

The Economics of Oil Development in the Everglades: Bad Business, Huge Risks



Prepared for Natural Resources Defense Council
by Evan Hjerpe, PhD, Conservation Economics Institute

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Cover Photos: Vibroseis Vehicles and Seismic Survey Lines in Big Cypress National Preserve
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Executive Summary

Why drill for oil in the Everglades? Both current production and the prospects for future expansion are minimal. Yet efforts continue to develop small amounts of oil and gas, at the expense of Florida's sensitive natural resources, including the Everglades. Expanded oil and gas exploration and drilling would cause irreparable harm to Florida's natural resources and would jeopardize the state's leading industry, tourism. On the other hand, the small size of Florida's oil industry means that there would be very little economic harm from imposing a statewide legislative ban on well stimulation techniques, such as hydraulic fracturing (also known as fracking) or acidizing, that could cause significant environmental damages.

Oil drilling and production employs less than a thousand of Florida's workforce of more than 10.5 million people. Oil and gas extraction account for 0.0002 percent of state GDP (gross domestic product, i.e., the value of all goods and services produced in the state) – essentially invisible. Likewise, Florida oil production is a small fraction (less than 0.04 percent, or one-twenty-fifth of one percent) of U.S. oil production; 22 other states produce more. Broadly speaking, oil production does not matter to the Florida economy, and Florida does not matter to oil production.

Florida has two oil-producing regions: at the western end of the Panhandle, bordering Alabama; and in southern Florida, in and around the Big Cypress National Preserve, a key part of the Everglades ecosystem. In 2020, the northern (Panhandle) region accounted for about three-quarters of the state's modest oil output and more than 99 percent of its natural gas production. Yet owners of privately held minerals in the Everglades have been granted state and federal approvals to explore for more oil. For example, a Texas-based oil company, Burnett Oil Company, began destructive seismic exploration in sensitive ecosystems in the Big Cypress National Preserve in 2017 in its quest to find more oil¹ and has since applied for state and federal approvals to drill. Private mineral owners have also applied to search for oil on private lands north of the Big Cypress National Preserve, but the Florida Department of Environmental Protection denied the permit application.² Similarly, other oil exploration projects proposed to take place on state and private lands adjacent to the preserve³ and in a water conservation area in western Broward County failed to move forward.⁴

The fossil fuel industry's interest in oil production in and near the Everglades threatens public lands, natural and cultural resources, wildlife, water supplies – and losses to Florida tourism, a vastly larger industry than oil. In 2019, out-of-state visitors, both domestic and international, spent \$99 billion in Florida and supported 1.6 million jobs. Attempts to value Florida's natural resources, which are both of benefit to residents and a major draw for tourism, have produced estimates in the billions of dollars per year. Recreational boating and saltwater fishing each support more than 80,000 jobs in the state. Losing

¹ See Quest Ecology, *Seismic Survey Inspection Report Big Cypress National Preserve* (June 2019), available at: <https://www.nrdc.org/sites/default/files/seismic-survey-inspection-report-20190615.pdf>.

² <https://seminoletribune.org/state-denies-permit-for-immokalee-oil-well/>.

³ <https://www.nationalparkstraveler.org/2020/08/oil-company-drops-exploration-plan-near-big-cypress-national-preserve>.

⁴ <https://www.nationalparkstraveler.org/2020/01/groups-want-florida-purchase-big-cypress-national-preserve-mineral-rights>.

any noticeable part of tourism to oil exploration and production makes sense only to private mineral owners and the fossil fuel industry.

Energy experts doubt that there is enough oil in Florida to support a substantial industry. But even if it were possible to switch from a tourism-based state economy to an oil-based one, would it be good for Floridians economically? The oil industry is unusually volatile, in Florida and elsewhere. Tourism-related employment is remarkably stable by comparison: since 1990, Florida hotel and restaurant jobs, and Florida real estate and rental jobs have both increased by 60 percent.⁵

Oil well stimulation techniques such as fracking and acidizing facilitate production from unconventional oil deposits. In Florida, acidizing is more likely to be used than fracking due to the state's geology, in which porous limestone houses aquifers used for drinking water supplies (see Section 4, below). Wastewater from these techniques can contain hazardous pollutants and pose threats to groundwater aquifers – crucial sources of Florida's drinking water. Proposals for a statewide legislative ban on fracking and acidizing techniques have been introduced in recent years, with bipartisan support, in both houses of the state legislature. While a statewide ban has not yet been adopted, approximately two-thirds of Florida residents live in a county or city that has adopted local bans or resolutions opposing fracking. Since oil production plays such a small role in the Florida economy, and reserves are estimated to be quite small, there would be little economic loss from passing a legislative statewide ban on fracking and acidizing.

Florida possesses clean energy resources and related employment opportunities, which would be more sustainable for Florida's economy than oil. The Sunshine State has recently experienced large increases in installed solar capacity – the Solar Energy Industries Association ranks Florida as third in the country for solar capacity installed. However, solar power could employ many more than the current 11,200 people in Florida if the state promoted renewable energy more vigorously. Unlike oil spills and fossil fuel emissions, responsibly sited solar panels do not destroy the beaches, natural resources, and wildlife that draw so many tourists to Florida and fuel its economy.

With climate change effects already occurring in Florida, it is economically prudent to restrict future oil development and to instead protect natural resources to assist with climate resilience and refuge for biodiversity. Climate change increases the odds that future oil development in Florida will create physically and economically stranded assets that will be environmental liabilities with little financial value. Additionally, allowing new oil development in Florida is directly at odds with federal and regional goals of decreasing greenhouse gas emissions and restoring the hydrologic flows of the Everglades. Risking damage to aquifers and groundwater caused by new oil exploration and development not only threatens the Everglades ecosystem, but also threatens the foundational pieces for some of the biggest economic sectors in Florida such as agriculture, real estate, and tourism. The risks of new oil development in Florida are simply not worth the minimal returns to a few private mineral owners.

⁵U.S. Department of Labor Bureau of Labor Statistics, Current Employment Statistics, as reported by Florida Department of Economic Opportunity, <http://www.floridajobs.org/workforce-statistics/data-center/statistical-programs/current-employment-statistics>.

1. OIL PRODUCTION AND THE FLORIDA ECONOMY

1.1. Jobs Due to Oil Production

Total civilian employment in Florida is more than 10,500,000 people.⁶ According to the federal Bureau of Labor and the Florida Department of Economic Opportunity, mining (which includes oil drilling) and logging account for only 5,700 Florida jobs. However, the logging sector currently employs about 1,600 people in Florida⁷ and “mining, except oil and gas” employs approximately 3,400 Florida residents.⁸ This leaves only about 700 jobs in oil and gas production, or less than one for every 15,000 jobs in the state. These numbers pale in comparison to the tourism industry (see Section 3 below), which accounts for more than one million jobs in the state.

Much higher, misleading figures for Florida oil industry employment have been published,⁹ including an outlier estimate from the oil industry itself. The American Petroleum Institute (API) claimed that the oil and gas industry directly contributes \$5.3 billion (and \$23.2 billion when including multiplier effects) to the Florida economy and supports 72,000 direct jobs (and 286,800 jobs when including multiplier effects) in the state.¹⁰ The source of this claim is a study of the oil and gas industry’s contribution to the national economy done for API by the accounting firm PricewaterhouseCoopers (PwC).¹¹ However, it is important to note that these estimates included vast multiplier effects, where indirect and induced effects in numerous industry sectors not related to oil and gas production are included in the job estimates.¹²

⁶U.S. Department of Labor, Bureau of Labor Statistics, “Economy at a glance: Florida,” <https://www.bls.gov/eag/eag.fl.htm>. Last visited December 13, 2021.

⁷ U.S. Department of Labor Bureau of Labor Statistics, https://data.bls.gov/cew/apps/table_maker/v4/table_maker.htm#type=8&year=2021&qtr=2&own=5&area=12000&supp=0. Last visited December 13, 2021.

⁸ Florida Department of Economic Opportunity, <http://lmsresources.labormarketinfo.com/library/press/release.pdf>. Last visited December 13, 2021.

⁹ One academic study made the implausible estimate that there were 18,621 Florida jobs in the extraction of natural gas and crude petroleum (Alan Hodges et al., “Economic contributions of agriculture, natural resources, and food industries in Florida in 2015,” available at: http://economic-impact-of-ag.com/FL/2017FL_Economic_Contributions_of_Agriculture_Natural_Resources_and_Food_Industries_in_Florida_in_2015-1jks9d.pdf.) That estimate is more than 2 percent of all oil and gas production jobs nationwide, even though Florida produces only 0.04 percent of the nation’s oil (see Section 1.2 below). For comparison, the Bureau of Labor Statistics (BLS) estimate for Florida employment in Oil and Gas Extraction (NAICS 2111) is 91 jobs for 2017 and currently 59 jobs in 2021. We have not seen any support for the Hodges et al. estimate, which is almost 250 times greater than reported BLS values. Similarly, Hodges et al. estimate 2,708 jobs in the Drilling Oil and Gas Wells sector, yet the BLS estimate for 2021 is 111 jobs in this sector.

¹⁰American Petroleum Institute, Oil and Natural Gas Stimulate Florida Economic and Job Growth, https://www.api.org/-/media/Files/Policy/Jobs/Economics-Nat-Gas-Oil/API_OilEconomy_Florida.pdf.

¹¹ PricewaterhouseCoopers, 2013, “Economic Impacts of the Oil and Natural Gas Industry on the U.S. Economy in 2011,” https://www.api.org/~media/Files/Policy/Jobs/Economic_Impacts_ONG_2011.pdf.

¹² A good example of how API and PwC exaggerate the economic impacts of the oil and gas industry nationally and in Florida comes from the most recent PwC study for 2019 (<https://www.api.org/-/media/Files/Policy/American-Energy/PwC/API-PWC-Economic-Impact-Report.pdf>). For Florida, the direct employment for the oil and gas industry is estimated at approximately 70,000 jobs, down from their 2011 estimate of 72,000 direct jobs. However, when adding in the indirect and induced jobs, the 2019 estimate for Florida oil and gas employment ballooned to over 460,000 jobs, up from the 2011 estimate of 287,000 total jobs. Taken at face value, PwC indicates that direct oil and gas employment in the state of Florida has fallen by 2,000 jobs from 2011 to 2019, yet, when including multiplier effects, total oil and gas related employment for Florida supposedly increased by 173,000 jobs from 2011 to 2019. We could not find any documentation to support this large discrepancy and therefore must question the accuracy of these estimates. Finally, employment multipliers can be calculated as the ratio of total employment

In addition to including indirect and induced effects, the PwC study defines the oil and gas industry as including gas stations, fuel dealers, natural gas distribution companies, asphalt paving and roofing, other petroleum products, and manufacturing and wholesaling. Oil and gas production, supporting activities for oil and gas, and refining represented less than half of national total employment in PwC’s sprawling definition of the oil and gas industry. PwC did not provide a breakdown of employment by individual activities for Florida, but since the state has so few jobs in oil and gas production, and no refineries, actual oil production and processing must account for very little of PwC’s Florida employment estimate. Rather, the state’s alleged inflated numbers of “oil industry” jobs, as perceived by API and PwC, must almost exclusively consist of gas stations and the like.

1.2. The Importance (or Lack Thereof) of Florida Oil

As with employment, oil represents only a tiny sliver of Florida’s economic activity, or gross domestic product (GDP). In 2020, Florida state GDP was \$1.1 trillion dollars.¹³ Of that total, oil and gas extraction accounted for just \$25.4 million, or 0.0002 percent of the state’s total GDP (see Figure 1 below).

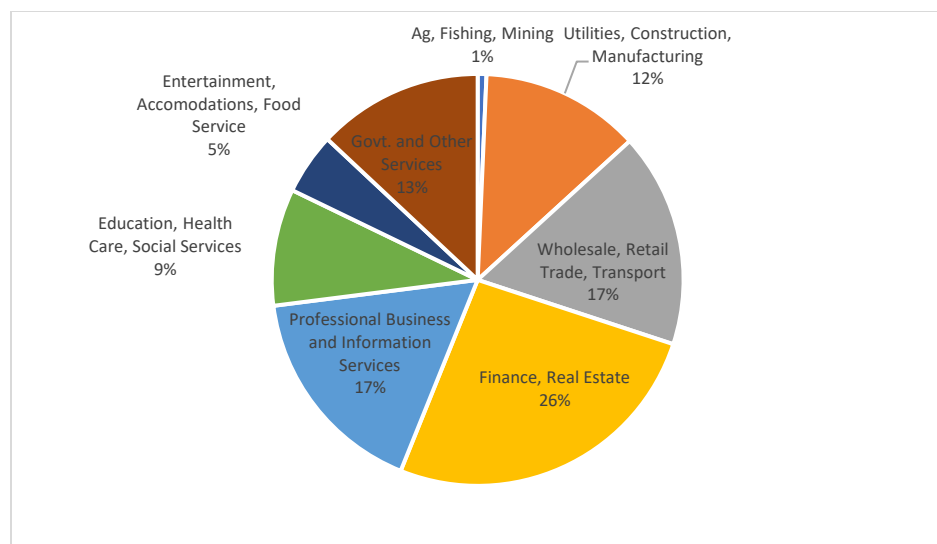


Figure 1: Shares of Florida GDP by Industry 2020*

*Oil and Gas Extraction are included with Agriculture, Fishing, and Mining and account for merely 0.0002 percent of total Florida GDP.

Source: Calculated from Bureau of Economic Analysis

Tourism, widely seen as one of Florida’s leading industries today (see Section 3 below), does not appear as a standalone category in GDP data. However, tourism undoubtedly accounts for much of entertainment, accommodation, and food service, as well as significant parts of rentals, transportation,

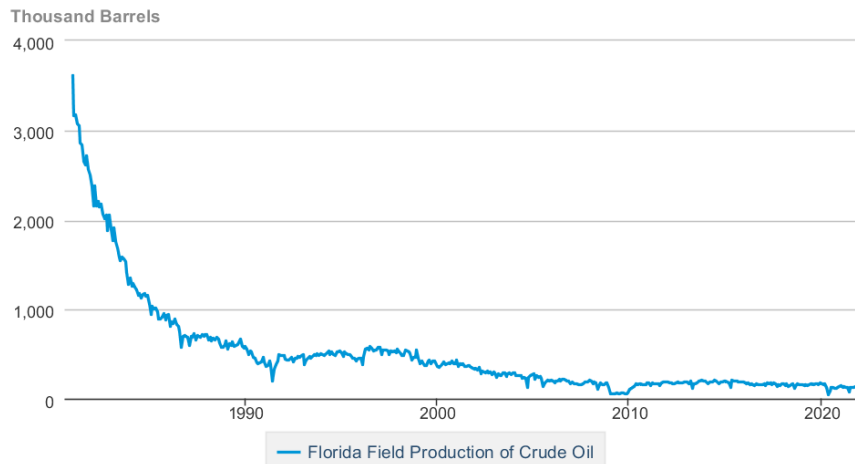
(that includes indirect and induced effects) to direct employment. The latest PwC study shows an employment multiplier effect of 6.6 (460,000 total jobs/70,000 direct jobs), which is virtually impossible at the state level and unheard of in the economics literature. These inconsistencies further call into question the accuracy of API claims of regional economic impacts of the oil and gas industry.

¹³ U.S. Commerce Department, Bureau of Economic Analysis, <https://apps.bea.gov/itable/iTable.cfm?ReqID=70&step=1#reqid=70&step=1&isuri=1>. Last visited December 17, 2021.

and trade, and perhaps other sectors as well. Thus, if tourism were shown as a sector of Florida GDP, it would be a major contributor to total state GDP— unlike oil and gas.

Florida oil production peaked in 1978, at roughly 130,000 barrels per day (bbl/day), due primarily to the Jay Field in the Panhandle in northwestern Florida.¹⁴ However, Florida oil production has declined sharply since then to roughly 4,000 bbl/day by 2021 and there have been limited oil field discoveries since the 1980s (see Figure 2).¹⁵

Florida Field Production of Crude Oil



 Source: U.S. Energy Information Administration

Figure 2: Decline in Florida Crude Oil Production

In 2021, Florida ranked only 23rd among the 32 oil-producing states, accounting for only 0.04 percent (one-twenty-fifth of one percent) of total U.S. oil production (see Figure 3).¹⁶ The nine named states in Figure 3, other than Florida, plus federal offshore wells, produced 96 percent of the nation’s oil. Today, Florida has less than 0.1 percent of the nation’s crude oil reserves.¹⁷

¹⁴ U.S. Energy Information Administration, “Florida state profile, 2021,” available at: <https://www.eia.gov/state/analysis.php?sid=FL>. Last visited January 21, 2022.

¹⁵ *Id.*

¹⁶ U.S. Energy Information Administration (EIA), “Monthly Crude Oil and Natural Gas Production,” available at: <https://www.eia.gov/petroleum/production/>. Last visited December 21, 2021.

¹⁷ U.S. EIA, Crude Oil Proved Reserves, Reserves Changes, and Production, Proved Reserves, as of December 31, 2014-19.

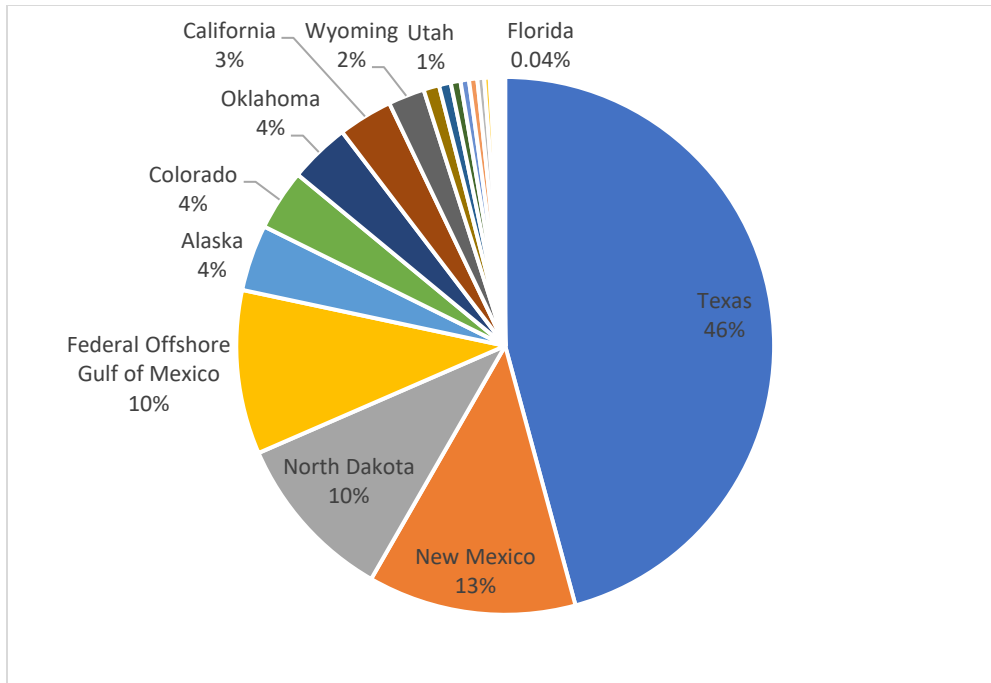


Figure 3: Crude Oil Production by State for September 2021

Source: U.S. Energy Information Administration (EIA) data

In summary, the oil industry represents an insignificant fraction of Florida employment and GDP, and Florida represents an insignificant fraction of U.S. oil production. Broadly speaking, oil production does not matter to the Florida economy, while Florida does not matter to oil production.

2. DRILLING IN THE EVERGLADES

Florida has two oil-producing regions: a northern one at the western end of the Panhandle, bordering Alabama; and a southern one, known as the Sunniland oil trend, in south Florida, which spreads over the southwest Everglades.¹⁸ The oil fields within this trend include Raccoon Point and Bear Island, which are located within the Big Cypress National Preserve (hereinafter, “Big Cypress” or “Preserve”).¹⁹

In 2020, Florida produced a total of 4,078 bbl/day of oil.²⁰ The northern Panhandle oil fields produced about three-quarters of the state’s oil and more than 99 percent of its natural gas. In comparison, the five active oil fields in south Florida produced only about one-quarter of the state’s oil (1,114 bbl/day) and very little natural gas in 2020.²¹ Raccoon Point and Bear Island, the two existing oil fields within Big

¹⁸ Florida Department of Environmental Protection, “Florida State Production Data 2000 to 2021,” <https://floridadep.gov/water/oil-gas/documents/state-production-data-2000-2021>. Last visited December 21, 2021.

¹⁹ U.S. Department of Interior, National Park Service, Big Cypress National Preserve, A National Preserve - One Land, Many Uses, <https://www.nps.gov/bicy/learn/the-first-national-preserve.htm>. Last visited December 21, 2021.

²⁰ Calculated from Florida Department of Environmental Protection (DEP), “Florida State Production Data 2000 to 2021,” <https://floridadep.gov/water/oil-gas/documents/state-production-data-2000-2021>. Last visited December 21, 2021.

²¹ *Id.*

Cypress, produced only 585 bbl/day in 2020, which is about one-seventh of the state total for the year.²² Nonetheless, oil companies have continued to express interest in searching for oil in the Everglades.

The fossil fuel industry has set its sights on new parts of the Everglades in its pursuit of oil, including the Big Cypress National Preserve, which is a part of the National Park System. Located just to the north of Everglades National Park, Big Cypress covers over 700,000 acres that includes much of the western Everglades.²³ Providing 42 percent of the water flowing into Everglades National Park, the Big Cypress basin is a vast hydrologic network — among the least altered environments remaining in south Florida. Water flows on the surface in marshes and sloughs and below ground through porous substrate in aquifers. Big Cypress Swamp is a significant aquifer recharge area.²⁴ The Preserve is also home to a wide range of wildlife, including endangered species such as the Florida panther, the wood stork, the red-cockaded woodpecker, and the American alligator.²⁵

Much of the surface of the current Preserve was once owned by the Collier family, after whom Collier County, Florida, is named. The Colliers sold their surface ownership within the original Preserve to the National Park Service in the 1970s but retained ownership of the minerals (oil and gas) beneath the surface.²⁶ Subsequently, the Colliers conveyed additional acreage to the National Park Service to create the “Addition Lands,” significantly expanding the northeast portion of the Preserve.²⁷

The federal government attempted to purchase the Colliers’ minerals beneath the Preserve and other nearby public lands in and near the Everglades in the early 2000s because, according to then-Florida governor Jeb Bush, the purchase was needed to stop “oil drilling in two of the most environmentally-sensitive areas of the state.”²⁸ Various appraisals valued the Colliers’ minerals beneath Big Cypress, the Florida Panther National Wildlife Refuge, and Ten Thousand Islands National Wildlife Refuge from \$5 million to \$475 million. In 2003, the federal government agreed to purchase the Colliers’ minerals beneath these public lands for \$120 million.²⁹ However, the purchase fell through, so the minerals beneath these sensitive public lands remain in the hands of the Colliers’ corporations and other private interests.³⁰

²² *Id.*

²³ Trista L. Thornberry-Ehrlich, Colorado State University, Big Cypress National Preserve Geologic Resource Management Issues Scoping Summary” (2005), available at: <https://irma.nps.gov/DataStore/DownloadFile/596402>.

²⁴ National Park Service, “Big Cypress National Preserve Geologic Resource Evaluation Report” (2008), available at: <https://irma.nps.gov/DataStore/DownloadFile/426452>.

²⁵ National Park Service, “Revised Environmental Assessment for A Proposed Oil and Gas Plan of Operation: Nobles Grade 3-D Seismic Survey within Big Cypress National Preserve proposed by Burnett Oil Company, Inc.,” (2016), available at: <https://parkplanning.nps.gov/document.cfm?parkID=352&projectID=53498&documentID=71803>.

²⁶ National Park Service, “Revised Environmental Assessment for A Proposed Oil and Gas Plan of Operation: Nobles Grade 3-D Seismic Survey within Big Cypress National Preserve proposed by Burnett Oil Company, Inc.,” (2016), available at: <https://parkplanning.nps.gov/document.cfm?parkID=352&projectID=53498&documentID=71803>.

²⁷ *Id.*

²⁸ Elizabeth Glass Geltman, Huffington Post, “Drilling in Big Cypress: Rejected Bush Plan to Purchase Florida Mineral Rights Looks Genius in Retrospect,” January 7, 2016, available at: https://www.huffingtonpost.com/elizabeth-glass-geltman/more-drilling-in-big-cypr_b_8912882.html.

²⁹ Wes Allison, Tampa Bay Times, “Report Questions Offer to Protect Everglades,” August 25, 2005, available at: <https://www.tampabay.com/archive/2005/06/09/report-questions-offer-to-protect-everglades/>.

³⁰ *Id.*

Oil and gas activities in the greater Big Cypress Swamp predate the creation of the Preserve: the first well to produce oil in Florida was drilled, in the Sunniland trend, in 1943.³¹ Existing oil production facilities in the Preserve, however, are confined to two relatively small areas, the Bear Island and Raccoon Point fields.³² Oil exploration took place in 2017 and 2018 in new parts of the Preserve not impacted by earlier oil development.

The Colliers' corporations have leased their minerals beneath Big Cypress to the Texas-based Burnett Oil Company, which began the first of four planned phases of seismic oil exploration within 110 square miles of the Preserve, largely consisting of wetlands.³³ Burnett Oil's seismic testing used 33-ton "vibroseis" and other vehicles to drive off-road through the Preserve and apply vibrating plates to the surface to send seismic signals underground to map potential oil.³⁴ The vibroseis vehicles and other supporting off-road vehicles and seismic survey crews have already damaged wetlands and wildlife habitats in the Preserve, including deep soil rutting and compaction, and cutting down and driving over slow-growing, mature dwarf cypress trees and other wetland vegetation.³⁵ The creation of seismic survey lines accelerated the spread of invasives (e.g., torpedograss-- *Panicum repens*) and overall reclamation attempts have been insufficient.³⁶ Besides contributing to environmental degradation that is never fully mitigated, seismic oil exploration also adversely affected tourism and visitor experiences in Big Cypress, as some of the exploration-related noise and damage occurred close to the I-75 (Alligator Alley) corridor and a primary visitor entrance to Big Cypress from the Florida National Scenic Trail.

While several conservation groups oppose additional oil exploration and development in Big Cypress,³⁷ opposition to oil development in the Everglades is not limited to environmental interests. Edward Glab, who worked at ExxonMobil for 25 years and is now Co-Director of the Global Energy Security Forum at Florida International University, was quoted as follows: "maps do not show any exploitable shale in the state of Florida... the potential in Florida to produce a significant amount of oil is simply not there... We can find [oil] in many places where the risk to the environment is far less than it is here in Florida. So, I say, stay out of the Everglades."³⁸ This sentiment was echoed by a former Assistant Secretary of the U.S.

³¹ American Oil & Gas Historical Society, 2018, "First Florida Oil Well", available at: <https://aoghs.org/petroleum-pioneers/first-florida-oil-well/>. Last visited January 5, 2022.

³² Florida Department of Environmental Protection, "Interactive Map of Permitted Wells" available at: <https://ca.dep.state.fl.us/mapdirect/?focus=oilandgas>. Last visited December 27, 2021.

³³ Jenny Staletovich, Miami Herald, "Florida judge clears way for Big Cypress oil exploration," April 24, 2017, available at: <https://www.miamiherald.com/news/local/environment/article146501559.html>.

³⁴ National Park Service, "Revised Environmental Assessment for A Proposed Oil and Gas Plan of Operation: Nobles Grade 3-D Seismic Survey within Big Cypress National Preserve proposed by Burnett Oil Company, Inc.," 1, 18-20 (2016), available at: <https://parkplanning.nps.gov/document.cfm?parkID=352&projectID=53498&documentID=71803>; Burnett Oil Company, Inc., "Nobles Grade 3-D Seismic Survey Big Cypress National Preserve and Big Cypress National Preserve Addition Plan of Operations" at Exhibit 7 (2014), available at: <https://parkplanning.nps.gov/document.cfm?parkID=352&projectID=53498&documentID=66527>.

³⁵ Quest Ecology (2019), "Seismic Survey Inspection Report: Big Cypress National Preserve," available at: <https://www.nrdc.org/sites/default/files/seismic-survey-inspection-report-20190615.pdf>.

³⁶ *Id.*

³⁷ See, e.g., <https://www.savebigcypress.org/>.

³⁸ Luis Hernandez, WLRN, "Energy Pro: Florida is not a Big Oil State. So Why Drill?," August 17, 2015, available at: <https://www.wlrn.org/environment/2015-08-17/energy-pro-florida-is-not-a-big-oil-state-so-why-drill>.

Department of the Interior, the late Nathaniel P. Reed, who was integral in creating Big Cypress National Preserve.³⁹

3. TOURISM AND THE VALUE OF NATURE

3.1. Valuing Tourism and the Environment

Unlike oil production, tourism is big business in Florida – based heavily on the state’s extraordinary and unique natural resources, including the Everglades. An academic study commissioned by Visit Florida, the state’s official tourism marketing corporation, found that 131 million out-of-state visitors in 2019 spent approximately \$99 billion in the state that directly supporting over 1 million jobs (and 1.6 million jobs when including indirect and induced effects).⁴⁰ The Florida Fish and Wildlife Conservation Commission reports that fish and wildlife recreation, such as hunting, freshwater and saltwater fishing, wildlife viewing, and recreational boating are big businesses in the state, contributing billions of dollars annually to the state economy and creating tens of thousands of Florida jobs.⁴¹ For example, recreational boating contributed \$10.4 billion to the economy and created 82,700 Florida jobs in 2013; recreational saltwater fishing contributed \$6.6 billion and created 96,800 jobs in 2015.⁴²

Focusing solely on Big Cypress, the National Park Service found that in 2020, approximately 1.2 million visitors to the Preserve spent \$96 million in nearby communities, supporting 1,300 local jobs.⁴³ Thus, tourists visiting the Preserve create more jobs than the entire Florida oil and gas industry does (see Section 1.1). Figure 4 illustrates steadily increasing visitation to Big Cypress over the last 30 years, despite sharp declines in 2017 and 2018. Interestingly, the declining visitation occurred during the years that Burnett Oil Company’s oil exploration activities took place that were visible and audible at high traffic visitor points of the Preserve.⁴⁴ Visitation in 2019 and 2020 (during the COVID-19 global pandemic) rebounded quickly to well over 1 million visitors annually, after oil exploration activities ceased.⁴⁵

³⁹ Nathaniel P. Reed, Sun-Sentinel, “Pristine Big Cypress worth preserving,” April 11, 2016, available at: <https://www.sun-sentinel.com/opinion/commentary/fl-viewpoint-drilling-20160411-story,amp.html>.

⁴⁰ Rockport Analytics, “2019 Contribution of Travel & Tourism to the Florida Economy,” available at: <https://www.visitflorida.org/media/30679/florida-visitor-economic-large-impact-study.pdf>.

⁴¹ Florida Fish and Wildlife Conservation Commission, “Socioeconomic Assessment,” available at: <https://myfwc.com/about/overview/economics/>. Last visited December 30, 2021.

⁴² *Id.*

⁴³ Cullinane Thomas, C., and L. Koontz. 2021. 2020 national park visitor spending effects: Economic contributions to local communities, states, and the nation. Natural Resource Report NPS/NRSS/EQD/NRR—2021/2259. National Park Service, Fort Collins, Colorado. Available at: https://www.nps.gov/nature/customcf/NPS_Data_Visualization/docs/NPS_2020_Visitor_Spending_Effects.pdf.

⁴⁴ Additionally, Hurricane Irma hit the Florida Keys and the Everglades in September of 2017, which likely also contributed to decreasing visitation in 2017 and 2018.

⁴⁵ National Park Service Visitor Use Statistics, available at: <https://irma.nps.gov/STATS/>.

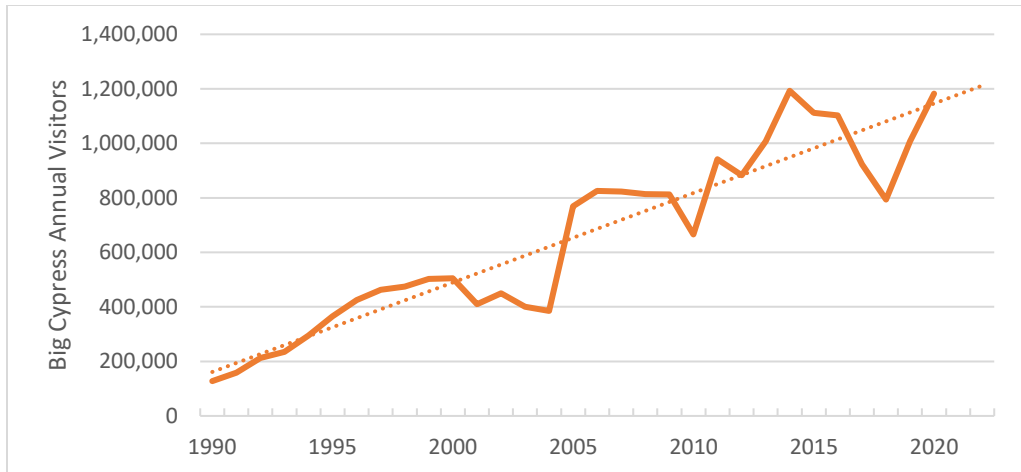


Figure 4: Annual Visitation to Big Cypress National Preserve (1990-2020)

Source: National Park Service Visitor Use Statistics, available at: <https://irma.nps.gov/STATS/>.

The value of nature extends beyond its proven ability to attract tourists. A 2010 study found that Everglades’ restoration will create \$46.5 billion in ecosystem benefits.⁴⁶ The restoration is a multi-year, multi-billion-dollar project that could be thwarted by oil drilling; the estimated benefits, however, are several times larger than the cost of the restoration process. Most of the benefits are in groundwater purification, real estate values (homes are worth more if located near cleaner water), wildlife habitat, and hunting.⁴⁷

Another study found that the value of carbon storage in Everglades’ mangroves was \$2 billion to \$3.4 billion.⁴⁸ Loss of adequate freshwater flows through the Everglades could cause degradation of the mangroves and the release to the atmosphere of large quantities of carbon currently stored in the mangroves.

Even these multi-billion-dollar estimates fail to convey the true value of irreplaceable natural environments and endangered species. The value of nature can be of utmost importance, without having a well-defined price tag attached. Beyond the large, estimated prices for the Everglades’ ecosystem services lies its dignity as a unique ecosystem and a home to species that live nowhere else in the world. Thus, cost-benefit analyses cannot fully comprehend the meaning of losing the incalculable values that the Everglades provides, whether to oil exploration, careless economic development, or climate change.⁴⁹

⁴⁶ McCormick, B., Clement, R., Fischer, D., Lindsay, M., & Watson, R. (2010). Measuring the Economic Benefits of America’s Everglades Restoration. Mather Economics. Available at: <http://www.evergladeshub.com/sci-info/pdf/reports/EF11-RTIeconFull.pdf>.

⁴⁷ *Id.*

⁴⁸ Jerath, M., Bhat, M., Rivera-Monroy, V. H., Castañeda-Moya, E., Simard, M., & Twilley, R. R. (2016). The role of economic, policy, and ecological factors in estimating the value of carbon stocks in Everglades mangrove forests, South Florida, USA. *Environmental Science & Policy*, 66, 160-169.

⁴⁹ See Frank Ackerman and Lisa Heinzerling (2004), *Priceless: On Knowing the Price of Everything and the Value of Nothing* (New York: The New Press); Frank Ackerman (2017), *Worst-Case Economics: Extreme Events in Climate and Finance* (London: Anthem Press).

3.2. Escaping Volatility: The Value of Predictable Growth

The oil industry in Florida is not only small; like the industry elsewhere, it varies significantly and unpredictably from year to year. Figure 5, showing annual drilling permits, reveals the erratic rhythm of the Florida oil industry.⁵⁰ Because production from an existing oil well declines over time, additional drilling is required to maintain or expand production. The annual drilling permit data suggest that this has been a constantly fluctuating process. Expansion of the oil and gas industry in Florida would provide the “opportunity” to subject more of the state economy to the wildly unstable pattern shown in Figure 5.



Figure 5. Florida Oil and Gas Drilling Permits Issued by Year, 1945-2020

Source: Calculated from Florida Department of Environmental Protection, Oil and Gas Permit Database, <https://floridadep.gov/water/oil-gas/content/oil-and-gas-permit-database>.

The instability of the oil industry is not unique to Florida. Academic research has found that oil prices are more volatile than almost all other prices, especially since the 1980s.⁵¹ The volatility of oil prices has a significant, negative effect on future GDP growth.⁵²

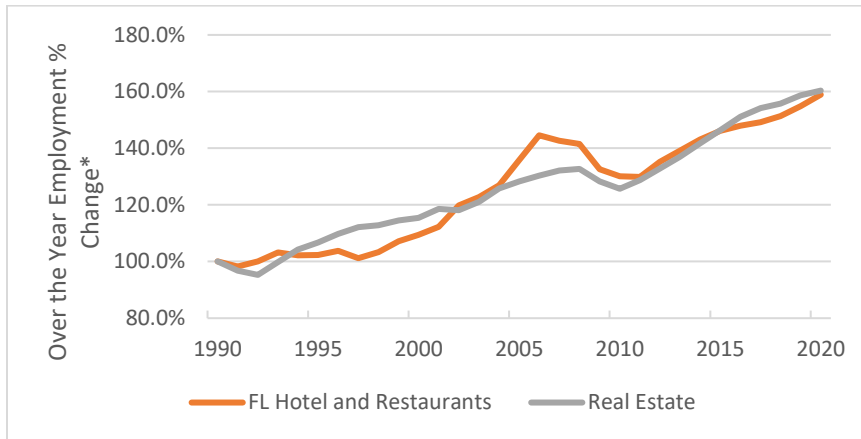
In contrast, the nearly steady growth of tourism-related employment is reflected in Figure 6. Since 1990, Florida hotel and restaurant employment and real estate employment have both grown by 60 percent. Both series slumped around the time of the Great Recession, in 2008-2010, but soon recovered. During the COVID-19 global pandemic, both series of employment also dropped, but economic recovery is already occurring. Full data for 2021 has not yet been reported, so it is not included here. Tourism-related jobs generally do not pay as much as oil industry jobs, but in Florida they are hundreds of times

⁵⁰ Due to the small size of the state’s industry, there do not appear to be any data on Florida oil production employment over time.

⁵¹ Eva Regnier (2007), “Oil and energy price volatility,” *Energy Economics* 29, 405-427.

⁵² Hui Guo and Kevin L. Kliesen (2005), “Oil price volatility and U.S. macroeconomic activity,” *Federal Reserve Bank of St. Louis Review* 87, 669-683.

more numerous, and far more reliable from year to year. Thus, any oil development that could jeopardize Florida’s tourism industry would not be a net gain for the state economy.



*Employment in 1990 = 100%.

Figure 6: Yearly Employment Change in Florida Hotels and Restaurants and Real Estate

Source: U.S. Department of Labor Bureau of Labor Statistics, *Current Employment Statistics*, as reported by Florida Department of Economic Opportunity, <http://www.floridajobs.org/workforce-statistics/data-center/statistical-programs/current-employment-statistics>. Data series began in January 1990.

4. PROPOSED STATEWIDE FRACKING BAN IN FLORIDA

Hydraulic fracturing, or fracking, is a technology that has allowed production of oil and gas from so-called “unconventional” reservoirs across the United States. Hydraulic fracturing is a form of “reservoir stimulation” – broadly, a set of practices used to increase oil and gas production. Due to the state’s geology, hydraulic fracturing will likely not be a key technology for producing oil in Florida. However, a different well stimulation technique, known as matrix stimulation, has been used in some cases and is proposed for wider use. Acid matrix stimulation or “acidizing” is the most common form of matrix stimulation and could allow greater exploitation of Florida’s unconventional oil. Acidizing dissolves portions of the oil-bearing rock formations through the injection of acid mixed with water and other chemicals, allowing oil to flow to the wellbore more easily. Acidizing techniques threaten groundwater resources since Florida oil fields generally lie deeper than the shallow aquifers that provide the state with fresh drinking water.

Throughout the drilling, fracking or acidizing, and subsequent production activities, operators must manage and dispose of several types of waste. Wastewater, including so-called “produced water” and flowback,”⁵³ is by far the largest waste stream that the oil and gas industry produces. Operators may

⁵³ Produced water is water that is naturally occurring in subsurface geologic formations and that is co-produced with oil and gas. Produced water can vary from nearly fresh to many times saltier than seawater, and may contain naturally occurring contaminants such as hydrocarbons, heavy metals, salts, and naturally occurring radioactive material, as well as chemicals intentionally added to assist in drilling, completion, well stimulation, maintenance, enhanced recovery, and other activities.

temporarily store produced water in tanks or pits, recycle it for reuse in subsequent fracking or acidizing, or dispose of it using underground well injection.⁵⁴ Once a well is no longer producing economically, the operator typically plugs the well with cement to prevent fluid migration from outlying formations into the well and to prevent downward drainage from inside the well.⁵⁵ If wells are not properly plugged or the plugs deteriorate, polluted wastewater may escape into the environment.⁵⁶ Spills and leaks of oil and gas wastewater are also one of the leading causes of environmental impacts from oil and gas operations, particularly impacts to water resources and soils.⁵⁷

Groundwater is one of Florida's most valuable natural resources. Around 93 percent of Florida's population depends on groundwater for drinking water, far more than any other state in the nation.⁵⁸ Florida aquifers are vulnerable to contamination because large areas are characterized by well-drained sandy soils overlying porous limestone. A shallow water table and high rainfall increase the potential for contamination to reach the groundwater.⁵⁹ Thus, the use of fracking and acidizing techniques should be extremely concerning to Floridians since it threatens to pollute their drinking water.

Concerns about Florida's drinking water and other resources have fueled attempts to ban fracking and acidizing statewide, although they have not yet succeeded. In the 2018 Florida legislative session, proposed legislation was introduced that would have banned "well stimulation" techniques such as fracking and acidizing.⁶⁰ While it failed to pass, similar legislation has been reintroduced in the 2022 Florida legislative session.⁶¹ Even former energy company executives have publicly supported a statewide fracking ban, citing both economic and environmental concerns.⁶²

Opponents of the statewide fracking ban include Associated Industries of Florida and the Florida Petroleum Council. One news report described these groups as "the lone two voices in opposition in a

Flowback is used reservoir stimulation fluid that later returns to the surface. In addition to stimulation chemicals that were intentionally added to the fluid, flowback can also contain products of chemical reactions between the stimulation fluid and subsurface formations and fluids, as well as varying amounts of produced water.

⁵⁴ See, e.g., United States Government Accountability Office. (2012). Report to the Ranking Member, Committee on Science, Space, and Technology, House of Representatives; Energy-Water Nexus; Information on the Quantity, Quality, and Management of Water Produced during Oil and Gas Production; John Veil, Veil Environmental, LLC. (2015). U.S. Produced Water Volumes and Management Practices in 2012, Prepared for the Ground Water Protection Council. See also, U.S. Government Accountability Office, Unconventional Oil and Gas Development: Key Environmental and Public Health Requirements 1, 13 (2012), <http://www.gao.gov/assets/650/647782.pdf>.

⁵⁵ *Id.*

⁵⁶ *Id.*

⁵⁷ See, e.g., Kharaka, Y. K., & Dorsey, N. S. (June 2005). Environmental issues of petroleum exploration and production: Introduction. *Environmental Geosciences*, 12(2), 61-63; Otton, J. K. (2006). Environmental aspects of produced-water salt releases in onshore and estuarine petroleum-producing areas of the United States - a bibliography. Retrieved from U.S. Geological Survey Open-file report 2006-1154: <https://pubs.usgs.gov/of/2006/1154/>; U.S. EPA. Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-16/236F, 2016.

⁵⁸ Edward A. Fernald, *Water Resources Atlas of Florida* 116 (1998).

⁵⁹ *Id.* at 145.

⁶⁰ Florida Senate, SB 462 (2018), <https://www.flsenate.gov/Session/Bill/2018/462/BillText/Filed/HTML>; Florida House of Representatives, HB 237 (2018), <https://www.myfloridahouse.gov/Sections/Bills/billsdetail.aspx?BillId=60017&SessionId=86>

⁶¹ See Florida Senate, SB 208 (2021), <https://www.flsenate.gov/Session/Bill/2022/208/?Tab=BillText>.

⁶² John Hall and John Hushon. "Commentary: Fracking not worth risk in Florida," *Naples Daily News*, December 15, 2017, available at: <https://www.naplesnews.com/story/opinion/contributors/2017/12/15/commentary-fracking-not-worth-risk-florida/941533001/>.

sea of organizations that came out in support of the statewide ban.”⁶³ Industry arguments against a statewide fracking ban include the risk of sending the “wrong message” about fracking to the rest of the country, and the assertion that a fracking ban would lead to litigation if it would deprive property owners of their rights to extract oil.⁶⁴

Economic arguments in support of fracking in other parts of the country do not always apply to Florida. Such arguments have often emphasized the benefits of increased employment and wages, as well as royalty and lease payments to local landowners. In the case of fracking or acidizing in the Everglades, there will be no royalty or lease payments made to the federal government, because the subsurface minerals are privately owned. One recent study of fracking in other states, by prominent environmental economists, compares the carefully measured economic benefits of fracking with its negative effects, as valued by households, finding a modest net benefit. Yet self-reported values, as the study points out, can be distorted by lack of public information on the risks associated with the technology.⁶⁵ If people were better informed about the environmental impacts of fracking, they might have more negative evaluations of the technology, tipping the cost-benefit balance against fracking.

Another high-profile economic study, which may be more relevant to Florida, provided a detailed examination of changes in housing prices in Pennsylvania near fracking sites.⁶⁶ It found large, negative effects of fracking on nearby house prices – losses of 9.9 to 16.5 percent – for homes dependent on groundwater wells.⁶⁷

While Florida has not yet banned fracking or acidizing, approximately 65 percent of Florida residents live in a city or county that has passed a local resolution supporting a statewide ban on fracking.⁶⁸ How much difference would a statewide fracking or acidizing ban make to the Florida economy? The answer is, very little. The small size of the state’s oil industry and reserves (as discussed in Section 1) means that a statewide ban on fracking and acidizing would pose little risk to Florida’s economy.

5. JOBS FROM CLEAN ENERGY

In clean energy, unlike oil and gas, jobs can be created without threatening the Everglades or other natural environments. Florida is experiencing large increases in its solar capacity (see Figure 7). According to the Solar Energy Industries Association (SEIA), Florida had a total installed solar capacity of 7,765 megawatts (MW) in 2021 (third most among all states), generating over four percent of the state’s electricity.⁶⁹ Florida ranks second among all states with 11,200 jobs in the solar industry in 2021 – more

⁶³ Ana Ceballos, “Senate Panel Ignores Petroleum Industry Pleas, Advances Fracking Ban,” Florida Politics, February 5, 2018, available at: <https://floridapolitics.com/archives/tag/oil-industry/>.

⁶⁴ *Id.*

⁶⁵ Alexander W. Bartik, Janet Currie, Michael Greenstone, and Christopher R. Knittel (2018), “The Local Economic and Welfare Consequences of Hydraulic Fracturing,” National Bureau of Economic Research, <https://ssrn.com/abstract=2692197>.

⁶⁶ Lucija Muehlenbachs, Elisheba Spiller, and Christopher Timmins (2015), “The Housing Market Impacts of Shale Gas Development,” American Economic Review 105(12): 3633–3659.

⁶⁷ *Id.*

⁶⁸ Floridians Against Fracking. <https://www.floridiansagainstracking.org/mission/local-resolutions-and-ordinances/>. Last visited December 30, 2021.

⁶⁹ Solar Energy Industries Association, “Florida Solar,” available at: <https://www.seia.org/state-solar-policy/florida-solar>.

than fifteen times Florida oil industry employment, but still below the solar industry’s percentage of the state labor force in other states, such as North Carolina and Massachusetts.⁷⁰

As seen in Figure 7, most of the state’s 7,765 MW of solar capacity is in large-scale, utility-owned projects (where costs per kilowatt-hour are lower than from rooftop panels). Owners of smaller solar installations, such as rooftop solar, typically rely on net metering connections, allowing them to sell solar electricity to the grid. The Florida Public Service Commission reported that in 2020, net metering connections provided 828 MW of solar energy.⁷¹

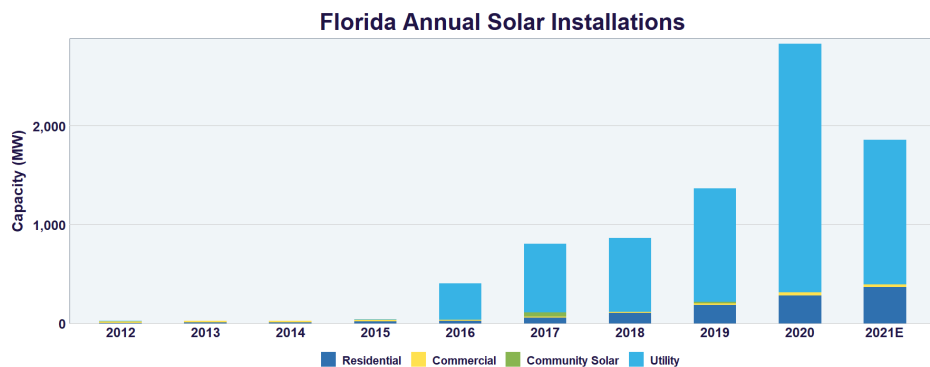


Figure 7: Florida Solar Installations by Year

Source: Solar Energy Industries Association, 2021.

As elsewhere in the country, solar power costs continue to drop in Florida. SEIA found the state had an 11 percent decline in solar power prices in the last five years, making solar investments continually more affordable. Florida has plenty of room for expansion of solar power and solar jobs in the years ahead. More vigorous state policies to promote renewable energy could help jump-start the industry. And there is an added bonus to harnessing solar energy: unlike oil spills and fossil fuel emissions, rooftop solar panels do not destroy the climate or the beaches, water resources, and wildlife that draw so many tourists to Florida and fuel its economy.

6. PUBLIC LANDS, CLIMATE CHANGE, AND FLORIDA OIL DEVELOPMENT

We have illustrated that drilling for oil in Florida (and Big Cypress) makes little economic sense. But allowing new oil development in Big Cypress would also counter existing federal policy for the large-scale restoration of the Everglades and national goals of reducing greenhouse gas (GHG) emissions. The Comprehensive Everglades Restoration Plan (CERP) was authorized by Congress in 2000 and allocated

⁷⁰ *Id.*

⁷¹ Florida Public Service Commission, “Consumer Renewable Energy Systems: 2020,” available at: <https://www.floridapsc.com/ElectricNaturalGas/CustomerRenewableShowYear?folder=2020>.

more than \$10.5 billion to conduct the largest hydrologic restoration program in the U.S.⁷² While the costs of CERP, split largely between the federal government and the state of Florida (and to a lesser degree tribal and local agencies), continue to increase,⁷³ the benefits of restoration significantly outweigh the total costs and significantly contribute to various Florida economic activities.⁷⁴ Likewise, the Biden Administration committed the U.S. to re-join the Paris Agreement and pledged to achieve a 50-52 percent reduction from 2005 levels in economy-wide net GHG pollution by 2030.⁷⁵ Given the coalescence around restoring the Everglades and reducing our national GHG emissions, it makes little sense to allow further ecological degradation and increased emissions that will come from oil development in Big Cypress.⁷⁶

With climate change likely leading to sea rise, ocean acidification, and greater salination of southern Florida aquifers,⁷⁷ now is the time to protect and conserve the natural buffers in the Greater Everglades ecosystem, including Big Cypress, that can assist with climate resilience and wildlife refuge. Adding greater risk of ecological degradation, through potential oil spills and groundwater contamination from oil development, makes even less sense when considering the climate change effects in the region, such as sea-level rise. Furthermore, climate change could lead to stranded oil assets in Big Cypress. Stranded oil assets are infrastructure necessary for oil development (e.g., facilities, well pads, pipelines) that may no longer be usable, or profitable, due to policy or pricing changes in a decarbonizing economy or from physical stranding due to climate change effects such as flooding and sea rise.⁷⁸ Given the vast hydrologic network and extremely low elevation of Big Cypress, sea-level rise and flooding may lead to future stranded oil assets. And, given the decreasing social acceptance of fossil fuels, future regulations and diminishing markets for oil may also contribute to stranded oil assets in Big Cypress.

Furthermore, ecosystem service damages from the oil exploration that took place in Big Cypress in 2017 and 2018 are emblematic of the negative externalities from oil development that have adverse, and cascading, effects on the overall Florida economy. Research has shown that oil development activities, such as exploration, on public lands lead to a reduction in outdoor recreation and visitation.⁷⁹ That is,

⁷² National Park Service. Comprehensive Everglades Restoration Plan (CERP). Available at: <https://www.nps.gov/ever/learn/nature/cerp.htm>.

⁷³ A 2017 Congressional Research Report estimates the plan will ultimately cost over \$16 billion. The report is available at: <https://www.everycrsreport.com/reports/R42007.html>.

⁷⁴ McCormick, B., Clement, R., Fischer, D., Lindsay, M., & Watson, R. (2010). Measuring the Economic Benefits of America's Everglades Restoration. Mather Economics. Available at: <http://www.evergladeshub.com/sci-info/pdf/reports/EF11-RTIeconFull.pdf>.

⁷⁵ The White House. FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies. April 2021, available at: <https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/>.

⁷⁶ Recent updates to the National Park Service "9B" rules that govern non-federal oil and gas activities that occur within national park service boundaries provide greater federal oversight and may afford greater protection of national park service ecosystem services. The updated 9B rules are available here: <https://parkplanning.nps.gov/document.cfm?documentID=72995>.

⁷⁷ US Environmental Protection Agency. What climate change means for Florida. August 2016, EPA 430-F-16-011, available at: <https://www.epa.gov/sites/default/files/2016-08/documents/climate-change-fl.pdf>.

⁷⁸ See, e.g., the Carbon Tracker Initiative definition of stranded assets available here: <https://carbontracker.org/terms/stranded-assets/>.

⁷⁹ Rasch, R., Reeves, M., & Sorenson, C. (2018). Does oil and gas development impact recreation visits to public lands? A cross-sectional analysis of overnight recreation site use at 27 national forests with oil and gas development. *Journal of outdoor recreation and tourism*, 24, 45-51.

oil development and tourism tend to be incompatible and mutually exclusive land uses at the watershed level. Research has also shown that oil and gas development repels amenity migrants, or people relocating to areas for natural and socio-cultural environments, whereas conservation and ecosystem protection attract amenity migrants.⁸⁰ Additionally, numerous ecosystem services can be adversely affected by oil exploration, leading to a decrease in water quality, biodiversity, and other services that are extremely valuable in their own right (such as carbon storage), but are also the foundational pieces for some of the biggest economic sectors in Florida such as agriculture, real estate, and tourism.

With so much at risk, additional oil development in Florida and the Everglades must be comprehensively evaluated to clearly delineate the resulting costs and benefits. This report can be used as a starting point in identifying the type and scale of potential costs associated with further oil development in and near the Greater Everglades ecosystem. Protecting public lands, above and below ground, and limiting pollution and negative externalities that adversely affect all other industries and stakeholders, results in tremendous societal benefits that accrue to all Florida residents. In the case of national public lands such as Big Cypress National Preserve, the benefits of conservation also accrue to all U.S. citizens. By contrast, allowing further oil development in the Everglades would only benefit a handful of private mineral owners. Thus, economic analysis clearly, and overwhelmingly, indicates that it would be in the best interest of the state of Florida and federal government to curtail new oil development in the Everglades.

⁸⁰ Hjerpe, E., Hussain, A., & Holmes, T. (2020). Amenity migration and public lands: Rise of the protected areas. *Environmental management*, 66(1), 56-71.