Human Impact in Florida

IMAGINE *OUR* FLORIDA

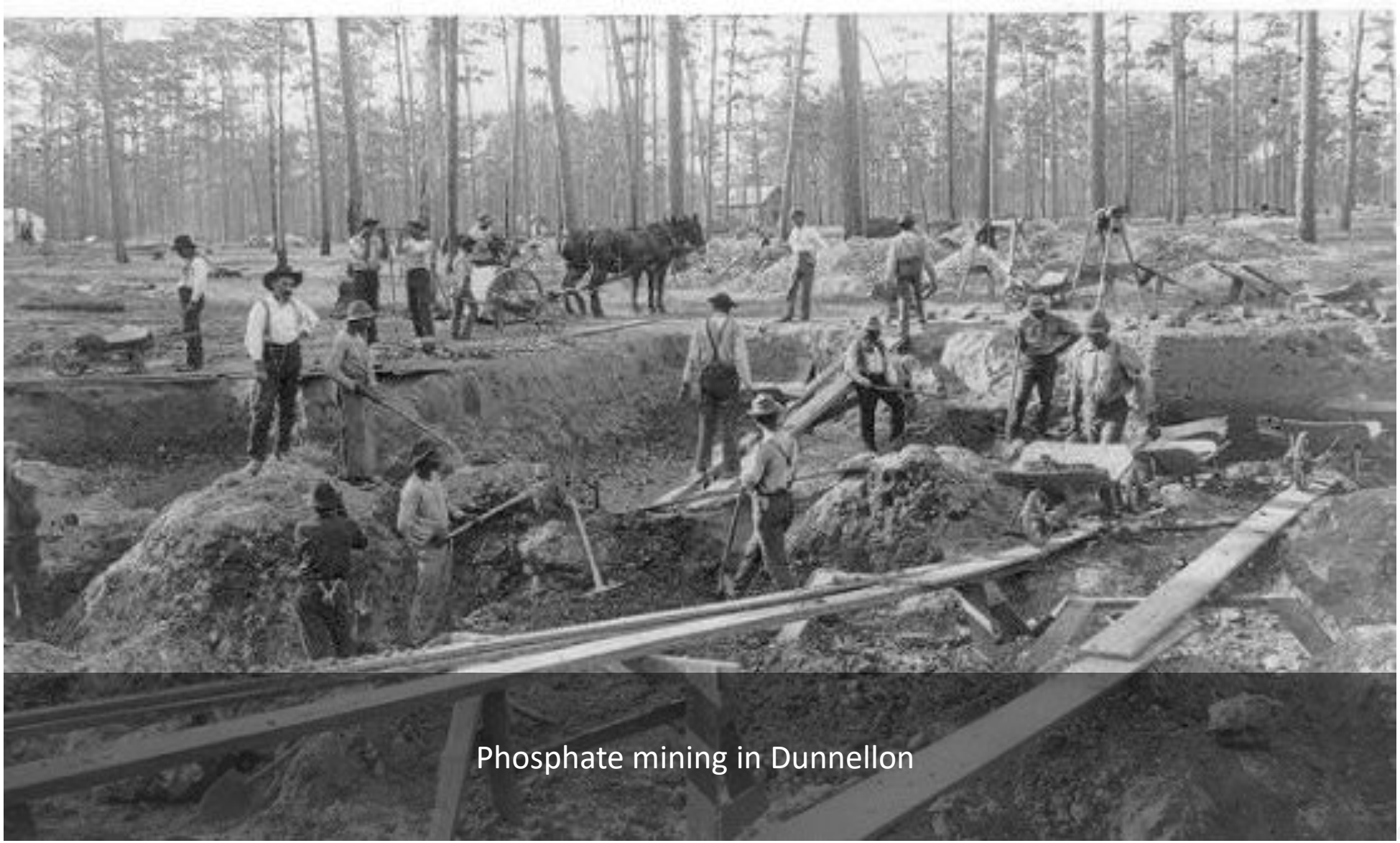
There are four major categories of human impact.

- Overexploitation of natural resources
- Habitat modification, fragmentation, and conversion
- Introduction of exotic species
- Pollution

Overexploitation of Natural Resources

- Due to high demand of plumage for Victorian hats, 95% of Florida's shorebirds were killed by the turn of the 1900 century (Burns 2009).
- Mining of phosphate, limestone, zircon, leucoxene, ilmenite, rutile, and sand became popular in the 20th century.
- Phosphate was used for fertilizer. Limestone, sand, and gravel were used for construction. Ilmenite and rutile were used for pigmentation in paints, plastic, and paper.
- Florida produces ¼ of the world's phosphate(Florida Department of Environmental Protection [FDEP] 2014).
- Mining removes plants, disrupts drainage patterns and recharge of the aquifer, changes soil profiles, and destroys habitat. The processing of phosphate also uses a lot of water which historically has drained springs (Derr 1998).

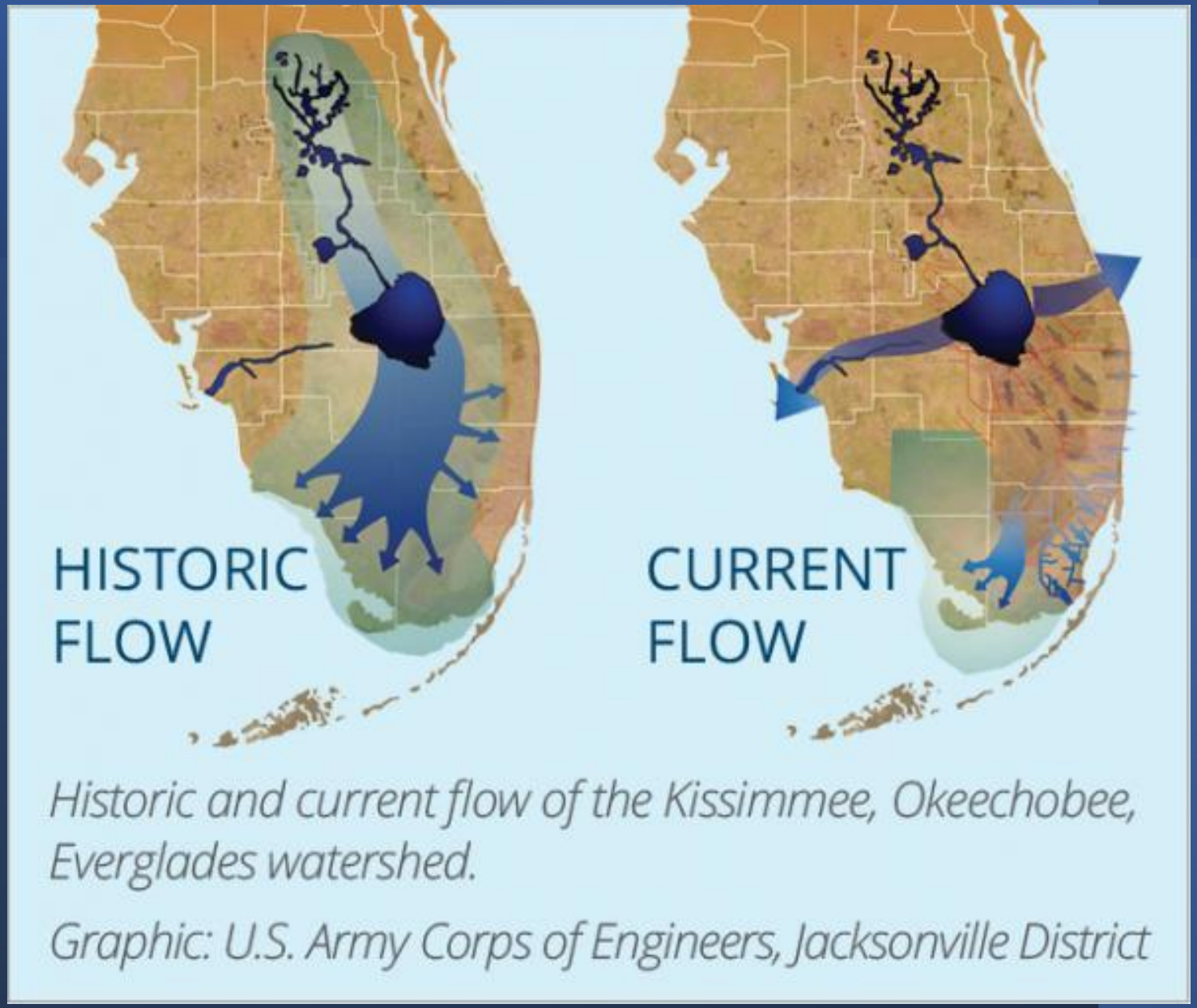
Old hats decorated with birds.
Photo credits: NPR.org



Phosphate mining in Dunnellon

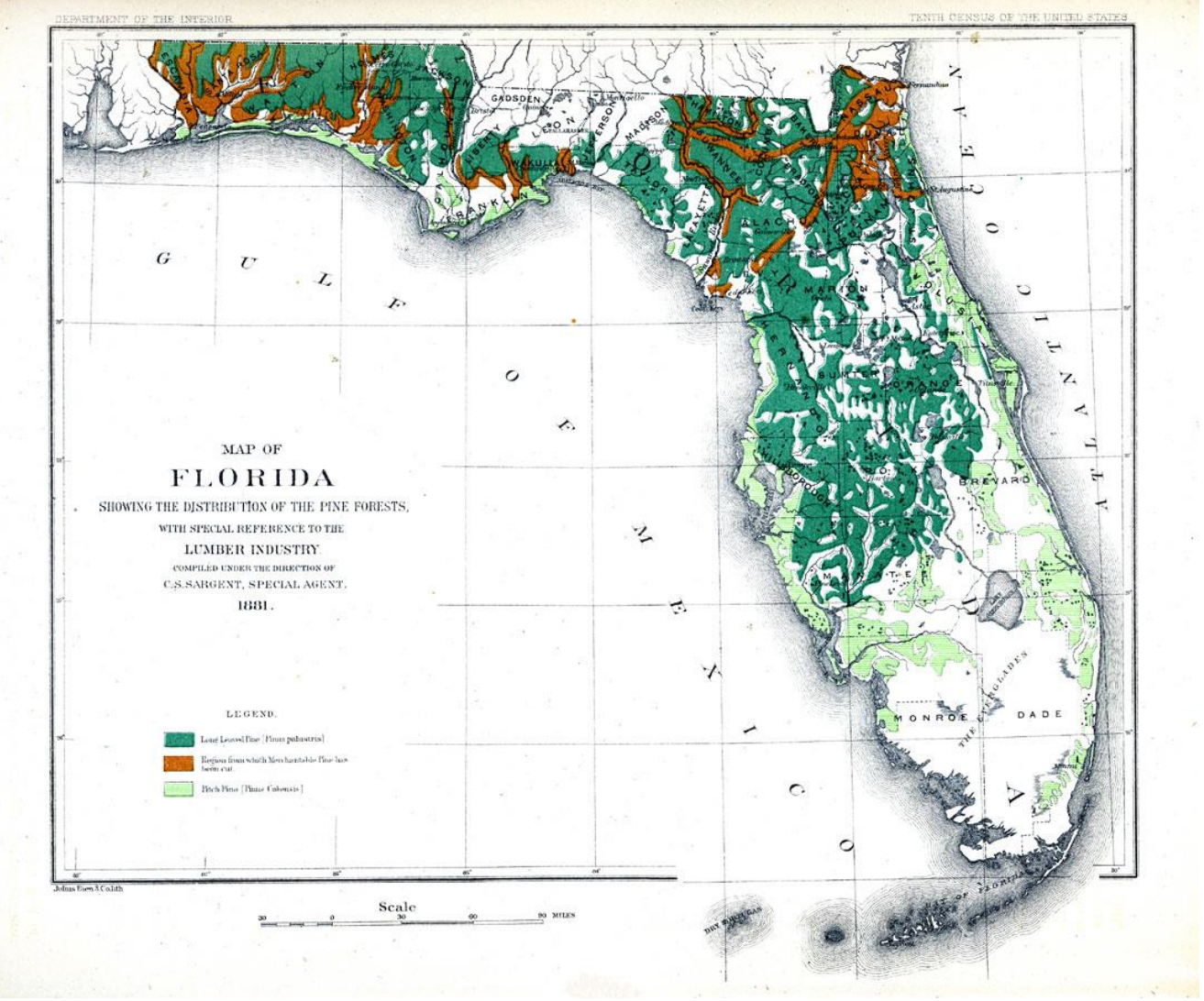
Habitat modification, fragmentation, and conversion

- Hydraulic conditions of the Everglades watershed for agriculture and development (National Park Service 2016).
- Destruction of longleaf pine ecosystems for timber and development (Myers and Ewel 1990).
- Overall, reduction and degradation of wild spaces due to rangeland, development, agriculture (Volk et al. 2017).
- Habitat fragmentation due to urban sprawl (Volk et al. 2017).

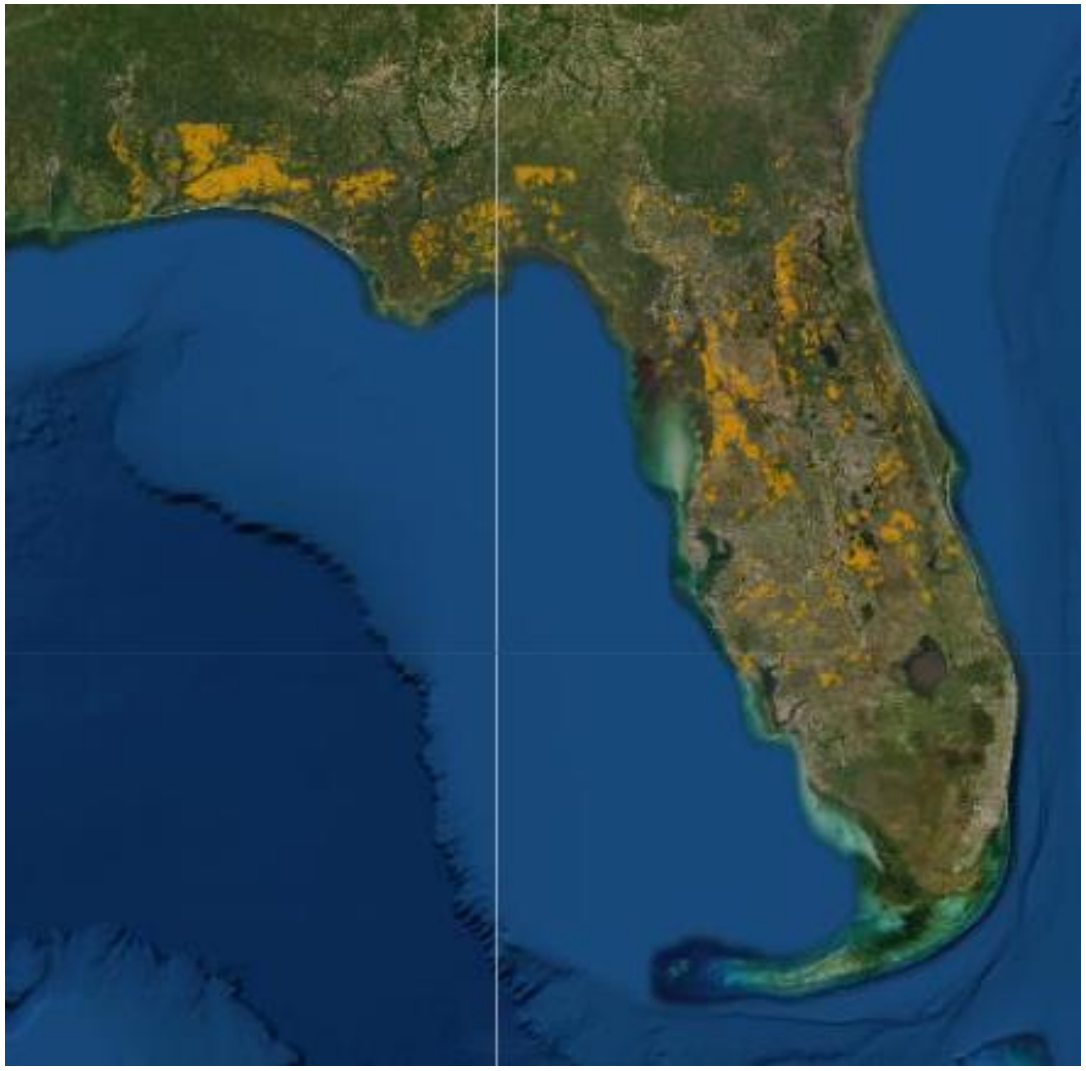


Historic and current flow of the Kissimmee, Okeechobee, Everglades watershed.

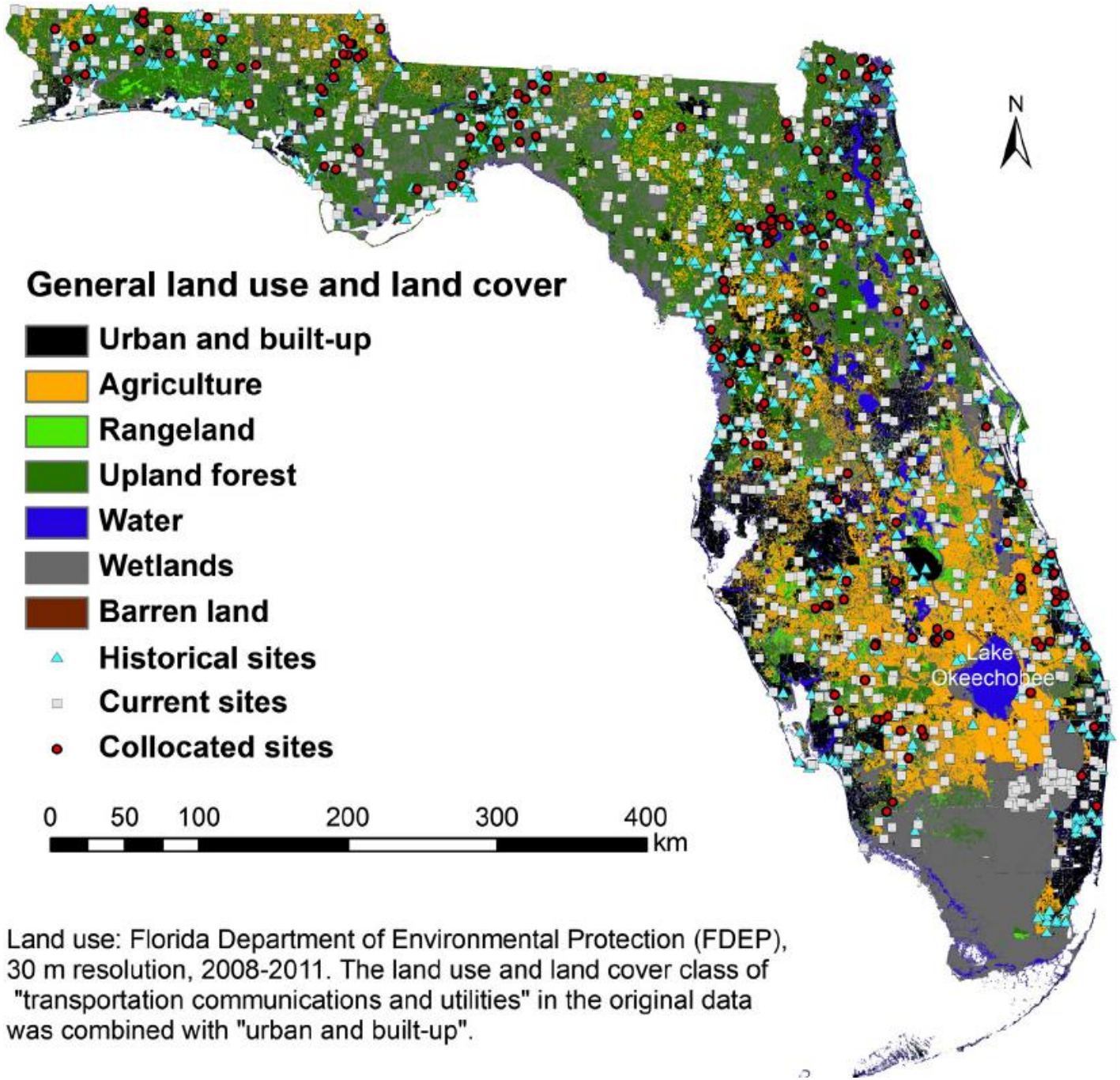
Graphic: U.S. Army Corps of Engineers, Jacksonville District



Historic map showing Longleaf pine (Dark green), pitch pine (light green), and cities (brown) in 1881. (USF Libraries Digitization Center).



Current map showing longleaf pine ecosystems (yellow) distribution throughout Florida (FNAI).



Land use: Florida Department of Environmental Protection (FDEP), 30 m resolution, 2008-2011. The land use and land cover class of "transportation communications and utilities" in the original data was combined with "urban and built-up".

Urban Sprawl

- In the early 1900's and before, most of Florida was only accessible by boat. This made it difficult for many people to inhabit the areas on a large scale (Turner 2003).
- Construction of railroads and highways along coasts and through the panhandle brought tourism (Derr 1998).
- The first boom in the 1920's was a result of the introduction of automobiles, window screens, vaccines for yellow fever, ice factories, and refrigerators (Derr 1998).
- The Post- World War II era brought new construction techniques and financing options leading to the second wave in the 1950's (Jackson 1995; Rome 2001).
- Increased popularity of air conditioners in the 1960's brought a third wave (Derr 1998).

The Florida Wildlife Corridor map vision is the Florida Ecological Greenways Network Priorities 1-3 (2021) developed and maintained by the University of Florida Center for Landscape Conservation Planning; Conserved Lands, Florida Natural Areas Inventory, May 2021.
Map by Archbold Biological Station, A. Meeks

Introduction of exotic species

After timberlands were mostly wiped out, Farmers imported trees to produce tung oil for paint, ink, and linoleum. By 1930, 90% of tung oil in the U.S. was from Alachua County (Robb and Travis 2013). Unfortunately these trees are highly invasive. By 1960 the tung oil industry was drastically diminished in Florida.

- Australian pine was brought in for shade.
- Brazilian pepper was introduced as an ornamental plant.

Tung Plant

Australian Pine

Brazilian Pepper

Pollution

In the 1920's sugarcane was brought to south Florida. Approximately 50% of the sugar in the U.S. comes from Florida (Baucum and Rice 2009). In addition to manipulating landscape and hydrology to prevent overflooding the crops, sugarcane resulted in high amounts of fertilizer runoff which lead to eutrophication, red algae blooms, and provides nutrients for invasive plants.

Sugar cane crops in South Florida

Conservation Efforts

1903- President Theodore Roosevelt declared the first National Wildlife Refuge in Florida, Pelican Island, as a way to preserve bird populations affected by plume hunting.

1908- President Roosevelt established Ocala National Forest to preserve land, a trend that has led to 1.2 Million acres of Federally protected land in Florida.

1915- Formation of the Everglades National Park to protect imperiled species.

Throughout the early 1900's, Water Mangement Areas were established to reduce flooding and would later take on other measures to protect and conserve water.

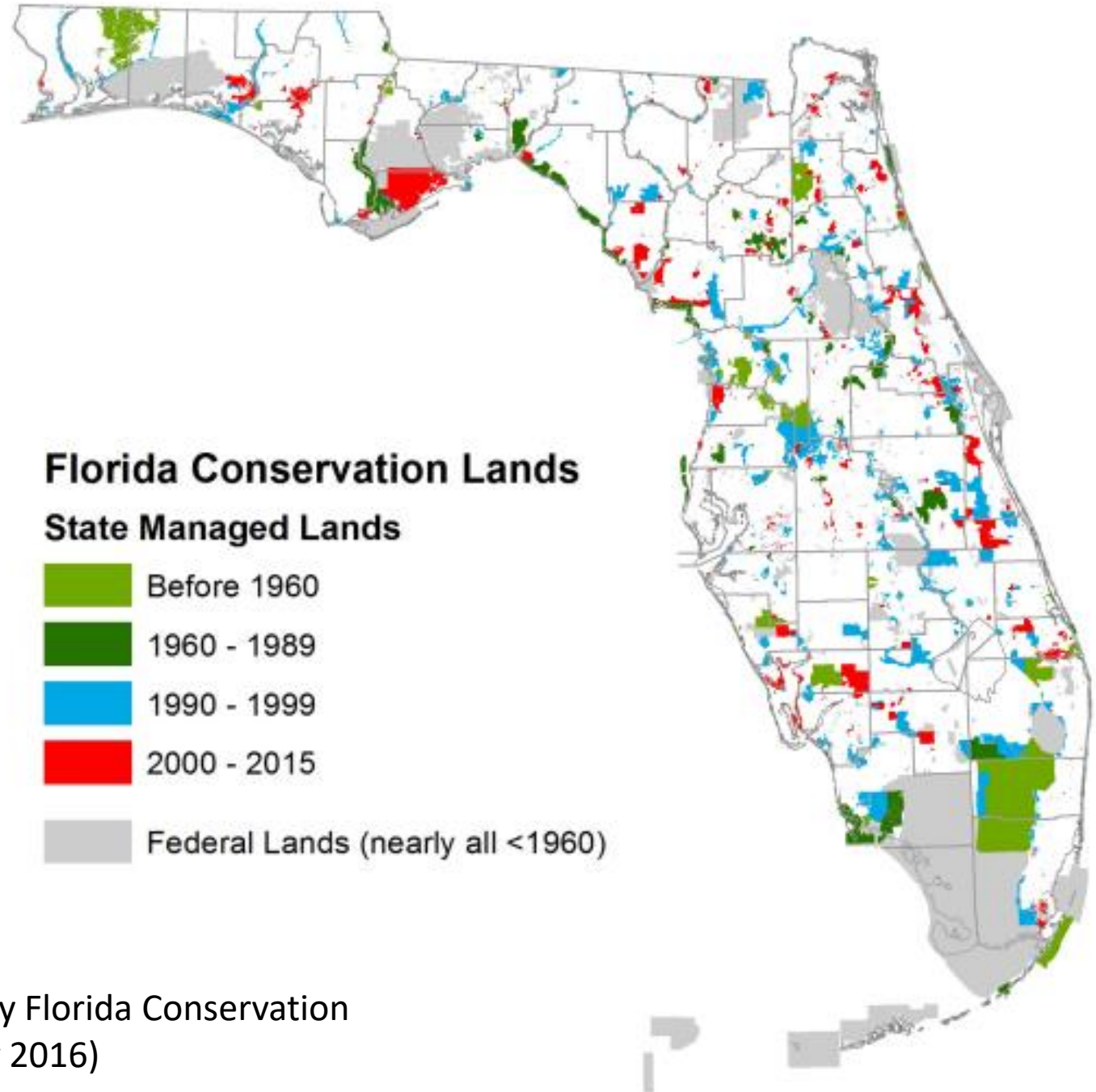
1929- Florida's first state park land was acquired to conserve biodiversity and water resources.

1936- Florida officially opened it's first state park, Pine Log State Park, in Panama, Florida. Today there are 175 State Parks.

1969- Science-based focuses on conservation were used to determine conservation land with specific goals in mind using programs such as Environmentally Endangered Lands (EEL), Conservation and Recreation Lands (CARL), Save Our Coasts, and Save Our Rivers (Knight et al. 2011)

1990- The CARL program was replaced by Preservation 2000 (P2000) , a 10-year land acquisition program funded by bond sales and became the largest land acquesition project in the country (Farr and Brock 2006).

1999- Florida Forever (FF) succeeded P2000. Its purpose was land acquisition, development of water resources, preservation and restoration of wildlands, greenways, nature trails, and recreation (Farr and Brock 2006).



Source: Florida Natural Areas Inventory Florida Conservation Lands (Florida Natural Areas Inventory 2016)

Climate Change Impact

- The coastal region in the big bend area, a previously underdeveloped area with vital forests, salt marshes, and salt terns, is at risk of sea level rise. Sea level rise can replace the existing ecosystems. Salt marshes and terns require high concentration of salt deposits. As tides go out, water evaporates leaving high concentrations behind. As sea level rise occurs, more water will be present for longer periods. This will dilute the salt concentration. Meanwhile, maritime forest ecosystems with plants such as cabbage palms and cedar will experience more exposure to salt, putting them at risk .
- Development, disruption of water flow, sea level rise, increased storm damage, and temperature change are causing shifts in the composition of mangrove forests (Doyle et al. 1995). In some cases, they are extending farther north and replacing other coastal ecosystems (Wunderlin and Hansen 2008; Zomlefer et al. 2006).
- The Florida Keys have experienced the replacement of slash pine by mangroves as a result of sea level rise (Alexander 1976; Ross et al. 1993).
- The "heat island effect" describes the increased temperatures as a result of heat radiating off buildings and roads in urban areas. Average temperatures were 2.9°C or 5.22°F warmer in urban areas than in those with tree coverage (Sonne et al. 2000).
- Average precipitation in Florida has declined by 10-20% (Marshall et al. 2004) due to development and agriculture, which can impact sea breeze and lead to temperature increases.

Future of Conservation

- Developing solutions for continued population growth could be addressed by higher density housing (Carr and Zwick 2016).
- Migration of populations inland due to sea level rise will need to address agricultural land use and the ability to protect undeveloped land (Vargas et al. 2014; Noss et al. 2014).
- Coastal protection and hardening measures will be needed to reduce the impact of sea level rise (Pilkey et al. 2009).
- Continued land use research and planning will need to be ongoing as trends, technology, and conditions change. (Volk et al. 2017)

References

- Alexander, Taylor R. 1974. Evidence of Recent Sea Level Rise Derived from Ecological Studies on Key Largo, Florida. In Environments of South Florida: Present and Past, edited by Patrick. J. Gleason, 219- 222. Miami, Fla.: Miami Geological Society.
- Baucum, Leslie E. and Ronald W. Rice. 2009. An Overview of Florida Sugarcane. IFAS Extension University of Florida. SS-AGR-232. Retrieved from http://ufdcimages.uflib.ufl.edu/IR/00/00/34/14/00001/SC03200.pdf
- Burns, Ken. 2009. The National Parks: America's Best Idea: Parks – Everglades. Retrieved from http://www.pbs.org/nationalparks/parks/everglades/
- Carr, Margaret and Paul D. Zwick. 2016. Florida 2070 Mapping Florida's Future – Alternative Patterns of Development in 2070. Technical Report. 1000 Tallahassee, Fla.: 1000 Friends of Florida.
- Derr, Mark. 1998. Some Kind of Paradise: A Chronicle of Man and the Land in Florida. Gainesville, Fla.: University Press of Florida.
- Doyle, Thomas W., Thomas J. Smith III, and Michael. B. Robblee. 1995. Wind Damage Effects of Hurricane Andrew on Mangrove Communities along the Southwest Coast of Florida, USA. Journal of Coastal Research 21:159–168.
- Farr, James A. and O. Greg Brock. 2006. Florida's Landmark Programs for Conservation and Recreation Land Acquisition. Sustain 14: 35–44.
- Florida Department of Environmental Protection. 2014. Florida Minerals: Making Modern Life Possible. Retrieved from http://www.dep.state.fl.us/geology/geologictopics/minerals.htm
- Jackson, Kenneth T. 1985. Crabgrass Frontier: The Suburbanization of the United States. New York: Oxford University Press.
- Knight, Gary R., Jon B. Oetting, and Lou Cross, eds. 2011. Atlas of Florida's Natural Heritage – Biodiversity, Landscapes, Stewardship, and Opportunities. Tallahassee, FL: Institute of Science and Public Affairs, Florida State University.
- Marshall, Curtis H., Roger A. Pielke, Louis T. Steyaert, and Debra A. Willard. 2004. The Impact of Anthropogenic Land-Cover Change on the Florida Peninsula Sea Breezes and Warm Season Sensible Weather. Bulletin of the American Meteorological Society. 132(1): 28-52. doi: http://dx.doi.org/10.1175/1520-0493(2004)132<0028:TIOALC>2.0.CO;2
- Myers, Ronald L. and John J. Ewel. 1990. Ecosystems of Florida. Orlando: University of Central Florida Press
- National Park Service. 2016. Natural Features & Ecosystems. Retrieved from https://www.nps.gov/ever/learn/nature/naturalfeaturesandecosystems.htm
- Pilkey, Orrin H., William J. Neal, and David M. Bush. 2009. Coastal Erosion. In Coastal Zones and Estuaries, edited by Federico Ignacio Isla and Oscar Iribarne, 32-42, Oxford, UK: EOLSS Publishers.
- Robb, Jeffrey B. and Paul D. Travis. 2013. The Rise and Fall of the Gulf Coast Tung Oil Industry. Forest History Today. Retrieved from http://www.foresthistory.org/publications/FHT/FHTSpringFall2013/TungOil.pdf
- Rome, Adam. 2001. The Bulldozer in the Countryside: Suburban Sprawl and the Rise of American Environmentalism. Cambridge: Cambridge University Press
- Ross, Michael S., Joseph J. O'Brien, Leonel da Silveira, and Lobo Sternberg. 1994. Sea-Level Rise and the Reduction in Pine Forests in the Florida Keys. Ecological Applications 4(1): 144-156.
- Sonne, Jeffrey K. and Robin K. Viera. 2000. "Cool Neighborhoods: The Measurement of Small Scale Heat Islands." Proceedings of 2000 Summer Study on Energy Efficiency in Buildings, American Council for an Energy-Efficient Economy, 1001 Connecticut Avenue, Washington, DC.
- Turner, Gregg. 2003. A Short History of Florida Railroads. Charleston, S.C.: Arcadia Publishing. U.S. Census Bureau. 1910. Supplement for Florida. Retrieved from https://www2.census.gov/prod2/decennial/documents/41033935v9-14ch01.pdf
- Vargas, Juan C., Michael Flaxman, and Barry Fradkin. 2014. Landscape Conservation and Climate Change Scenarios for the State of Florida: A Decision Support System for Strategic Conservation. Summary for Decision Makers. GeoAdaptive LLC, Boston, MA and Geodesign Technologies Inc., San Francisco CA.
- Volk, Michael, Hoctor, Thomas, Nettles, Belinda, Hilsenbeck, Richard, Putz, Francis, Oetting, Jon. 2017. Florida Land Use and Land Cover Change in the Past 100 Years. 10.17125/fci2017.ch02.
- Wunderlin, Richard P., Bruce F. Hansen, Alan R. Franck, and F. B. Essig. 2016. Atlas of Florida Plants. http://florida.plantatlas.usf.edu/. USF Water Institute.] Institute for Systematic Botany, University of South Florida, Tampa.
- Zomlefer, Wendy B., Walter S. Judd, and David E. Giannasi. 2006. Northernmost Limit of Rhizophora mangle (Red Mangrove; Rhizophoraceae) in St. Johns County, Florida. Castanea 71(3):239–244. doi: http://dx.doi.org/10.2179/05-33.1