

Nesting Habitat Availability for Cape Sable Seaside Sparrows as a Function of Everglades Water Depth

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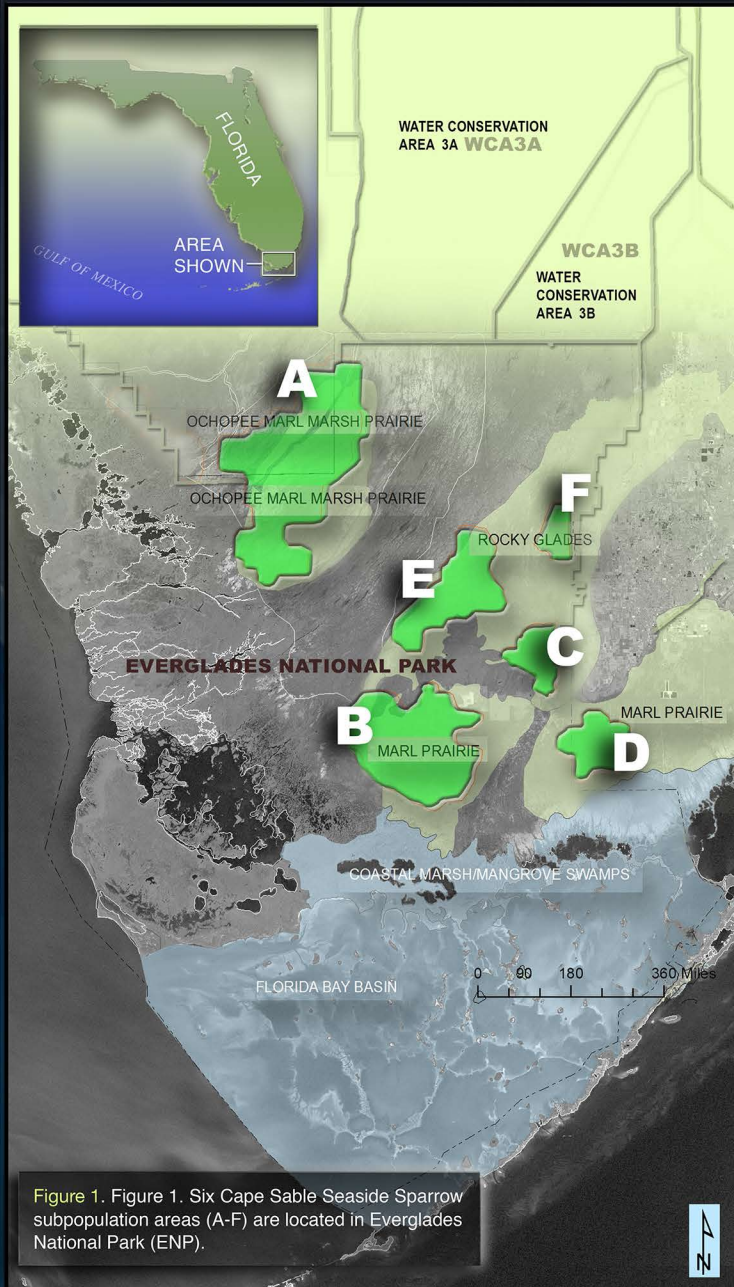


Figure 1. Figure 1. Six Cape Sable Seaside Sparrow subpopulation areas (A-F) are located in Everglades National Park (ENP).

The Cape Sable seaside sparrow (CSSS, *Ammodramus maritima mirabilis*), one of eight remaining subspecies of seaside sparrow, once ranged over freshwater and brackish marsh habitats in southern Florida. The current known distribution of this endangered sparrow is restricted to six separate subpopulation areas (A through F, fig. 1) in Everglades National Park (ENP). Changes in habitat and hydrology threaten the CSSS with extinction and efforts by regulatory and water-management agencies have had limited success in increasing populations. The sparrows build their nests on the ground and up to 17 centimeters (~ 7 inches) above the ground in mixed marl prairie communities. These short-hydroperiod prairies must remain mostly dry during the nesting season (roughly March 1 through July 15) to increase nesting success. Regulatory and water-management agencies have monitored water levels in nesting areas to simultaneously maintain adequate water depth in Everglades National Park and minimize flooding CSSS nesting areas. Previously, a single water-level gage was used to estimate water depths in one or more subpopulation domains. Recently, water-level gages used to assess water depths in CSSS habitats were discontinued due to reduction in funding levels. An alternative and improved method for assessing water depths was needed.



Cape Sable seaside sparrow in Florida Everglades National Park. Photograph courtesy of David A. La Puma

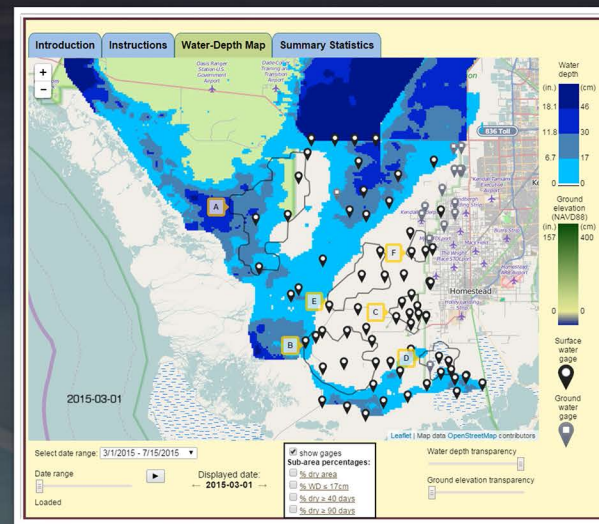


Figure 2. Everglades Depth Estimation Network (EDEN) surface and groundwater gages located in the proximity of Cape Sable seaside sparrow subpopulation areas are indicated. Water depth are viewable by calendar year or for the sparrow nesting season (roughly 3/1 through 7/15) for the years 1992 through the present. The EDEN water depth data is automatically updated every afternoon for the previous day's water surface.

The Everglades Depth Estimation Network (EDEN) daily water-level and water-depth surfaces provide 400-square-meter gridded surfaces for the freshwater Everglades for the period 1991 to current (2015) (Telis and others, 2014; Conrads and others, 2014). An EDEN application was developed to use these surfaces to assess water levels and water depths in CSSS habitat on a real-time basis (fig. 2). An animated viewer shows the range of water depths and areal statistics indicating percentages of flooded areas with water depths greater than nesting depths, and percent dry for the previous 40 and 90 consecutive days (fig. 3). Pop-up windows on the map provide gage information, historic water-level percentiles, real-time water levels, and links to EDEN gage pages and Explore and View EDEN (EVE) gage data (fig. 4). The summary statistics tab provides compiled statistics on consecutive dry days during the nesting season (fig. 5) and non-consecutive hydroperiod during the calendar year. Wildlife-resource scientists can use this application to assess impacts on nesting success and develop management strategies for the future. Water-control managers can use these results to manage movement of water through water-control structures and, when possible, reduce flooding in these areas during the nesting season. This application of the EDEN water-level and water-depth data demonstrates how scientists and resource managers are using EDEN to analyze how water-management practices can affect vulnerable species in the Everglades.

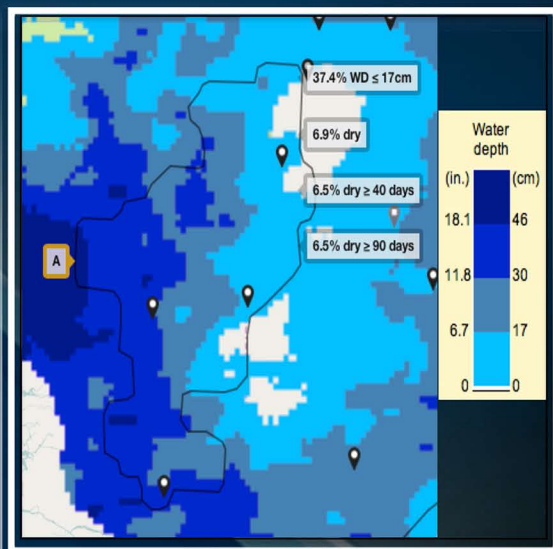


Figure 3. Screenshot showing the 7/15/2014 daily statistics for Subpopulation Area A. Daily statistics available are percentage of dry grid cells [water depth < 0 centimeter (cm)], percentage of grid cells with water depth ≤ 17 centimeters (maximum sparrow nesting depth), percentage of grid cells that have been dry for the previous 40 days, and percentage of grid cells that have been dry for the previous 90 days.

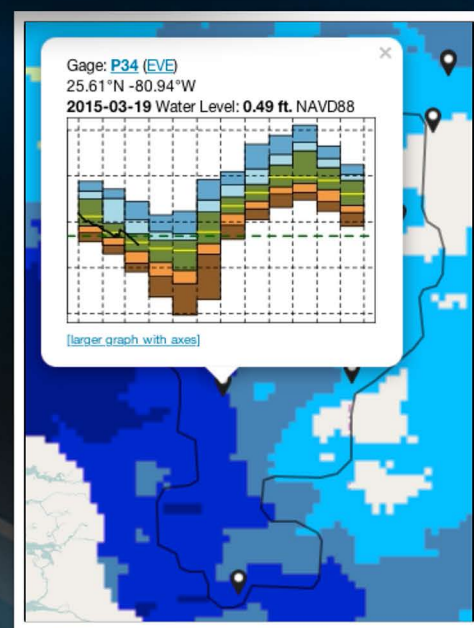
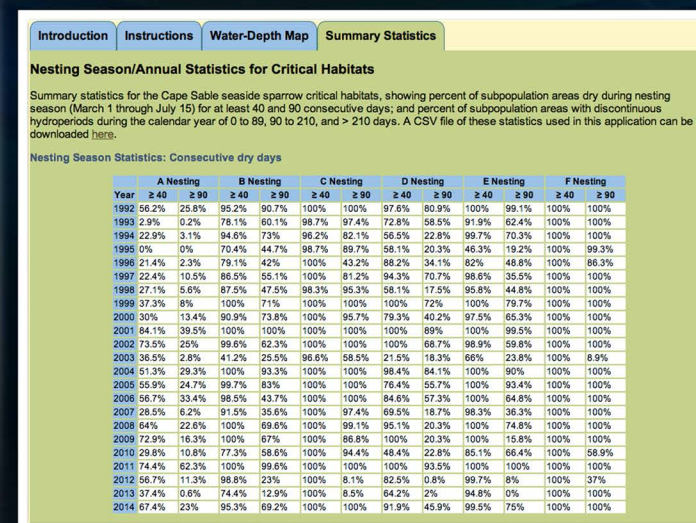


Figure 4. Screen capture showing the pop-up display and the monthly duration hydrograph for station P34 with the current water level and links to Everglades Depth Estimation Network (EDEN) gage pages and Explore and View EDEN (EVE) gage data.



Year	A Nesting	B Nesting	C Nesting	D Nesting	E Nesting	F Nesting
1992	56.2%	25.8%	95.2%	90.7%	100%	97.6%
1993	2.0%	0.2%	78.1%	60.1%	98.7%	97.4%
1994	22.9%	3.1%	54.6%	73%	96.2%	82.1%
1995	0%	0%	70.4%	44.7%	98.7%	89.7%
1996	21.4%	2.5%	79.1%	42%	100%	43.2%
1997	22.4%	10.5%	85.5%	55.1%	100%	81.2%
1998	27.1%	5.6%	87.5%	47.5%	98.3%	95.3%
1999	37.3%	8%	100%	71%	100%	100%
2000	55%	13.4%	90.9%	73.8%	100%	95.7%
2001	64.1%	39.5%	100%	100%	100%	100%
2002	73.5%	25%	99.6%	62.3%	100%	100%
2003	36.5%	2.6%	41.2%	25.5%	96.6%	58.5%
2004	51.3%	29.3%	100%	63.3%	100%	98.4%
2005	55.9%	24.7%	99.7%	83%	100%	76.4%
2006	56.7%	33.4%	98.5%	43.7%	100%	84.6%
2007	28.5%	6.2%	91.5%	35.6%	100%	97.4%
2008	64%	22.8%	100%	69.6%	100%	99.1%
2009	72.9%	18.3%	100%	67%	100%	86.8%
2010	29.8%	10.8%	77.3%	58.6%	100%	94.4%
2011	74.4%	62.3%	100%	99.6%	100%	100%
2012	56.7%	11.3%	56.8%	23%	100%	8.1%
2013	37.4%	0.6%	74.4%	12.9%	100%	8.5%
2014	67.4%	23%	95.3%	69.2%	100%	100%

Figure 5. Screenshot of table showing the summary statistics calculated for each subpopulation area for the sparrow nesting season. Nesting season statistics are the percentage of subpopulation area grid cells with ≥ 40 and ≥ 90 consecutive dry days. Annual statistics are also available (not shown in fig. 5), giving non-consecutive hydroperiod days (percentage of grid cells within each subpopulation area with water depth > 0 centimeter) binned at 0 to 89 days, 90 to 210 days, and ≥ 211 days.

References

Conrads, P.A., Petkewich, M.D., O'Reilly, A.M., and Telis, P.A., 2014, Hydrologic record extension of water-level data in the Everglades Depth Estimation Network (EDEN), 1991–99: U.S. Geological Survey Scientific Investigations Report 2014–5226, 27 p., <http://dx.doi.org/10.3133/sir20145226>.

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