Strategic Growth of the National Wildlife Refuge System

Recommendations for a 21st Century Land Protection Strategy

By Julie Kates, Noah Matson, and Peter Nelson

Noah Matson, Aransas National Wildlife Refuge, Texas

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I. INTRODUCTION

Identifying and protecting new national wildlife refuges has always been a visionary act, an investment in future generations of animals and people, since the days that President Theodore Roosevelt first envisioned a refuge for wildlife at Florida's Pelican Island. Today, the National Wildlife Refuge System continues to expand, as federal entities and state, local, and private partners work together to protect exceptional and irreplaceable landscapes and look for new opportunities to protect vital wildlife habitat.

No single method exists for designating new refuges. In 1932, wildlife biologist J. Clark Salyer drove 18,000 miles in six weeks scoping out waterfowl sites that could be converted to refuges, and some of the nation's most renowned waterfowl refuges were established during this time. The Refuge System has often focused its conservation work on protecting such "trust resources," an imprecise term that typically refers to migratory birds, threatened and endangered species, interjurisdictional fish, and some marine mammals, but little consideration was given to conserving other categories of wildlife or to the integrity of the ecosystems they inhabit.[1]

A targeted and opportunistic approach may have made sense in the past, but conservation challenges have changed. Invasive species, environmental contaminants, and competing demands for water have grown into major threats. Landscapes are increasingly fragmented by development, compromising ecosystem functions and leaving many species disconnected from the full range of habitat components on which they depend. And climate change is causing species range shifts, decoupling community assemblages, and altering phenology, hydrology, and disturbance regimes.[2] With limited funding available for land conservation and increasing numbers of species and ecosystems that need protection, a strategic and systematic approach is essential to optimizing conservation outcomes. As the only federal land management system dedicated first and foremost to wildlife conservation, the Refuge System's contribution to the broader conservation estate should be through investments that focus on protecting and restoring the integrity of nationally significant ecosystems.

We recommend that a strategic growth policy for the Refuge System include both a coarse filter to identify areas whose protection will contribute to high ecological integrity and fine filter to identify areas important for the recovery of at-risk species. It should prioritize parcels that would add representative, redundant, and irreplaceable conservation targets to the Refuge System where they are not adequately protected within the existing conservation estate. Land acquisition projects should not be expected to conserve a static suite of species over the long term, particularly in an era

[1] R.L. Fischman and B. Adamcik, Beyond Trust Species: The Conservation Potential of the National Wildlife Refuge System in the Wake of Climate Change, 51 Natural Resources Journal 1-33 (2011).

[2] H. Gitay, A. Suàrez, R.T. Watson, and D.J. Dokken (eds.), Climate Change and Biodiversity: IPCC Technical Paper V, Intergovernmental Panel on Climate Change, Geneva, Switzerland (2002).

of rapid climate change. Therefore, the strategic growth framework should be designed to evaluate the long-term viability of specific conservation targets for a given acquisition project, consider the climate risks of individual projects, identify and protect climate change refugia and diverse geophysical settings, build connectivity across the landscape, and engage in climate science and planning partnerships. FWS must revise the Land Acquisition Priority System to incorporate these principles. We recommend establishing a new tier of planning that considers both existing and future refuges across ecologically defined regions to guide more effective and strategic conservation actions.

II. THE REFUGE SYSTEM'S MISSION AND MANDATES

As the Refuge System faces a new era of conservation threats, it does so with a more well-defined set of responsibilities. In 1997, Congress enacted the National Wildlife Refuge System Improvement Act, which for the first time articulated a unifying mission to guide the System as a whole. The Improvement Act declared that the Refuge System's role is to administer "a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."[3] In addition, the Improvement Act called for the biological integrity, diversity, and environmental health of the System to be maintained.

Finally, the Improvement Act explicitly instructs the Secretary of the Interior to "plan and direct the continued growth of the System in a manner that is best designed to accomplish the mission of the System, to contribute to the conservation of the ecosystems of the United States, to complement efforts of States and other Federal agencies to conserve fish and wildlife and their habitats, and to increase support for the System and participation from conservation partners and the public."[4] In our view, this important provision of law guides the U.S. Fish and Wildlife Service (FWS) to assess the entire "conservation estate" (the existing mix of federal, state, tribal, local, and private conservation lands and waters) and build upon it, focusing on those ecosystems that are not sufficiently protected by our existing conservation network. Below we recommend criteria to guide the development of a more strategic framework for expanding the Refuge System.

III. PRINCIPLES FOR A STRATEGIC GROWTH POLICY

A. Using Coarse and Fine Filters

To fulfill the range of its legal responsibilities, the Refuge System must complement single-species conservation approaches with a "coarse-filter" ecosystem approach that emphasizes the maintenance and restoration of ecological integrity at the landscape scale. The strategic growth framework must, therefore, focus both on acquiring lands for the purposes of recovering species

[3] 16 U.S.C. § 668dd(a)(2).
[4] 16 U.S.C. § 668dd(a)(4)(C).

that are already imperiled, as well as acquiring priority lands that contribute to biological integrity and diversity across whole landscapes and ecosystems to prevent new species declines.

1. Managing for biological integrity and diversity

FWS policy defines biological diversity as "[t]he variety of life and its processes, including the variety of living organisms, the genetic differences among them, and communities and ecosystems in which they occur," and biological integrity as "[b]iotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities." The U.S. Forest Service's (USFS's) recently finalized 2012 National Forest Management Act Planning Rule,[5] with its adoption of ecological integrity as the agency's management objective at the ecosystem scale, provides a useful example for capturing these terms in Refuge System policy. In adopting this framework, the USFS acknowledges two important points: 1) that ecological integrity is well understood and defined within the scientific literature[6] and 2) that the concept is also employed by the National Park Service and Bureau of Land Management within the Department of the Interior, stating that "aligning approaches across the broader landscape will facilitate an all-lands approach to ecological sustainability."

Under the USFS planning rule, ecological integrity is to be evaluated and monitored by assessing the departure of key ecosystem characteristics from historic (or future expected) natural ranges of variation, and resiliency is reflected in the ecosystem's ability to return to this range in the face of natural or human-induced perturbations. According to the USFS, managing for ecological integrity at the ecosystem or community scale is expected to provide ecological conditions in support of 80-90% of species within the planning area. This degree of conservation coverage from the "coarse-filter" approach is generally accepted and widely applied in conservation planning.

For the purposes of strategically growing the Refuge System, we recommend that FWS work with the conservation science community, as well as other land management agencies and non-governmental conservation organizations, to develop standardized methods for identifying those areas of high ecological integrity within defined multi-ownership geographic areas, such as ecoregions. High priorities should include parcels whose acquisition will contribute to landscape-scale structure, function, composition, and connectivity. While no single acquisition parcel can secure the ecological integrity of a given landscape, the goal is to develop a rational process for acquiring a set of lands that in total will increase landscape-level integrity and resiliency.

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[5] See http://www.fs.usda.gov/planningrule.

[6] The planning rule defines "ecological integrity" as: "The quality or condition of an ecosystem when its dominant ecological characteristics (for example, composition, structure, function, connectivity, and species composition and diversity) occur within the natural range of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human influence."

2. Recovering threatened and endangered species

The Refuge System's strategic growth framework should prioritize opportunities to enhance ecological conditions at the landscape scale for the purposes of sustaining and recovering native biodiversity, including imperiled species. However, an ecosystem conservation approach to strategic growth must be coupled with a "fine filter" species-level approach to ensure that at-risk elements of biodiversity are not ignored in conservation planning.

The USFS planning rule provides an example of how to develop species-level conservation strategies within broader, landscape-level ecosystem planning. Under the USFS planning rule, at-risk species (including threatened and endangered, candidates, and G1-G3 ranked species by NatureServe), and those unlikely to be conserved via the ecosystem integrity approach, will receive species-level conservation strategies within the plans (the so-called "fine filter").

In addition to targeting high-integrity areas that will contribute to landscape-level conservation (i.e., those lands able to support 90% of native biodiversity), Refuge System strategic growth policy should develop a companion strategy to identify parcels for acquisition at the species-level of biological organization. Such a companion strategy would specifically target lands that support species unlikely to be conserved via landscape-level conservation approaches.

Of the more than 550 national wildlife refuges, 59 were established expressly for the protection of endangered species, and many others protect endangered species within their borders as well. Still others sustain vulnerable species that would likely become endangered if not for these sanctuaries. Kirtland's Warbler Wildlife Management Area in Michigan maintains nesting habitat for the endangered warbler, for example, and the Florida Panther National Wildlife Refuge has been one of the last safe havens for the endangered cat.

Since the passage of the Endangered Species Act in 1973, however, protection of endangered species has fallen primarily under the aegis of regulations on federal and private activities – making it illegal to kill or harm a federally listed plant or animal, for example – rather than land acquisitions to protect listed species. Such regulations may help to protect endangered species, but they do not restore habitats or foster any conservation measures with the aim of bringing species back from the brink of extinction. Looking ahead, FWS has an unparalleled opportunity to acquire land and develop conservation plans that protect and restore endangered species populations.

When developing conservation targets, FWS must always take endangered species into account. In the past, the agency has understandably focused recovery plans on those refuges expressly designed to protect certain species, while ignoring other refuges that could provide crucial habitat. For example, a 1996 recovery plan for the Atlantic Coast population of the threatened piping plover mentioned only a few of the more than twenty refuges within the population's breeding range. This represents a missed opportunity to design ecosystem-level recovery plans for species whose historic ranges fall across other refuges and protected or unprotected lands.

Furthermore, rather than being integral components of larger conserved landscapes, refuges that protect endangered species are often isolated "islands" of protection surrounded by ever-increasing threats. The Refuge System should be the cornerstone of a coordinated ecosystem-level approach to endangered species protection and the catalyst for related conservation efforts by state, local, and private entities. As a result, FWS must be more open to working with such entities to connect protected landscapes, even as it places greater priority on endangered species within its own Refuge System.

B. Building Representation, Redundancy, and Irreplaceability

The new strategic growth framework should be designed to protect ecosystems that build redundancy, resiliency, and representation into the Refuge System. To maintain biodiversity over the long term, species must exist in the fullest possible array of environments in which they have historically occurred. A species may have occurred in a variety of habitats, so to protect it in only one large tract of public land would be a missed opportunity for conservation. For example, the red wolf's historic range stretches from coastal prairies to upland forests, from southern Illinois down to Florida. Efforts to reintroduce the wolf to the Appalachians but not elsewhere would not protect the full ecological representation of the species. Although it may not be economically or politically feasible to restore a species in all its historic habitats, efforts must be made to be as representative as possible.

Furthermore, just as technological systems often include redundant functions as a protective measure, conservation also must incorporate some measure of redundancy, a biological insurance policy to protect against the catastrophic loss of any single population or habitat. In an ideal scenario for conservation, a species would have redundant populations, each at high enough levels to ensure resiliency, spread out throughout most or all of the habitats of its historic range. The work of Dr. J. Michael Scott shows that the Refuge System currently does a good job of representing and building in redundancy for migratory waterfowl.[7] The System should build on this conservation success by expanding into more species and ecosystems.

As FWS hones its conservation targets, the agency should take into account the notion of irreplaceability, considering those ecosystems that are in most danger of being lost forever and those species that have relatively little of their habitat in protection. FWS must proactively assess the threat levels that exist around existing refuges or around important habitats that could be protected in the Refuge System. If a certain habitat is lost, for example, can it be replaced elsewhere? If it is degraded by a potential threat, can it be restored? It will be increasingly difficult in the future to restore degraded habitat to an idealized natural state. Yet, by assessing the extent of existing threats

[7] See A.B. Pidgorna, Representation, Redundancy, and Resilience: Waterfowl and the National Wildlife Refuge System, PhD Dissertation, University of Idaho, Moscow (2007); D.A. Rupp, The Strategic Role of the National Wildlife Refuge System in Coordinated Bird Conservation in the United States, MS Thesis, University of Idaho, Moscow (2009).

and levels of degradation, managers can determine a parcel's potential to be restored to a level at which it can sustain biodiversity. With ever more incentives available to private landowners, and by fostering a new spirit of ecological cooperation, it may be more feasible than ever for FWS to purchase degraded lands and restore them to conservation status.

C. Factoring in Climate Change

Climate change is a new reality that urgently requires new thinking and new policy for guiding the growth of the Refuge System. The Refuge System was built on the premise of providing permanent sanctuaries for wildlife where species could live without the stresses of competing human intrusions. Even as biology and ecology advanced, and refuges incorporated local ecological dynamics into refuge management, the focus has been on smaller-scale changes with the goal of providing sanctuary to the same species and habitats for which a particular refuge was established. This approach is no longer adequate in the context of a rapidly and ever changing climate. As highlighted by a recent EPA report[8] on land protection planning and climate change:

> Land protection exhibits the three characteristics of decisions that should reflect some understanding of climate change impacts: it is long term, hard to reverse, and resource-intensive. These characteristics of land protection decisions, along with the rapid pace of land development, now and in the future, and the variety of interactions possible between climate and land use, highlight the importance of incorporating climate change information into land protection decisions.

The draft National Fish, Wildlife and Plants Climate Change Adaptation Strategy[9] (soon to be released as final), which FWS co-led, provides extremely important context, background information, and strategies for addressing climate change in land protection programs and protected areas management relevant to strategic growth of the Refuge System:

> The management challenge will not be to keep current conservation areas as they are, but rather ensure there is a network of habitat conservation areas that maximizes the chances that the majority of species will have sufficient habitat somewhere…
>
> The most robust approach to helping fish, wildlife, and plants adapt to climate change is to conserve enough variety and amount of habitat to sustain diverse and healthy (e.g., viable, sustainable, abundant) populations as landscapes and seascapes are altered by climate change. We will need well-connected networks of conservation areas to allow for the movement of species in response to climate change. Selecting areas that will be both resilient and able to capture the broadest range of species is an important challenge…

[8] Environmental Protection Agency (EPA/600/R-09/142F), An Assessment of Decision-Making Processes: Evaluation of Where Land Protection Planning Can Incorporate Climate Change Information (2011), Available at http://cfpub.epa.gov/ncea/global/recordisplay.cfm?deid=238091.

[9] See http://www.wildlifeadaptationstrategy.gov/.

> This *Strategy* makes no presumption about the best way of securing additional conservation areas (lease, easement, acquisition, other), only that climate change will demand that we increase and perhaps accelerate our collective efforts to do so. But simply creating new networks of conservation areas or acquiring more land to be protected in perpetuity will not be enough. Biologists and conservation land managers also must manage these conservation areas in innovative and flexible ways, as species and ecosystems respond and adjust (often in unpredictable fashion) to climate change…
>
> Increasing the number, quality, and size of conservation areas can increase the opportunities for individual species to adapt to climate change, and also make it more likely that native biodiversity will be conserved. For some species, their required habitat under climate change may be well outside their current or historic range. Healthy and biologically diverse ecosystems are likely to better withstand or adjust to the impacts of climate change. Increasing the number (redundancy) and distribution of protected fish, wildlife, and plant populations is important for the same reason. Establishing larger and more hospitable conservation areas for species to transition to will also increase opportunities for species to create new assemblages of species that are better able to persist in a dynamic climate.

Many of the strategies and actions included in the habitat conservation section of the draft National Wildlife Adaptation Strategy should help guide the growth of the Refuge System. These include strategies and actions to identify high-priority areas for conservation under a changing climate, securing appropriate conservation status of high-priority areas, restoring habitat features where necessary to maintain resilience to climate change, and protecting and restoring ecological connections to facilitate species movements in response to climate change.

1. Reprioritize conservation targets under a changing climate

The Refuge System will likely not be able to conserve the same species and habitats over the long term in the same places they are today. As the first step for incorporating climate change into the growth of the Refuge System, FWS should evaluate whether the conservation targets (i.e., species or habitats) of a particular land protection project are viable over the course of several decades based on climate change projections in the geographical setting being analyzed. If not, the conservation targets for that project need to be reevaluated. This evaluation needs to happen over larger spatial and temporal scales than have traditionally been used in the Refuge System.

2. Identify the climate risks of land protection projects

Different priority conservation areas will be vulnerable to different climate risks. These risks need to be understood and planned for. For instance, more frequent and severe droughts in the Southwest will require land protection planning to incorporate water protection planning, including the acquisition of adequate water rights to meet the purpose of the refuge. Sea-level rise is a unique climate risk that is already resulting in the loss of coastal land and habitat in the Refuge System. Serious attention should be given to land protection projects at risk of sea-level rise and inundation to ensure that investments will provide conservation benefits over the long term.

3. Identify and protect climate change refugia

Not all places on the landscape and in the country will be equally affected by climate change. There are many small- and large-scale factors that affect the local climate relevant to biodiversity. For example, varied topography causes micro-climates like north-facing slopes to remain cooler than other areas of the landscape. Deeper lakes will persist longer and have cooler water. Northern edges of biomes may experience fewer changes than southern edges.[10] These types of places, or refugia, should be prioritized for conservation because they represent opportunities for long-term conservation under a changing climate.

4. Identify and protect the geophysical stage

As climate change forces species out of the habitats they have historically relied upon, no land acquisition project can be assumed to conserve a static range of wildlife. Instead, the Refuge System should look to protect key elements that are likely to support new species assemblages. Certain elements of the underlying geophysical settings of the landscape drive species diversity.[11] Among the adaptation actions included in the draft National Wildlife Adaptation Strategy is the conservation of "areas representing the range of geophysical settings, including various bedrock geology, soils, topography, and projected climate, in order to maximize future biodiversity."[12] By identifying and protecting the underlying geophysical elements that correlate to the current diversity of species in a region, conservation practitioners can ensure this "stage" is available for species to adapt and evolve as the climate changes.

5. Build connectivity

Ecological connectivity is a critical element in facilitating species adaptation to climate change. As defined in the USFS planning rule, connectivity refers to "[e]cological conditions that exist at several spatial and temporal scales that provide landscape linkages that permit the exchange of flow, sediments, and nutrients; the daily and seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long distance range shifts of species, such as in response to climate change."[13] FWS should identify discontinuous areas of terrestrial and aquatic habitat within the Refuge System and the larger conservation estate, and establish protections for potential high-priority movement corridors along both latitudinal and altitudinal gradients.

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[10] See M.B. Ashcroft, Identifying refugia from climate change, 37 Journal of Biogeography, 1407–1413 (2010).

[11] See M.G. Anderson and C.E. Ferree, Conserving the Stage: Climate Change and the Geophysical Underpinnings of Species Diversity, 5(7) PLoS ONE e11554. doi:10.1371/journal.pone.0011554 (2010); E.T. Game, et al., Incorporating Climate Change Adaptation into National Conservation Assessments, 17 Global Change Biology 3150-3160 (2011).

[12] National Fish, Wildlife, and Plants Climate Change Adaptation Strategy (January 2012).

[13] See http://www.fs.usda.gov/planningrule.

6. Tap into climate science and planning networks and programs

The Refuge System cannot achieve its conservation vision alone. The information needed in the context of climate change is shared by FWS's conservation partners and sister agencies. In particular, the Landscape Conservation Cooperatives, the National Climate Change and Wildlife Science Center, and the implementing partnership of the National Wildlife Adaptation Strategy will be important networks in which the Refuge System should participate. These partnerships will help the Refuge System identify high-priority conservation areas that include many of the elements listed above to inform the growth of the Refuge System.

IV. INCORPORATING REFORMS INTO LAPS

Strategic growth requires a method for prioritizing acquisition opportunities. Every year since 1987, FWS has turned to the Land Acquisition Priority System (LAPS) to rank acquisition projects. Although projects are evaluated on their biological merits, the criteria and scoring structure used thus far overlook several important project elements. FWS must address these shortcomings to ensure that LAPS accurately captures those projects that best meet the principles outlined above.

In addition, LAPS needs to be used up front as a planning tool for identifying new additions to the Refuge System, not just for prioritizing parcels for appropriations. Currently, LAPS, with all of its transparent criteria for what it is important to the Refuge System, is not integrated into the identification of new acquisitions, only on scoring additions identified through other processes. LAPS should be used throughout the land protection planning process to assist planners and decision makers in identifying the best contributions to the Refuge System.

A. Considering Climate Risks

Many coastal refuge managers are already confronting the loss of acreage on their units due to rising seas, yet LAPS fails to consider the vulnerability of new acquisitions to sea-level rise. In many cases, vulnerable and expensive parcels are still considered high priorities for FWS acquisition dollars. This can incur heavy opportunity costs, as less vulnerable (and often less expensive) properties go unprotected and are potentially developed or otherwise degraded, reducing the ecological adaptive capacity of the landscapes in which these refuges are embedded. Vulnerable coastal properties should not be wholly dismissed as invaluable acquisitions, as protection of these areas may provide valuable time and transitional habitat to allow wildlife to adapt. However, FWS should account for likely losses of coastal property and consider whether alternatives to fee-title acquisition, such as conservation easements, are more appropriate.

Land protection is a permanent and expensive investment, and climate considerations including, but not limited to, sea-level rise should be integrated into LAPS to ensure the purpose of the project will be met over the long term.

B. Valuing the Acquisition

Although LAPS is used to determine acquisition priorities, scoring is based on the characteristics of the refuge for which a project would be acquired rather than on the basis of the acquisition itself. As a result, scores do not necessarily reflect the level of contribution a parcel would make to the conservation of wildlife or ecosystem integrity. An existing refuge that fulfills LAPS criteria may result in a low-value acquisition ranking high on the list. Revising LAPS to evaluate what would be protected by the acquisition project instead of what the Refuge System already protects will help to funnel dollars to the most important projects for conservation. New criteria should include mechanisms to account for the purpose and future state of the parcel where restoration of a parcel is the objective to contribute to a broader goal.

C. Addressing the Additive Scoring Bias

Projects are currently scored out of a possible 850 points, generated out of a possible 50 points for the project summary and 200 points from each of four categories: fisheries and aquatic resources, endangered and threatened species, bird conservation, and ecosystem conservation. This additive scoring system can result in high-value acquisition projects ranking low on the priority list. For example, a project could receive the maximum 200 points in the endangered and threatened species category because its acquisition would be critical for recovery of listed species, yet if it is located in a desert ecosystem, the bias toward wetlands and waterfowl habitat currently embedded in LAPS could result in a low ranking. FWS should restructure the scoring system to ensure projects that would make exceptional contributions to the Refuge System are not undervalued.

V. INTEGRATING STRATEGIC GROWTH INTO LANDSCAPE-LEVEL PLANNING

Recommendations in FWS's *Conserving the Future: Wildlife Refuges and the Next Generation* related to conservation planning and strategic growth recognize the need for a landscape-scale context; however, conservation will be best achieved by considering existing refuges and future growth of the Refuge System in concert. A new tier of refuge plans that targets ecologically defined regions, rather than focusing on the scale of a single refuge as is currently done through comprehensive conservation plans (CCPs), could be an effective vehicle for integrating the two. "Comprehensive landscape plans," potentially focused at the sub-LCC level, would allow FWS to consider the collective ecological contributions of multiple refuges, their relationships to other protected areas, and gaps in the conservation estate. Informed by national mandates, the principles of a new strategic growth policy, and LCCs and other landscape collaborations (see Figure 1), these plans would entail:

- setting population and habitat goals for the planning region as a whole,
- identifying and prioritizing unprotected areas of the landscape that must be secured to meet those goals, and

§ determining the optimal allocation of resources among existing refuge units and land protection efforts to achieve those goals.

The inclusion of this broad-level information in the new comprehensive landscape plans not only facilitates better coordination among individual refuges, but also leaves room for the next generation of land protection plans (LPPs) and CCPs to focus on the more detailed aspects of implementation, ideally obviating the need for further step-down plans.

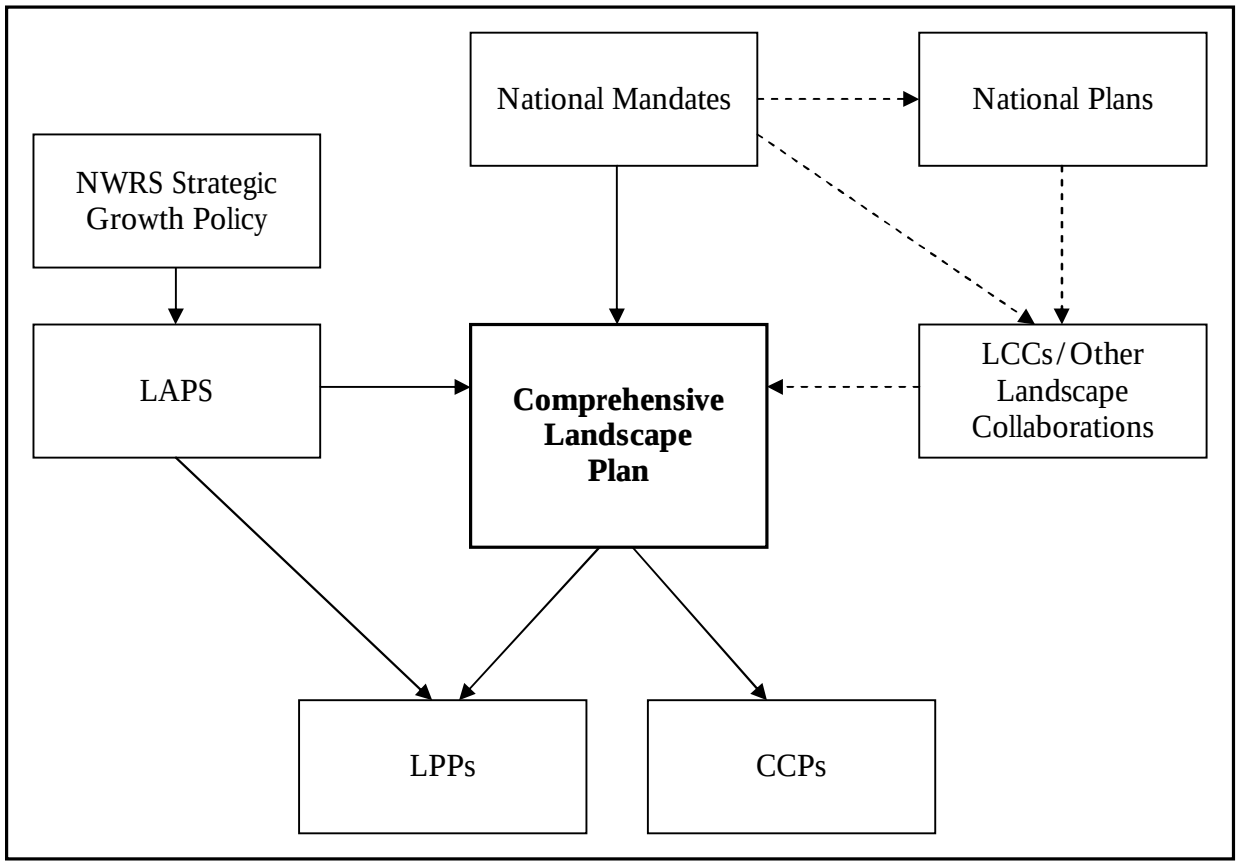

Figure 1. Diagram of the process for developing an integrated Comprehensive Landscape Plan.

VI. CONCLUSION

For the Refuge System to succeed in carrying out its mission, a more structured and purposeful framework for land protection is needed. FWS should develop a strategic growth policy that applies both ecosystem-level and species-level approaches; builds representation, redundancy, and irreplaceability into the System; and factors in climate change considerations. These principles must be incorporated into LAPS for policy to translate into on-the-ground conservation. We recommend that land protection and refuge planning be considered together within new comprehensive landscape plans to ensure that conservation actions are designed to contribute to the broader landscape in which they are carried out.