

Lost Among the Skeletons: Mapping Remnant Live Oak Habitats in Southeast Louisiana & Exploring Cultural Loss in Ghost Forests

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Live Oak Losses in Southeast Louisiana

Clearing of live oak natural levee forests for agricultural & residential development began during the settler-colonial period. Today, only 1-5% of their historic range remain, and these forest remnants are extremely fragmented. Live oak forests face additional threats from invasive species, saltwater intrusion, & infrastructure development.
(LDWF 2005, Day Jr. et al. 2007, White and Skojac 2002)



Living Oaks in New Orleans



Skeleton Oaks in St. Bernard Parish

Live Oak Forest Biodiversity & Indigenous Communities

Live oak forests are culturally significant to local Indigenous communities:

- Source of many traditional foods & medicinal plants
- Wildlife habitat for Louisiana black bear, bald eagle, and wetland & migratory birds
- Provide protection from heat, hurricane winds, & storm surge
- Guardians of sacred burial mounds

Plant diversity declines as the land changes from freshwater to saltwater ecosystems:

- Traditional food & medicinal systems restricted to salt-tolerant species

These changes result in a reduced ability to engage in subsistence activities and limit access sacred areas related to live oak forests.

(Giardino 2010, Bethel et al. 2011, Dunn 1983, Moerman 1998, Greer 2019)



Fig. 1: (A) Elderberry, *Sambucus canadensis*: Berries are used for jellies & drinks, flowers & berries into teas for colds & flus. Bark is boiled to make a poultice for pain, swelling, & burns. (B) Night-Crowned Heron resting in the limbs of a live oak tree. (C & D) Live Oak, *Quercus virginiana*: The bark is used as an astringent to treat aches, sores, & hemorrhages. Boiled, the bark & roots create a red dye. Acorns are used as a food source. (C) Spanish moss (*Tillandsia usneoides*) is boiled in a tea to relieve fevers and chills; the cordage is also crafted into dolls. (D) Resurrection fern (*Pleopeltis polypodioides*) from the live oak tree are boiled into a tea & used to wash sore mouth or bleeding gums.

Natural Protection Efforts

- **Oyster Shell Reefs** are natural breakwaters that protect shorelines against wave erosion and storm surge, preventing further habitat migration and land loss. One elder taught his children the importance of returning oyster shells to the bay around a burial mound, so reefs could replenish themselves and continue to protect the land.
- **River Diversions** which allow freshwater & sediments from the Mississippi River to reach the wetlands and build the land back up.
- **Marsh Restoration** by encouraging replanting in at-risk areas supported by sediment diversions.
- **Reforestation** of areas that are still intact and may be built back up from sediment diversions.

(Barras et al. 2003, Bendick et al. 2018, Brown et al. 2011)

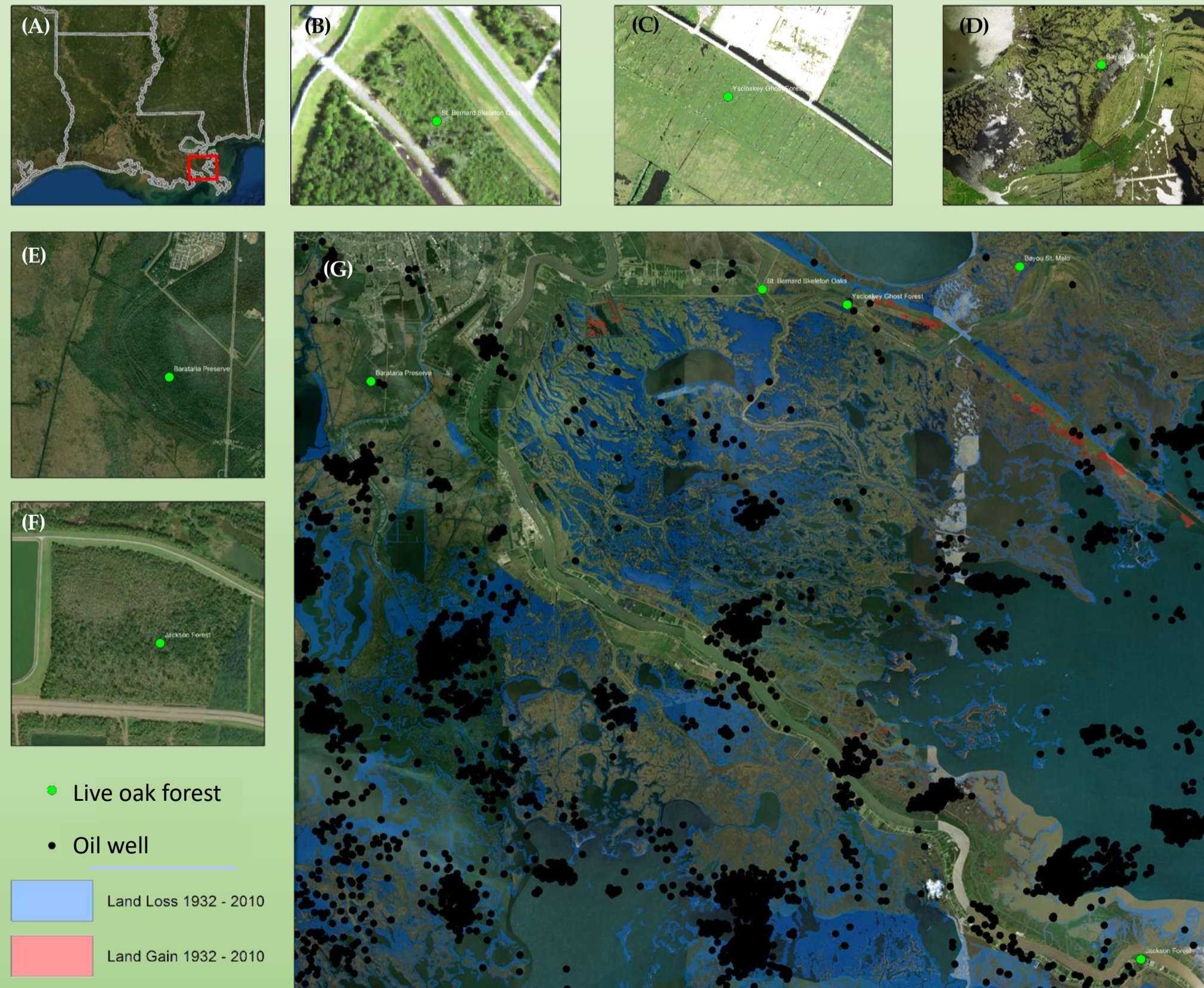
Ghost Forests & Saltwater Intrusion

- **Ghost Forests** are stands of dead trees left behind after saltwater intrusion into freshwater forests
- Causes of Saltwater Intrusion:
 - Leveeing of the Mississippi to halt seasonal flooding
 - Oil & natural gas extraction leading to down-faulting
 - Hurricane storm surge in impounded wetlands
 - Deep, straight navigation & oil extraction canals act as passages for saltwater intrusion

(Bethel et al. 2011, Colten 2017, Day et al. 2000, Davis 1973, Keim et al. 2019, Salinas et al. 1986)



Remnant Oak Forests & Land Loss Maps



Conclusion

Habitat change occurs as freshwater systems, like live oak forests, convert to saltwater marshes that can handle the new brackish conditions. Continued erosion eventually leads to completely open waters. Live oaks can grow to be several hundred to over a thousand years old. They are elders who teach lessons about community, support, change, and generosity. Live oak forests act as cultural protections for the way they provide food and medicinal plants, guard burial grounds, and shelter against intense heat or strong storms. In return, we must also protect these elders and the communities they form.

References

1. Salinas, L.M., R.D. DeLaune, and W.H. Patrick, Jr. 1986. Changes occurring along a rapidly submerging coastal area: Louisiana, USA. *Journal of Coastal Research* 2(3): 269-284. Fort Lauderdale, ISSN 0749-0208
2. White, David A, and Stephanie A Skojac. 2002. "Remnant Bottomland Forests near the Terminus of the Mississippi River in Southeastern Louisiana." *Castanea* 67: 12.

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Research Question

How are biocultural aspects of live oak forests in southeast Louisiana affected by conversion to brackish ghost forests?

Methods & Materials

- Identification of three intact live oak natural levee forests & one ghost forest using previous studies and environmental assessments:
 - Barataria Preserve Forest, Jefferson Parish (Fig 2E)
 - Bayou St. Malo Ridge, St. Bernard Parish (Fig 2D)
 - Jackson Forest, Plaquemines Parish (Fig 2F)
 - St. Bernard Parish Skeleton Oaks (Figs 2B & 2C)
- GIS provided imaging and visual analysis of the forests; overlaying maps of canals, pipelines, oil & gas fields, land loss, and forest data highlighted land conversion risk factors in the area. (Figures 2 A-G)