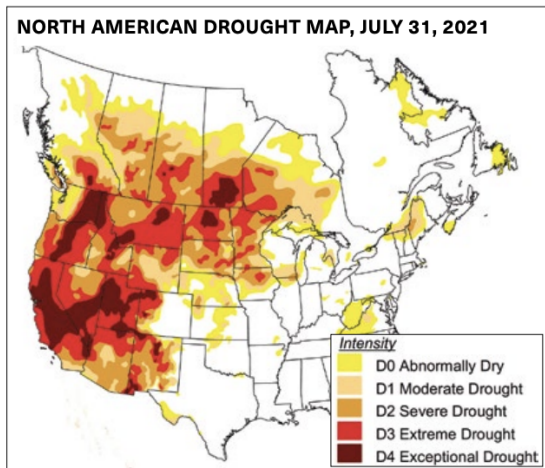


Recent Drought Emphasizes the Need to Protect Wetland Basins and Water Supplies



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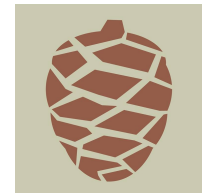
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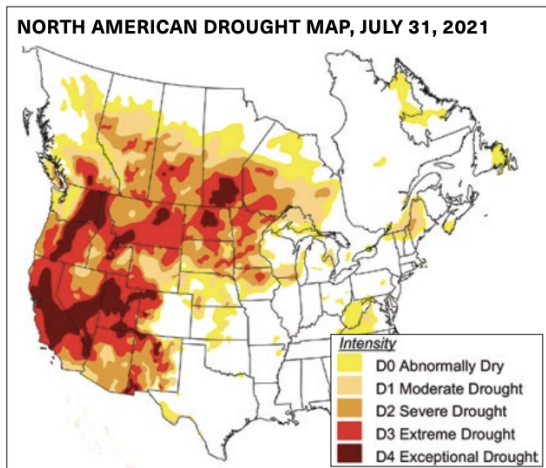
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Title	Birding
Grade(s)	Middle School
Location(s)	Schoolyards, local parks, local nature preserves
Authors	Amanda (team SCICON), Tony, Matthew, Tyler,

Lesson Overview	Birds as indicators of the human impact on the environment. Bird counts are empirical evidence of changes! This is the nature of science. Bird populations have been declining worldwide for decades. Until recently, this information was captured by scientists, specifically ornithologists, and with limited time and resources. Now, anyone can participate in community science projects. Through the use of various programs, we can now contribute to the global database that scientists can use to make better-informed decisions and policies for environmental health. Because humans have impacted bird populations in our area, their populations have been declining since at least the 1960s. Students will utilize skills of observation, identification, and documentation to assess the strength of bird populations in their community, school, and local protected, natural sites. This project can culminate in students creating a bird-friendly landscape (minimizing impacts on birds). This can allow them to actually affect positive change in their local areas. Birds are an “excellent barometer for planetary health” because they are widely distributed, relatively easy to survey, and responsive to environmental change, giving insight into wider trends in their natural ecosystems. NY Post Article
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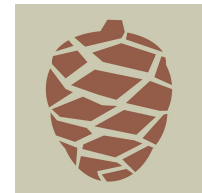
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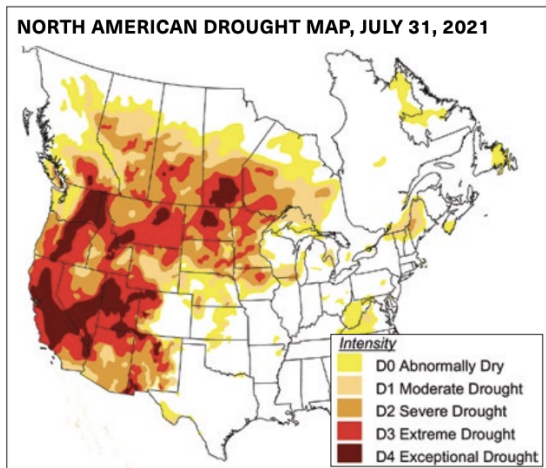
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NGSS Science Standard(s) From Climate Literacy Framework	MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
Climate Change	☐ Causes: ☒ Effects: reduced bird populations ☐ Mitigation Strategies: ☒ Adaptation Strategies: create bird habitat Climate Resilience: Investing in bird habitats can sequester carbon, improve water security, and protect people from climate disasters. State of the Birds Report (2022)
Other Learning Targets	SEP 3. Planning and carrying out investigations. Skills of data collection, creating detailed descriptions, research, and data analysis

Pre-Field Trip		
Location	Activity & Teacher Notes	Resources



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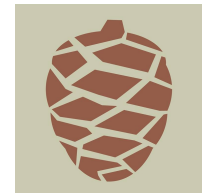
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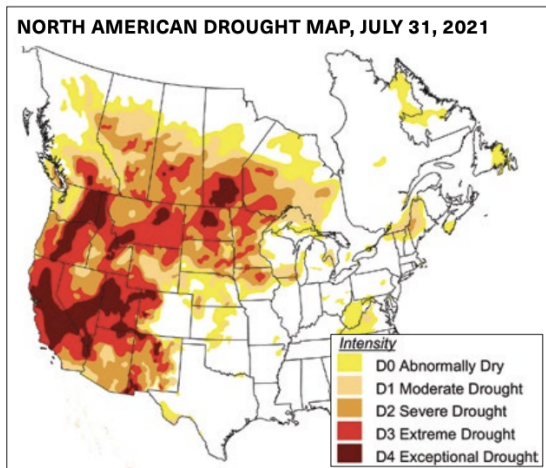
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Classroom	Students research current trends in bird populations in the Americas.	Article by Cornell Lab NY Post Article State of the Birds Report (2022)
Schoolyard	Have students hypothesize as to what habitat will host the largest diversity of bird species (school or field trip site). Students go outside and monitor the bird populations. Record what birds and how many are observed.	All optional: Binoculars, birding field guide, phone or tablet with Merlin and eBird app
Classroom	Build a better schoolyard habitat: What can we do at our school to make it a better habitat for birds and insects? Design a schoolyard bird habitat.	This can be as simple as making a hypothetical bird-friendly schoolyard to a real-world schoolyard restoration project.
Additional Resources:	ebird.org using their "explore" feature, we can see what birds have been documented in target areas. The Merlin app allows users to identify birds through a series of questions, photographs, or by sound.	
Assessment:	Students create a hypothesis of what bird populations will be at the field trip compared to their schoolyards. Students will create a data sheet to collect appropriate data while on the	



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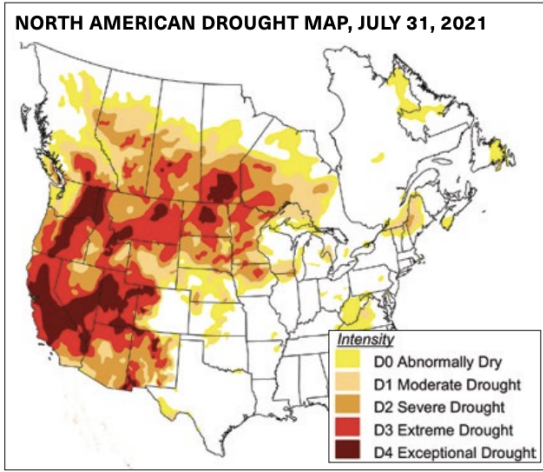
field trip and while at school. Students appropriately assess the health of bird populations in their local areas using empirical evidence.

Field Trip		
Location	Activity & Teacher Notes	Resources
	Record how many birds, species, Native plants, hummingbird attractors Could be butterflies, bees Rate human impact Tips for birding with kids Tips for gardens at schools, local native plant nurseries	
	Bird count at Pixley NWR, Allensworth	
	Ebird - data by Cornell Lab of Ornithology, vetting process Merlin - can take a pic, can do step by step, microphone feature	
Assessment:		

Extension or Project		
Location	Activity & Teacher Notes	Resources



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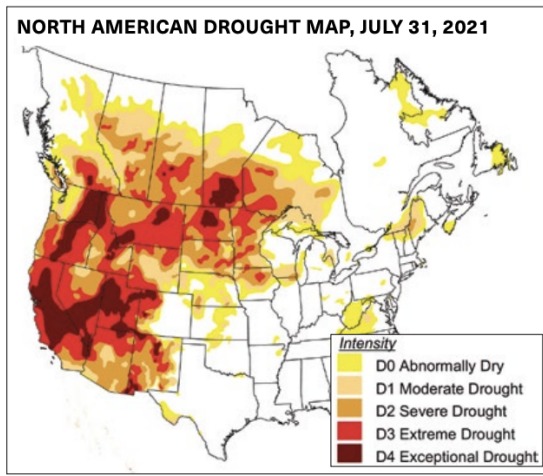
	Do same protocol as on field trip at their school Compare the two sites Visit a site with a good pollinator garden Put in a few plants and see if any new species come, even potted	
School Campus	Create a suitable habitat by planting native plants and landscaping an area to encourage bird diversity.	Native plants, soil, landscaping tools, and irrigation supplies
	Make a bird guide for this campus	
Assessment:		

Notes:

- **SG 2 Agenda: Capinero 2.21.25**
- Big Ideas
 - Bird populations are declining worldwide
- Birds and climate change
 - Climate Resilience: Investing in bird habitats can sequester carbon, improve water security, and protect people from climate disasters.
 - compromised forests have very little resilience to the forces of wildfire and climate change, which puts greater forest landscape health and forest resources (such as water reservoirs) at risk of disaster. Investments in forest restoration can turn around this dim outlook for western forests and western forest birds.



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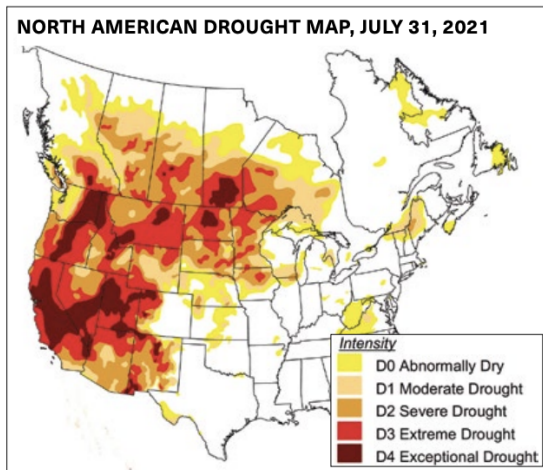
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- Despite their decades-long gains, ducks continue to face pressures from grassland habitat loss, wetland drainage, coastal wetland loss, and climate change impacts. Recent droughts have tipped duck populations downward—underscoring the need for continued conservation investments to keep duck populations healthy and resilient.
 - Sea ducks face elevated threats from climate change, including effects on food resources, altered predator communities, and rapid changes to breeding habitats. Strategic solutions will be needed to reverse declining trends for species that have not yet responded to large-scale conservation efforts.
 - In California's Central Valley, limited water supplies forced a 60% reduction in rice acreage in 2022, which traditionally provides crucial habitat for over 5 million wintering ducks. P.13
 - Climate change is a major stressor on seabird populations, as warming and rising ocean waters reduce nesting habitat, impact prey fish populations, and whip up deadly storms.
 - The future of many plants depends on birds. Recent research points to the interconnectedness of birds and plants, and shows why bringing back birds is a key to ensuring climate adaptation for plants. The study, published in the journal *Science* (Fricke et al. 2022), showed that the ability of animal-dispersed plants to keep pace with climate change has been reduced by 60% due to the loss of birds, as well as mammals. More than half of all plant species rely on animals to disperse their seeds, and the seed stage is the only time when plants have the opportunity to move into latitudes or elevations where climatic conditions may be most suitable in the future. Put simply, the loss of birds has much larger ecosystem ramifications; and conversely, the revival of bird populations holds the potential for much broader biodiversity gains.
 - Example of mgmt from CA - EJ + Birds: Still the answers weren't good, and the future looked even worse—with water runoff along the Sacramento River projected to increase up to 60% by 2100 due to climate change. "The community is so happy to finally have the new levee for meaningful flood protection, and to see all the birds that the new habitat is now attracting." In 2000, Congress allowed ecosystem benefits to be included in assessments of flood-control projects. The Nature Conservancy of California stepped in to work with the U.S. Fish and Wildlife Service, the Corps, and the community on designing riparian habitat into a new levee system. The completed



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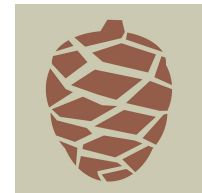
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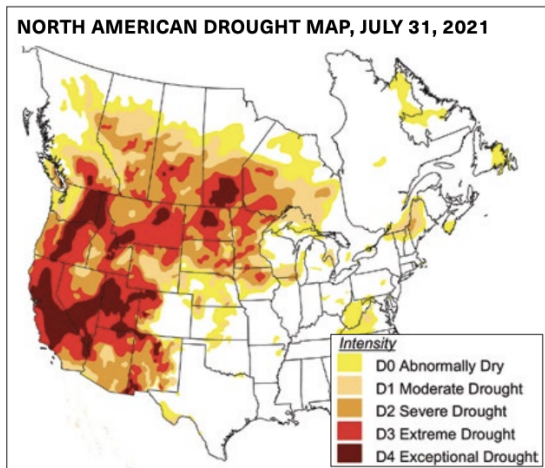
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project would connect nearby national wildlife refuge lands and create one of the largest contiguous areas of wildlife habitat along the Sacramento River—benefitting local populations of Red-tailed Hawks; several at-risk bird species such as Lazuli Bunting and Bank Swallow; and 35 federally endangered species, including Western Yellow-billed Cuckoo and Least Bell's Vireo.

- **Bird Habitat Can Put America on a Fast Track to Climate Resilience:** Those priority bird habitats can also provide climate resilience in other ways—by mitigating against floods, purifying and storing drinking water supplies, and making our air cleaner. Birds bring money to the climate-resilience fight, too. Across America, there are numerous examples of how bird-conservation funding for restoring forests, grasslands, and wetlands can also strengthen our communities in the face of climate change.



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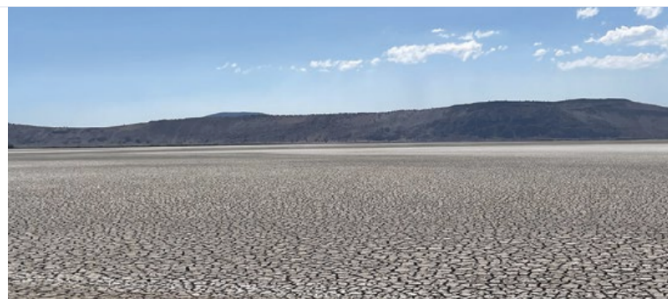
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TULE LAKE, SUMMER 2019

Western Waters: The crown jewels of waterfowl habitat in the American West—the Great Salt Lake, the Klamath River Basin, and the Central Valley of California—are turning into cracked-earth barrens. Years of drought and chronic below-average snowpacks have left vital water supplies at historic lows. The Great Salt Lake declined to its lowest level ever recorded in 2022. For the first time in their history, Lower Klamath and Tule Lake National Wildlife Refuges will be dry in fall 2022. In California's Central Valley, limited water supplies forced



TULE LAKE, SUMMER 2021

a 60% reduction in rice acreage in 2022, which traditionally provides crucial habitat for over 5 million wintering ducks. In all three regions, the effects of drought are exacerbated by rigid local water laws and over-allocation of limited water supplies that restrict sufficient water deliveries to waterfowl and waterbird habitats. Policies that create efficient water-sharing solutions are desperately needed if waterfowl and waterbird populations are to avoid drastic declines across the American West.