospatial science improved, more people were using it and asking for GIS files, and by the early 2000s we had all that wetlands information in one geospatial layer in a digital environment which really improved our data management, our distribution, the viewing of that information, and the creation of customized downloads and maps.

The national wetlands inventory was the first project in the Department of the Interior to send out digital data using floppy disks, to send out digital data over the internet, to place our digital data in the cloud, to make our digital data available through an online mapper, and viewable on Google Earth

And that digital transformation was really a huge step in the evolution of a collection of maps to a real living database. The national wetlands inventory dataset is considered the nation's data set for the location, type, and extent of our nations wetlands.

[Kayt] Wetlands aren't static. They change over time, particularly with accelerating development and rising sea levels, and so the data need to be updated. But because data collection is so time-intensive, we have to decide what areas to prioritize -- these tend to be the coasts and in urban centers because they're changing the most. New data comes into the system at a rate of 50-100 million acres annually. Users have access to data that can be queried in different ways to make custom maps for their needs. The users are real estate developers, farmers, state agencies, and more.

You know, over half a million users visit our wetlands mapper interface every year, and those users download nearly 400 maps a day. The rate has steadily increased every year. Primarily the pattern is, where there are people there are maps being downloaded. So, urban centers, in those areas there's a lot of maps being printed. But I think the biggest impact that these maps have to wetlands conservation is what they often refer to as passive avoidance [\[SGG1\]](#).

[Kayt] Basically, this means wetland conservation occurs passively, without the engagement of regulatory or conservation personnel, because the National Wetlands Inventory data provides users information on the location and extent of wetlands and they avoid impacting those wetlands.

In the past 4.5 years we've had over a million maps that were created, which assisted all sorts of users in figuring out the location of those wetlands.

[Kayt] In case you didn't catch that, Mitch mentioned in the last 4.5 years 1 million maps have been downloaded from the NWI mapping tool. That's twice as fast as the paper maps, and another huge milestone for the National Wetland Inventory Program, showing just how important maps are.

[Kayt] We have 110 million acres of wetlands in the lower 48, which may sound like a huge number, but in reality, it's only about 5.8% of our land area, making them relatively rare. There are a number of hotspots for wetlands across the United States, like the Everglades. Another sits in the middle of the country, with millions of small depressions across the landscape.

{MONTANA}

My name is Sean Fields, I'm the coordinator for a migratory bird conservation partnership known as the Prairie Pothole Joint Venture.

[Kayt] The prairie pothole region sits in the heart of North America - consisting of about 300,000 square miles, with two thirds in Canada and a third in the United States - it can be found in parts of Montana, North Dakota, South Dakota, Minnesota, and Iowa.

The region is characterized by millions of small shallow wetlands, known as the prairie potholes, of course, and surrounding grassland. It's most notable for this extremely productive breeding grounds for many migratory birds, but most notably breeding waterfowl. Over half of the continental waterfowl population are hatched in the prairie pothole region, and there's hundreds of other grassland and wetland dependent birds that breed and migrate through this region.

[Kayt] Sometimes referred to as North America's "duck factory," because of its importance for breeding waterfowl, the prairie potholes are also productive farmlands - and most are privately held.

Montana is a little bit unique in that, of the northern states, we're one of the few that has not lost the majority of its wetlands; we still have, we think, 60-70% of the original wetlands up in the prairie. We have a lot of our native grasslands as well, and one of the reasons is it is so cold and the soil is, in many cases, poor, and so there hasn't been a great deal of pressure to plow it up for agriculture. My name is Linda Vance and I'm the senior ecologist for the Montana Natural Heritage Program in Helena, Montana.

[Kayt] Linda works to collect and disseminate data on Montana's species and habitats, emphasizing those of critical importance. As an ecologist, Linda also works with mapping those habitats.

I first started with the Heritage Program in 2005, and at that point, you know, recognizing the biodiversity significance of wetlands, it was important to us to go out and conduct surveys. But the problem was that we didn't know where those wetlands were. If we wanted to go out and survey wetland habitats, we had to start by calling up landowners and land managers and asking them if they could suggest any places we could go.

[Kayt] The National Wetlands Inventory program's mapping from the '70s and '80s had never been updated in Montana - at that time, the maps were printed aerial images with Mylar, a type of clear plastic, used to overlay information. A far cry from the digital data we have today.

In 2005, the Farm Service Agency started flying a national agricultural imagery project, and every year they would send small planes over pretty much the entire country and collect images at a 1-meter resolution, which is very high resolution, in true color and in a color infrared band. With color infrared, wet areas pop out as a really brilliant red, and so when you look at those on a computer, you can see the wetlands much more clearly.

[Kayt] By combining this imagery with other data like topographical maps or soil surveys we're able to see a better picture of what's happening. More recently they've incorporated LiDAR, an active sensor typically aboard a plane that bounces energy off the ground and then returns to the sensor and satellite remote sensing maps to show surface water permanence.

With the resulting models, they really developed into decision support tools. We can use these maps and the data along with other data, such as soil productivity and surrounding land use to model risk of drainage or conversion to other uses, and then we can target those wetlands that are high risk for conservation programs, like protection. There's all sorts of private lands initiatives that range from restoring degraded wetlands, and that might be plugging ditches, removing a lot of the siltation from wetlands so they're functioning once again, and really ensure these agricultural economies are thriving while implementing conservation programs. I think it's key to know that they're not mutually exclusive and that these farmers can be very successful while continuing to implement conservation practices on their lands.

The presence of a wetland means that there's a source of forage and habitat for pollinators. And so, for example, there've been recent studies in Alberta that show that pollinator abundance and diversity is much higher in cultivated fields that have a

wetland embedded in them or adjacent to a wetland. In that way, by providing a habitat for pollinators, wetlands have a really significant economic value for crops.

Beyond being important for wildlife, we know that wetlands are very important for things like flood control, and we're seeing these more weather extremes along with changing climate, more flooding, and as we see that, it's really driving home the fact that we need to keep these wetlands on the landscape and functioning. Ground water replenishment, water purification. So there's a lot of an additional impact that these wetlands have for much more than just waterfowl and wildlife. We know that we're losing wetlands every year, we have, over time, we've lost 50% of all the wetlands in the Prairie Pothole Region. Here in Montana it's not that extreme but certainly we are losing wetlands and we need to make sure we keep track of what's happening on the landscape, and the Montana Wetland Council and the Natural Heritage program with Wetland and Mapping Center has been instrumental in being able to track those changes.

That being said, we can go back in, we can restore these wetlands that are lost - certainly here in Montana - and we can work with our landowners to ensure they understand the impacts of lost wetlands.

We're using remote sensing and the maps to look at how wetlands naturally dry over the summer, and we're able to say to land managers, help them say to their permittees - it's okay to put your cattle in this area in later summer; the wetlands have dried up, the soil is hard, the cattle won't do any kind of damage and there'll be a little bit more green forage for them. But how about early in the spring, when those wetlands are really flooded, when there's waterfowl breeding around the edges or nesting around the edges, how about you keep the cattle somewhere else?

[Kayt] Participation in deliberate ranching practices means agriculture and conservation can be very compatible. And the good news is that there has been fairly decent success with bringing wetlands back.

So there's an area just south of Bozeman where the wetlands along the Madison River had been plowed up, probably early in the 20th century. And there's a rancher down there who was committed to trying to bring them back. He was primarily interested in improving the fishery. He went out with help from the NRCS and other local partners and he got rid of all the ditches that were draining the land. And when he blocked up those ditches and basically restored the hydrology, what happened within a year or two, was the wetlands vegetation started to come back on its own. The seed bank had been there all that time, and so we started to see the wetland plants emerging, it was the most amazing thing.

[Music Outro]

[Kayt] Thank you so much for joining us for today's episode of A Talk on the Wild Side. Special thanks to Aimee Weldon, Kate O'Brien, Bill Wilen, Mitch Bergeson, Sean Fields, and Linda Vance for lending their expertise.

To learn more about the Saltmarsh sparrow, The National Wetlands Inventory, and the Prairie Potholes, or for notes and a transcript of today's show, visit [www.fws.gov/openspaces](http://www.fws.gov/openspaces).

Music in this episode is from Audioblocks. Saltmarsh sparrow sound recordings by Phil Brown and Tayler Brooks, Baird's Sparrow and Northern Shoveler by Paul Marvin via xeno-canto . Our theme music is Settling In by Dexter Britain.

Until next time.