Received: 6 September 2023 | Revised: 7 June 2024 | Accepted: 9 August 2024

DOI: 10.1111/csp2.13225

CONTRIBUTED PAPER

Conservation Science and Practice
A journal of the Society for Conservation Biology
Open Access
WILEY

# Marshaling science to advance large landscape conservation

**Joshua H. Daskin**[1] | **Angeline Meeks**[1] | **Vivienne L. Sclater**[1] | **Julie M. Sorfleet**[1] | **Jon Oetting**[2] | **Thomas S. Hoctor**[3] | **Joseph M. Guthrie**[1] | **Hilary M. Swain**[1]

[1]Archbold Biological Station, Venus, Florida, USA

[2]Florida Natural Areas Inventory, Florida State University, Tallahassee, Florida, USA

[3]Center for Landscape Conservation Planning, University of Florida, Gainesville, Florida, USA

**Correspondence**
Joshua H. Daskin, Archbold Biological Station, 123 Main Drive, Venus, FL 33960, USA.
Email: jdaskin@archbold-station.org

**Funding information**
Bellini Better World

**Abstract**

Applying science to conservation requires deliberate planning and action infrequently taught in academic settings. To illustrate impactful analysis and science communication, we describe scientific activities targeting the needs of land trusts, NGOs, landowners, and government agencies working to conserve the Florida Wildlife Corridor ("Corridor"). This 7.2 million hectare area is prioritized for habitat connectivity conservation in the US state of Florida. Our activities are built on decades of science guiding Florida land conservation. We quantified threats (e.g., average of over 14,000 ha of development/year from 2001 to 2019) and socio-ecological benefits of Corridor conservation, prioritized yet-to-be-conserved Corridor areas, produced and shared a new statewide connectivity model, and convened groups to identify campaign science needs. The new connectivity model—the Florida Circuit Model—supported the geography of the Corridor, as designated, and facilitates local (10 km radius, or less) conservation planning. Our efforts have contributed to allocation of over $2 billion for land conservation and the permanent protection of over 82,000 ha within the Corridor by state agencies from June 2021 to March 2024. Targeting science to outreach and policy, planning, and management decisions can motivate public, media, researcher, and government support for land conservation, improve conservation interventions, and attract research funding.

**KEYWORDS**

actionable science, collaboration, co-production, research impact, science-implementation gap

## 1 | INTRODUCTION

Many researchers from students to senior leaders aspire for their science to advance conservation. In addition, much has been written about the challenges of putting conservation science to work for conservation outcomes (Bisbal & Eaton, 2022; Dubois et al., 2020; Knight et al., 2008). Challenges include (1) the rewards structure of academic institutions which prioritizes knowledge and publications over applied impact, (2) identifying the science and data needed to secure conservation targets, (3) communicating technical concepts to implementers, and (4) ensuring conservation actors trust the science.

Partly due to this focus of universities on advancing conceptual research, many students and academic scientists have little exposure to, and many misconceptions about, the ways that science truly informs on-the-ground conservation. If a goal is to advance conservation outcomes, even timely, relevant and highly publicized publications in high-impact journals are likely to be insufficient (e.g., Daskin & Pringle, 2018) without deliberate planning of implementation (Bisbal & Eaton, 2022; Fisher et al., 2020). Moreover, mismatches in the pace of conservation versus that of scientific progress and its publication can make it difficult to unite scientists with practitioners to impact conservation. This temporal mismatch between conceptual scientific advances and application is also well-known from other fields (Weisz et al., 2014). Meanwhile, practitioners are not always incentivized to seek scientific guidance or to document how their conservation successes or shortcomings came about. In particular, descriptions of how data and science contributed to outcomes are relatively rare (Dubois et al., 2020). However, write-ups of the intersection of science and conservation can be inspiring for students and for researchers looking to increase their impact (e.g., Levitt & Woodley, 2014).

To illustrate how scientists can effectively marshal data analysis and synthesis for impact, we describe a suite of scientific activities (Table 1) we are contributing toward a large-landscape conservation initiative, the campaign to conserve the Florida Wildlife Corridor (hereafter "Corridor"; Figure 1). The Corridor is a 7.2-million hectare (ha) area stretching from the southern tip of the Everglades ecosystem in the US state of Florida to the borders with Georgia (north) and Alabama (northwest).

The Corridor geography was formally recognized as a priority for state land conservation by unanimous vote of the Florida legislature in June 2021 (The Florida Wildlife Corridor Act, 2021). However, the Corridor's origins date to early conceptual science on habitat fragmentation and connectivity (Crooks & Sanjayan, 2006; Harris, 1984; Noss, 1987; Noss & Harris, 1986). Connectivity among habitats is well-established as a key contributor to long-term retention of biodiversity and ecosystem function (Haddad et al., 2015). Demography, genetics, animal movements, and ecosystem service provision are all tied to habitat connectivity (Benson et al., 2016; Coulon et al., 2010; Damschen et al., 2019; Haddad et al., 2015; Laurance et al., 2002; Ricketts et al., 2006). As a result, retaining and improving connectivity has been the target of many conservation efforts at local to continental scales (Hilty et al., 2019; Van der Ree et al., 2015).

When first named in 2010, the Corridor was an education and outreach campaign to support conservation of the highest priority areas included in a GIS model of statewide connected habitats, the Florida Ecological Greenways Network (FEGN; Hoctor et al., 2004). The FEGN combines spatial overlays of ecological and hydrological data with connectivity modeling for focal species. It has been produced and updated since its inception in 1995 by the University of Florida and the Florida Department of Environmental Protection with guidance from a technical advisory group. The FEGN has informed protection of wildlife corridors and large intact landscapes for a succession of state, federal, and local land conservation programs and plans (Hoctor et al., 2000; Hoctor & Volk, 2021). It is maintained with input and funding from state agencies and nonprofit organizations. The Corridor's geography as currently approved by the Florida legislature is defined by the FEGN's top three of five priorities.

The Corridor encompasses around 42% of Florida's area, of which 3.9 million ha are existing lands managed for conservation (40.5% federal, 46.4% state, 2.8% local government, and 10.2% privately owned) and approximately 3.3 million ha are yet to be conserved lands termed the Corridor "Opportunity Areas." The primary threats to the Opportunity Areas include conversion of natural and working lands to development for Florida's fast-growing human population and the replacement of relatively low-impact agriculture (timber and ranching) with high-intensity farming (e.g., sugarcane or other row crops).

The Corridor campaign is a timely case study in the use of science for conservation for three primary reasons. First, there is growing national and international interest in creating new and better connected protected areas, for example through the 30-by-30 and Half-Earth efforts (CBD, 2021; White House, 2021; Wilson, 2016). Florida is today nearly 31% conserved, but there is broad understanding this is not enough, particularly because it is not connected. Second, there is increased recent progress toward conserving the Corridor; between June 2021 and July 2023, the Florida legislature allocated over $2 billion to acquisition and easement programs with emphasis on the Corridor. The funding has restored support for state land conservation, which averaged $300 million annually from 1990 to 2008. Third, the interdisciplinary nature of large landscape conservation necessarily touches the ecology, climate, hydrology, sociology, infrastructure, and economics of the geographies in question. In turn, this requires buy-in from a broad range of scientists and practitioners, some of whom may be new to conservation and helped by science and data provision (Scarlett & McKinney, 2016). The cooperation—and challenges—among numerous agency and nonprofit partners to realize the Corridor vision provide an example for other projects.

**TABLE 1** Summary of scientific and science communication activities supporting the campaign to conserve the Florida Wildlife Corridor between 2021 and 2023.

| Activity | Description | End-users | Outcomes |
|---|---|---|---|
| Documenting the development threat | | | |
| Quantifying land cover change | Statewide summary and mapping of the National Land Cover Dataset (Dewitz & USGS, 2021) over time to quantify natural lands conversion to development and crops | Primarily conservation NGOs | Messaging the rate of land cover change and the threat to Florida ecosystems to legislators, agencies, and the public to motivate land conservation and funding |
| Prioritizing the Florida Wildlife Corridor | | | |
| Florida Ecological Greenways Network (FEGN) | Maintenance of a statewide connectivity model based on ecological and hydrological data and expert advisory (Hoctor et al., 2000; Hoctor & Volk, 2021) | Agencies and NGOs | Decades-long use in conservation planning for protected areas, trails, and more. Defines the Corridor geography |
| Corridor Horizons | Advising development of a new prioritization combining the FEGN with urgency criteria | Agencies and NGOs | Model highlights areas of high combined ecological value and near-term threat of development. Intended to focus conservation funds on most at-risk locations in the Corridor |
| Land use planning data | Oversee collation of statewide zoning, future land use, utilities easements, and building permits by the Central Florida Regional Planning Council | Agencies and NGOs | Compelling collation of the volume of development occurring statewide. Motivates local and statewide action from agencies and the public. Data served to NGO partners for conservation tax ballot initiatives |
| Florida Circuit Model | New connectivity model using circuit theory (Dickson et al., 2019; McRae et al., 2008) to identify statewide priorities for local (10 km radius) connectivity conservation from land cover, road, and traffic data | Agencies and NGOs | In use by counties to plan spending of conservation funds on new easements and acquisitions |
| Communicating and convening science | | | |
| Corridor Science Exchanges | Three day-long online meetings of scientists and stakeholders to identify data and analysis needs for Corridor conservation campaign | Attended by agencies, NGOs, for-profit companies, academics, and landowners | |
| Corridor Water Resources Report | Commissioned report on the overlap of Corridor and water resources conservation | Agencies, NGOs, and the public | Credible data on how Corridor conservation can and cannot serve water resources conservation in Florida served to decision-makers and the public to motivate action, bring reputability |
| Cartography and fact sheets | Many custom maps and tailor-made fact sheets depicting natural resources, biodiversity, development, agriculture, prioritizations, and conservation lands in and around the Corridor | NGOs and the public | Data and maps served to partners to support tax ballot initiatives, land trust activities, and to inspire public support for conservation |

Drawing on our experience as the scientific leaders of the Corridor campaign since the associated act was passed in 2021 (some co-authors have been engaged with the Corridor much longer), we describe scientific activities and their application to (1) documenting the threat of development, (2) prioritizing areas to be conserved most urgently, and (3) communicating the motivations for and benefits and costs of Corridor conservation (Table 1). Crucially, we describe some pitfalls experienced along the way to impactful science communication and implementation. While not exhaustive of our involvement with the Corridor campaign, we describe the most salient scientific activities since the passage of the Corridor Act in 2021.

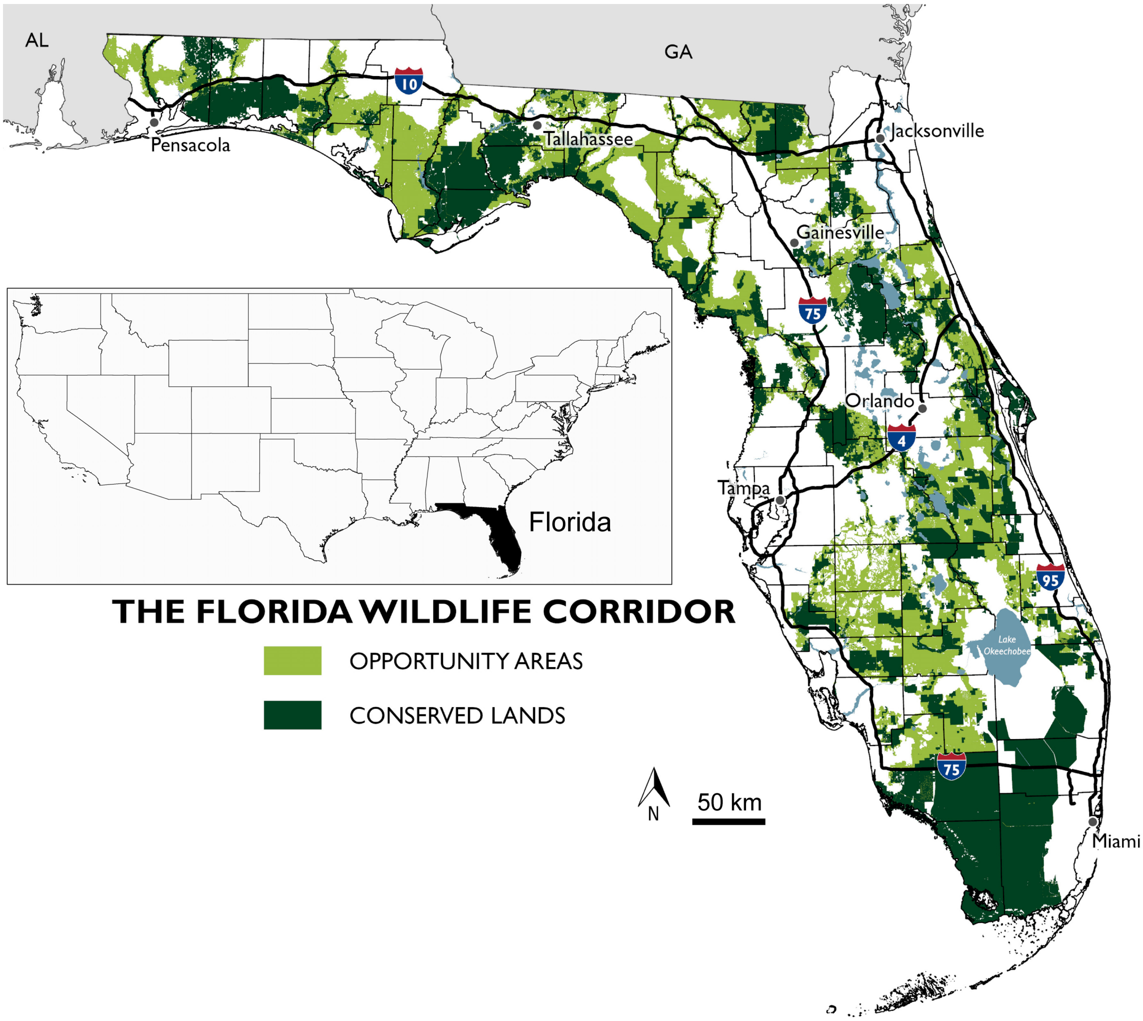


FIGURE 1 The Florida Wildlife Corridor and the location of the state of Florida within the United States. Dark green areas of the Corridor are already conserved in perpetuity and the light green Opportunity Areas are yet to be conserved.

## 2 | METHODS AND CONSERVATION APPROACH

### 2.1 | Documenting the development threat

Quantifying and communicating habitat loss to legislators, agency officials, and the broader public is needed to convey the scale of threats facing ecosystems and wildlife, and subsequently to motivate funding and action. As elsewhere, Florida researchers have long raised concerns about rapid human population growth and consequent habitat loss. For example, 90% of longleaf pine forests were destroyed from 1936 to 1995 (Kautz, 1998; Volk et al., 2017), among many other assaults on natural and agricultural landscapes. As of 2022, Florida had both the fastest growing and third largest US state population, averaging over 294,000 additional residents annually since 2013. The rate of increase has accelerated in recent years (US Census Bureau, 2023) to over 365,000 added residents from July 2022 to June 2023. However, no study has comprehensively documented the recent accompanying pace of land cover change statewide.

Therefore, we used the National Land Cover Database to quantify Florida-wide development from 2001 to 2019. The NLCD is produced from 30 m Landsat imagery every 2–4 years since 2001 (Dewitz & USGS, 2021; Wickham et al., 2021). Specifically, we used data representing land cover for the years 2001, 2003, 2006, 2008, 2011, 2013, 2016, and 2019. Commercial satellite products identifying near real-time land cover change may be attractive. However, we determined through a series of discussions with the Florida Wildlife Corridor Foundation (FWCF; a stakeholder engagement group promoting the vision of the Corridor) and the Live Wildly Foundation (promoters and funders of Florida conservation and the Corridor campaign) that simpler and cheaper approaches were sufficient for the Corridor campaign. Given the pace of decision-making (weeks-to-months), daily land use change data may not be needed for many large landscape conservation efforts.

We reclassified the available NLCD rasters for each year of NLCD data into three separate rasters representing the classes "crops," "natural areas," and "developed." We calculated the areal extent of change from one class to another between each pair of subsequent years with data. The NLCD has limited thematic resolution, categorizing all agriculture as either natural or cropland. It does not distinguish pastures from natural grasslands or timber plantations from natural forests. However, in a state where vast ranchlands and timber are key to wildlife persistence (Repenning & Labisky, 1985; Swain et al., 2013), but more intensive agriculture is less valuable, the NLCD works well for measuring change in high-quality habitat. Detailed accuracy assessment, limitations, and advantages of the NLCD, and its comparison to other land cover change products are described in the online supplementary material (Appendix S1).

We supplied the NLCD results to partners including Conservation Florida (a land trust), the Live Wildly Foundation, Audubon Florida (a conservation, education, and outreach group), and the FWCF, all of whom advocate for continued state funding of land acquisition and easements.

## 2.2 | Prioritizing the Florida Wildlife Corridor

Given the Corridor's extent and increasing rate of conversion to development (see Results and Discussion), and the limited nature of conservation resources, conservation investment must be prioritized. We have designed and contributed to four prioritizations of the Corridor and surrounding areas (Figures 2 and 3). Each weights biodiversity, connectivity, and impending development differently, and prioritizes yet-to-be-conserved areas over different spatial scales. These differences among products reflect the range of ways conservation projects are selected by the agencies, NGOs, and land trusts we worked with to design these prioritizations.

The first prioritization we discuss is the FEGN (Hoctor et al., 2000; Hoctor & Volk, 2021), which is based primarily on ecological and hydrological resource locations and their connectivity. It has five priority levels—the top three of which comprise the Corridor—and it is designed to yield a statewide network of connected lands. The FEGN does not include any measure or indication of the degree of threat. A technical advisory group including over 30 members from federal and state environmental and transportation agencies, conservation nonprofits, and academia has advised adjustments to FEGN boundaries and assignment of priority levels since the 1990s. Ongoing work includes development of finer prioritizations within the five existing priority levels. Most Florida land conservation agencies and nonprofits are familiar with the FEGN and many use it to prioritize land acquisition. We do not report new results from the FEGN here, although we continue serving its data to conservation partners.

The second prioritization—the Corridor Horizons ("Horizons")—was led by the FWCF, which contracted with a global consulting firm's natural resources practice to combine the FEGN's ecological priorities with urgency

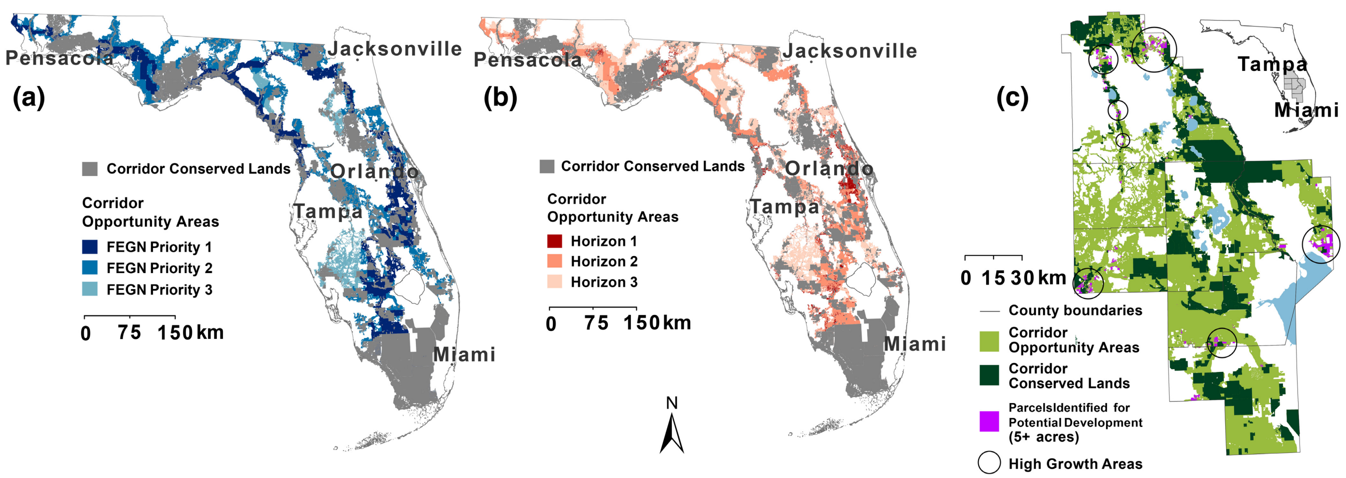


FIGURE 2 Three prioritizations of the Florida Wildlife Corridor. (a) The Florida Ecological Greenways Network (FEGN) is based on ecological values. (b) The Florida Wildlife Corridor Horizons combines the FEGN and a model of development pressure. (c) A portion of the Central Florida Regional Planning Council's planning and development maps which combine zoning, utilities, building permits, and other planning data to identify areas at near-term risk of development (circled and in purple).

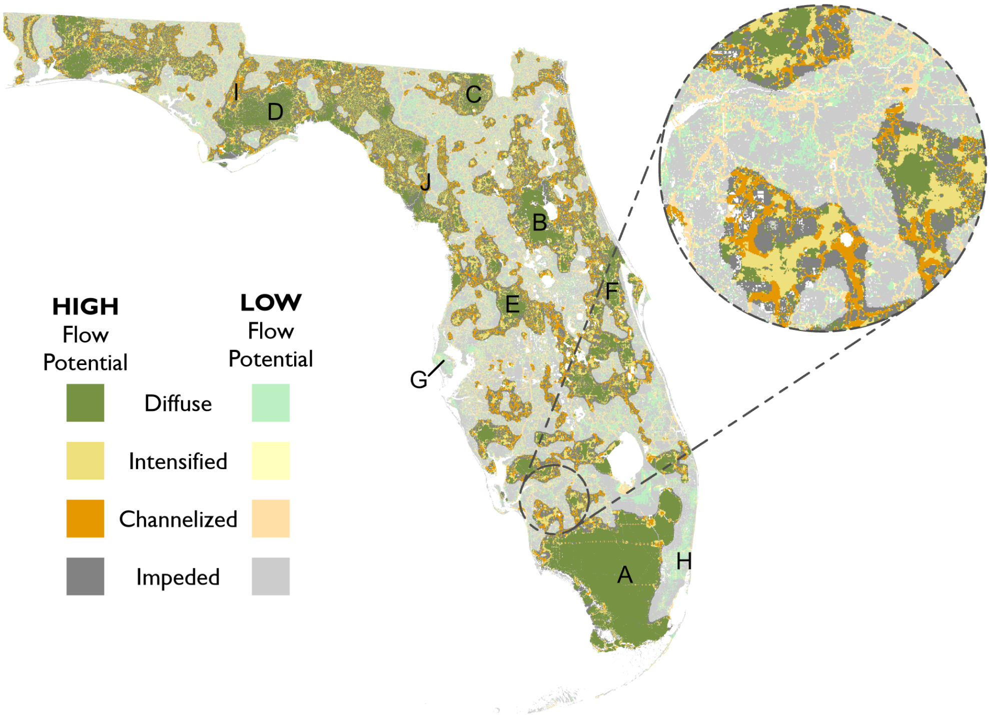


FIGURE 3 The Florida Circuit Model. For display, we considered the area of the state with the highest flow potential and whose cumulative area sums to the size of the Florida Wildlife Corridor (7.2 million ha) to have "high" flow potential (brighter areas in map; likely sources of species' movement from within relatively intact habitats). The threshold could be adjusted to highlight relatively high flow potential within more local areas, if desired. Lettered locations are (a) Everglades National Park, (b) Ocala, (c) Osceola, and (d) Apalachicola National Forests, (e) the Green Swamp, (f) St. John riverscape, (g) Pinellas County, (h) Miami, and the (i) Apalachicola, and (j) Suwanee Rivers.

criteria. The urgency module was based on an existing nationwide urbanization model (Sohl et al., 2007), agricultural land values (USDA NASS, 2021), distance to the nearest existing development, and spatially explicit human population projections (Florida Wildlife Corridor Foundation, 2021). We provided Florida natural history expertise and geospatial data to the firm's analysts while helping "truth" the assumptions of their model with on-the-ground knowledge of conservation actors, ecosystems, and major planned developments. The Horizons include three priority levels: Horizons 1, 2, and 3. The most urgent, Horizon 1, includes areas forecast to be developed by 2030 or which are in the highest FEGN (ecological) priority areas and forecast to be developed by 2050.

Third, we contracted the Central Florida Regional Planning Council (CFRPC)—one of 10 semigovernmental agencies in Florida that provide planning services for consortiums of cities and counties—to collate statewide land use planning data to help prioritize Corridor Opportunity Areas. This work included collating spatial data for vacant parcels, many thousands of recent building permits, current and planned future zoning, and utilities service areas to identify Opportunity Areas likely to be converted to development within approximately 10 years, in the absence of new conservation efforts. The work was initially completed for seven counties in central Florida, then extended to the full state (CFRPC, 2023).

Fourth, to identify connectivity priorities on a local scale (defined as a 10 km radius), we built an omnidirectional circuit theory model, the "Florida Circuit Model." Circuit theory considers landscapes and their resistance to species' movements as analogous to electrical circuits and their resistance to electrical current (McRae et al., 2008). It quantifies connectivity across all possible pathways without assuming that organisms have perfect knowledge of the landscape to allow selection of a single best "least-cost" travel route (Dickson et al., 2019; McRae et al., 2008). A given route between two points has a cost defined by the resistance to movement along the path, which is parameterized by a resistance layer.

The Florida Circuit Model had two inputs. First, statewide land cover (FWC & FNAI, 2021) was reclassified from 228 categories into 18, each with a rated level of resistance. The rating was done according to relative naturalness and assuming that lower resistance is correlated with higher habitat value for animal movement (Appendix S2). Second, we included road locations (often barriers to connectivity) categorized by binned traffic volumes (low: < 1440 vehicles per day = 1 vehicle per min; moderate: 1441–7200 vehicles per day; and high: >7220 vehicles per day = 5 vehicles per min; FDOT, 2021). These thresholds are similar to those used for low, moderate, and high annual average daily traffic (AADT) in other studies of wildlife mortality from vehicle collisions (Jacobson et al., 2016) and span the range of AADT within which vehicle impacts to wildlife populations likely increase in Florida and elsewhere (Charry & Jones, 2010; Fahrig et al., 2001). The raw land cover and AADT datasets are both publicly available. We used this relatively simple parameterization from just two GIS layers to ease model explanation and possible future updates. The model is species-agnostic, based on land cover for the years 2019–2020 and built using the program Omniscape in the language Julia (Landau et al., 2021; McRae et al., 2008, 2016). Our complete modeling methods and code are available in the online supplementary material (Appendices S3 and S4).

Omniscape produces three related outputs (McRae et al., 2016). Cumulative current represents species' movement through a land cover pixel. It is higher for low-resistance land cover and where the amount and quality of source habitat are high, and barriers are low. Flow potential is current modeled only based on source habitat strength, with all resistances set to 1. It indicates expected flow in the absence of barriers such as roads and developed land cover and is higher where the amount and quality of source habitat is higher.

Normalized current is the ratio of cumulative current to flow potential. Areas where it is close to 1 are considered to have "diffuse" flow. Diffuse areas with low flow potential are disturbed (i.e., few good species' habitats) and those with high flow potential are large areas of intact habitat where current spreads out widely (McRae et al., 2016). If normalized current is less than 1 (cumulative current < flow potential), it indicates "impeded" flow due to barriers such as major roads or development. If greater than 1 (cumulative current > flow potential), current is being "intensified" or "channelized" into the area which may indicate a corridor or a path of least resistance around or through major barriers. These areas, if they have low flow, might be candidates for local corridor protection or for restoration targeting improved connectivity.

## 2.3 | Communicating and convening science

Long before the Corridor was named as such, researchers and practitioners have championed statewide connectivity conservation in Florida (Hoctor et al., 2000; Noss, 1987). State agencies like the Florida Fish and Wildlife Conservation Commission have included connectivity conservation among their strategic priorities (FWC, 2019; Love, 2013), but agency leaders have stated publicly that they need help with messaging to the public and elected representatives. With a large, loose coalition of organizations all speaking to landowners, donors, legislators, politicians, and scientists about the Corridor, having clear, consistent, fact-based messaging is key to garnering support and action. Correct and well-communicated facts are essential to campaign credibility. We use science and our network of research colleagues to ensure the campaign's messaging to conservation partners, decision-makers, and the public is backed by vetted data.

To address the challenges of communication in summer of 2021, shortly after the passage of the Florida Wildlife Corridor Act, we produced a Corridor fact sheet with basic information about overlaps of the Corridor with state land acquisition and easement priorities, biodiversity, water resources, and agriculture. For example, over 80% of areas proposed for state-funded conservation are within the Corridor, 88% of Opportunity Areas are cattle ranches or working timber lands, and more than 8000 miles of recreational trails are in the Corridor. We shared this fact sheet with key partner organizations providing talking points for interactions with media, legislators, funders, and other collaborators. We updated the fact sheet in the fall of 2023.

We frequently produce maps of the Corridor and share wildlife images and sound captured through our camera trap and acoustic ecology study in the Corridor. We and our partners use these resources in reports, fact sheets, social media posts, and various public-facing written and film media. Creating consistent design and color schemes for maps and graphics used by multiple partners may seem like a small detail, but it projected unified messaging to decision-makers, especially through immediate recognition of the Corridor map (Figure 1).

As the campaign to conserve the Corridor was gaining momentum in the wake of the associated act, we organized three Corridor Science Exchanges, which were day-long online meetings to catalyze the information sharing and analyses needed to support efficient, effective Corridor conservation. The facilitated meetings were focused on (1) prioritization of the Corridor, (2) how water resources are or are not impacted by Corridor conservation, and (3) human and agricultural resilience to global change in the Corridor. Each was attended by 30–50 leading scientists and practitioners who participated in broad synthesis discussions and produced lists of outstanding questions whose answers would help motivate Corridor conservation and/or elucidate its true benefits and costs.

To credibly advocate for expanded support, conservation organizations need credible data assessing the costs and benefits of large landscape conservation (beyond biodiversity conservation) for multiple parties. The Water Science Exchange served as the kickoff to an expert-led report on the overlaps (and lack-thereof) between the Corridor and a suite of water resources (Graham et al., 2022). The report, led by the University of Florida's Water Institute, spanned freshwater supply for ecosystems and people, wetlands, groundwater and springs, coastal-inland hydrological connections, water quality, lakes, and rivers. Using a series of GIS analyses, the report illustrates how these resources—of critical concern to Florida citizens and politicians—are or are not likely to be conserved by protecting the Corridor.

## 3 | RESULTS AND DISCUSSION

### 3.1 | Documenting the development threat

We found that 195,213 ha of natural lands (including pastures and timber plantations) were converted to development between 2001 and 2019 (mean 10,845 ha/y). A further 64,258 ha of natural areas were converted to cropland (Figure 4) and 18,349 ha of cropland were converted to development in the same period.

From 2001 to 2019, 0.42% of natural areas within the Corridor and 2.33% of the natural areas outside the Corridor were converted to development or crops. This difference is unsurprising, given that 54% of the Corridor is already protected and the remaining area is meant to include suitable wildlife habitats. However, within the Corridor, the rate of natural lands conversion increased 50% from an average of 0.02%/year from 2001 to 2008 to 0.03%/year from 2009 to 2019. Outside the Corridor, the rate of natural lands conversion to development decreased by 44% from an average of 0.18%/year from 2001 to 2008 to 0.10%/year from 2009 to 2019, but it should be noted a massive decline of the Florida real estate market occurred after the worldwide banking collapse in 2007–2008 and increasing population growth may now reverse this trend.

Within the Corridor, the total extent of natural areas converted to development and to crops was similar for the time period studied (Figure 4), indicating that these habitats are at-risk from both exurban growth and agricultural intensification. Outside the Corridor, development is the single primary driver of habitat loss.

### 3.2 | Prioritizing the Florida Wildlife Corridor

In addition to the 3.1 million ha in the top three priorities of the FEGN that comprise the Corridor Opportunity Areas, there are 1.7 million ha in the two lower priorities of the FEGN (Hoctor & Volk, 2021). The details of the FEGN are available in existing publications (Hoctor et al., 2000, 2004; Hoctor & Volk, 2021).

Horizon 1, the top priority of the Corridor Horizons model, includes 379,948 ha. This equals 11.5% of the Opportunity Areas. As of 2022, the counties with the highest amount of Horizon 1 by area were Orange, Volusia, Osceola, and Polk, all of which are in central Florida and which have fast-growing human populations projected to increase by 20%–66% between 2020 and 2045 (UF BEBR, 2021). The same counties issued over 84,000 building permits between 2019 and 2022 according to the CFRPC development planning product. Statewide, 453,400 building permits were documented for these years.

More deliberately targeting municipal policies to incentivize smart development (e.g., clustered, outside the Corridor, and avoiding other serious environmental impacts) is a possible future direction for the campaign. The CFRPC work has made available data types not often used in priority setting for biodiversity conservation, but which are familiar to local land use planners. It also gives voice to the Corridor directly from an agency intimately familiar with development and city planning processes. The CFRPC has since become a major proponent of the Corridor within central Florida. Other organizations and agencies using the freely available CFRPC data include a wildlife advocacy and outreach nonprofit. Bear Warriors United, Seminole County in east central Florida is using the dataset to help prioritize parcels for protection under its new public lands acquisition program. Live Wildly and the Trust for Public Lands are using the data to study the potential for new county tax ballot initiatives that could pay for additional land conservation.

The Florida Circuit Model identified that compared to the statewide values, the Corridor is low in impeded pixels (26% vs. 40% statewide; the latter imposed by our definition of “impeded”; see Appendix S3) and high in diffuse (44% vs. 33% statewide) and intensified pixels (16 vs. 12%). The Corridor also has considerably higher flow potential (Appendix S5). Still, we identified some major channelized areas with potential to provide connectivity and which are not presently included in the Corridor (Appendix S6). These include areas surrounding the Santa Fe River and several coastal-to-inland pathways in the central west coast (western Manatee and

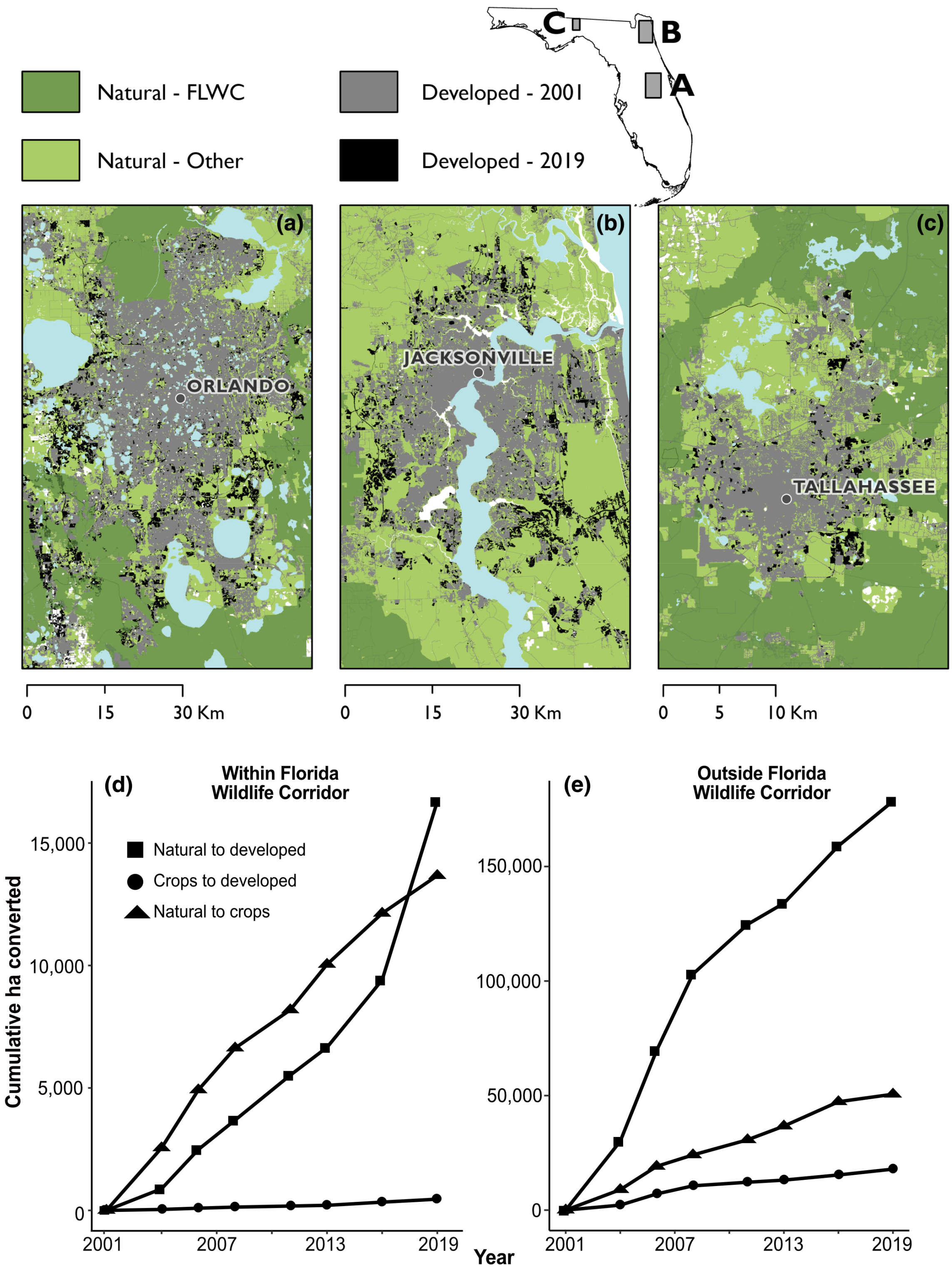


**FIGURE 4** Subsets of the statewide land cover change product developed from the National Land Cover Change Dataset (Dewitz & USGS, 2021; Wickham et al., 2021) for the (a) Orlando, (b) Jacksonville, and (c) Tallahassee regions of Florida. The statewide volume of land cover change showing cumulative hectares of Florida land conversion within (d) and outside (e) the Florida Wildlife Corridor. In addition to natural ecosystems, "Natural" includes both ranchlands and managed timber. Note the different y-axis scales on (d and e).

southwest Hillsborough counties), although the latter had only moderate flow potential on the statewide scale because this region of Florida's Gulf Coast lacks large intact source habitats. Both are considered Priority 4 areas in the FEGN, not quite rising to the level of priority needed for inclusion in the Corridor.

Advantages of the Florida Circuit Model for conservation partners include that its statewide coverage and 100 m resolution allows location-specific conservation planning and comparison among multiple possible connectivity routes. Although some models now use more objectively defined landscape resistances (Zhang et al., 2019) than our model's parameterization (rated land cover resistances), our experience is that conservation practitioners are comfortable making decisions based on subjective expert decisions. Still, regardless of the prioritization model, it is key to validate modeled corridors and movement pathways with on the ground knowledge before making conservation decisions (McRae et al., 2016).

We first shared Florida Circuit Model maps at the 2023 Everglades Coalition conference. Following the presentation, one of us was approached by staff of Audubon Florida and the Live Wildly Foundation about using the model with field data on Florida Panther (*Puma concolor coryi*) movements to identify potential road crossing locations. We have since shared the model with dozens of partners and held one-on-one meetings with interested end-users, including staff of The Nature Conservancy's Florida chapter. At least one county, Collier in southwest Florida, is using the model to help identify locations for new taxpayer-funded protected areas. We continue to solicit feedback on the model's utility, potential future updates, and display considerations—for example, whether to adjust the display threshold for what is shown as "high" flow potential (Figure 3) to avoid turning practitioners off from considering conservation of expansive ranch lands which have lower flow potential than natural areas.

To further share the prioritizations we developed and contributed to, we hosted opportunities for land trust, agency, nonprofit, landowner, and research partners to meet with and ask questions of analysts who worked on each prioritization. The meetings also helped analysts to learn what end-users find most useful. These included the January 2022 prioritization Science Exchange and an April 2022 session at the first Corridor Summit, a conference advancing the vision for Corridor conservation. In total, over 100 attendees learned about the four tools above, and two additional prioritizations of broader geographies including Florida (Anderson et al., 2016).

Despite interest in the urgency component of the Horizons model expressed at these meetings, at least one land trust and a major state environmental agency's staff expressed concerns that the most urgent parcels may be too small to justify real estate transaction costs in peri-urban areas of the Corridor. We therefore assessed the distribution of parcel sizes across Horizons, finding 1048 parcels larger than 100 ha within Horizon 1 together

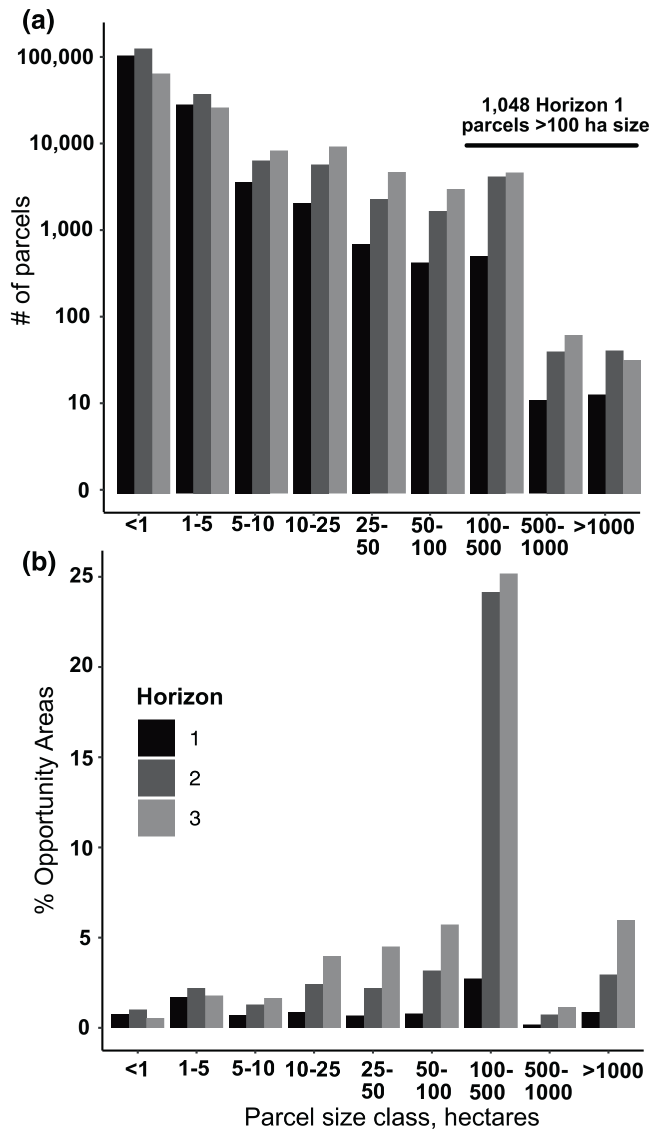


**FIGURE 5** Parcel size versus (a) number of parcels (not log scale of *y*-axis) and (b) percent of Corridor Opportunity Areas.

totaling over 187,501 ha (49% of Horizon 1 and about 6% of the entire Opportunity Areas; Figure 5). Other attendees noted that given the high real estate values in areas targeted for development the Horizons model may help identify areas where tools other than acquisition or easement are best suited for conservation. These might include ecotourism or payment for ecosystem services. We also heard support for greater consideration of water resources in land conservation prioritization (see below re: water resources report).

Following the 2022 Summit, at the request of the FWCF and in response to Science Exchange participants who wanted further opportunities to engage with prioritization analysts, we developed a working group focused on Corridor prioritizations. We wrote and distributed fact sheets for three of the abovementioned products (the

Circuit Model was not yet completed) and hosted webinars with contributors to each product. An important lesson for us was that land trusts in the region use prioritizations to justify projects on willing landowners' properties more so than they do to identify new projects. It may be fruitful to work with land trusts to map willing sellers' parcels onto locations of resources that are of known interest to agencies or private funders. This might help reveal which species and ecosystems are over- or under-represented in conservation efforts and whether it is buyers or sellers who should be targeted to help rectify any undesirable biases.

### 3.3 | Communicating and convening science

The Corridor water resources report (Graham et al., 2022) helps conservation organizations source credible data to assess and identify co-benefits that large landscape conservation provides beyond biodiversity protection. The Corridor can provide protection to rivers (62% of major rivers are within the Corridor), springs (55% of mapped spring vents), and surface water wetlands (75% of marshes), but not as much to drinking water supplies (38% of high-priority aquifer recharge areas) or the watersheds of major springs (38%).

A major benefit of the expert panel approach to the water resources report was to generate enthusiasm for and interest in the Corridor campaign among academic hydrologists and aquatic ecologists. Few were previously engaged in the campaign for what is primarily thought of as a terrestrial corridor, but their rigorous analysis helps boost and broadcast the campaign's credibility around a topic of great interest within Florida: water. A similar expert report on the overlap of Corridor conservation with human and natural resilience to climate change was published in April 2024, led by Florida Atlantic University scientists we recruited (Polsky et al., 2024). We see both the Corridor water and climate reports as models for the ever-growing range of organizations and agencies seeking nature-based solutions and win-wins for wildlife conservation and water, climate resilience, or human well-being (van Rees et al., 2023).

Our Corridor cartography is put to use for both targeted conservation actions and public awareness and outreach. We supply custom maps to the Live Wildly Foundation and the Trust for Public Lands for the abovementioned county ballot initiatives targeting new land conservation. Other maps are included on signs at Zoo Tampa (over 1 million visitors per year are invited to share where in the Corridor they have visited), in a Corridor exhibit in Washington, DC, and in a National Geographic-sponsored habitat connectivity curriculum for 11- to 13-year-old students. In addition, a public-facing brand campaign, "Live Wildly," which has garnered over 154,000 social media followers on the back of recreation-themed messaging about the Corridor has featured our mapping. All these public-facing efforts help grow the national attention on large landscape conservation and the Corridor.

## 4 | LESSONS LEARNED

Conservation is fundamentally a values driven proposition. Most often, scientists are not the decision-makers when it comes to conservation purse strings, land use change, politics, or the actions of individuals (e.g., landowners). However, science can help identify the tools and priorities for protecting the values communities consider important. Engaging with diverse stakeholders allows two-way communication between scientists and their audiences to plan data-driven decision-making that motivates funding, public awareness, or conservation prioritizations and actions (Bisbal & Eaton, 2022; Cooke et al., 2021; Fisher et al., 2020; Gerber et al., 2020). Hearing stakeholders' values (i.e., what people want to conserve; species, ecosystems, recreational access, and ecosystem services) helps steer our science. For example, hearing a need for more water resources data related to the Corridor, we contracted the water report, then distilled it for delivery to legislators and partners. This helps fill one of the gaps identified in the introduction, namely identifying the science and data needed to secure conservation targets.

Moreover, planning for impact should go beyond the intended end-user agreeing that scientist-offered products are a good idea. Indeed, we often find science is enthusiastically accepted by practitioners as free help and information, but the collaborations likely to have greater impact must include planning *how* science products will be used. To achieve what end? How long will the product remain relevant and useful? Having early input on mutually agreed-upon goals helps ensure scientists' preconceived notions of what is useful, or any researcher's bias toward conceptual versus applied advances, do not limit production of analyses, tools, and products that effectively advance conservation (Cooke et al., 2021; Pitman et al., 2021). More generally, we recommend taking the time and effort to prioritize impact as part of a project's development, just as scientists regularly prioritize study design.

Creating actionable products can require balancing scientific creativity, independence, and individual ambition with a readiness to service partners' and a campaign's needs. This tradeoff has sometimes been a tension for our organizations. However, shifting some focus from discovery- or hypothesis-based conceptual conservation science to meet the needs of implementation partners comes with more immediate uptake of one's work, which is rewarding. In our case, this has meant maps and analyses served directly to land trusts, filmmakers, journalists, local and state government officials, advocates, and landowners whose missions include motivating and conserving Corridor lands. We have also found that increasing one's impact can recruit new public and private research funders.

As of March 2024, over 82,000 ha of the Corridor have been permanently conserved since the Corridor Act was signed into law in July 2021, due in part to the provision of credible science-backed information. The millions of hectares conserved in Florida before the Corridor campaign began were also informed by science-implementation collaborations (Oetting et al., 2006). Often, the information needed for decision-makers may be low-hanging fruit conceptually (e.g., rates of habitat loss), but other times may coincide with the forefront of conservation science (e.g., valuing ecosystem services).

Place-based organizations (e.g., field stations) and scientists with deep local ecological knowledge are often familiar with local decision-making processes and players and may have expansive networks to draw upon when forming partnerships. Developing a working knowledge of local institutions positioned to advance conservation is key. These groups may include land use planners, land trusts, lawmakers, politicians, government agencies and staff, developers, agriculture operators, and others. Scientists wanting to better understand processes relevant to conservation outcomes can consider attending public meetings and serving on a local advisory commission.

Conservation partnerships are also fluid, meaning those who succeed in developing actionable conservation science must be flexible. The priorities of multiple organizations will not always overlap perfectly, and the degree of cooperation between certain partners will necessarily change over time. This has been true of the Corridor campaign and can require creativity to find overlapping priorities. Similarly, success requires an openness to new skills and even disciplines. Because decision-makers and the public are not necessarily motivated by biodiversity conservation, we have partnered with hydrologists, climatologists, sociologists, municipal planners, and economists to quantify potential benefits of conserved and connected habitats to people and ecosystems.

Still, skills originally honed through conceptual research are highly transferable to high-impact conservation settings. These include critical thinking, the ability to consider the benefits and limitations of wide-ranging data and models, and clear communication to partners of tradeoffs inherent to various datasets. All are skills built in academic science research and training and are, in our experience, traits in high demand in applied conservation.

Many (Beier et al., 2017; Cook et al., 2013; Gerber et al., 2020) have noted that university and other academically oriented organizations could enable more actionable science by better incentivizing work with applied impacts. One of our organizations (Archbold Biological Station) has recently built a conservation strategy to encourage scaling and tracking of the impact of our science. There are existing tools to help with such endeavors, whether at the scale of a single researcher or a large institution (Salafsky & Margoluis, 2021).

We have found it fulfilling to jump feet-first into the campaign to conserve the Corridor and encourage others to similarly invest in actionable science for conservation, especially in the current climate of excitement for large landscape conservation (CBD, 2021; White House, 2021; Wilson, 2016). This means, in part, identifying the end-users and their needs before research, data visualization tools, or other products are fully planned. We have certainly not perfected this art and there are undoubtedly other models for successful implementation of conservation science that we have yet to learn of or attempt, but we hope the examples herein help illustrate one successful approach.

## AUTHOR CONTRIBUTIONS

JHD conceived of and wrote the paper and built the circuit model. JMS, AM, and VLS completed the NLCD analysis. All authors contributed to planning and implementation of conference and workshop events and communication of the analyses described. HMS conceived of the CFRPC data collation and THH maintains the FEGN. THH, JO, VLS, and JHD participated in design of the Horizons model, led by the Florida Wildlife Corridor Foundation.

## ACKNOWLEDGMENTS

We thank Bellini Better World and the Live Wildly Foundation for supporting this work, the Florida Wildlife Corridor Foundation, Wildpath, Conservation Florida, Ron Ritter, Duko Hopman, Sarah Garlick, the staff of Archbold Biological Station, and the community of conservation organizations and agencies of Florida that have enabled the Corridor vision through decades of work.

## CONFLICT OF INTEREST STATEMENT

We have no conflicts of interest to declare.

## FUNDING INFORMATION

This work was funded by Bellini Better World.

## DATA AVAILABILITY STATEMENT

Appendix S2 contains the reclassified land use categories and resistance values used to build the Florida Circuit Model. Appendix S4 contains the Julia code used to run the Florida Circuit Model. All other data are publicly available.

## ETHICS STATEMENT

We declare that we and the work contained in this manuscript conform to *Conservation Science and Practice*'s ethics and integrity policies.

## PERMISSION TO REPRODUCE MATERIAL FROM OTHER SOURCES

Not applicable.

## ORCID

*Joshua H. Daskin* https://orcid.org/0000-0002-1134-7072
*Julie M. Sorfleet* https://orcid.org/0009-0003-5236-0438

## REFERENCES

Anderson, M. G., Barnett, A., Clark, M., Prince, J., Olivero Sheldon, A., & Vickery, B. (2016). *Resilient and connected landscapes for terrestrial conservation*. The Nature Conservancy, Eastern Conservation Science, Eastern Regional Office. https://www.sciencebase.gov/catalog/item/5a551b8ee4b01e7be242b9f5

Beier, P., Hansen, L. J., Helbrecht, L., & Behar, D. (2017). A how-to guide for coproduction of actionable science. *Conservation Letters*, *10*(3), 288–296. https://doi.org/10.1111/conl.12300

Benson, J. F., Mahoney, P. J., Sikich, J. A., Serieys, L. E. K., Pollinger, J. P., Ernest, H. B., & Riley, S. P. D. (2016). Interactions between demography, genetics, and landscape connectivity increase extinction probability for a small population of large carnivores in a major metropolitan area. *Proceedings of the Royal Society B: Biological Sciences*, *283*(1837), 20160957. https://doi.org/10.1098/rspb.2016.0957

Bisbal, G. A., & Eaton, M. J. (2022). Considering science needs to deliver actionable science. *Conservation Biology*, *37*(1), e14013. https://doi.org/10.1111/cobi.14013

CBD. (2021). First draft of the post-2020 global biodiversity framework. *Secretariat of the Convention on Biological Diversity*, 12. https://www.cbd.int/doc/c/abb5/591f/2e46096d3f0330b08ce87a45/wg2020-03-03-en.pdf

Census Bureau, U. S. (2023). *Florida fastest-growing state for first time since 1957*. Census.Gov. https://www.census.gov/library/stories/2022/12/florida-fastest-growing-state.html

CFRPC. (2023). *Florida wildlife corridor planning and development data statewide summary* (p. 19). Central Florida Regional Planning Council for Archbold Biological Station.

Charry, B., & Jones, J. (2010). Traffic volume as a primary road characteristic impacting wildlife: A tool for land use and transportation planning. Proceedings of the 2009 International Conference on Ecology and Transportation. https://escholarship.org/uc/item/4fx6c79t

Cook, C. N., Mascia, M. B., Schwartz, M. W., Possingham, H. P., & Fuller, R. A. (2013). Achieving conservation science that bridges the knowledge–action boundary. *Conservation Biology*, *27*(4), 669–678. https://doi.org/10.1111/cobi.12050

Cooke, S. J., Nguyen, V. M., Chapman, J. M., Reid, A. J., Landsman, S. J., Young, N., Hinch, S. G., Schott, S., Mandrak, N. E., & Semeniuk, C. A. D. (2021). Knowledge co-production: A pathway to effective fisheries management, conservation, and governance. *Fisheries*, *46*(2), 89–97. https://doi.org/10.1002/fsh.10512

Coulon, A., Fitzpatrick, J. W., Bowman, R., & Lovette, I. J. (2010). Effects of habitat fragmentation on effective dispersal of Florida scrub-jays. *Conservation Biology*, *24*(4), 1080–1088.

Crooks, K. R., & Sanjayan, M. (Eds.). (2006). *Connectivity conservation* (1st ed.). Cambridge University Press.

Damschen, E. I., Brudvig, L. A., Burt, M. A., Fletcher, R. J., Haddad, N. M., Levey, D. J., Orrock, J. L., Resasco, J., & Tewksbury, J. J. (2019). Ongoing accumulation of plant diversity through habitat connectivity in an 18-year experiment. *Science*, *365*(6460), 1478–1480. https://doi.org/10.1126/science.aax8992

Daskin, J. H., & Pringle, R. M. (2018). Warfare and wildlife declines in Africa's protected areas. *Nature*, *553*(7688), 328–332. https://doi.org/10.1038/nature25194

Dewitz, J., & USGS. (2021). National land cover database (NLCD) 2019 products; (Ver. 2.0, June 2021). US Geological Survey. https://doi.org/10.5066/P9KZCM54

Dickson, B. G., Albano, C. M., Anantharaman, R., Beier, P., Fargione, J., Graves, T. A., Gray, M. E., Hall, K. R., Lawler, J. J., & Leonard, P. B. (2019). Circuit-theory applications to connectivity science and conservation. *Conservation Biology*, *33*(2), 239–249. https://doi.org/10.1111/cobi.13230

Dubois, N. S., Gomez, A., Carlson, S., & Russell, D. (2020). Bridging the research-implementation gap requires engagement from practitioners. *Conservation Science and Practice*, *2*(1), e134. https://doi.org/10.1111/csp2.134

Fahrig, L., Neill, K. E., & Duquesnel, J. G. (2001). *Interpretation of joint trends in traffic volume and traffic-related wildlife mortality: A case study from key largo, Florida*. University of California Davis Road Ecology Center. https://escholarship.org/uc/item/18b683s6

FDOT. (2021). *Annual average daily traffic*. Florida Department of Transportation. https://ftp.fdot.gov/file/d/FTP/FDOT/co/planning/transtat/gis/TRANSTAT_metadata/aadt.shp.xml

Fisher, J. R., Wood, S. A., Bradford, M. A., & Kelsey, T. R. (2020). Improving scientific impact: How to practice science that influences environmental policy and management. *Conservation Science and Practice*, *2*(7), e210.

Florida Wildlife Corridor Foundation. (2021). *Connecting the Florida wildlife corridor* (p. 38).

FWC. (2019). *Florida's wildlife legacy initiative: Florida's state wildlife action plan* (p. 252). Florida Fish and Wildlife Conservation Commission. https://myfwc.com/conservation/special-initiatives/swap/action-plan/

FWC, & FNAI. (2021). *Cooperative land cover, version 3.5*. Florida Fish and Wildlife Conservation Commission & Florida natural areas inventory. https://myfwc.com/research/gis/regional-projects/cooperative-land-cover/

Gerber, L. R., Barton, C. J., Cheng, S. H., & Anderson, D. (2020). Producing actionable science in conservation: Best practices for organizations and individuals. *Conservation Science and Practice*, *2*(12), e295. https://doi.org/10.1111/csp2.295

Graham, W. D., Schlatter, K. J., Braswell, A. S., Brenner, M., Cohen, M. J., Dietch, M. J., Gebremicael, T. G., Shortelle, A. B., & Sukop, M. C. (2022). *Florida wildlife corridor water benefits report: An independent assessment led by the University of Florida Water Institute* (p. 200). Archbold Biological Station. https://www.archbold-station.org/projects/water-and-wildlife-corridors/

Haddad, N. M., Brudvig, L. A., Clobert, J., Davies, K. F., Gonzalez, A., Holt, R. D., Lovejoy, T. E., Sexton, J. O., Austin, M. P., Collins, C. D., Cook, W. M., Damschen, E. I., Ewers, R. M., Foster, B. L., Jenkins, C. N., King, A. J., Laurance, W. F., Levey, D. J., Margules, C. R., … Townshend, J. R. (2015). Habitat fragmentation and its lasting impact on Earth's ecosystems. *Science Advances*, *1*(2), e1500052. https://doi.org/10.1126/sciadv.1500052

Harris, L. D. (1984). *The fragmented forest: Island biogeography theory and the preservation of biotic diversity*. University of Chicago Press.

Hilty, J. A., Keeley, A. T., Lidicker, W. Z., Jr., & Merenlender, A. M. (2019). *Corridor ecology: Linking landscapes for biodiversity conservation and climate adaptation*. Island Press.

Hoctor, T. S., Carr, M., Zwick, P. D., & Maehr, D. S. (2004). Identification and realization of a Florida ecological network: The Florida statewide greenways project and its political context. In *Ecological networks and greenways: Concept, design, implementation* (pp. 222–250). Cambridge University Press.

Hoctor, T. S., Carr, M. H., & Zwick, P. D. (2000). Identifying a linked reserve system using a regional landscape approach: The Florida ecological network. *Conservation Biology*, *14*(4), 984–1000. https://doi.org/10.1046/j.1523-1739.2000.99075.x

Hoctor, T. S., & Volk, M. (2021). *Florida ecological greenways network update project final report*, (p. 12). http://conservation.dcp.ufl.edu/wp-content/uploads/2021/09/FEGN_Update-Final-Report.pdf

Jacobson, S. L., Bliss-Ketchum, L. L., de Rivera, C. E., & Smith, W. P. (2016). A behavior-based framework for assessing barrier effects to wildlife from vehicle traffic volume. *Ecosphere*, *7*(4), e01345. https://doi.org/10.1002/ecs2.1345

Kautz, R. S. (1998). Land use and land cover trends in Florida 1936–1995. *Florida Scientist*, *61*(3/4), 171–187.

Knight, A. T., Cowling, R. M., Rouget, M., Balmford, A., Lombard, A. T., & Campbell, B. M. (2008). Knowing but not doing: Selecting priority conservation areas and the research–implementation gap. *Conservation Biology*, *22*(3), 610–617. https://doi.org/10.1111/j.1523-1739.2008.00914.x

Landau, V. A., Shah, V. B., Anantharaman, R., & Hall, K. R. (2021). Omniscape. Jl: Software to compute omnidirectional landscape connectivity. *Journal of Open Source Software*, *6*(57), 2829. https://doi.org/10.21105/joss.02829

Laurance, W. F., Lovejoy, T. E., Vasconcelos, H. L., Bruna, E. M., Didham, R. K., Stouffer, P. C., Gascon, C., Bierregaard, R. O., Laurance, S. G., & Sampaio, E. (2002). Ecosystem decay of Amazonian Forest fragments: A 22-year investigation. *Conservation Biology*, *16*(3), 605–618. https://doi.org/10.1046/j.1523-1739.2002.01025.x

Levitt, J. N., & Woodley, S. (Eds.). (2014). *Conservation catalysts: The academy as Nature's agent: Levitt, James N., Woodley, Stephen: 9781558443013: Amazon.com: Books*. Lincoln Institute of Land Policy.

Love, K. (2013). *Cooperative conservation blueprint regional pilot project* (p. 46). Florida Fish and Wildlife Conservation Commission. https://myfwc.com/media/5862/strategicapproach.pdf

McRae, B. H., Dickson, B. G., Keitt, T. H., & Shah, V. B. (2008). Using circuit theory to model connectivity in ecology, evolution, and conservation. *Ecology*, *89*(10), 2712–2724. https://doi.org/10.1890/07-1861.1

McRae, B. H., Popper, K., Jones, A., Schindel, M., Buttrick, S., Hall, K., Unnasch, R., & Platt, J. (2016). *Conserving Nature's stage: Mapping omnidirectional connectivity for resilient terrestrial landscapes in the Pacific northwest*. https://doi.org/10.13140/RG.2.1.4158.6166

Noss, R. F. (1987). Protecting natural areas in fragmented landscapes. *Natural Areas Journal*, *7*(1), 2–13.

Noss, R. F., & Harris, L. D. (1986). Nodes, networks, and MUMs: Preserving diversity at all scales. *Environmental Management*, *10*(3), 299–309. https://doi.org/10.1007/BF01867252

Oetting, J. B., Knight, A. L., & Knight, G. R. (2006). Systematic reserve design as a dynamic process: F-TRAC and the Florida forever program. *Biological Conservation*, *128*(1), 37–46. https://doi.org/10.1016/j.biocon.2005.09.014

Pitman, N. C., Vriesendorp, C. F., Alvira Reyes, D., Moskovits, D. K., Kotlinski, N., Smith, R. C., Thompson, M. E., Wali, A., Benavides Matarazzo, M., & Del Campo, A. (2021). Applied science facilitates the large-scale expansion of protected areas in an Amazonian hot spot. *Science Advances*, *7*(31), eabe2998.

Polsky, C., Baldwin, J., Adams, D. C., Clark, R., Donovan, V., Emrich, C., Glickman, S., Hoctor, T. S., Klizentyte, K., Mitchum, G., Noss, R., O'Brien, M., Owosina, E., Pate, E., Vogel, J., Volk, M., & Zierden, D. (2024). *The Florida wildlife corridor and climate change* (p. 136). Archbold Biological Station and Florida Atlantic University. https://www.archbold-station.org/projects/climate-and-wildlife-corridors/

Repenning, R. W., & Labisky, R. F. (1985). Effects of even-age timber management on bird communities of the longleaf pine Forest in northern Florida. *The Journal of Wildlife Management*, *49*(4), 1088–1098. https://doi.org/10.2307/3801400

Ricketts, T. H., Williams, N. M., & Mayfield, M. M. (2006). *Connectivity and ecosystem services: Crop pollination in agricultural landscapes*. https://espace.library.uq.edu.au/view/UQ:193193

Salafsky, N., & Margoluis, R. A. (2021). *Pathways to success: Taking conservation to scale in complex systems*. Island Press.

Scarlett, L., & McKinney, M. (2016). Connecting people and places: The emerging role of network governance in large landscape conservation. *Frontiers in Ecology and the Environment*, *14*(3), 116–125. https://doi.org/10.1002/fee.1247

Sohl, T. L., Sayler, K. L., Drummond, M. A., & Loveland, T. R. (2007). The FORE-SCE model: A practical approach for projecting land cover change using scenario-based modeling. *Journal of Land Use Science*, *2*(2), 103–126. https://doi.org/10.1080/17474230701218202

Swain, H. M., Boughton, E. H., Bohlen, P. J., & Lollis, L. O. (2013). Trade-offs among ecosystem services and disservices on a Florida ranch. *Rangelands*, *35*(5), 75–87.

The Florida Wildlife Corridor Act. (2021). The Florida Wildlife Corridor Act, s. 259.1055, The Florida State Legislature. https://www.flsenate.gov/Session/Bill/2021/976/BillText/er/HTML

UF BEBR. (2021). *Florida demographic estimating conference*, *54*. https://www.google.com/url?sa=i&url=http%3A%2F%2Fedr.state.fl.us%2Fcontent%2Fpopulation-demographics%2Fdata%2FMediumProjections_2020.pdf&psig=AOvVaw11pnL4sLoqCC3CezUoT3pG&ust=1706448266234000&source=images&cd=vfe&opi=89978449&ved=0CAgQrpoMahcKEwignJan1f2DAxUAAAAAHQAAAAAQBA

USDA NASS. (2021). *Quick Stats*. USDA National Agricultural Statistics Service. https://quickstats.nass.usda.gov/results/E0F5EB36-3313-3D7B-9E7F-E56A3365CF2B#9A9F55D7-E267-38C6-ACB9-DF106291B5A7

Van der Ree, R., Smith, D. J., & Grilo, C. (2015). *Handbook of road ecology*. John Wiley & Sons.

van Rees, C. B., Jumani, S., Abera, L., Rack, L., McKay, S. K., & Wenger, S. J. (2023). The potential for nature-based solutions to combat the freshwater biodiversity crisis. *PLoS Water*, *2*(6), e0000126. https://doi.org/10.1371/journal.pwat.0000126

Volk, M. I., Hoctor, T. S., Nettles, B. B., Hilsenbeck, R., Putz, F. E., & Oetting, J. (2017). Florida land use and land cover change in the past 100 years. *Florida's Climate: Changes, Variations, & Impacts*.

Weisz, J. R., Ng, M. Y., & Bearman, S. K. (2014). Odd couple? Reenvisioning the relation between science and practice in the dissemination-implementation era. *Clinical Psychological Science*, *2*(1), 58–74. https://doi.org/10.1177/2167702613501307

White House. (2021). *Executive order on tackling the climate crisis at home and abroad*. https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/

Wickham, J., Stehman, S. V., Sorenson, D. G., Gass, L., & Dewitz, J. A. (2021). Thematic accuracy assessment of the NLCD 2016 land cover for the conterminous United States. *Remote Sensing of Environment*, *257*(112), 357. https://doi.org/10.1016/j.rse.2021.112357

Wilson, E. O. (2016). *Half-earth: Our planet's fight for life*. WW Norton & Company.

Zhang, Y., Clauzel, C., Li, J., Xue, Y., Zhang, Y., Wu, G., Giraudoux, P., Li, L., & Li, D. (2019). Identifying refugia and corridors under climate change conditions for the Sichuan snub-nosed monkey (*Rhinopithecus roxellana*) in Hubei Province, China. *Ecology and Evolution*, *9*(4), 1680–1690. https://doi.org/10.1002/ece3.4815

## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**How to cite this article:** Daskin, J. H., Meeks, A., Sclater, V. L., Sorfleet, J. M., Oetting, J., Hoctor, T. S., Guthrie, J. M., & Swain, H. M. (2024). Marshaling science to advance large landscape conservation. *Conservation Science and Practice*, *6*(10), e13225. https://doi.org/10.1111/csp2.13225