Connecting the

Florida Wildlife Corridor

FLORIDA WILDLIFE CORRIDOR COALITION

Preface and acknowledgements

Acknowledgements

The Florida Wildlife Corridor Coalition would like to acknowledge the tireless contributions of the individuals who made this effort possible. We thank Mallory Dimmitt, our CEO, for her guidance, support, and expertise at every step of this process. Next, we thank Traci Deen, CEO of Conservation Florida; Tori Linder, Managing Director of Path of the Panther, and Noah Valenstein, Managing Partner at Brightwater Strategies Group, who all brought invaluable perspectives and a wealth of expertise on the practical landscape of Florida's conservation space. We thank Tom Hoctor, Director at the Center for Landscape Conservation Planning at the University of Florida; Vivienne Sclater, GIS and Data Manager at the Archbold Biological Center; and Jonathan Oetting, Chief of Conservation Planning Services at the Florida Natural Areas Inventory at Florida State University, for advancing understanding of the natural land conservation and providing geospatial data and analysis and insightful technical guidance. Finally, our thanks go to Josh Daskin, Director of Conservation at Archbold Biological Station, who shared his expertise in ecology and biodiversity to ground the team's research and the report development.

Additionally, the Florida Wildlife Corridor Coalition is grateful to all who contributed through expert interviews, provided insight on conservation approaches, helped to shape innovative ideas, and gave a voice to the Corridor lands.

Connecting the Florida Wildlife Corridor

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Executive summary

The Florida Wildlife Corridor (the "Corridor") consists of 10 million acres of lands under conservation status (conserved lands) and 8 million acres of lands without specific conservation status (opportunity areas). Preserving the opportunity area, which consists primarily of privately owned natural lands and working lands that are generally compatible with Corridor objectives (e.g., ranchlands), is crucial to ensure permanent connectivity in the Corridor for biodiversity and continuation of the benefits the Corridor provides to Floridians. While the operating goal of the corridor is ecological connectivity, there is a clear expectation that these lands support the long-term success of a rural economy, job creation, preservation of vital history and the overall social well-being of the state's people. Legislative and budgetary support for preservation of the Corridor was confirmed with Senate Bill 976 in the summer of 2021.

This report explores an innovative strategy for the Corridor's preservation while maintaining its value to Florida and minimizing the cost of Corridor preservation to the public.

Value to Florida

The Corridor provides significant value to Florida. The Corridor's landscapes, from vast wetlands to upland forests, provide habitat for close to 2,000 unique species, 60 of which are listed as threatened or endangered by either the US Endangered Species Act, the State of Florida, or the International Union for Conservation of Nature (IUCN) Red List.[1] This biodiversity and natural land not only represent inherent scientific, recreational, and cultural value, but also supports significant socioeconomic benefits to the state. In a detailed and likely conservative estimate, the Corridor supports at least 114,000 jobs and provides at least $30 billion in annual value in sectors such as recreation, tourism, agriculture, ranching, and forestry.[2]

[1] IBAT Alliance, *The IUCN Red List of Threatened Species*, accessed on Oct 11, 2021, https://www.iucnredlist.org/.

[2] Tourism impact based on state and national parks within the Corridor, data from Florida Department of Environmental Protection (FL DEP), Florida State Parks Foundation, and National Park Service (NPS). Agriculture, ranching, forestry, and mining impact based on proportion of applicable FL working lands located within the Corridor; data from FWC, University of Florida (UF) Institute of Food and Agricultural Sciences (IFAS), and U.S. Department

This estimate does not include the likely significant impact of access to nature on health (mental or physical) or mitigation of environmental risk, such as harmful algal blooms in coastal regions (large concentrations of aquatic microorganisms linked to nutrient runoff), or inland flooding avoided by having intact upstream wetland buffer zones. The wetlands filtering excess nutrients before they harm the streams, rivers, estuaries or coasts is estimated to deliver $1.3 billion annually. The Corridor's forest store 2.5 gigatons of carbon stocks (roughly 2.5 times the annual carbon emissions of the global aviation industry).[3] With 3 major U.S. Department of Defense (DoD) commands and over 6 vital military bases located in or near the Corridor, these open space lands are also important to U.S. national security.

The $30 billion annual value figure also does not include the impact of the Corridor on Florida real estate value or the ability to attract and/or retain businesses or people in the state economy. The Corridor's expansion would give the public improved access to natural areas through new private and public parks. This could reverse Florida's declining park-to-inhabitant ratio, which has declined by about 50% since the 1980s.[4] Maintaining the current level would require creating an additional 100,000 acres of parks while achieving the 1980s level would require several million acres.

The concept of a "corridor" is in some ways accommodating given that the biological criterion for Corridor land is connectivity, not nature sanctuaries. In other ways, the concept is highly demanding—the corridor is only as connected as its weakest link. Any land lost that is a highly critical connection cannot be compensated with other lands, no matter how biologically interesting they may be.

The Corridor also seeks to be a sustaining platform for Florida's rural economy, jobs, and quality of life, and a backdrop for the intense and contrasting developed regions of the state. It has been cited as maintaining a foundation for growing the state in a way that "keeps Florida *Florida*."

Current trends and data-based strategies

The Corridor's economic, social, national security and environmental benefits are not guaranteed in perpetuity as this asset will be altered in time. Geospatial projections suggest that with no action to secure the opportunity area, by the end of this decade, 900,000 acres may be converted to incompatible use (e.g., high density housing development). A further 3 million acres may be lost by 2050.

If only historic conservation instruments (easements and fee simple purchases) are used to purchase or protect the land, conserving the opportunity area would likely be cost-prohibitive,

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of Agriculture National Agricultural Statistics Service (NASS), . UF data on restorable wetlands; Xu et al (2017). *PEATMAP: Refining estimates of global peatland distribution based on a meta-analysis.* University of Leeds. https://doi.org/10.5518/252; The World Economic Forum (WEF), *The Net Zero Challenge*. https://www.weforum.org/projects/the-net-zero-challenge*;* Winkler, Karina. HILDA+. https://landchangestories.org/hildaplus-mapviewer/.

[3] Biomass carbon stocks based on Spawn et al., 2010. Soil carbon based on SoilGrids 2.0, Poggio et al. 2021. Carbon fluxes based on Global Forest Watch, Harris et al. 2021.

[4] Analysis does not include state forests and other wildlife management area. Park data from FL DEP, floridastateparks.org; NPS; state tourism board statistics.

requiring $17 billion to $42 billion in public funding.[5] Furthermore, there is no current public policy or general effort supporting the transfer of private lands to public ownership at this scale. Given this, securing the Corridor at lower cost will likely require an innovative strategy with two approaches to retain the land in a "working" status:

- Prioritizing land at near-term risk of conversion to incompatible use ("Horizon 1 lands"). This is key—success depends on a concentrated effort to develop Corridor solutions for a highly specific subset of lands, which will necessarily be the most challenging.
- Deploying an innovative mix of conservation instruments—traditional methods like easements and fee-simple acquisitions, and new methods for improving the profitability of compatible land use (carbon credit sales on ranches) and "managed conversion" to the private sector (for example, working with developers on wildlife-compatible designs).

Analytics and geospatial algorithms suggest that a strategy that uses a mix of instruments to secure roughly 1 million acres of Horizon 1 lands may cost approximately $500 million per year through 2030 (total of $ 4.2 billion); in this same period, the Corridor will deliver $298 billion in value to Florida. There is no assumption that investment at this scale needs to come from simply expanding existing Florida Forever or other public funds. A more innovative and diversified set of financial funding streams will likely be necessary, and be more sustainable and lower risk, overall.

Florida's return on investment

The return on investment of this strategy may be substantial. As with other infrastructure projects, the cost of preserving the Horizon 1 lands would be frontloaded in 2022-2030, while the preservation benefits would continue to accrue in later decades. One common way to look at such long-term investments is to assess their net present value ("NPV")—calculating the current value of costs and benefits over time. Preserving the Horizon 1 lands using the strategy defined is this report is projected to have an NPV cost of $5.5 billion and a net present value benefit (the value achieved or protected by avoiding the conversion to development of Horizon 1 lands) of $33.8 billion, which results in a 6.1x return on investment.[6]

Given the urgency and scale of this tremendous opportunity and the innovation demands, executing the Corridor plan in the next 10 years would require an organized effort—likely similar to high-performing private or public sector operations. A combination of disciplined process, technical skill (biological, financial, regulatory), compelling communications and marshalling of highly talented innovators would be needed. Timing would play a critical role—execution would need to have time sensitivity and move at a speed and on a scale to keep pace with Florida's land market.

[5] Assuming $2,100 per acre for less than fee simple acquisition and $5,300 per acre for fee simple acquisition based on the historic average cost of the Florida Forever and RLFP programs.

[6] Costs and benefits of protecting Horizon 1 lands, calculated through 2050 using a 5% discount factor.

Florida Wildlife Corridor At-a-Glance

10 million	Acres under conservation status (“conserved lands”)
8 million	Acres that are unprotected lands (“opportunity areas”), primarily privately-owned natural and working lands (e.g., ranches, timberlands)
50%	Decline in Florida’s park-to-inhabitant ratio since the 1980s
114,000+	Number of jobs the Corridor currently provides (directly and indirectly)
$30 billion	Approximate annual value of the Corridor to the State[7]: • $4 billion (approx.) in direct economic annual value (renewably generated by the recreation, tourism, agriculture, ranching, and forestry sectors that depend on the Corridor) • $24 billion (approx.) in indirect & other economic annual value (recreation, tourism, agriculture, ranching, and forestry sectors and the DoD activity and mining in the Corridor) • $1 billion (approx.) in annual value through environmental benefits, such as carbon absorption and excess nutrient filtration **Significant FL State Policy, executive and legislative action and diverse public stakeholder interest have affirmed the Corridor goals.** Legislative and budgetary support for preserving the Corridor was affirmed by the passage of Senate Bill 976 in the summer of 2021), pointing to the potential for socioeconomic impact from this policy and funding and implementation scenarios to realize it
21%	Estimated Corridor opportunity area that may be lost by 2050 due to conversion to residential or other development (6% of this by 2030)
1.8 million	Number of acres protected through programs such as Florida Forever, Rural and Family Lands, and Sentinel Landscapes Partnership between 1990 and 2021, primarily through conservation easements and the purchase of land for conservation purposes
$17-42 billion	Estimated cost of using easements and land purchases alone to secure the Corridor opportunity area
$500 million	Annual investment needed for the next 9 years (through 2030, for a total of $4.2-4.6 billion) to secure Horizon 1 Corridor land with an innovative conservation strategy, to prevent erosion of the opportunity areas (providing a 6.1x return on investment)
$298 billion	Estimated value the Corridor will provide the state over the next 9 years

[7] Figure does not include the impact of access to nature on population health, real estate values or downstream marine fisheries; or cost avoidance due to mitigation of harmful algal blooms or inland flooding due to intact upstream wetland buffer zones.

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Where is the Corridor?

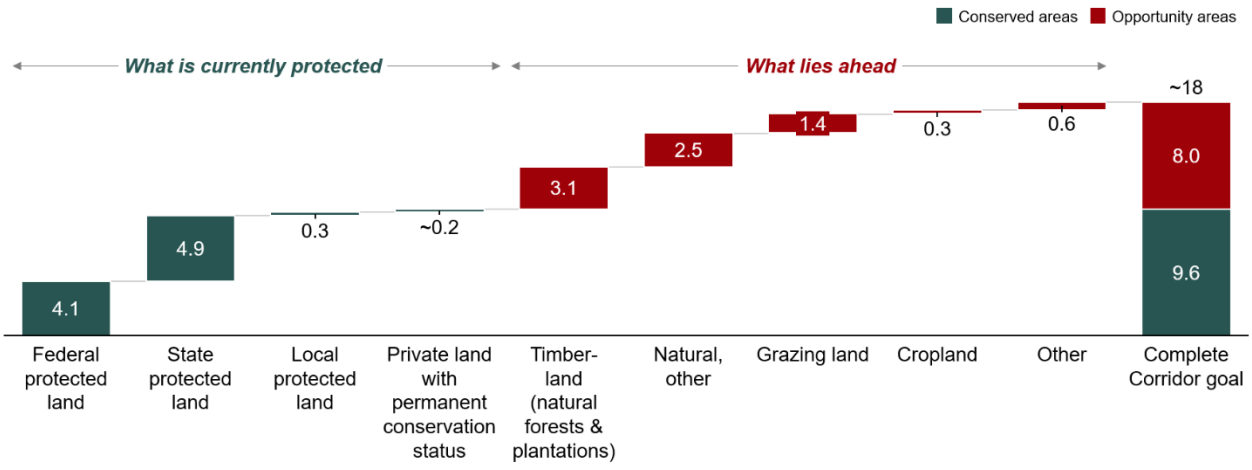
The Corridor's current status and land use

The Florida Wildlife Corridor (the "Corridor") currently consists of 9.6 million acres under conservation status (conserved lands) and an additional 8 million acres without specific conservation status (opportunity areas). The Corridor includes US hotspots of species richness providing habitat for more than 1,700 species of fauna, including several endangered species. Many of these species depend heavily on the Corridor. The iconic Florida panther (*Puma concolor coryi*) and several other wide-roaming species critically depend on the land connectivity that the full Corridor provides.

Equally important, the Corridor is the foundation of a substantial rural economy that is vital to today's Florida economy, and is deeply emblematic of the region's rich history. Ranching, forestry, agriculture, nature-based tourism and other areas provide employment, economic, and social contributions to the state's well-being. Furthermore, there are vital national security activities made possible by the relatively large areas of low-density use and open space. The state hosts 3 major DoD Commands (more than any other state) and over 6 bases—many of which are active partners in land preservation. A perspective shared many times, across a wide range of stakeholders is that the Corridor space is essential to "keeping Florida *Florida*." The very character, attractiveness and long-term sustainability of the state's mainstream economic, urban and infrastructure development depends on conserving its rural corridor.

Of the conserved lands, ninety-eight percent (98%) is a combination of federal, state, and local protected areas. The remaining 2% is privately owned land with conservation easements under state, county, city or philanthropic programs. The Corridor conservation to date has been overwhelmingly legacy, public agency-driven, classic “park like” protection.

Florida Wildlife Corridor under current protection and opportunity areas by type of land *(in millions of acres)*



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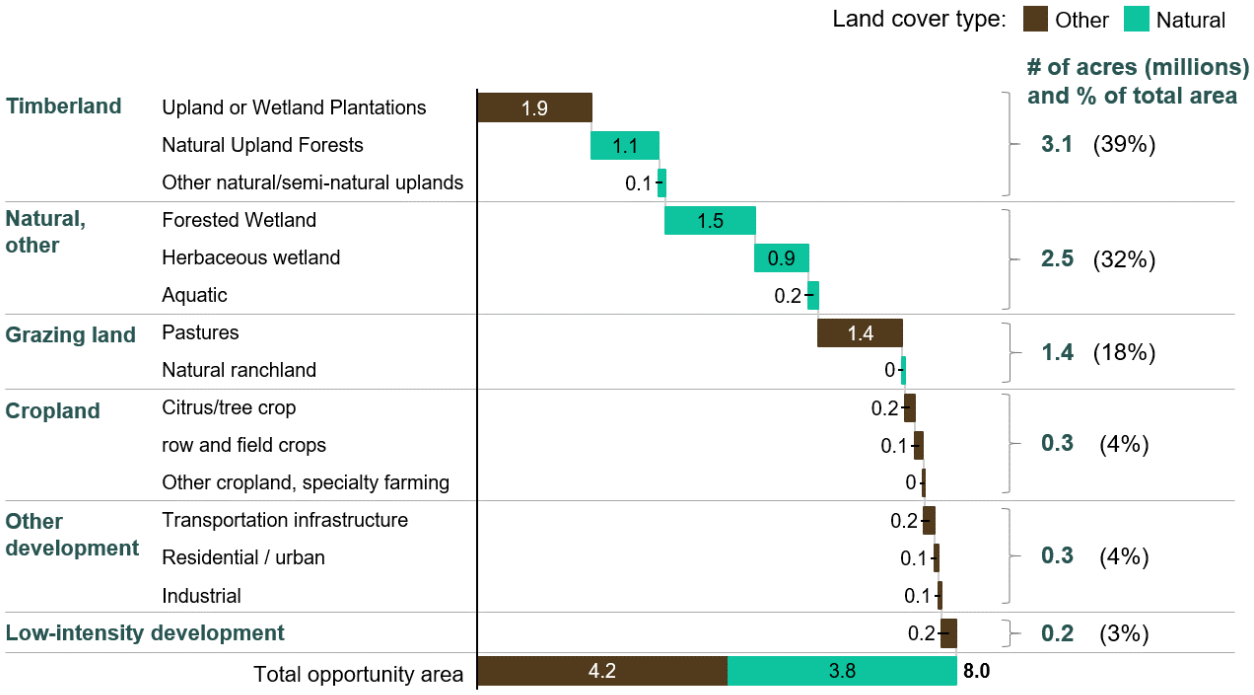
Natural land coverage (including natural upland forests used for timber) make up 3.8 million acres (approximately 50%) of the opportunity area. Most of the natural land cover is wetlands, which are a top priority for conservation given their importance to protecting Florida's ecology and ability to manage the regional water economy and remove, store or sequester carbon dioxide from the atmosphere.

Land cover types in the Corridor opportunity area *(in millions of acres)*



Source: FLWC GIS data by Archbold Biological Station, CLC data

Prioritizing opportunity areas for preservation

Not all of the 8 million acres in the opportunity area would require the same near-term conservation attention. Most attention would be given to land that has the highest importance to maintain a functioning ecological network, a current land use that is not compatible with Corridor objectives, or a currently compatible use but is at high and imminent risk of conversion to non-compatible use (high density residential development).

The central factor in defining land priority is the ability of secured land to create ecological connections within the Corridor for wildlife movement and habitat protection. These connections are critical for the survival of the 60 endangered and threatened species in Florida as well as many other fauna and flora species. Without functional end-to-end connectivity the Corridor does not function and will not deliver on the formal policy objectives and social interests of the State. To guide this, the Florida Ecological Greenways Network (FEGN) has established a baseline prioritization currently in use for evaluating the relative ecological connectivity contribution of specific lands. Within the opportunity area, 3.3 million acres fall in the highest priority of this framework (P1, 42%), 3.5 million acres are second priority (P2, 44%), and 1.1 million acres are

third priority (P3, 14%).[8] This classification is the currently accepted view of corridor connectivity prioritization. It is however, a “snapshot” classification that is not fully capable of accounting for time-based risk of conversion to high-density development.

It is important to stress that current land use of the vast majority of the opportunity area is compatible with Corridor objectives: for example, Florida panther population expansion can occur on a variety of working lands across the opportunity area. Working lands of many types can provide the connectivity required to make a functioning Corridor.

Looking at the third consideration—that of risk of conversion to incompatible use: Florida’s economic development and population growth has accelerated (e.g., roughly 800 to 900 people moving to the state each day) necessarily driving development and potentially putting large parts of the Corridor opportunity area at increased risk of development conversion.[9] Using advanced geospatial prediction models, we estimate that by 2050, more than 20% of the opportunity area (1.7 million acres) may be converted to development (primarily high-density real estate).[10]

It is important to note that this report does not consider the risk of conversion of low-intensity working lands to high-intensity agricultural use (e.g., converting natural grasslands to sugarcane plantations), which may have impacts on ecological functions and environmental services provided by the Corridor.

In the remainder of this report, we explore how the loss of the opportunity area to incompatible use can be avoided—what the costs of such a conservation strategy may be, and what benefits it would produce.

[8] FEGN is a statewide database that identifies and prioritizes a functionally connected statewide ecological network of public and private conservation lands.

[9] Net new residents per day between 2020 and 2025, forecast by the FL State Demographic Estimating Conference, Florida Demographic Forecast, March 3, 2021.

[10] The methodology assumes the acres developed by 2030 and 2050 follow a linear interpolation from the University of Florida 2070 model. To account for leakage (“balloon effect”) of development into adjacent parcels within the Corridor, the high risk area is increased by 25% and the medium risk area is increased by 50%.

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How can the Corridor be protected?

The Corridor includes large-scale legacy land conservation projects created over the last century to capture areas such as the Everglades, Big Cypress, Ocala National Forest, Avon Park, DoD lands, and major state-protected areas. State conservation programs like Florida Forever and related programs such as RFLP were central to establishing conservation areas across the Corridor. Over the past 30 years, these efforts have protected areas primarily using two preservation levers:

- Fee simple acquisitions, which are purchases that transfer full ownership of the property to public agencies (often the State).
- Less-than-fee simple acquisitions (also called conservation easements). These acquire an interest in the property, which allows the state program to conserve and protect resources on the property at a lower cost while keeping the land in private ownership. Such land is not publicly owned but is limited in its development to supply conservation and other benefit in the public good.

Less-than-fee simple acquisitions have preserved 0.2 million acres, and fee simple acquisitions have preserved 1.5 million acres of the established Corridor—at a combined cost of $7 billion over the past three decades.[11]

Of the Corridor's 18 million acres of identified land, currently 8 million acres are not under any formal conservation status. While most of the current private land use (such as cattle ranching and timber operations) is generally compatible with the Corridor's objectives, using conservation instruments to avoid the loss of land to incompatible use (such as high-density residential development) would be needed to maintain the land's biodiversity and socioeconomic value. In

[11] Analysis based on Florida Natural Areas Inventory (FNAI) Atlas, DEP Division of State Lands, and Florida Conservation Lands (FLMA) data, Oct. 2021. Nominal costs adjusted for inflation to 2021 values using the US BLS Consumer Price Index for 1995 for all Preservation 2000 acquisitions, and 2010 for all Florida Forever acquisitions.

addition, private owners that do seek to protect conservation value for the public interest may need outside financial support.

If only historic conservation instruments (easements and fee simple purchases) are used, securing the entire opportunity area would likely be cost-prohibitive, requiring an estimated $17 billion to $42 billion in public funding.[12] This would mean accessing that level of funding within a timeframe that would achieve conservation before land conversion. Furthermore, there is no formal public policy supporting withdrawal of private lands into full public ownership at this scale. Simple land acquisition at this level would appear to be a high-risk strategy on multiple levels.

Securing the land needed at a reasonable, efficient cost to the public would likely require an innovative strategy centered on the objective to retain the broadly "working" status of these lands. This could focus on two components:

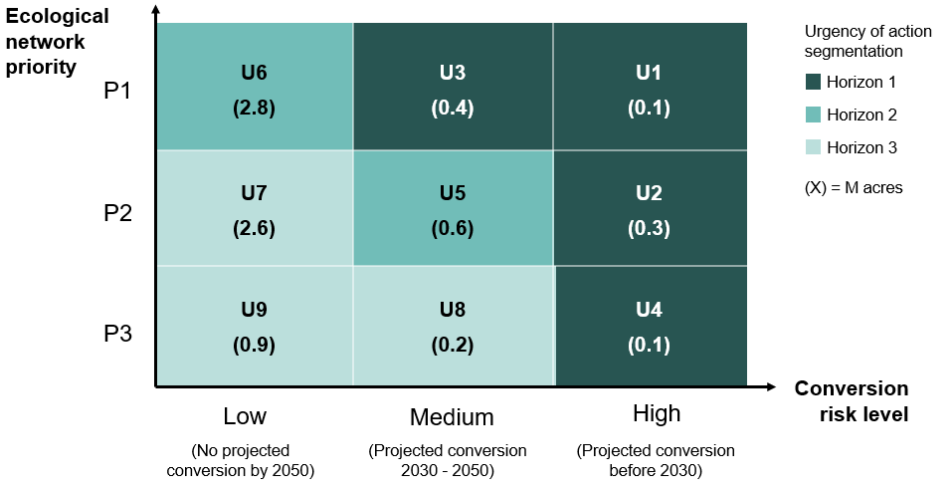
- Prioritizing preservation resources on land with high ecological connectivity importance and near-term risk of conversion to incompatible use (high-density development)
- Deploying an innovative mix of conservation instruments, including easements and fee-simple acquisitions, as well as engaging the private sector in improvements to the profitability of current, compatible land use (such as carbon credit sales on ranches) and "managed conversion" (working with developers to develop wildlife-compatible designs).

Prioritizing land based on both near-term risk of conversion and connectivity

While some lands in the Corridor opportunity area are at near-term risk of conversion to high intensity development, other areas may not have have a high probability of conversion for a few decades. While all lands in the Corridor opportunity area have conservation value, some could play a much larger role in maintaining a functionally connected, statewide ecological network through being a connectivity "chokepoint" or landscape "hub." Timing would be critical—the long-term success of the Corridor will only be possible with the successful conservation of key lands in the next 10 years. No amount of conservation in lands "not at risk" could make up for losing to conversion the high-priority lands in the next 5 to 10 years.

[12] Assuming a cost of $2,100 per acre for less than fee simple acquisition and $5,300 per acre for fee simple acquisition based on the historic average cost of the Florida Forever and RLFP programs.

Tiering of the Corridor area by urgency levels considering conversion risk and ecological network priority

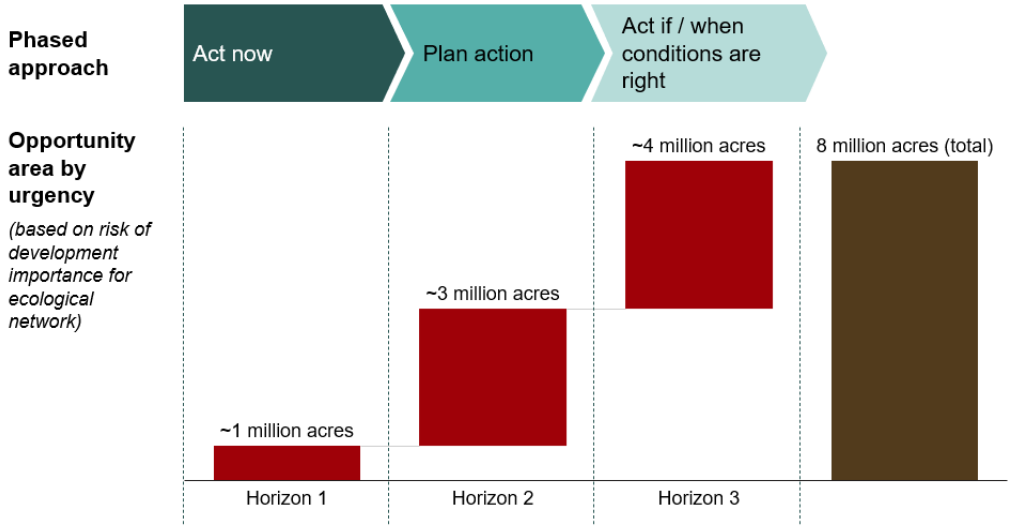


To keep public cost low and preserve the value created by the Corridor, resource prioritization could consider both a spatial view of the lands' importance to the overall network and a temporal view of the conversion risk. This could focus efforts on conserving network-critical lands that have the highest probability to be developed for a non-compatible use. Each site can be assigned a "horizon" score (from 1 to 3) to denote the urgency, with 1 being most urgent to secure through near-term action (within 5 years) to avoid conversion by 2030.

This approach could also set the stage for the longer-term protection of the Horizon 2 and Hoizon 3 lands. Actions taken and lessons learned in securing Horizon 1 lands could refine methods and establish a track record with stakeholders to build trust, establish the integrity of the Corridor effort, and demonstrate the value of the initiatives to the public. Efforts that may demonstrate success could include securing rights of first refusal or supporting business programs for working lands that improve the profitability of compatible use. In addition to such monitoring and trust building efforts, neart-term easements or fee-simple acquisitions of Horizon 2 or 3 lands may be justified if the landowners are highly motivated to sell and/or the land is critically important for other ecolocial reasons independent of the Corridor objectives.

Risk of conversion to high-density development is determined using a multi-factor model with population and urbanization growth projections, distance to existing development, and land valuations. As shown on the following graphic, this creates a phased "horizon" for optimizing the value gained through securing land. Geospatial models suggest that 1 million acres fall in the Horizon 1 lands category. These lands may convert to incompatible use before 2030, or are of utmost importance for the corridor's network and may convert before 2050. Another 3 million acres are Horizon 2 lands, sites of medium network importance with conversion potentially happening before 2050, or of highest importance with lower risk of conversion to high-density development. Another 4 million acres of Horizon 3 lands might only convert post-2050 and are not of highest network importance, or may convert by 2050 but are of lowest importance in terms of maintaining the ecological network (though are still a part of it). The currently available information shows the need to concentrate solutions in the near-term on a specific (approximately 1 million acre) subset of lands.

Phased approach for securing the Corridor opportunity area



Deployment of innovative mix of conservation instruments

To be effective, the Corridor strategy would minimize costs to the public through applying a variety of instruments—some traditional, others innovative and even "speculative" in their use of entrepreneurial development and testing.

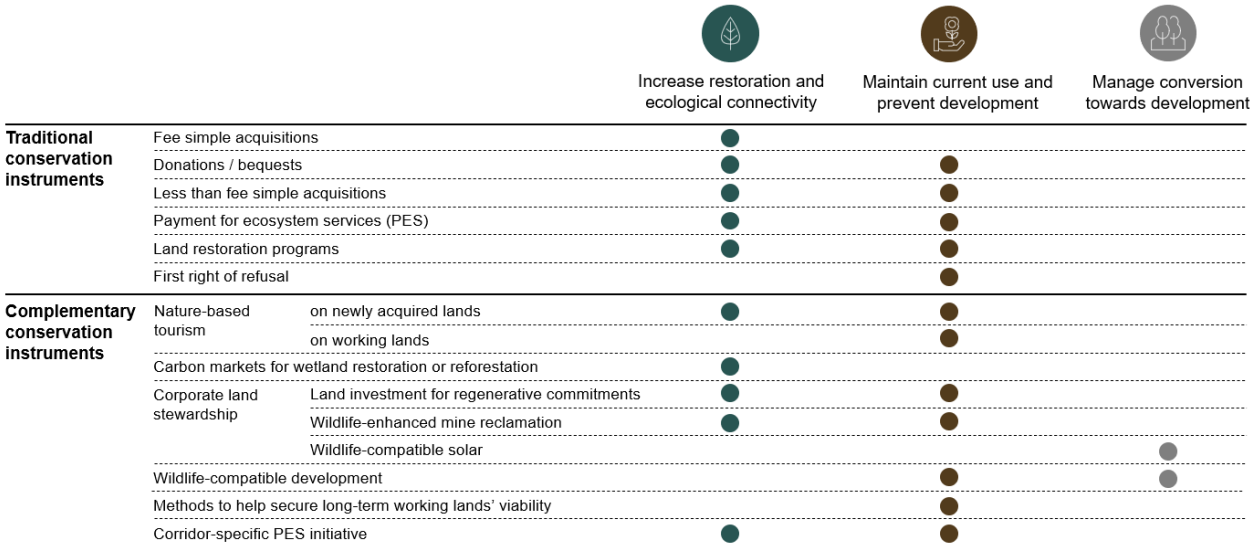
Multiple considerations feed into the decision to deploy a specific instrument to a parcel in the opportunity area.

First is the forward-looking status of specific parcels to determine if they could be maintained in their current use, if they require ecological restoration, and if they can be converted to development in a way that minimizes loss of value to the Corridor. Depending on the ecological priority of the land and the level of conversion risk, different conservation or use approaches may be deployed to secure the Corridor's Horizon 1 lands:

1. **Restore select critical areas** through restoration or a full protection status to achieve their full ecological potential
2. **Maintain the status quo** where land uses are compatible with wildlife to avoid future development
3. **Manage the conversion to development** where lower ecological priority lands cannot be kept in current land use due to high development pressure

Regardless of the approach used, actions such as using public and philanthropic funds to acquire land or easements and using innovative financing options to channel private sector funding to land conservation and securing resources for long-term conservation would support reaching the targets.

Allocation of conservation instruments to opportunity areas



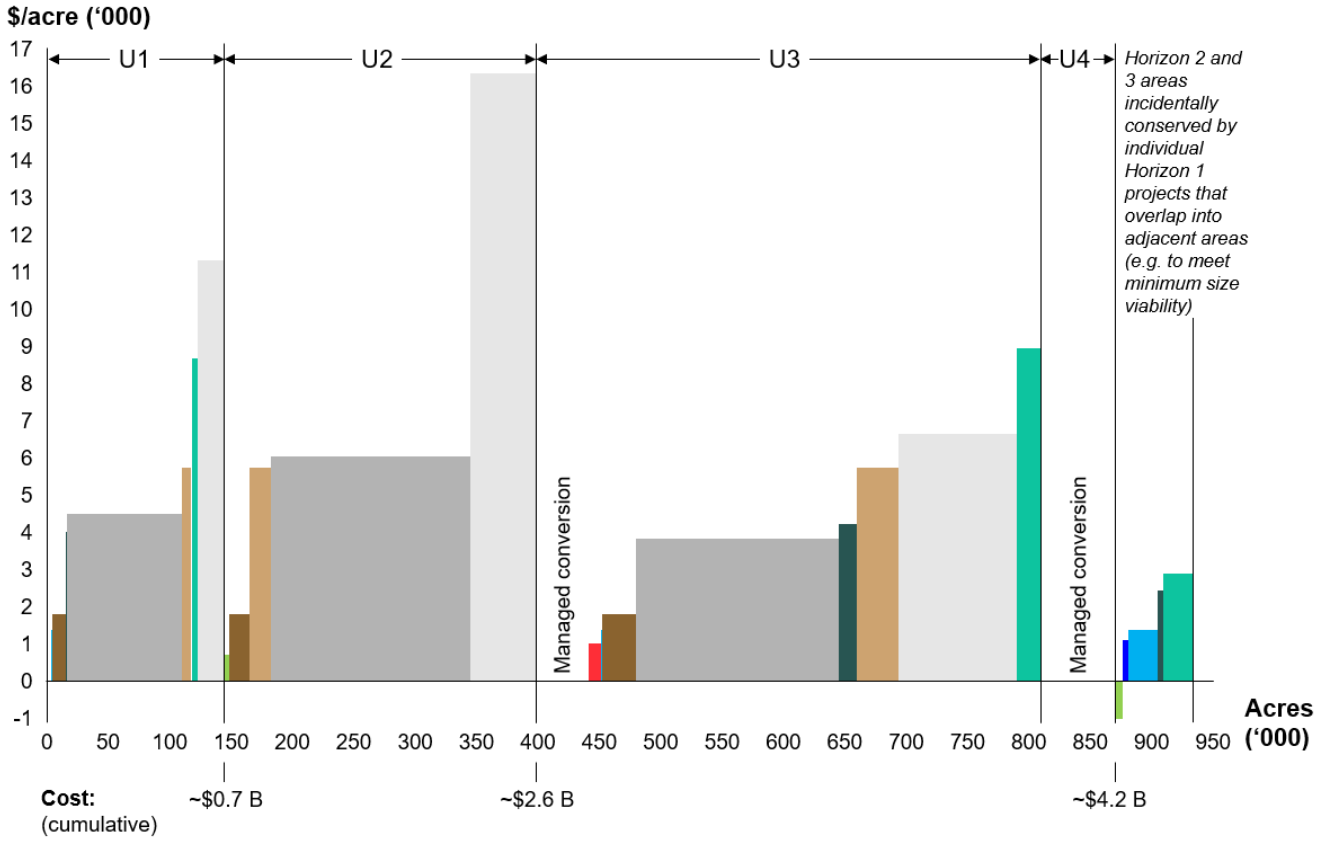
Innovative financing approaches could use initiatives such as encouraging or investing in nature-based tourism, carbon credit programs, corporate investments in land stewardship, investments in working lands viability and profitability, payment for ecosystem services, and/or wildlife compatible development. Using a mix of conservation instruments could help improve socioeconomic outcomes (such as new revenue from tourism development or carbon markets) and better align the lands with other state priorities, like developing real estate in a way that is compatible with wildlife.

Cost is a second consideration for selecting the conservation instrument to be applied. Stewardship of public resources by using the most cost-efficient approach is consistent with the State's broader social and environmental objectives. Geospatial models with algorithms that match instruments to lands based on the parcel's characteristics, conservation objectives and instrument costs could be used to explore the costs of applying different options.

Optimizing the mix of conservation instruments could preserve Horizon 1 lands (and prevent the erosion of the Corridor's value) at an approximate cost of $470 million per year from 2022 to 2030, a total of $4.2 billion.

The graphic that follows is a cost curve based on geospatial analysis that mapped locations and determined likely implementation costs for multiple possible conservation instruments, based on estimates of parcel-level land prices and accounting for any revenue that may be produced (such as through ecotourism). This used a portfolio-based approach that balanced instruments proven effective at achieving conservation outcomes with the implementation cost. The selected instruments were determined using geospatial analytics and then aggregating the data into cost per acre and numbers of acres per lever to plot the cost curve.

Estimated cost curve to conserve Horizon 1 land at its fullest potential



Traditional conservation instruments

- Easement (less than fee)
- Fee simple acquisition

Complementary conservation instruments

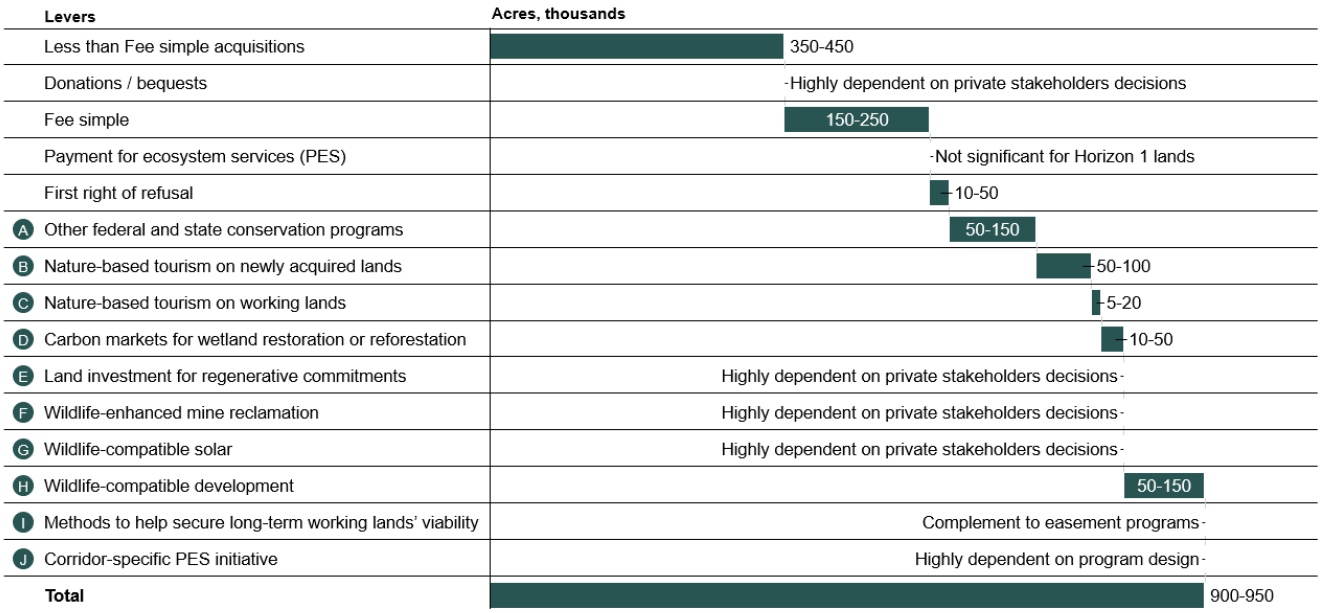
- Restoration benefits supporting easement
- Restoration benefits and carbon credits supporting easement
- Lodging park
- Camping site park
- Nature-based tourism on working lands
- Large carbon reforestation project
- Large carbon wetland project
- First right of refusal
- Managed conversion (*negligible cost per acre contribution*)

***Note on the cost curve**: Distribution of actions and costs is based on a geospatial analysis that mapped locations and land compatibility with multiple conservation instruments, optimizing to reduce overall portfolio costs. Conservation action is sequenced by urgency of Corridor areas, thus some higher-cost areas/instruments appear before less costly actions along the curve. Cost per acre estimates are based on parcel-level estimates of fair-market land value, in addition to other potential implementation costs and revenues.*

This analysis is driven by land characteristics, conversion risk levels and ecological priorities (with U1 to U9 being the urgency levels from the priority-risk matrix). Both instruments with potential financial benefits such as nature-based tourism and carbon are used, and traditional instruments, such as fee simple and less than fee simple acquisitions (which may be needed to protect lands of highest ecological priority with low monetization potential), are included in the modelling. The instrument of wildlife-compatible development is assigned to lands already engaged in development processes, which is based on the current condition of the Horizon 1 lands.

The proportion of acres protected by fee-simple acquisitions (relatively more expensive) compared to easements or “less than fee” acquisitions (relatively less expensive) is a factor in the preservation cost. The share of easements across all acres protected by state conservation programs increased from roughly 5-10% before the year 2000 to 50% over the past decade. If this trend continues as the cost curve assumes—which would require policy in alignment with this and landowner willingness—easements may reach 70% over the next decade. However, if the ratio of easements to fee-simple acquisitions does not change, the overall costs to preserve Horizon 1 lands are projected to increase by $50 million per year.

Potential preservation of Horizon 1 acres through various conservation instruments, using cost curve assumptions



Traditional conservation levers

The following financing instruments have been successful in adding areas to the Corridor.

Fee simple acquisitions

This type of land purchase transfers full ownership of the property and associated rights (including the title) to the purchasing entity and may establish a fully protected status in

perpetuity. In the last 30 years, state funded Florida Forever and, Preservation 2000 fee simple acquisitions have purchased 1.5 million acres of land in the current traditional area.[13] As an example, the Wekiva-Ocala Greenway is an ongoing acquisition project funded by Florida Forever, with the goal to acquire more than 80,000 acres of land critical to Corridor connectivity and biodiversity. Of all the currently proposed Florida Forever projects, 82% of the combined area (1.8 million acres) lies within the Corridor, which accounts for 22% of the Corridor opportunity area.[14]

Private action, donations and bequests to the public

Donation and bequests transfer of full property ownership with associated rights (including the title) for a protected status in perpetuity when used for conservation purposes. A donation or bequest may be considered by landowners for altruistic reasons as well as potential tax benefits. For example, Florida Forever projects have been supplemented with land and fund donations from non-governmental organizations (NGOs) such as Conservation Florida and The Nature Conservancy; numerous state departments; some water management districts; and private landowners. These donations have conserved roughly 77,000 acres of Corridor land.[15]

Less than fee simple acquisitions

Less than fee simple acquisitions, or conservation easements, are a right granted to an entity to use a property owned by another party for a specific, limited purpose for a defined period or indefinitely (stated as “in perpetuity”). These acquisitions have been developed under Florida Forever, Rural and Family Lands, the Sentinel Landscapes Partnership founded by DoD, the U.S. Department of Agriculture (USDA), and the U.S. Department of the Interior (now a coalition of federal agencies, state and local governments, and non-governmental organizations), and others. Easement contracts stipulate (and limit) the possible use of land to keep it compatible with wildlife objectives. Conservation easements have added nearly 250,000 acres of land currently protected by the Florida Forever program. As one example, the Adams Ranch aims to protect over 7,000 acres of habitat in southern Osceola County for rare species such as the Eastern Indigo Snake and the Bald Eagle by completing additional conservation easements on the property.[16] Because land ownership itself is not transferred under an easement contract (and landowners continue to have the right to certain types of development and the sale of the land), the costs of such contracts is lower than fee simple acquisitions.

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[13] Analysis based on Florida Natural Areas Inventory (FNAI) Atlas, DEP Division of State Lands, and Florida Conservation Lands (FLMA) data, Oct. 2021. Nominal costs adjusted for inflation to 2021 values using the US BLS Consumer Price Index for 1995 for all Preservation 2000 acquisitions, and 2010 for all Florida Forever acquisitions.

[14] “About the Corridor,” Florida Wildlife Corridor Coalition, Dec 2, 2021, https://floridawildlifecorridor.org/about/about-the-corridor/.

[15] Florida DEP Office of Environmental Services, “2021 Florida Forever Five-Year Plan,” May 17, 2021, https://floridadep.gov/lands/environmental-services/documents/2021-florida-forever-five-year-plan-abstract-and-introduction.

[16] FLMA data by FNAI.

Creating innovative easement and purchase options may increase landowner interest in using these instruments. For example, shorter-term (10- or 25-year) easements may address the near-term risk of conversion to development while lowering cost. This may also reduce landowners' concerns about limiting future generations' options for using the land or allowing indefinite public or state access. While these methods would not permanently conserve the lands, they would take a step toward conservation could be useful to securing high-risk lands and fairly compensating landowners. Such shorter-term easements may also postpone land sales and create future value for all parties involved. Other ways to increase landowner interest may include creating more flexibility with public access and recreational use, giving the ability to sell or retain carbon rights, improving access easement information, and making connections with peer landowners who have used the instrument to discuss their experience prior to the easement transaction.

As part of using this instrument, a transaction-based process may be helpful to be able to quickly and directly purchase urgent lands outright, evaluate them for easements and other conservation instruments, and then sell them to private ownership, as appropriate based on the conversation assessment.

Payment for ecosystem services initiatives

Payment for ecosystem services (PES) programs pay landowners for implementing conservation "best practices" on privately owned lands. Two current PES programs in Florida are the Northern Everglades Payment for Environmental Services (NE-PES), which pays landowners to retain water on private land to restore historic water flows, and the Gopher Tortoise PES, which pays landowners to implement practices compatible with maintaining the gopher tortoise's extensive burrow system used by over 350 other species for survival. PES programs are a possible option for landowners who are hesitant to cede land use rights indefinitely. The growth of PES programs may facilitate a shift in landowners' perspective of conservation and address any concerns with conservation easement.

Other state and federal programs using fee simple and less than fee simple acquisitions

Several federal and state land conservation programs have used fee simple and less than fee simple acquisitions for various types of lands.[17] These include the Agricultural Conservation Easement Program (ACEP) under the USDA, the Sentinel Landscapes Partnership, and the Land and Water Conservation Fund (LWCF), maintained by a coalition between the U.S. Department of Interior, the National Parks Service (NPS), and state agencies. Over the past 10 years, aggregate funding in Florida (not Corridor-specific) from these three sources has totaled more than $800 million. Of this, $360 million was ACEP funding, $190 million was DoD funding to preserve lands needed for military activities, and $275 million was provided by LWCF.

Given that funding is typically budgeted at the federal level for state-based programs, increasing collaboration between local Florida interests and the DoD may lead to a better understanding of

[17] Conservation Florida; USDA Natural Resources Conservation Service (NRCS).

how the Corridor's opportunity area may support achieving federal objectives. This may be particularly relevant for Horizon 1 lands, which present the highest urgency and may align with DoD's existing activities in the state.

Right of first refusal

A right of first refusal (ROFR) is a contractual right held by an entity to make the first offer on a property when the property is put on the market, before the seller entertains offers from other buyers. Since ROFR contracts typically do not include an agreed upon price for the future sale and landowners can refuse the first offer and sell to other interested buyers (including a higher sale price), this would not significantly constrain landowners.[18] While this instrument may not ultimately conserve the lands, it may be useful for establishing relationships with the owners of Horizon 2 and 3 lands. This could start the conversation on potential land sale and may increase the likelihood of completing a transaction or agreement in the future.

ROFR contracts can be structured like a "covered call" option in which the land could be bought by the contract holding entity for a certain price at any point before an expiration date, after which the contract is void. This type of contract limits the landowner's future options, and as a result, would have a higher cost than simple ROFR contracts. This strategy may be useful for securing high priority lands with an uncertain risk of conversion to development, such as a parcel that is ecologically critical that may convert to an incompatible use between 2030-2040. Buying a call option with a set buying price at 125% of the current fair land value (and at a contract cost of 25% of the current fair land value) may be an affordable way to avoid the risk of future development on the land. The land value would rise rapidly in value in the years closer to the conversion while accounting for uncertainty in conversion risk scenarios.

Innovative conservation instruments

In addition to traditional land conservation instruments, other complementary options could be developed to capitalize on the land's financial and ecological value. Nature-based tourism, carbon markets, corporate land stewardship, wildlife-compatible residential and infrastructure development, and establishing the long-term viability of working lands may be considered as alternate ways to gain additional benefit from the lands.

Nature-based tourism on newly acquired lands

Today, nature-based tourism in state and national parks in the Corridor directly provides Florida an estimated $2 billion in revenue and more than 20,000 jobs, not accounting for indirect impacts.[19] Additional public or privately-owned parks (i.e., natural space accessible to the public)

[18] Expert interviews, November 2021.

[19] Florida State Parks Foundation, *Florida State Parks and Trails - 2020 Impact Sheets*, floridastateparksfoundation.org/2020-Impact/; FL DEP Office of Park Planning, "Economic Impact Assessment Report 2020," Feb 17, 2021, https://floridadep.gov/parks/parks-office-park-planning/documents/economic-impact-assessment-report-2020.

on unprotected land within the Corridor opportunity area could offer sustainable levels of camping, glamping, and other recreational activities. These could not only protect the land, but also support the economy and create new jobs. Recreational activities may generate revenue to manage the land and possibly finance the creation of public access on Horizon 2 and 3 lands.

This type of development could take many forms, such as networks of resorts or lodges, more "traditional" park areas (state or local), and private lands with public access. Building on the state's extensive existing network of protected areas and public access land, innovative ideas may be key to expanding this resource. Area-specific designs could retain many working elements of the land's current use or enhance the visitor infrastructure, concessions, or habitat restoration, as examples. Done right, this may secure the Corridor's function, increase public recreation options, and make additional economic contributions to the state. While the addition of more traditional state park-type lands may be considered, there could be an important opportunity to develop complementary alternatives. One example could be developing public access-focused easements or other arrangements that confirm long-term protection while encouraging and permitting compatible development for public access recreation. This could include fee-based access and substantial roles for private concessionaires and investors.

Nature-based tourism on private working lands (without change of ownership)

As with nature-based tourism on acquired land, this option could aim to create economic revenue through using the land for recreational activities. Activities like offering event venues, lodging, hunting, agricultural picking, wildlife observation or fishing, already exist for ranchlands and croplands. According to interviewed landowners, adding these activities to working land could potentially increase their profit by 10% or more. As with newly acquired lands, an operating partner that is different from the landowner could be hired to manage the recreational business. The particular activities suited for the land would depend on the land's characteristics, attractiveness to potential visitor groups, landowner skills to implement and maintain the activities, and how these may complement the land's other uses.

The approach to easement protection could be modified to further enable public access and diversify land use, while still retaining the Corridor's function.

Creating a carbon market for wetland restoration and reforestation

Restorable wetlands and deforested lands could be used to generate carbon credits that are tradeable on the voluntary carbon market. These projects are considered natural climate solutions, or nature-based solutions: conservation, restoration and/or improved land management actions in landscapes or wetlands that increase carbon storage or avoid greenhouse gas emissions. There is increasing demand for carbon credits generated by natural climate solutions (as opposed to those generated through renewable energy, for example). Between 2010 and 2020, the share of carbon credits from natural climate solutions that was retired (used to compensate for emissions) in voluntary carbon markets increased from 5% to

40%, a trend that is expected to continue.[20] Existing analyses suggest that natural climate solution projects could achieve nearly a third of what is needed to reach the United Nations' consensus target of limiting global warming to the target of 1.5° Celsius above preindustrial levels.[21] This translates to using reforestation and wetland restoration, among other projects, to absorb 7 gigatons of carbon dioxide (GtCO2) per year on a global scale by the end of 2030.

In the Corridor, both large-scale (above 50 kilotons of carbon dioxide equivalent) and small-scale carbon projects, such as wetland restoration and reforestation, could monetize carbon sequestration at a price of $5 to $15 per ton of carbon dioxide equivalent (at late 2021 levels). Initial estimates indicate that there is a potential to trade 800 to 1,000 kilotons of carbon dioxide equivalent each year (this is further described in the next chapter). On a large scale, such projects could fund wetland restoration while supporting biodiversity and water retention. Small-scale wetland restoration and reforestation projects could also be used as alternate means for private landowners to invest in the voluntary carbon market. Note that this report did not consider carbon projects based on avoided loss of stocks and sinks.

Several documents and feasibility studies would be required before carbon market credits can be issued and sold. First, reforestation projects must be sited appropriately on formerly forested areas, to avoid the loss of native grasslands, prairies, and wetlands through afforestation. Second, wetland restoration projects Third, set-up expenses may be cost prohibitive for individual landowners; assistance may be needed to help them access technical and financial resources to support their entering the carbon market. This central support group, often referred to as a "carbon desk," could perform traditional outreach and support functions. In the context of an easement, a carbon desk managing several projects could support a group of small landowners or buy up carbon rights across multiple parcels to potentially lower costs. A carbon desk at the state level could support landowners with small-scale projects across a larger geographic region in a similar way.

Attracting corporate land stewardship investments

The Corridor could benefit from attracting private funding to land conservation. The following are potential avenues for corporate land stewardship.

Corporate investment in regenerative activities and impact reduction

In recent years, an increasing number of companies have invested in conserving natural land and/or addressing how they affect nature. Some companies have committed to business models that are "nature positive" or "regenerative" to enhance future generations' ability to flourish and/or that compensate for their operations' impact on the environment. These commitments include sizeable place-based conservation commitments, such as Amazon's grant to protect 4

[20] Aminetzah, et al, "Why investing in nature is key to climate mitigation," Jan 25, 2021, https://www.mckinsey.com/business-functions/sustainability/our-insights/why-investing-in-nature-is-key-to-climate-mitigation.

[21] World Economic Forum, "Nature and Net Zero," May 27, 2021, https://www.weforum.org/reports/nature-and-net-zero.

million acres of land in the Appalachian Mountains and other U.S. regions in 2020. Walmart helped protect over 1.8 million acres of land through support to the National Fish and Wildlife Foundation. In 2021, Goldman Sachs, Apple, and Conservation International established a $200 million Restore Fund for carbon removal through nature-based solutions, while Disney is supporting over 1 million acres of forest conservation.[22]

This movement to invest in land preservation appears to be expanding a financial supply market that could provide access to additional funds for conservation, particularly where companies have communicated corporate stewardship interest in Florida.

Wildlife-enhanced mine reclamation

Roughly 150,000 acres in the Corridor have mines, both active and closed (primarily phosphate mines). Reclamation is required after mining to restore the land to beneficial use. This process may offer the opportunity to assess wildlife compatibility as the land is reclaimed, such as improving soil and vegetation to support habitats and food chains. For example, several parks were developed on previously mined lands in the Polk, Hillsborough, Hardee, and Manatee counties.[23] Furthermore, mitigation requirements for mined land may offer opportunities to invest in mitigation banks, potentially outside the mined area and into Corridor lands of equal or greater value. It is important to note that while such lands have an active mining status or pending future development, any intensive development is effectively “on hold” so the protection is interim.

Wildlife-compatible solar field development / addition to cropland

When implemented in way that is compatible with wildlife, solar fields may be an option for some Corridor lands. Between 2020 and 2040, Florida’s solar energy generating capacity is expected to increase by more than 2x, with some estimates as high as ten-fold, which will require roughly 50,000 to 250,000 additional acres of land.[24] The needed solar fields may complement local housing development or commercial power demand, or tie into the overall grid (for example, the Babcock Ranch community sources a significant amount of energy from solar sources).[25] For corporations, solar energy could align with carbon reduction objectives. One case example Google’s development of a 6-gigawatt solar farm to support achieving its goal of fully operating

[22] Amazon.com, "Amazon Commits $10 Million to Restore and Conserve 4 Million Acres of Forest in the Appalachians and Other U.S. Regions in Partnership With the Nature Conservancy," Apr. 21, 2020. NFWF, “NFWF Announces Grants to Protect More Than 200,000 Acres in Seven States Through Walmart’s Acres for America Program”, Nov. 22, 2021. Apple.com press release, “Apple and partners launch first-ever $200 million Restore Fund to accelerate natural solutions to climate change”, Apr. 15, 2021

[23] Mosaic Florida Phosphate, “A Guide to Formerly Mined Public Parks in West Central Florida,” https://mosaicfloridaphosphate.kinsta.cloud/wp-content/uploads/FormerlyMineParksBrochur.pdf.

[24] U.S. Energy Information Administration, FL state energy profile overview.

[25] “The Heart of Babcock Ranch,” Kitson & Partners et al, Dec 2, 2021, https://babcockranch.com/our-vision/core-initiatives/#energy; babcockranchforbusiness.com; “Utilities,” Kitson & Partners et al, Dec 2, 2021, https://babcockranchforbusiness.com/sustainability/utilities/.

on carbon-free energy by 2030.[26] Solar 'micro-communities' may be another instrument for monetizing working land to boost landowner revenue. Identification of land that would be appropriate for this instrument (such as for grid-connect potential) and designing structures that allow for movement within the Corridor could be important to developing this option.

Fostering wildlife-compatible development

Housing demand has contributed to converting nearly 1 million acres of natural land in Florida over the past 20 years. If this continues at the same rate, by 2030, roughly 0.5 million acres of Corridor land may be at risk of conversion to high-intensity housing development, with an additional 1.2 million acres projected to be converted to housing development in the decades after.

Several options may be used to encourage suburban and rural development planning to be compatible with wildlife corridor goals. One is using density bonuses to incentivize cluster housing that uses above normal density and sets aside the remaining land as open space. This model exists in Florida today, such as with the Alachua's Rural Cluster land use designation. To aggregate green space across various properties to protect larger areas of the Corridor (like a buffer zone), zoning, planning, transfer of development rights, and private capital for wildlife-compatible projects could be used.

Success could depend on the innovative landscape and architectural and community design leadership in Florida. While there may be an abundance of interest and concepts, developing practical ideas (or "residential products") that are attractive to the market would be needed.

Building the case that compatibility with the Corridor and associated recreational opportunities increases the land's attractiveness and property value would also be essential to fostering wildlife-compatible development. Based on interviews, active residential developers have seen an increase in homeowner interest in properties located near natural areas. This emerging market signal aligns with recent research on the positive impact of nature on mental health and human connectivity.[27] Such value could be captured if new development is built in a way that extends, rather than diminishes, the Corridor's ecological value.

Aggregating green space could also be considered when planning road infrastructure. The renewed Infrastructure Investment and Jobs Act (enacted in November 2021) includes allowances for state and federal agencies to fund habitat connectivity projects, with $350 million in funding for wildlife crossings.[28]

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[26] "24/7 Carbon-Free Energy by 2030," Google LLC, Dec 2, 2021, https://www.google.com/about/datacenters/cleanenergy/.

[27] Kirsten Weir, "Nurtured by Nature," American Psychological Association, Apr 1, 2020, https://www.apa.org/monitor/2020/04/nurtured-nature.

[28] 117th Congress, "H.R.3684 - Infrastructure Investment and Jobs Act," Nov 15, 2021, https://www.congress.gov/bill/117th-congress/house-bill/3684/text.

Supporting working lands' long-term viability

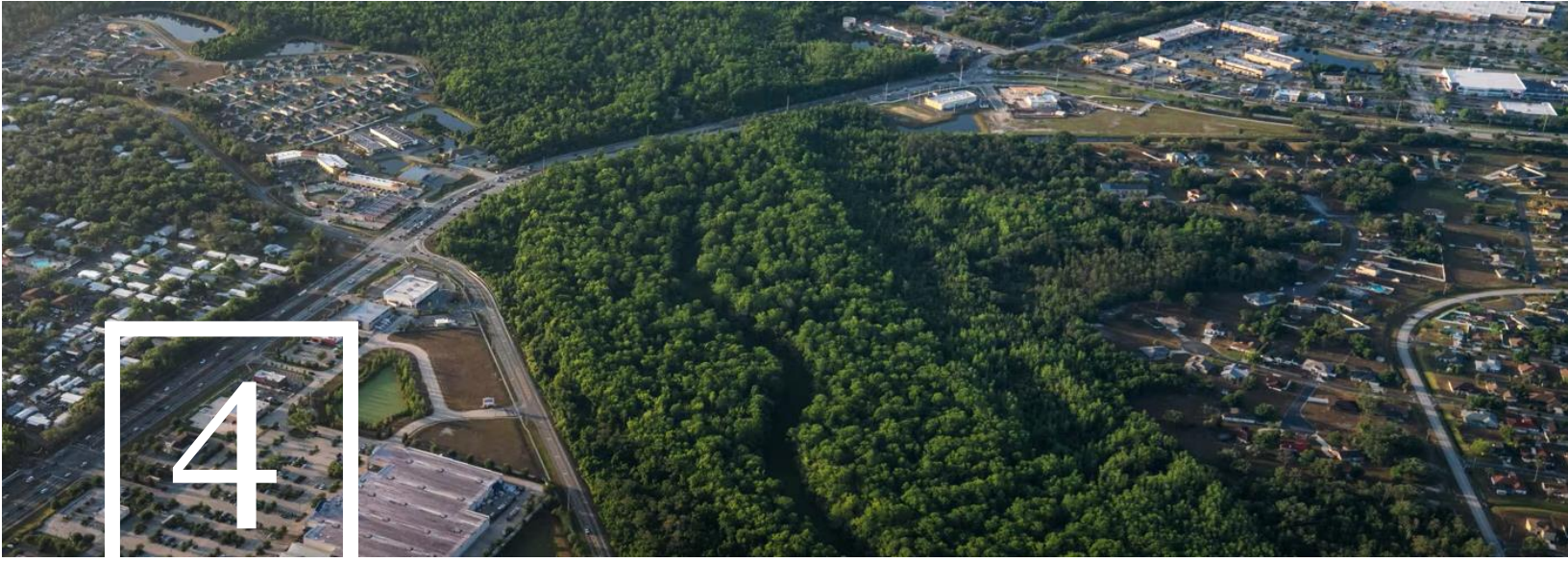
Ensuring that working lands are economically viable in the long-term is critical to maintaining the Corridor. Some of the levers already discussed—such as nature-based tourism, carbon markets and solar energy—could create additional revenue streams for landowners and increase incentives to maintain the land in its natural state.

Other instruments for supporting working lands' viability in the long-term could include accessing higher-end markets that offer price premiums (for example, grass-fed, locally grown beef that is produced in-state), upgrading or investing in new processing facilities (such as meat processing plants or sawmills), and encouraging off-rotation cropland areas to grow feed for animals on nearby cattle ranches.

There may be important cases where public sector investment is less about controlling land and more about helping Florida's infrastructure increase the state's competitiveness like how transportation and logistics assets support the broader state economy.

Corridor-specific Payment for Ecosystem Services initiative

A Payment for Ecosystem Services (PES) initiative for the Corridor may be another way to support working lands. While various PES instruments exist in Florida and could be expanded (such as to extend the Northern Everglades PES to other regions in the state, where relevant), none of the existing services fully addresses the Corridor's unique needs, ecosystem and specific ecological value to the state. A new PES could support conservation efforts on working lands that intersect with the Corridor. Based on interviews, a landowner's participation in a PES is often followed by an easement agreement as the landowner realizes the benefits of conservation practices—this makes PES a first step toward longer-term land conservation.



4

Impact with (and without) the Corridor

The value of the Corridor today

The Corridor has demonstrated value to Florida in several different ways:

- **Biodiversity services**, such as the ongoing recovery and northward expansion of the iconic Florida panther in response to increasing pressure from human activity, development and habitat loss, and the resulting species isolation and inbreeding[29]
- **Renewable provisioning services**, such as the continued productivity of farms and ranches that support rural livelihood, communities and recreational opportunities
- **Other related economic activity**, such as secondary processing of agricultural products
- **Regulating services** for water patterns and climate through the Corridor's diverse landscape, and safeguarding significant surface waters and underground aquifers to regulate the environment

Assessing these could form the basis for understanding the Corridor's overall value to the state and the potential impact if it is not preserved.

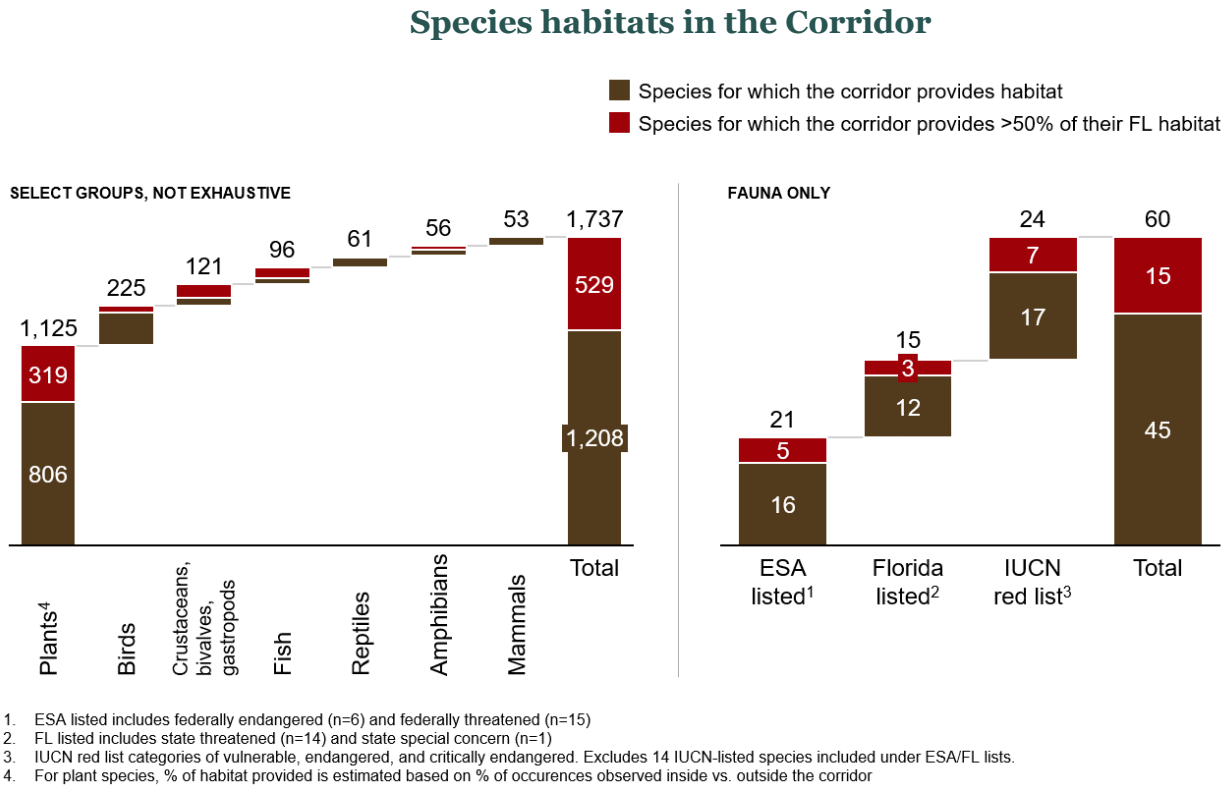
[29] "Florida Panther," U.S. Fish and Wildlife Service, Jul 28, 2020, https://www.fws.gov/southeast/wildlife/mammals/florida-panther/.

Components of the Corridor's value today

Biodiversity services

The Corridor includes hotspots of species richness, like the Everglades and the Southern Florida Coastal Plain, which have national significance. The state's natural lands encompass numerous ecologies, such as upland forests, wetlands and other aquatic areas, and grassland. The Corridor provides habitat for over 1,737 species of fauna, including at least 28 species of plants and 36 species of animals protected under the Endangered Species Act of 1973 and Florida's Endangered and Threatened Species list, plus an additional 24 animals on the IUCN Red List of Threatened Species. In total, the Corridor provides 48% of the habitat for species in Florida on average.[30]

Many species in Florida depend heavily on the Corridor because it holds a disproportionately large part of habitats compared to the rest of the land in the state (over 50% for 529 species and over 90% for 15 species).[31] Wide-roaming species like the Florida panther are critically dependent on the connectivity accessed through the full Corridor for their long-term genetic health and survival.



1. ESA listed includes federally endangered (n=6) and federally threatened (n=15)
2. FL listed includes state threatened (n=14) and state special concern (n=1)
3. IUCN red list categories of vulnerable, endangered, and critically endangered. Excludes 14 IUCN-listed species included under ESA/FL lists.
4. For plant species, % of habitat provided is estimated based on % of occurences observed inside vs. outside the corridor

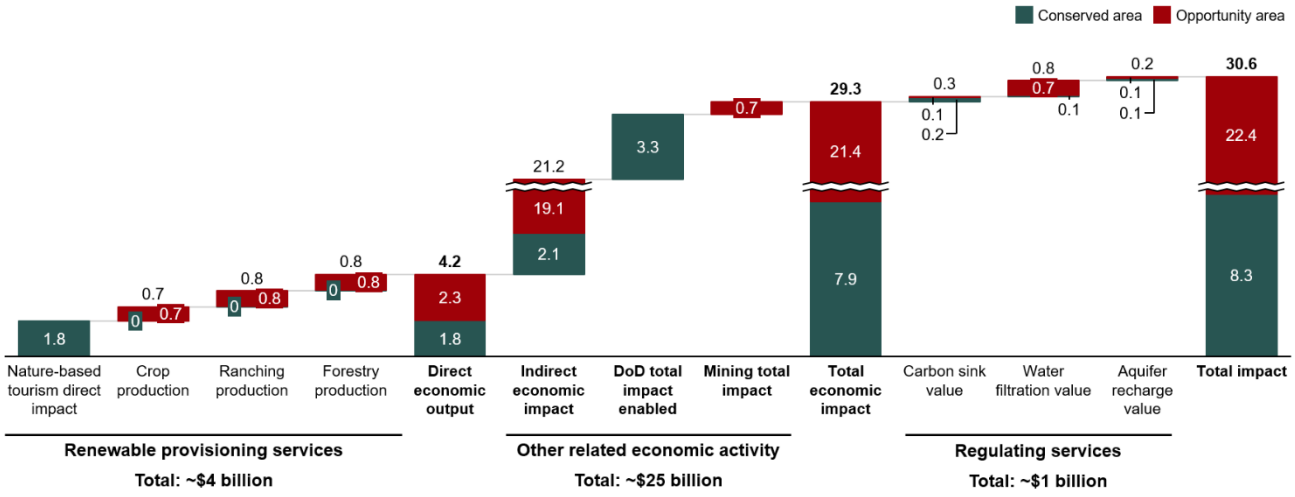
[30] Based on range maps and occurrence data from data by US Fish and Wildlife Service, Florida Fish and Wildlife Conservation Commission, International Union for Conservation of Nature, and Florida Natural Areas Inventory.

[31] Ibid.

Renewable provisioning services and other related economic activity

The value of the renewable provisioning services (indirect and other related economic impacts) and regulating services the Corridor contributes is estimated at a minimum of roughly $30 billion per year. This directly supports close to 40,000 jobs and indirectly supports an additional 75,000 jobs in the state. The full economic value of the Corridor is likely underestimated as this does not include all the current economic activity it enables, such as coastal fishing in waters downstream from Corridor waterways, or impacts of access to natural areas or freshwater filtration & retention on real estate values, among other benefits. For example, an economic analysis report found that restoring the Everglades would bring a net present value of $46.5 billion in benefits for Florida's economy, based largely on improving and securing water quality, habitat and hunting, and real estate property values.[32] The health of the Everglades and these restoration benefits may depend in part on the health of the headwaters located upstream in the Corridor opportunity areas.

Estimates of the Corridor's current annual value in renewable provisioning and regulating services *($ billion per year)*

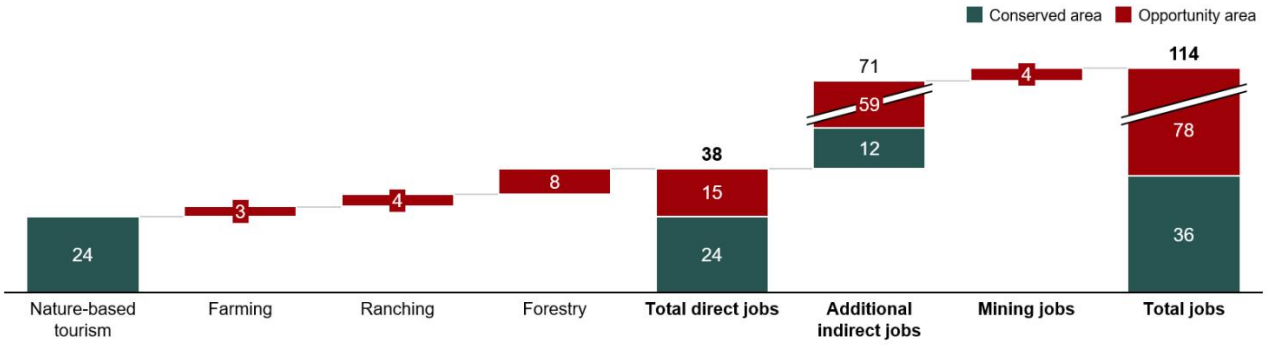


Value calculations are likely a significant underestimation of total value provided; several potentially significant sources of value (e.g., inland flood protection, impact on human health) could not be calculated

Of the Corridor's $30 billion impact per year, approximately $4 billion is primary renewable economic production, such as the sale value of crops and livestock, and about $21 billion is secondary or indirect economic impact within the state (analysis described below). This includes outsourced supply chain processes for Corridor-supported industries, like grain production for livestock feed, seed production for crops, and harvested timber conversion to wood and pulp. The economic impact created by the recreation, tourism, agriculture, ranching, and forestry sectors relies on healthy lands in the Corridor. Another roughly $4 billion of economic impact comes from ongoing mining in the Corridor and government expenditures on DoD training activity that uses unpopulated land in the Corridor.

[32] "Measuring the Economic Benefits of America's Everglades Restoration", 2010 report by Mather Economics prepared for The Everglades Foundation

Estimates of number of jobs supported by the Corridor *(thousands)*



Nature-based tourism and national parks in the Corridor contribute nearly $2 billion in primary economic impact to the state, and directly support more than 20,000 jobs.[33] Working lands in the Corridor opportunity area produce over $2 billion in goods, which is evenly distributed among agricultural production on cropland, livestock on ranchland, and forestry production on timberland.[34] These sectors together support close to 15,000 jobs.

The Corridor's indirect economic impact on the state is substantially higher. This is estimated as $21 billion and 71,000 additional jobs when accounting for the secondary economic activity created further up and down the value chain from the primary activities in the Corridor.[35] These include agricultural inputs and services (like fertilizer manufacturing, pest control services and veterinary services), food and related product manufacturing (such as canned, bottled and frozen fruit and juices, and vegetables manufacturing) and forest product manufacturing (like paper mills and product manufacturing).

Mining, such as phosphate rock and other stone mining, and quarrying are also in the Corridor—these contribute an estimated $0.7 billion impact and support 4,000 jobs.[36] In addition, DoD is able to use the natural Corridor lands for activities on at least 5 REPI-funded (Readiness and Environmental Protection Integration) installations or ranges, such as Eglin Air Force Base and

[33] Direct economic impact and jobs estimates based on visitor expenditure data from US NPS (includes Everglades NP, Big Cypress NPRES, and Canaveral NS), Florida State Parks Foundation and FL DEP (Includes all state parks within Corridor boundaries, excludes any non-nature historical-based parks, small disconnected urban sites, and offshore parks).

[34] Agricultural production & jobs estimate from USDA NASS "Florida Agricultural Overview", based on proportion of relevant agricultural land types within vs. outside the Corridor areas (CLC data). Timberland production data based on UF IFAS report by Hodges et al. "Economic Contributions of the Forest Industry and Forest-based Recreation in Florida in 2016", estimate based on proportion of timberland within vs. outside the Corridor areas (CLC data).

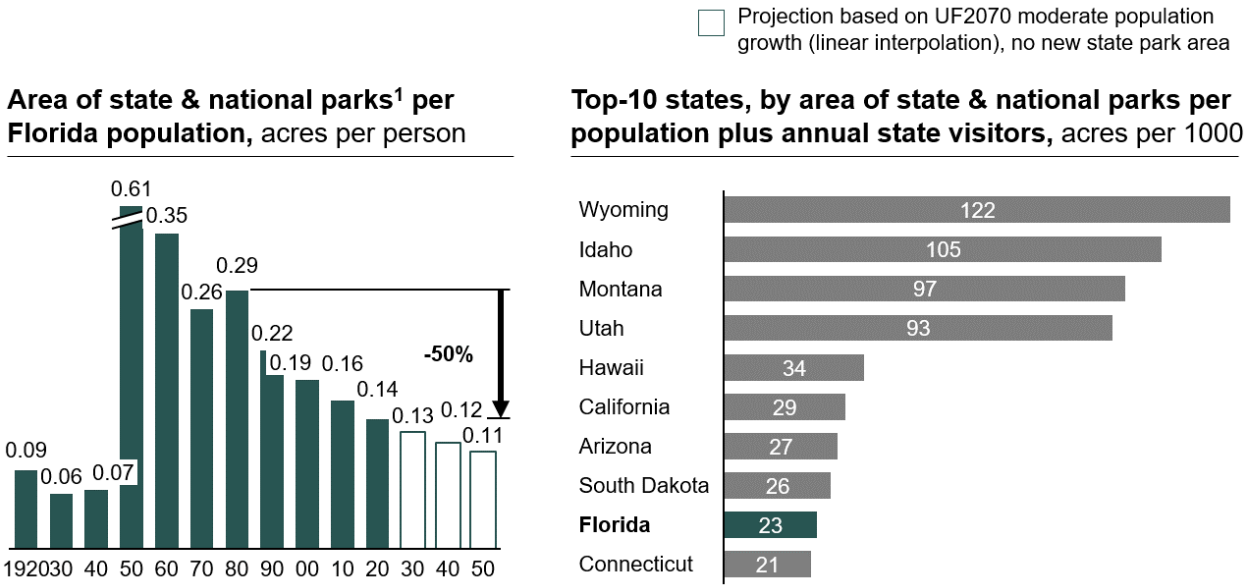
[35] Indirect economic impact multiple based on the contribution of food manufacturing, agricultural input and services, forest product manufacturing, and nature-based recreation in Florida, applied to the primary production from the corridor. Based on UF IFAS report by Hodges et al. "Economic Contributions of Agriculture, Natural Resources, and Food Industries in Florida in 2015".

[36] Based on proportion of Florida's phosphate rock, stone mining & quarrying, and sand gravel mining activity occurring inside vs. outside the Corridor areas, assessed with CLC land cover data, and UF IFAS report by Hodges et al. "Economic Contributions of Agriculture, Natural Resources, and Food Industries in Florida in 2015".

Avon Park Air Force Range.[37] The direct defense expenditures associated with these sites is estimated at $3 billion per year.[38]

Accelerated conservation action may also increase revenue and jobs in the nature-based tourism and recreation sector. The sustainable development of additional parks and natural recreation sites in the Corridor opportunity area may increase the economic impact by several percentage points, while expanding social impact through community access to nature for Florida's inhabitants and visitors.

Florida has about 800,000 acres of state parks and 2.6 million acres of national parks, making it one of the U.S.'s top-10 states for ratio of public parks to inhabitants and visitors.[39] While the number of public parks for recreation has remained relatively constant in Florida (not including state forests and other wildlife management areas), the state's population has steadily increased and is projected to continue to grow. The market demand for nature-based recreation land appears to be rising as the population increases. To meet this demand, aside from purchasing more lands, there may be value in developing additional supply through using existing Corridor areas—many may be useful for establishing new recreation sites for public access to trails and waterways, and campsites and other lodging.



1. Historical state parks analysis includes 715k acres, additional 85k acres have been added throughout to reach 800k currently reported by DEP. National Parks included are Everglades (1.5M acres), Big Cypress (730k), Cape Canaveral (58k), excluding largely marine areas such as Biscayne NP. Does not include state forests, and other wildlife management areas.

[37] "Readiness and Environmental Protection Integration," DoD REPI Program, accessed on Oct 11, 2021, http://www.repi.mil/. Installations considered are Eglin AFB, Avon Park AFR, NAS Whiting Field, Tyndall AFB, and Camp Blanding JTC.

[38] Matrix Design Group, Inc., "Florida Defense Industry Economic Analysis" (2020 update), prepared for The Florida Defense Support Task Force, Jan 2020, https://www.enterpriseflorida.com/wp-content/uploads/Florida-Defense-Industry-Economic-Impact-Assessment_2020-FINAL.pdf.

[39] Analysis does not include state forests and other wildlife management area. Park & visitor data from FL DEP, floridastateparks.org; NPS; state tourism board statistics; U.S. Census Bureau; Smith et al. "2019 Outlook and Analysis Letter – The vital statistics of America's state park systems" (February 2020), Utah State University

These overall value estimates for the Corridor are likely conservative since many benefits are hard to quantify economically. For example, the Corridor broadens public access to nature and shields communities from many climate risks. Communities adjacent to the Corridor may also experience strengthened cultural identity, reduced mental and physical illness rates, and better quality of life. External research has shown that access to nature is related to lower levels of mortality and illness, higher levels of outdoor physical activity, restoration from stress, a greater sense of well-being, and greater social capital.[40] Some studies have indicated that for every $1 spent on walking trails, approximately $3 is saved in medical expenses.[41] The value estimates also do not include the economic effects of access to natural areas on real estate values across the state or the state's ability to attract and retain people and businesses.

Regulating services

Healthy ecosystems are the foundation on which Florida's economy and communities thrive. Regulating the climate, reducing the impacts of extreme weather events such as inland and coastal flooding, maintaining the quality of water resources and soils, and helping to naturally pollinate many crops provides benefits across the state. The Corridor delivers climate regulation, flood risk reduction, surface water filtration, and freshwater provision.

Today, the Corridor forests (including wetland forests like mangroves, but not other wetlands like marshes) sequester 21 MtCO2e (millions of tons of CO2 gas equivalent) per year; this carbon sink representing almost 10% of Florida's annual greenhouse gas emissions from fossil fuel consumption.[42] If valued at $10/tCO2 (a prevalent price for carbon credits for nature-based solutions), the Corridor provides climate regulation worth approximately $200 million per year. This value may increase by about 5x to 10x by 2030, with projected price increases in the voluntary carbon markets.

The Corridor also protects 2.5 GtCO2e of carbon stocks in the form of organic carbon in the soil and biomass; this represents 60% of Florida carbon stocks.[43] Of this, between 30 and 130 MtCO2 are at risk of being lost by 2030 and 2050, respectively. This would cause a loss of $0.3 billion by 2030 and $1.3 billion by 2050, and further increase dangerous local and global climate impacts.

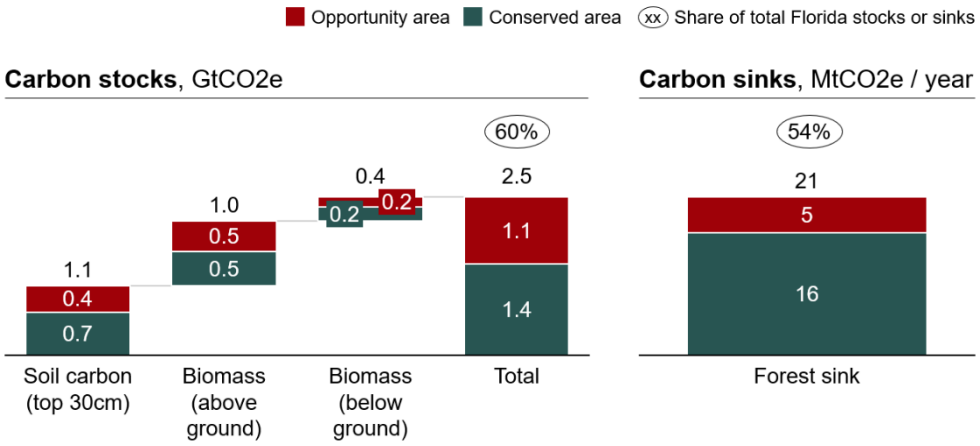
[40] American Public Health Association, 2013 policy statement: "Improving Health and Wellness through Access to Nature".

[41] American Heart Association, 2019 fact sheet: "Active Transportation – Creating Spaces that Promote Active Living".

[42] Forest carbon sink: Harris et al 2021; Global Forest Watch. Emissions: EIA. This report did not assess the sequestration contribution (incl. potential methane emissions) of pure wetlands.

[43] Biomass stocks: Spawn et al. 2010; Soil carbon stocks: SoilGrids 2.0, Poggio et al.

Carbon stocks and sinks within the Corridor[44]



The Corridor has water-related benefits such as natural filtration and nutrient removal from agricultural runoff, which protects the health of rivers, lakes, freshwater springs, and ultimately, coastal waters. The natural floodplains surrounding significant surface water bodies act as buffers that remove pollution before it enters waterways. This improves water quality across the state, from rivers used for recreation to coastal areas critical for recreational and commercial fishing. Excess nutrient pollution flowing into the sea worsens the harmful green algal blooms (and potentially the red tides), which cause commercial fisheries losses of $29 million each year on average and tourism-related losses estimated at $20 million each year.[45] The Corridor's natural floodplain lands immediately adjacent to waterways have the capacity to absorb 140,000 tons of excess nutrients (primarily nitrate and phosphorus) – more than the 25,000 tons of excess nutrients estimated to leak from nearby fertilizer and manure use. This natural water treatment service is valued at $0.7-1 billion per year.[46] This estimate does not capture the contribution that hundreds of thousands of small seasonal wetlands may make, especially in the upper levels of watersheds. It also does not include legacy nutrient loading (especially phosphorus) of the environment and associated potential absorption capacity limits.

The Corridor's natural floodplains also play an important role in reducing the impacts of extreme weather events. Flooding causes over $350 million in annual insurance payouts to households. Without natural floodplains as a buffer zone, those costs may increase. Forests, wetlands, and other natural floodplains retain and absorb more flood water compared to the urban area surfaces. A high-level estimate finds that over 180,000 people live in high-risk areas downstream of natural floodplains in the Corridor. If more Corridor natural areas were developed, the flood risk may increase for these people, and/or the number of people living in high-risk areas may potentially increase, given the size of the population living close (and downstream) to the Corridor. In contrast, restoring wetlands in the Corridor could further increase the natural floodplains' water retention capacity, which would help reduce the risk of downstream flooding.

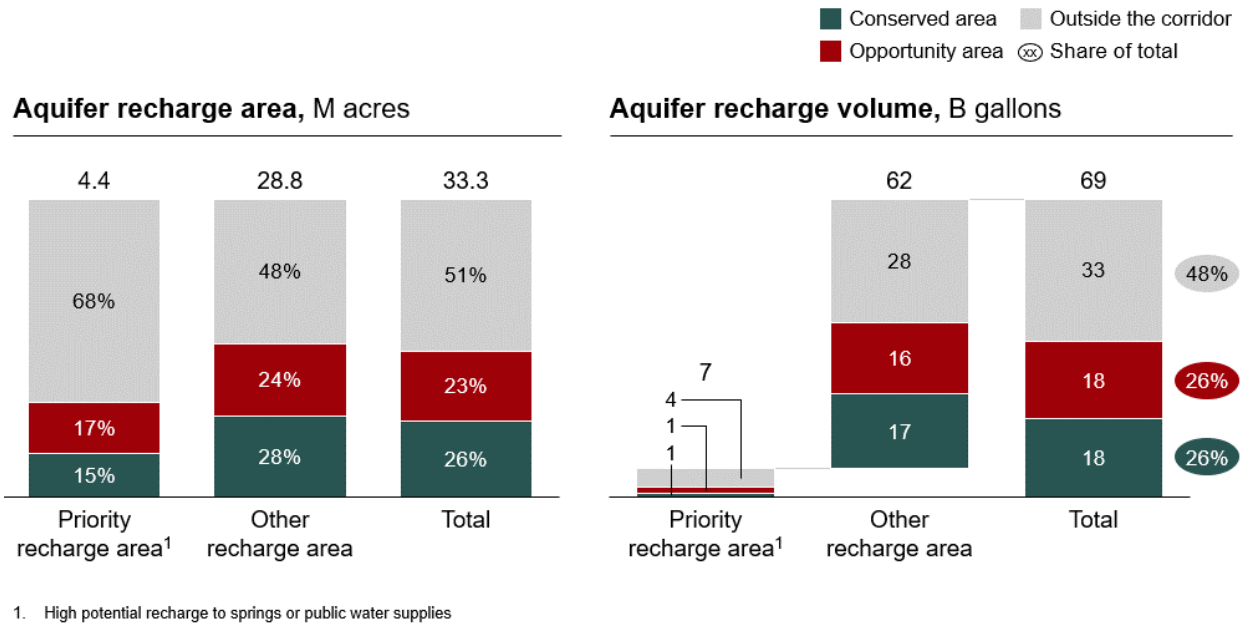
[44] Spawn et al. 2010, SoilGrids 2.0, Poggio et al. 2021, Harris et al. 2021; Global Forest Watch.

[45] FL Department of Health, http://www.floridahealth.gov/environmental-health/aquatic-toxins/_documents/economic-impacts.pdf. Lisa Krimsky, et al, "Understanding Florida's Red Tide," Dec 12, 2018

[46] FNAI and FWC based on nutrient leakage and retention rates from Gordon, et al., 2020, Sobota et al, 2015.

The Corridor also contains about 50% of Florida's aquifer recharge areas. These are places where water filters through the soil and recharges the state's freshwater aquifers.[47] An estimated 36 billion gallons of aquifer recharge stems from the Corridor. This is equivalent to the water consumed by over 1 million residents—a value of $200-250 million per year[48]. Furthermore, about 1.4 million acres of aquifer recharge areas in the Corridor are of highest significance for springs and public water supplies, accounting for a third of these areas in the state. The Corridor contains 171 significant springs and portions of 23 of Florida's 30 Outstanding Florida Springs (OFS) springsheds and has 1,300 named rivers and streams within it or crossing it.[49]

Aquifer recharge volumes within the Corridor



1. High potential recharge to springs or public water supplies

Value at risk from conversion to incompatible use

The substantial benefits of the Corridor lands are not guaranteed forever – geospatial analysis indicates they are at risk. By 2030, if no action is taken, an estimated 6% of the opportunity area (0.5 million acres) is likely to be converted to incompatible development, which may lead to a

[47] FNAI, UF Center for Landscape Conservation Planning, Florida Fish & Wildlife Conservation Commission, *CLIP - the Critical Lands and Waters Identification Project*, Aug 2016, https://www.fnai.org/services/clip.

[48] Based on ~85 gallons daily use per person, and a cost of $25 per 4000 gallons. Raftelis "2020 Florida Water and Wastewater Rate Survey" report

[49] Fred E. Lohrer, Archbold Biological Station Fact Sheet, Oct 3, 2007, https://www.archbold-station.org/html/aboutus/factsht.html.

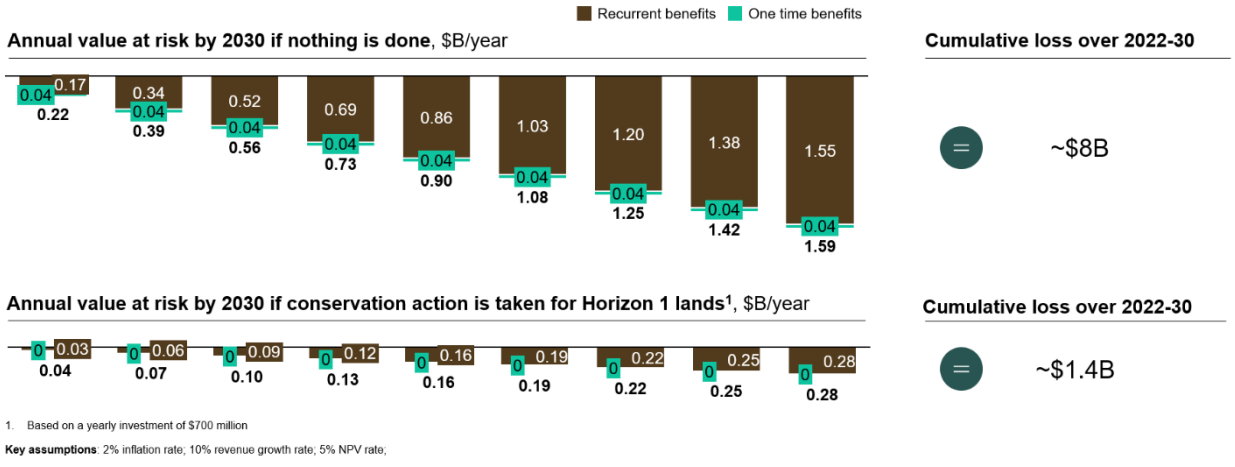
$700 million to $1 billion decrease of the Corridor's annual economic impact by 2030.[50] By 2050, the Corridor's annual value creation could decrease by 15% relative to its current value, which would be a $5 billion annual loss for the state. This decrease represents losses in both renewable provisioning services and regulating services, which would accumulate.

Over the next 9 years, this could potentially amount to a cumulative economic loss of $6 billion to $8 billion. The value could further degrade beyond 2030, which would result in an estimated cumulative loss of over $75 billion by 2050. Conservation action today could keep the natural lands intact and make the working lands sustainable. Inaction could put the Corridor's annual economic impact at risk.

Given the number of variables involved, these estimates do not have a potential 'tipping point' or straight line to when loss would occur. As an illustrative example (not based on data or expert interviews), if a certain proportion of natural land surrounding DoD-operated bases within the Corridor were lost, DoD may move some training activity to another state to accommodate low altitude or higher decibel maneuvers. Similarly, a sawmill would close if it were unable to source sufficient raw timber to remain profitable at scale. As another example, if headwater flow from central Florida were further reduced from historic levels, the ecological health and productivity of the Everglades and adjacent seas could be endangered.

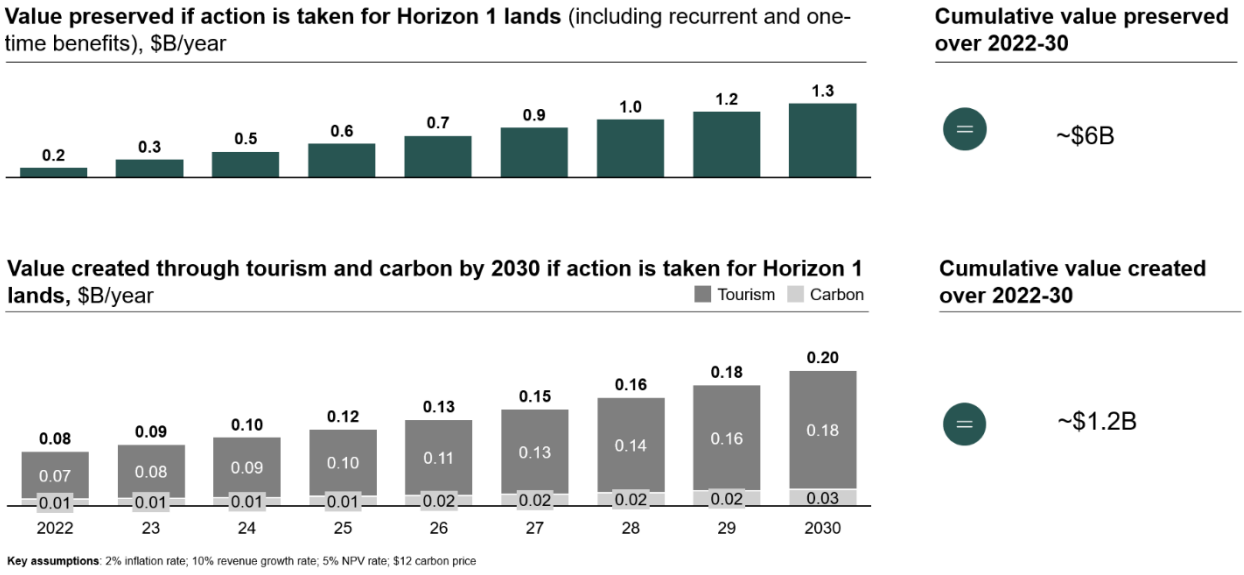
Value and return on investment for the Corridor strategy

Investments in protection could reduce the number of acres of natural land converted to uses that are incompatible with the Corridor. Using the innovative strategy to secure Horizon 1 lands discussed in Chapter 3 may preserve the vast majority of the Corridor's value. While implementing the Horizon 1 strategy would cost $500 million per year through 2030, it would lower the cumulative value loss during 2022 to 2030 from $8 billion (in the scenario of taking no action) to approximately $1.5 billion. This would effectively 'conserve' approximately $6.5 billion in economic value for the state.



[50] Risk of conversion of the Corridor opportunity area to development based on a linear interpolation of UF2070 model projections and including 25-50% leakage. Value based on analysis described earlier in this chapter.

By investing in the development of tourism and carbon credit sales, the state could avoid losses as well as gain approximately $1 billion in net new economic activity from nature-based tourism and carbon credit sales between 2022 and 2030. This gain could potentially surpass $17 billion between 2022 and 2050.



The return on investment of such a strategy may be substantial. As with other public or private infrastructure projects, the cost of preserving Horizon 1 lands would be frontloaded to 2022-2030, while the benefits would continue to accrue in the subsequent decades. A common way of assessing such long-term, frontloaded investments is to look at net present value (NPV). This value integrates the cost of investments, net gains, and a discount over time (conservatively, the near-term has higher impacts than the medium- and long-term). The projected potential NPV of the cost of preserving Horizon 1 lands, which would prevent Corridor erosion, is $5.5 billion if captured using the strategy defined in this report. The projected NPV of the value created by this strategy (the value conserved by avoiding Horizon 1 land converting to incompatible uses) is $33.8 billion. This could result in a $33.8 billion/$5.5 billion or 6.1x return on investment.[51]

[51] Costs and benefits of protecting Horizon 1 lands, calculated through 2050 using a 5% discount factor.

5

The Way Forward

The challenge set forth by State policy, and the apparent aspiration across many stakeholders, is for a permanent, ~18 million acre wildlife Corridor that is also a positive economic and social engine. At a time of significant economic and demographic growth in the state of Florida, the challenges involved in establishing and preserving such a corridor should not be underestimated. Success depends on innovative, disciplined, and well coordinated execution—fueled by a compelling narrative of actual progress. Coordination across various organizations, each with their own capabilities and objectives, will likely continue to be essential. Developing a detailed implementation roadmap may be a valuable first step in organizing this collaboration around an innovative 5- to 10-year strategy to secure Horizon 1 lands while monitoring the status of priority Horizon 2 and 3 lands. Such an implementation roadmap would carefully consider the optimal mix of traditional and innovative conservation instruments to secure Horizon 1 lands.

This road map could be designed around the following five objectives:

1 Facilitate sustainable and diverse funding of land conservation

A diversified portfolio of funding instruments could support efforts to preserve the Corridor and make best use of all available options. While important, this likely cannot rest on simply expanding the Florida Forever fund and traditional funding sources.

2 Raise landowners' awareness of the Corridor objectives and value creation opportunities

Stakeholder interviews have revealed that education and changing mindsets about the Corridor's objectives are needed for the vision to fully be implemented. Given the complexity of funding opportunities and processes, landowners will also benefit from an intermediary to demystify conservation levers and facilitate their access to funding opportunities.

3 Actively develop innovative solutions and partnerships to support conservation initiatives

Establishing an indefinite commitment with stakeholders would be critical to the long-term success of the Corridor. To do so requires advancing innovative thinking and further exploring the intersection of promoting the Corridor's vision and growing Florida's economy. This could take the form of partnerships with corporations or financial institutions with interest in nature-based or carbon solutions, for instance. There is tremendous potential in areas that would require an innovative, entrepreneurial mindset to "find a way."

4 Support decision making through rigorous analytics with an integrated view of Corridor's status

Advanced analytics can provide a holistic view of the current and projected future state. This should be used to inform all decision-making, model impacts under different scenarios, and monitor the land's evolution. As the work to date has shown, decision-making, tracking, and answers to questions from increasingly diverse stakeholders rely on substantial geospatial, economic and social models.

5 Remain informed of relevant policy and regulatory changes and implementation results to inform planning and management

Closely monitoring policy and regulatory changes impacting the Corridor is essential to achieving the Corridor's vision. Channeling lessons learned and experience from on-the-ground initiative implementation and formal and informal conservation discussions could help inform relevant policymaking. This is not necessarily about more regulation, but rather, identifying opportunities to update and align regulatory policy, such as potentially innovating in the areas of easement structures and terms.

Appendix

This appendix provides supporting information on the following topics:

Overview of federal and state land conservation programs

Program	Description	Funding to date, $	Example
Florida Forest Legacy Program	Provides grants up to $6.5M to state governments to be used for conservation easements or land acquisition	60M[1]	Bull Creek
ACEP: Agricultural Land Easement	Provides up to 50% of easement funding to land trusts protect farms and ranches from development and conserves grazing land, including rangeland, pasture and shrub land	360M[2]	-
ACEP: Wetland Reserve Easement	Provides up to 50% of funding needed to purchases short term (10-30 year) conservation easements on degraded or former wetlands in need of restoration	360M[2]	-
Conservation Easements within the EHNWR boundary	Provides conservation easements to conserve the natural resources within the boundary of the Everglades Headwaters National Wildlife Refuge Conservation Area	189M+	Archbold Reserve
DOD: Sentinel Landscapes and REPI programs	Provides funding for cost-sharing partnerships to acquire conservation easements from willing landowners	191.5M	Avon Park Air Force Range
Land and Water Conservation Fund	Provides matching grant to federal, state and local governments to purchase land, water and wetlands or develop recreational areas	275M	Spring Hammock Preserve
North American Wetlands Conservation Fund	Provides matching grants to wetlands conservation projects in the United States, Canada, and Mexico	12.5M	Gulf Coasts Watersheds Conservation
National Coastal Wetlands Conservation Grant Program	Provides matching grant of up to $1M to acquire, restore, or enhance coastal wetlands and adjacent uplands	32M	Bogey Creek Preserve

1. Pool of funding at national level, non-specific to Florida
2. Split between both ACEP programs

About the methodology used to develop this report

Spatial Scope

The study area for this project was the entire U.S. state of Florida. The overall objective was to conserve a pre-determined statewide wildlife corridor. The spatial unit used for the analyses was a grid of one hectare pixel resolution in the Florida GDL Albers projection (EPSG: 3513).

The state was divided into 5 distinct areas: 1) opportunity areas, defined as land in the Florida Wildlife Corridor (FWC) that is not currently conserved and is targeted for conservation action under this study), 2) currently protected federal, private and local protected areas, and 3) land outside of the corridor.

There following were fundamental base data sets for the study:

- *Critical Lands and Waters Identification Project* (CLIP) is a collection of spatial data that identify statewide priorities for a broad range of natural resources in Florida.[52] It includes

[52] Jon Oetting, Tom Hoctor, Michael Volk, "CLIP: Critical Lands and Waters Identification Project Version 4.0 User Tutorial," Sep 2016, https://www.fnai.org/PDFs/CLIP_v4_user_tutorial.pdf.

maps of priorities for biodiversity, landscapes, surface water, groundwater and marine areas. It also has an aggregated dataset that combines biodiversity, landscapes, and surface water into one priority layer.

- *Florida Ecological Greenways Network* (FEGN) is statewide database that identifies and prioritizes a functionally connected ecological network of public and private conservation lands (essentially the FWC).[53] The FEGN uses categories of priority (P1-3), which are described in detail in the "Important Conservation Lands" that follows.

- *Florida Land Cover Classification System's Cooperative Land Cover (CLC)* is a comprehensive land cover dataset designed for conservation planning.[54] It incorporates classifications used by the Florida Fish and Wildlife Conservation Commission, Florida Natural Areas Inventory (FNAI), and Florida's water management district. This was used to produce a feasible and usable land cover dataset that could be cross-walked with past land use data. The system is a hierarchical classification developed through expert workshops. The version published in 2018 was used, however it has most recently been updated in November 2021, after completion of this analysis (see the Florida Fish and Wildlife's Conservation Commission's Cooperative Land Cover Map at https://myfwc.com/research/gis/regional-projects/cooperative-land-cover/ for a description of the classification system).

Prioritization Analyses

Future Land-use Conversion

This mapped future land use conversion from corridor-compatible land uses to urban or other residential development. The current analysis assumes compatible land uses include most activities other than urban development; such as crop production, ranching, and timber harvesting. However, land-use conversion such as agricultural intensification may not be compatible with all Corridor goals or other environmental services and benefits, and may be considered in future analysis of conversion risks.

The spatial risk layer was developed by modelling the likelihood of each pixel in the Florida wildlife corridor opportunity area being converted to an urban land use.

The area of land in the Florida Wildlife Corridor opportunity area projected to be converted to urban use by 2030 and 2050 was developed using existing land use conversion models. The analysis was limited to these time periods as 2030 is an immediate horizon for assessing policymaking impacts and aligns with the time horizon in the United Nations' post-2020 Strategic Plan for Biodiversity. The 2050 horizon was used to as a timeframe for longer-term planning.

[53] UF Center for Conservation Planning, "Florida Ecological Greenways Network Update Project Final Report," May 31, 2021, http://conservation.dcp.ufl.edu/wp-content/uploads/2021/09/FEGN_Update-Final-Report.pdf.

[54] Robert Kawula, Jennylyn Redner, "Florida Land Cover Classification System," Sep 2018, https://myfwc.com/media/20455/land-cover-classification-revision-2018.pdf.

The highest risk pixels in the risk surface were identified until the area converted by 2030 was met. The next highest risk pixels were identified until the 2050 area converted was met. This formed a map of likely conversion by 2030 and 2050.

To create the risk layer, an ensemble approach was used to combine two spatial models of future land use projections and two spatial proxies of conversion risk. This approach mitigated the uncertainty that comes with any future land use projection by giving pixels identified across all models a higher weighting than those that limit the influence of the uncertainty in any single model. The following were the four inputs to this layer:

1. U.S. Geological Survey (USGS) Earth Resources Observation and Science (EROS) Center FORE-SCE framework. This model was developed by the U.S. Geological Survey (USGS) Earth Resources Observation and Science (EROS) Center using the FOREcasting SCEnarios of Land-use Change (FORE-SCE) modelling framework. This gives spatially explicit projections of future land use and land cover change in the U.S. at a 250 x 250-meter resolution from 1938 until 2100. The future projections follow the Intergovernmental Panel on Climate Change (IPCC) "Special Report on Emissions Scenarios" (SRES). Scenario A1B from the report was used for the study; this describes a future world with very rapid economic growth, a global population that peaks in the middle of the twenty-first century and declines thereafter, and the rapid introduction of new and more efficient technologies. It also assumes a balance of fossil fuel intensive and non-fossil fuel energy sources.[55]

The USGS future land-use outputs for 2030, 2040, 2050, 2060 and 2070 were combined into a single proxy of risk of conversion to development. Pixels had a binary score based on a projection of likelihood to be converted to urban use (1) or not converted (0) at each time step. Lower weights were assigned for conversion in the future, with a pixel converted in 2030 equal to 1, 2040 = 0.8, 2050 = 0.6, 2060 = 0.4, and 2070 = 0.2.

2. University of Florida projection of future land conversion. Another model used was the 2070 projection of future land conversion to urban areas produced by the UF GeoPlan Center, Florida Department of Agriculture and Consumer Services, and 1000 Friends of Florida.[56] This dataset contains a representation of land development projected to occur in 2070 based on land use and population distribution scenarios derived from Florida Bureau of Economic and Business Research data. The data was available in two time periods: 2010 (baseline of existing land use at that time) and 2070. If a pixel was projected to be converted to urban by 2070 (under the scenario based on current development patterns), it was assigned a 1; otherwise, it was scored as 0.

3. Florida Land Cover Classification System. This resource was used for a cost-distance analysis (a spatial proxy to assess the risk of conversion to development). This calculated the distance from each pixel in the Florida Wildlife Corridor opportunity area to a current urban area

[55] United Nations Intergovernmental Panel on Climate Change (IPCC) Working Group III, "IPCC Special Report on Emissions Scenarios," 2000, https://www.ipcc.ch/site/assets/uploads/2018/03/sres-en.pdf.

[56] Margaret H. Carr, Paul D. Zwick, Ph.D., "Florida 2070," Sep 2016, prepared for the Florida Department of Agriculture and Consumer Services & 1000 Friends of Florida, https://1000friendsofflorida.org/florida2070/wp-content/uploads/2016/09/florida2070technicalreportfinal.pdf.

in the year 2018. Urban areas were identified from the System's CLC dataset.[57] This assumed a linear relationship by which the closer a pixel is to an existing urban area and its corresponding access infrastructure, the more likely it is to be converted.

4. U.S. Department of Agriculture (USDA) National Agricultural Statistics Service (NASS). Another input was the ratio of agricultural and timber rent to land value.[58] Agricultural rent data, which reflects the agricultural potential and output of a farming area, was obtained from USDA NASS.[59] Locations where the land value of a property exceeds its potential revenues from agriculture were classified as high risk of conversion to development given economic incentives. Spatial data for this variable was only available across agricultural land types. To adjust for this, the median was assigned to pixels with no data and additional timberland rental data was extracted from the USDA Forest Service's cost estimates for carbon sequestration through afforestation in the U.S.[60]

Each of the four spatial layer inputs was scaled to a uniform size and given a score between 0 and 1. The average score per pixel was then calculated to give a final risk surface, with each of the four inputs having equal weight. The resulting final risk surface was then also scaled to the uniform size.

The Florida 2070 model between 2020 (current baseline) and 2070 were next linearly interpolated to calculate an expected area that will be converted by the years 2030 and 2050. This model was used instead of the USGS model given that the Florida 2070 model is calibrated to recent local trends in land development in Florida, whereas the USGS model is calibrated based on national level trends that are less likely to reflect Florida's current situation.

To complete the map, the highest risk pixels in the risk surface were identified until the area converted by 2030 was met. The next highest at-risk pixels were identified until the 2050 area converted was met. This formed a final categorical map that identified pixels as converted by 2030, by 2050, or not converted within those time horizons.

Finally, to account for leakage or a 'balloon squeeze' effect (where the squeezed area shrinks and the other area expands) where development moves into adjacent lands within the Corridor, the land at high risk of conversion to development was increased by 25% and the medium risk area was increased by 50%. This was done by sequentially selecting the next most at-risk pixels until the required percentage was reached. This is based on the assumption that the current high-risk lands are on the edge of the Corridor so leakage may occur outside the Corridor.

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[57] Kawula, Redner, "Florida Land Cover Classification System," https://myfwc.com/media/20455/land-cover-classification-revision-2018.pdf.

[58] To represent the cropland rent, pastureland as well as irrigated and non-irrigated cropland rent by county were extracted to compute the maximum of irrigated or non-irrigated rent.

[59] USDA NASS, *Quick Stats*, accessed on Oct 11, 2021, https://quickstats.nass.usda.gov/results/E0F5EB36-3313-3D7B-9E7F-E56A3365CF2B#9A9F55D7-E267-38C6-ACB9-DF106291B5A7.

[60] Anne Sofie Elberg Nielsen, Andrew J. Plantinga, Ralph J. Alig, "New Cost Estimates for Carbon Sequestration Through Afforestation in the United States," Mar 2014, https://www.fs.fed.us/pnw/pubs/pnw_gtr888.pdf.

However, since medium risk lands are more centrally located within the Corridor, a larger proportion of leakage was determined as likely to happen within the Corridor.

Important Conservation Lands

The 2021 Florida Ecological Greenways Network (FEGN) was used to identify and map important conservation lands within the corridor opportunity area. The FEGN has three primary components: priority ecological areas (PEAs), hubs, and corridors. Priority ecological areas include a selection of landscape species habitat models, a matrixed landscape of natural communities (habitat patches), Florida panther and black bear conservation zones and habitat, and existing conservation lands (of many types), among others.[61] Hubs involved refining PEAs based on landscape integrity as defined and mapped in the Critical Lands and Waters Identification Project (CLIP) database.[62] Lands below a threshold of landscape integrity or with connections smaller than 300 meters were removed. Seven separate landscape connectivity analyses were run, combined, and then overlayed with the hubs to further refine the lands. This report used FEGN Priority 1 (highest) to 3 (lowest) classifications.

Priority Areas and the Level of Urgency for Action

To identify priority locations for conservation and assign them a score for urgency of action, a conservation planning framework was used to weigh the ecological irreplaceability or importance of a site (the FEGN-based indication of ecological network importance) against the risk of it being converted (projection of future conversion to an urban area).[63] Land that is high in importance for conservation and at risk of conversion to development by 2030 was designated a priority for immediate action, followed by land of medium conservation importance at risk of conversion by 2030. Land that is not projected to be converted to development was deemed as not needing immediate conservation action since it does not face imminent threat. Funds spent to preserve these could have no impact and present a risk of redirecting resources that would be better spent benefiting or securing at-risk areas.[64]

This approach resulted in a decision matrix with 9 categories for urgency, with 1 being “act first” and 9 being “act last.” Categories 1 to 4 require conservation before the 2030 time horizon, 5 and 6 require conservation by the 2050 time horizon, and 7 to 9 do not require any action prior to 2050 other than their being regularly updated in the Corridor’s risk of conversion mapping to validate that the lands’ status has not changed. The lands requiring action before 2030 were categorized as “Horizon 1” lands.

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[61] UF Center for Conservation Planning, “Florida Ecological Greenways Network Update Project Final Report,” May 31, 2021, http://conservation.dcp.ufl.edu/wp-content/uploads/2021/09/FEGN_Update-Final-Report.pdf.

[62] Jon Oetting, Tom Hoctor, Michael Volk, “CLIP: Critical Lands and Waters Identification Project Version 4.0 User Tutorial,” Sep 2016, https://www.fnai.org/PDFs/CLIP_v4_user_tutorial.pdf.

[63] C. R. Margules, R. L. Pressey, “Systematic Conservation Planning,” May 11, 2011, https://doi.org/10.1038/35012251.

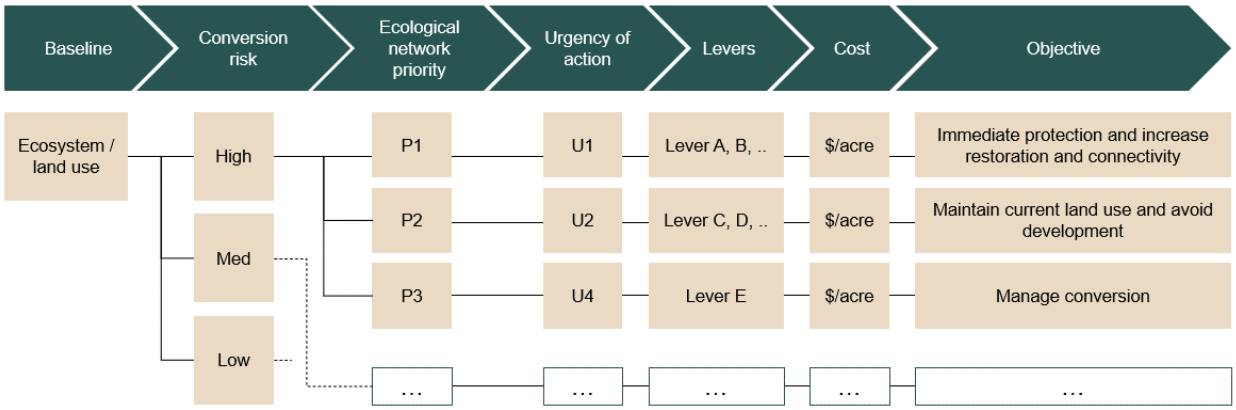
64 Robert L. Pressey, Rebecca Weeks, Georgina G. Gurney, "From Displacement Activities to Evidence-informed Decisions in Conservation,” Biological Conservation, Volume 212, Part A (August 2017: 337-348. https://www.sciencedirect.com/science/article/pii/S0006320717310376.

Lever Mapping and Cost Curve

The analyses aimed to map potential site-based conservation actions or instruments that would be used to achieve the required conservation before 2030 (Horizon 1 lands with urgency levels 1 through 4) and capture the associated costs for implementation and the potential revenue. Multiple instruments were identified: nature-based tourism through a private or state park or in conjunction with current landholders; managed conversion; a large carbon reforestation project; a large carbon wetland restoration project; an easement in combination with a restoration and carbon project; an easement with restoration but no carbon offset; and purchasing the land outright.

A decision-tree approach was used to apply these to the most suitable pixels in the Florida Wildlife Corridor opportunity area (see the following figure). For each pixel, an ecosystem type or land use was first assigned using the CLC data. The pixel was then placed into an urgency bucket based on its ecological priority level and risk of conversion to urban areas. Following this, the most appropriate lever for that pixel was determined.

Decision tree approach for assigning levers to suitable lands



In some cases, only one instrument was suitable for a given pixel; in other cases, several could be used to impact the same pixel. To determine which instrument is best where there are multiple options, the “best” option was assigned to the pixel based on several criteria. First, non-traditional options were prioritized over traditional options (easements and purchases). Second, the instrument’s feasibility, likelihood of success and cost were assessment. For example, purchasing the land outright is more likely to lead to long-term biodiversity outcomes than an easement or first right of refusal; however, it is also more expensive. The lowest risk option in terms of land access in that scenario would be to purchase the land outright. The least costly option would be to use a few easements with first right of refusals, which are less expensive but carry higher risk. This portfolio thinking was used to balance land availability risk and cost when assigning instruments.

The following are the instruments and their identified options and associated costs in order of priority:

1. Nature-based Tourism

This follows a fairly traditional view of a national park or protected area where land is protected for nature-based recreation such as hiking, fishing, camping, and kayaking. Camping, glamping set ups or hotels may further increase the attractiveness of land for nature-based tourism.

Options: Data on the potential location of new parks within the Corridor was taken from the modelling approach used for ecotourism. Analysis identified 60 parks; of these, 3 overlapped predominantly with Horizon 1 lands. The full park size was used, even if it extended beyond the Horizon 1 lands opportunity area or the existing Corridor since the entire asset would be required to realize the potential revenue.

Cost: The analysis assumed that 1 park will be created in conjunction with current landholders. The costs for this park would be an easement (50% of land value) and a $100 million upfront investment in tourism to generate revenue sources, such as glamping, self-camping, hiking, and birding activities.

The NPV of the park revenue was calculated for the 2022-2030 timeframe. The analysis assumed that tourism numbers in Florida will increase at 10% per year based on past trends,[65] and inflation will be 2% per year. It also assumed that an average daily spend for a visitor is $116.66, a 10% discount rate would be used, and a glamping venture would generate $1.5 million per year starting from year 2 (2023).[67]

The revenues were subtracted from the costs and divided by the park area to obtain a final $/area value for 2022-2030 from implementing this park.

To create a second park, the analysis used the same approach with a new assumption of having to purchase the land outright at a cost of $100 million.

In looking at a third part, the analysis again followed the same approach with the assumption of having to purchase the land outright through a $300 million upfront investment to create a high-end lodge. The lodge was estimated as generating $30 million per year from year 2 (2022).[68]

2. Managed Conversion

This instrument encompassed a set of actions that could be taken on land projected to be converted to urban areas by 2030 that has a low ecological and connectivity priority. In this scenario, investing in purchasing the land will be expensive with little ecological gain per the conservation planning approach and decision matrix described above. Actions within this

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[65] VISIT FLORIDA Research, *Florida Visitor Estimates*, accessed on Oct 11, 2021, https://www.visitflorida.org/resources/research/.

[66] Rockport Analytics, “Florida’s tourism economy experiences another record year in 2019 but shifts into a lower gear of growth,” Feb 8, 2021, https://www.visitflorida.org/media/30679/florida-visitor-economic-large-impact-study.pdf.

[67] Based on expert interviews.

[68] Based on expert interview.

instrument are aimed at making sure development occurs in a way that is compatible with the Florida Wildlife Corridor's objectives. These actions could be related to zoning laws, cluster housing or wildlife compatible solar development, as examples.

Options: All pixels in urgency bucket 4 were considered for managed conversion. This also accounted for two "inevitable" developments: North Ranch Sector Plan and Farmton project.[69] These areas are already permitted and in their inception phase, and are expected to be fully implemented by 2080. Given this, only pixels at risk of conversion to development by 2030 based on the risk model, and not covered by other conservation instruments, were selected as requiring managed conversion.

Cost: Managed conversion and many other instruments require the support of an implementation office to be realized. The cost of this office was determined by estimating the number of employees required to carry out Corridor-wide projects and then estimating the fixed costs required to support them. Employee estimates were 3 managers each earning $100,000 per year and 22 staff each earning $70,000 per year. An office in Florida costs roughly $1,500 per employee per month.[70] The analysis assumed 20 company cars at a cost of $8,500 per car per year. Fuel costs were assumed based on driving 350 miles per week with 25 miles/gallon, at a price of $3/gallon.

The total cost of the implementation office for 2022 to 2030 was calculated using an NPV approach with the assumption of 2% inflation and a 10% discount rate. The total cost was then applied equally to every acre in the Horizon 1 lands (including the parks and carbon projects that extend beyond them). The cost within the managed conversion areas was then totaled.

3. Mine Reclamation

Phosphate mines in the Corridor could potentially be restored to an ecological level that meets the Corridor objectives.

Options: Data on the location of all permanently or temporarily closed phosphate mines within the Corridor opportunity area was obtained from the Florida Department of Environmental Protection Geospatial Open Data portal.[71] All the mines overlapped with managed conversion areas so for Horizon 1, no mine reclamation was necessary.

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[69] Osceola County Board of County Commissioners (BCC), "North Ranch Long-term Master Plan/Sector Plan," Sep 29, 2015, https://www.osceola.org/agencies-departments/strategic-initiatives/north-ranch-sector-plan.stml.

[70] LiquidSpace Network, *Flexible Office Space in Florida*, accessed on Oct 11, 2021, https://liquidspace.com/us/fl#:~:text=Expect%20to%20pay%20around%20%241466.05,to%20three%20years%20and%20longer.

[71] Florida Department of Environmental Protection Geospatial Open Data, *Mandatory Phosphate Mine Boundaries 2016*, access on Dec 2, 2021, https://geodata.dep.state.fl.us/datasets/FDEP::mandatory-phosphate-mine-boundaries-2016/about.

Cost: The cost of rehabilitating a mine varies widely in Florida, from $5,000 to $35,000 per acre.[72] A cost of $20,000 per acre was used as a mid-point.

4. Large Carbon Reforestation Project

This instrument is a large commercial carbon project that reforests agricultural land to use it primarily for producing carbon credits. Only lands that experienced forest loss since 1960 were considered for reforestation[73].

Options: A large carbon project was identified through several steps. First, the parcels were overlayed with grazing lands and crop lands. Data on land parcels across Florida was obtained from UF's Center for Landscape Conservation Planning while data on the extent of croplands and grazing land was drawn from the CLC.[74] Second, the profit index was determined by deducting the registration cost ($130,000) and the land easement cost (50% of the land value) from the revenue of carbon credit. These costs were determined through expert interviews and represent typical carbon credit costs in the U.S. The carbon credit revenue was calculated across eight years (2022-2030) using the following assumptions and data: $10 per ton of CO2, an increase of 10% per year, a profit in year 3 (year 1 = 2022), and a sequestration rate of 11.5 CO2/ha based on typical values for reforestation projects in the U.S. as determined through expert interviews. Parcels were sorted based on a profitability index and filtered to those larger than 100 hectares (roughly 247 acres). The most profitable parcels were sequentially selected to reach a total area of 10,000 hectares (24,711 acres).

Cost: All costs and revenues for the different restoration projects were computed in NPV for the time period 2022-2030 using a discount rate of 10% and a cost increase of 2%. The higher than average discount rate was used to avoid an overestimation of carbon revenues. For the costs, a series of one-off costs paid at the start of the project (year 1 is considered in 2022) was considered. This included the easement cost (as 50% of the land value), the initial restoration cost of $2,500/hectare for wetlands and $1,500/hectare to reforest (for simplification, this assumes that all planting takes place in year 1), and the initial validation/registration cost of $130,000. Along with these fixed costs, the following annual costs (in NPV) were considered: a verification cost for the monetization of the carbon credit starting in year 3 at $20,000 per project per year, a carbon credit issuance fee of $0.22 per ton of CO2 starting in year 3, and an administrative cost of $10,000 per project per year starting in year 2. For the revenue, an initial carbon price of $12 per ton of CO2 sequestrated was used, which was set in NPV. This also considered that the profit would start in year 3 and a price increase of 10% would apply until 2031. For the project's full lifetime revenue, a 5% price increase was used from 2032 until 2052.

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[72] Kevin L. Erwin, "An Analysis of IMC Estimated Reclamation Costs for the Proposed Ona Mine," Dec 2003, http://www.sarasota.wateratlas.usf.edu/upload/documents/Mitigation%20Cost%20White%20Paper01.pdf.

[73] HILDA+, https://landchangestories.org/hildaplus/

[74] Kawula, Redner, "Florida land cover classification system," https://myfwc.com/media/20455/land-cover-classification-revision-2018.pdf.

To define the sequestration rate of forest, an average value present in the U.S. (11.5 ton of CO2 per hectare and per year) based on expert interview was used.

For wetlands, average sequestration rate per project area was calculated by applying a sequestration rate. This rate layer was developed by first assigning a wetland type to each wetland pixel. This assigned the nearest current wetland type in Florida (mangrove, saltmarsh or peatland) based on the spatial data for the current mangrove and saltmarshes footprint from the Florida Fish and Wildlife Conservation Commission[75] and a global peatland database, PEATMAP[76]. Next, sequestration rate was assigned based on the wetland type: 6.4tC/ha/year for mangroves,[77] 12.9 tC/ha/year for peatland,[78] and 1.36tC/ha/year for saltmarshes (average value of several studies.[79],[80],[81] A conversion ratio of 44/12 was used to convert tons of C into tons of CO2.

5. Large Carbon Wetland Restoration Project

This instrument represents a large wetland restoration program that produces carbon credits as the primary use of the land.

Options: The largest contiguous patch of restorable wetland within or predominantly overlapping strategy Horizon 1 lands was identified. The extent of restorable wetland ecosystems is based on USDA Natural Resources Conservation Service (NRCS) soils data and CLC data. The CLC dataset was used to identify areas that are either current wetlands or developed in a way that they do not need to be restored or are considered unrestorable due to development. Non-wetland natural, semi-natural and agricultural land uses are considered potentially restorable depending on their overlap with specific NRCS soil features.

The following are two classes of potentially restorable wetlands:

[75] Florida Fish and Wildlife Conservation Commission, *GIS & Mapping Data*, accessed on Oct 11, 2021, https://geodata.myfwc.com/.

[76] Xu et al, "PEATMAP: Refining estimates of global peatland distribution based on a meta-analysis," CATENA 160 (Jan 2018): 134-140. https://doi.org/10.1016/j.catena.2017.09.010. https://www.sciencedirect.com/science/article/abs/pii/S0341816217303004.

[77] Griscom BW et al, "National mitigation potential from natural climate solutions in the tropics," 2020, published by the Royal Society, http://dx.doi.org/10.1098/rstb.2019.0126.

[78] J. Leifeld, L. Menichetti, "The underappreciated potential of peatlands in global climate change mitigation strategies," Mar 14, 2018, https://doi.org/10.1038/s41467-018-03406-6.

[79] Maija Gailis et al, "Quantifying blue carbon for the largest salt marsh in southern British Columbia: implications for regional coastal management," Aug 5, 2021, https://www.tandfonline.com/doi/full/10.1080/21664250.2021.1894815

[80] Anne Gulliver et al, "Estimating the potential blue carbon gains from tidal marsh rehabilitation: A case study from South Eastern Australia," May 29, 2020, https://doi.org/10.3389/fmars.2020.00403.

[81] A. Burden, A. Garbutt, C. D. Evans, "Effect of restoration on saltmarsh carbon accumulation in Eastern England," Jan 30, 2019, https://doi.org/10.1098/rsbl.2018.0773.

- Class I (value 1): Suitable current land cover on soils that are identified as hydric and are very poorly drained or frequently flooded or poorly drained and have frequent to occasional flooding
- Class II (value 2): Suitable current land cover on soils that are identified as hydric

Class 1 was assessed as a primary opportunity for restoration because the ecosystem can be restored to a feasible extent.

Cost: The method described in "Large Carbon Reforestation Project" (item 4 above) was used to define the total cost of a carbon project by deducting the revenues from the sum of all costs. The revenues and the costs were computed in NPV for the 2022-2030 time period.

6. Easement with Profitability

Within the area of easement, several opportunities were identified that could add revenue or other benefits (described below).

6.a. Easement + Restoration with Carbon Credits

This involves acquiring an easement on land that can be restored to produce carbon credits.

Options: To locate areas to reforest within grazing land, the HILDA+ dataset was used to determine a sequestration rate. The reforestation map was combined with state-of-the art geospatial data on CO2 sequestration rates following natural regrowth to compute the total potential CO2 abated through reforestation for the next 30 years.[82] The HILDA+ dataset was used to identify areas deforested in the last 60 years (from 1960 to 2019).[83] To locate wetlands to restore, all wetlands in Class 1 for wetland restoration potential were considered.

Cost: The method described in "Large Carbon Reforestation Project" (item 5 above) was used to define the total cost of the project by deducting the revenues from the sum of all costs. The revenues and the costs are defined as NPV for the 2022-2030 time period.

6.b Easement + Restoration

This is acquiring an easement on the land and restoring its ecosystem, where the land is not in a condition to provide carbon credits.

Options: All Class 2 wetlands were considered and overlaid with Horizon 1 lands.

[82] Daniel Aminetzah et al, "Why investing in nature is key to climate mitigation," appendix, Jan 25, 2021, https://www.mckinsey.com/business-functions/sustainability/our-insights/why-investing-in-nature-is-key-to-climate-mitigation.

[83] Karina Winkler, "Data-driven reconstruction of global land use/cover change from 1960 to 2019," accessed on Oct 11, 2021, https://landchangestories.org/hildaplus.

Cost: The method described in “Large Carbon Reforestation Project” (item 5 above) was used to define the total cost of the project by totaling all costs. The costs were all calculated in NPV for the 2022-2030 time period.

7. Easement Acquisition

The easement, or less than fee simple land acquisition, has been used as conservation instrument in Florida. Acquiring a conservation easement is a legal agreement involving paying a landholder a percentage of the land value in return for long term or perpetual compliance with specified conservation actions and land-uses. This amount is usually around 50% of the land value.

Options: The Horizon 1 lands categorized with urgency levels 1 through 3 that were not covered by any other conservation instruments (nature-based tourism, large carbon projects in reforestation or wetland restoration or smaller carbon projects) were assigned to easement or purchase levers. This assumes that not all landholders will be open to an easement. Over the past three decades, there has been an increase in the share of acres protected by Preservation 2000 and Florida Forever program easements versus state acquisitions (from roughly 5-10% before the year 2000, to approximately 50% from 2010 to 2020).[84] This trend was extrapolated to assume a 70% share of easements by acre over the next decade for state conservation programs. The ratio of agricultural rent to land value was used to spatially select the pixels to include in easement. This considered that the higher the ratio (land value compared to agricultural rent), the higher the likelihood that a landholder would opt for an easement.

Cost: The percentage of the land value is negotiated on a case-by-case basis with the landholder, generally ranging from 40% to 50%.[85] The study assumed that the easement cost is 50% of the land value.

8. Outright Purchase

When a landholder is not open to an easement, the land may need to be purchased in full. Outright purchase is the least risky but most expensive conservation instrument.

Options: The Horizon 1 lands with urgency levels 1 through 3 were categorized as available and appropriate to purchase; however, only the remaining pixels (not included in the easement instrument) were selected.

[84] FNAI Florida Forever-acquired GIS data, Oct 2021; FNAI P2000 acquisitions estimate GIS data, 2003; DEP Division of State Lands, 2007 (for FNAI Atlas).

[85] FNAI Florida Forever-acquired GIS data, Oct 2021; FNAI P2000 acquisitions estimate GIS data, 2003; DEP Division of State Lands, 2007 (for FNAI Atlas).

Cost: Data on land prices (or fair market value) in Florida[86] based on a machine-learning model trained with over 6 million land sales in the U.S. was used to estimate the outright property purchase for conservation.

9. First Right of Refusal

Lands with lower risk of immediate conversion may not require purchase or an easement. In some cases, a more appropriate instrument is obtaining a first right of refusal in case the landholder decides to sell the property. First right of refusal does accept risk in increased cost since it does not use a price guarantee.

Options: The 10% of land in urgency bucket 3 that is at least risk of conversion to development was allocated to first right of refusal.

Cost: This calculated the first right of refusal as 10% of the land value.[87]

Benefits and Impacts Analyses

Tourism

Proposed park revenue prediction

To identify potential nature-based tourism sites, ecotourism revenues were modelled in locations across Florida. This analysis of ecotourism revenues was similar to the study by Balmford et al,[88] that estimated the global magnitude of visits to protected areas. To make this analysis more applicable to Florida, visitor data for 101 projected areas in the U.S. was extracted from this data set rather than using the global data set. The 105 state parks in Florida were individually associated with each corresponding spatial attribute (polygon) in the world database on protected areas.[89] Duplicate and invalid matches between areas and polygons were removed, which resulted in 142 total protected areas.

From each projected area location, a set of variables (or a summary of them, such as minimum, maximum, and average) were extracted. These included the remoteness (distance in minutes from the nearest cities with a population of 50,000 to one million;[90] natural attractiveness (count

[86] Christoph Nolte, "Data for: High-resolution land value maps reveal underestimation of conservation costs in the United States," Oct 8, 2020, published by Dryad, https://doi.org/10.5061/dryad.np5hqbzq9.

[87] Ibid.

[88] Andrew Balmford et al, "Walk on the Wild Side: Estimating the global magnitude of visits to protected areas," Feb 24, 2015, https://doi.org/10.1371/journal.pbio.1002074.

[89] "Discover the world's protected areas," Protected Planet, accessed Oct 11, 2021, https://www.protectedplanet.net/en.

[90] A. Nelson, D.J. Weiss, J. van Etten, et al, "A suite of global accessibility indicators," Nov 7, 2019, https://doi.org/10.1038/s41597-019-0265-5.

of mammals from the IUCN database of threatened species,[91] considering only species in the categories "vulnerable," "endangered" or "critically endangered"); population density[92] (inside and outside the project area within a 100-kilometer radius); Human Footprint (HFP)[93] (inside and outside the projected area); the protected area's size; distances between projected areas (minimum and mean distance for each); species richness[94] (total and threatened mammal richness, and total bird and reptile richness); and the variation in elevation (elevation at a 5-kilometer grid resolution was used as a proxy for the presence of mountains[95]).

These variables were used to train a supervised random-forest regression model. All variables, including the dependent variable, received log transformation. Seventy-six percent (76%) of the data were kept for calibration, while the rest was used to validate the model. Hyperparameter tuning was done using R's caret package[96] and repeated cross-validation with 40 folds and 500 as the number of trees. The resulting model, with an R^2 of 0.52 on the validation set, was used to estimate the potential number of visits per year to possible nature-based tourism areas (see Schägner, et al[97] for a similar approach).

The predicted number of visits was then multiplied by an estimated monetary value determined by calculating the average daily spend (in 2021 US dollars) of a tourist in a Florida state park.[98]

1. Eco-tourism and agrotourism opportunity areas

To identify areas with the potential for eco- and agrotourism, the model described above was adapted. The Corridor was divided into a grid with the resolution of the median protected area size in the U.S. This grid was filtered to only include cells intersecting with areas suitable for eco- and agrotourism (derived from the CLC dataset). Each of the remaining grid cells was entered into the RF model as a fictitious park to predict visitor numbers. While the absolute values were meaningless, their relative differences were used to identify areas with high visitor potential (per area, as all cells were off equal size). The cell values were given a value between 0 and 1, which created a heatmap for eco- and agrotourism potential.

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[91] IBAT Alliance, *The IUCN Red List of Threatened Species*, accessed on Oct 11, 2021, https://www.iucnredlist.org/.

[92] Socioeconomic Data and Applications Center (SEDAC), *Gridded population of the world* (version 4), accessed on Oct 11, 2021, https://sedac.ciesin.columbia.edu/.

[93] O. Venter, E. Sanderson, A. Magrach, et al, "Global terrestrial Human Footprint maps for 1993 and 2009," Aug 23, 2016, https://doi.org/10.1038/sdata.2016.67.

[94] IUCN 2021.

[95] G. Amatulli, et al, "A suite of global, cross-scale topographic variables for environmental and biodiversity modeling," *Scientific Data*, no. 5, 180040 (March 2018), https://doi.org/10.1038/sdata.2018.40.

[96] Max Kuhn, "Building predictive models in R using the caret package," *Journal of Statistical Software*, 28(5), 1‑26. https://doi.org/10.18637/jss.v028.i05.

[97] J. P. Schägner et al., "Mapping recreational visits and values of European National Parks by combining statistical modelling and unit value transfer," *Journal for Nature Conservation*, Volume 31 (June 2016): 71–84, https://doi.org/10.1016/j.jnc.2016.03.001.

[98] Rockport Analytics, "Florida's tourism economy experiences another record year in 2019 but shifts into a lower gear of growth," Feb 8, 2021, https://www.visitflorida.org/media/30679/florida-visitor-economic-large-impact-study.pdf.

2. Park distance to water

To assess the proximity of the proposed parks to water (an assumed driver behind visitor numbers), their location was compared to a surface water proximity layer from the CLIP dataset. From this layer, only priorities 1 and 2 were used as this includes area within a roughly 500 meter radius to surface waters. Parks (or sections of parks) that overlapped with this layer were assumed to be in close proximity to water.

3. Biodiversity

Species diversity

To assess the value of the Corridor for safeguarding biodiversity, several species' diversity related metrics were investigated. Species diversity was calculated for two distinct taxonomic groups: animals and plants.

For animals, species richness was determined by selecting species with their habitat (or part of it) within Florida based on IUCN distribution ranges.[99] For each range, the overlap with the Corridor was compared to the total range within Florida to calculate the proportion of the species' range within the Corridor.

For plants, the diversity was determined using GBIF-derived[100] occurrence records for plants within Florida. Plant species with less than 10 occurrences were excluded. For each species, the number of occurrences inside Florida and the Corridor were compared to determine the proportion of occurrences within the Corridor.

Rarity-weighted index

To determine the value of Florida (and specifically, the Corridor) as a hotspot for biodiversity within the continental U.S., the rarity-weighted index of species richness was calculated. The species distribution range maps from IUCN were overlayed with each other to get the species richness at a 1 km grid cell resolution. Using the "prioritizr" R-package,[101] the importance of each planning unit (grid cell) for rarity weighted species richness was calculated based on the data from Williams, et al.[102]

Threatened species

To determine the Corridor's coverage of threatened species, data on Florida-based species in the IUCN Red List were identified with an extinction risk category of vulnerable, endangered or critically endangered and their distribution data was used. The Florida-specific threatened

[99] IBAT Alliance, *The IUCN Red List of Threatened Species*, accessed on Oct 11, 2021, https://www.iucnredlist.org/.

[100] "Free and open access to biodiversity data," Global Biodiversity Information Facility (GBIF), accessed on Oct 11, 2021, https://www.gbif.org/.

[101] https://prioritizr.net/

[102] Williams P, Gibbons D, Margules C, Rebelo A, Humphries C, and Pressey RL (1996) A comparison of richness hotspots, rarity hotspots and complementary areas for conserving diversity using British birds. Conservation Biology, 10: 155–174.

species[103] were drawn from Florida Fish and Wildlife Conservation Commission data[104] and their range data was sourced from the IUCN Red List. The proportion of a species' Florida-wide range that overlaps with the Corridor was then calculated.

Carbon

To assess the biomass and Soil Organic Carbon (SOC) stocks stored in the Corridor, a harmonized global biomass carbon map[105] was used. This included both above ground and below ground carbon and SoilGrids (250 m v.2.0, 0-30 cm depth).[106] Coastal ecosystems like salt marshes and seagrasses were not included in the biomass carbon map.

To assess the portion of the carbon stocks that are at risk of being released through land conversion, the analysis followed Noon, et al[107] and considered the following:

1. Identified areas at risk of conversion to development by 2030 and 2050 (including Horizon 1 lands)
2. Kept timberland, grazing land, and wetlands based on the CLC dataset
3. Assumed 100% (above and below ground) biomass loss upon conversion
4. For SOC stocks, assumed 21.3% loss upon forest conversion, 25.2% loss upon grassland conversion, 100% (or 450 tC/ha, whichever was smaller) for wetland conversion. Wetlands may be underestimated since SOC losses can happen over a depth of up to 100 cm.

The analysis also estimated the mean annual forest fluxes within the Corridor and opportunity area (removals and emissions) based on Harris, et al,[108] and assessed how much of the net removals would be lost upon conversion by 2030 and 2050.

Water

1. Nutrient removal

To assess the Corridor's capacity for regulating water quality, the total usage, leakage and removal capacity of agriculture-derived nutrients (particulate nitrogen and phosphorous) from surface waters was calculated.

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[103] https://myfwc.com/media/1945/threatened-endangered-species.pdf

[104] https://myfwc.com/wildlifehabitats/wildlife/

[105] Spawn, S. A., Sullivan, C. C., Lark, T. J. & Gibbs, H. K. Harmonized global maps of above and belowground biomass carbon density in the year 2010. Sci. Data https://doi.org/10.1038/s41597-020-0444-4

[106] SoilGrids250m 2.0, Soil Organic Stock (0–30cm, t/ha) (ISRIC); https://doi.org/10.17027/isric-soilgrids.713396f4-1687-11ea-a7c0-a0481ca9e724

[107] M. L. Noon, A. Goldstein, J. C. Ledezma, et al, "Mapping the irrecoverable carbon in Earth's ecosystems," *Nat Sustain* (November 2021), https://doi.org/10.1038/s41893-021-00803-6.

[108] N. L. Harris, D. A. Gibbs, A. Baccini, "Global maps of twenty-first century forest carbon fluxes," *Nat. Clim. Chang.* no. 11 (January 2021): 234–240. https://doi.org/10.1038/s41558-020-00976-6.

The total usage was calculated as the total parameters “n” and “p” derived from fertilizer and manure used in counties that intersect with the Corridor.[109] To calculate the percentage of these nutrients that leak to surface waters, the average leakage per hectare[110] was multiplied by the total cropland area (from the CLC dataset). Then the leakage percentage was multiplied by the total n and p usage to assess the total leakage to surface waters. This analysis does not consider legacy nutrient loading and cumulative capacity constraints, which may be significant especially for phosphorus.

The capacity for nutrient removal was calculated by multiplying the “Priority 1” natural floodplain areas from the CLIP classification (immediately adjacent to significant surface waters) with the CLC landcover layer (including only areas which could function as an ecological floodplain). The remaining area was multiplied by the mean removal rate of n and p by functional floodplains[111] to determine the Corridor’s total removal capacity.

The avoided cost of nutrient removal through the Corridor was estimated as the cost of treatment plants removing the equivalent amount of nutrients from surface waters. The maximum avoided cost is equal to the total leakage of nutrients to surface waters. If the capacity of the Corridor is lower than this leakage, the avoided cost decreases.

2. Aquifer recharge

To assess the Corridor’s aquifer recharge capabilities, the total amount of water that could be recharged by the Corridor was calculated, followed by the associated avoided costs.

The potential recharge areas were identified using priority 1 and 2 of the aquifer recharge layer from CLIP. This was intersected with an aquifer recharge rates layer,[112] after which the total recharge was calculated.

The avoided cost of aquifer recharge by the Corridor was estimated as the cost of treatment plants for purifying an equivalent amount of freshwater.

3. Flood risk

To assess the influence of the Corridor in reducing flood risk, the overlap of the upslope floodplains to urban areas under flood risk was calculated.

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[109] J. A. Falcone, “Tabular county-level nitrogen and phosphorus estimates from fertilizer and manure for approximately 5-year periods from 1950 to 2017,” U.S. Geological Survey data release, https://doi.org/10.5066/P9VSQN3C.

[110] Daniel J. Sobota, et al, “Cost of reactive nitrogen release from human activities to the environment in the United States,” Environmental Research Letters, Lett. 10 025006 (2015), https://doi.org/10.1088/1748-9326/10/2/025006.

[111] Brad Gordon, Olivia Dorothy, Christian F. Lenhart, "Nutrient Retention in Ecologically Functional Floodplains: A Review," *Water* 12, no. 10: 2762. https://doi.org/10.3390/w12102762.

[112] Robert J. Gilliom, William M. Alley, and Martin E. Gurtz, “Design of the National Water-Quality Monitoring Program: Occurrence and distribution of water-quality conditions,” U.S. Geological Survey Circular 1112 (January 2013): 33. https://pubs.usgs.gov/circ/circ1112/.

The areas under flood risk were derived from a flood hazard map.[113] This included riverine area with decennial flood risk of more than 50 cm. This was intersected with a population density layer[114] to calculate the total amount of people under risk of floods before 2030.

The upslope area contributing to these flood risk areas was identified through hydrological analysis using a digital elevation model.[115] The overlap of the upslope area with the Corridor was calculated to assess the total percentage of corridor area contributing to mitigating flood risk for Florida inhabitants.

Scenario Analyses

Data for presentation was aggregated under several scenarios—both those associated with doing nothing and losing access to all the land at risk of conversion to development by 2030 and 2050, and completing all actions in line with the cost curve and conserving all Horizon 1 lands.

Areas with managed conversion lose 70% of their benefits based on the assumption that some ecological functioning is retained through environmentally-friendly and Corridor-compatible development.

[113] World Resources Institute, *Aqueduct Floods Hazard Maps*, version 2 (October 2020), https://www.wri.org/data/aqueduct-floods-hazard-maps.

[114] http://cidportal.jrc.ec.europa.eu/ftp/jrc-opendata/GHSL/GHS_POP_GPW4_GLOBE_R2015A/GHS_POP_GPW42015_GLOBE_R2015A_54009_250/V1-0/GHS_POP_GPW42015_GLOBE_R2015A_54009_250_v1_0.zip

[115] Consortium for Spatial Information (CGIAR-CSI), *SRTM 90m DEM Digital Elevation Database*, accessed on Oct 11, 2021, http://srtm.csi.cgiar.org.