

NATIONAL WILDLIFE REFUGE BOUNDARY EXPANSION:
A CASE STUDY FOR THE EXPANSION OF PAINT ROCK NATIONAL WILDLIFE
REFUGE

by

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EXECUTIVE SUMMARY

This paper focuses on the question of National Wildlife Refuge (NWR) boundary expansion, a timely and important issue in light of multiplying threats to wildlife and wildlife habitat. The paper features a case study on the Paint Rock River National Wildlife Refuge in southern Tennessee. I begin with an overview of the NWR System including a brief history of the NWR System and a short explanation of the purpose of NWRs. The NWR System was established in 1903 with the formation of Pelican Island by President Theodore Roosevelt to protect and conserve wildlife. Today, the system has evolved into a network of national conservation efforts, protecting a vast number of wildlife species, many of which are listed as endangered or threatened under the Endangered Species Act.

The most exceptional aspect of the National Wildlife Refuge System is that it is the only federal land system dedicated solely to the protection of native wildlife. Additionally, NWRs are designed to preserve biodiversity, promote environmental education, and allow for wildlife-dependent recreation. However, the fixed lines of refuge boundaries present a challenge when habitats are faced with growing environmental threats. Expanding the boundaries of refuges is crucial to mitigate threats like habitat fragmentation, urban development, and climate change. Boundary expansion enhances habitat connectivity and helps to secure critical habitat amid shifting species ranges.

After a review of eight NWRs in the Southeast, I determined that Paint Rock River NWR shows high potential for boundary expansion, and I present a case for expanding the boundary of this small 87-acre refuge. Paint Rock River NWR lies in a biologically rich region in southern Tennessee that supports over a dozen federally endangered species. I discuss four of these in detail: the gray bat, the Tennessee cave salamander, the palezone shiner, and Morefield's leather flower. Using ArcGIS, I mapped the species distribution overlaid with the current refuge

boundary. I also identified neighboring state and private-owned lands that have potential land acquisition opportunities. I gathered general information on a privately-owned parcel that lies between the existing refuge boundary and a nearby protected area—Bear Hollow Wildlife Management Area—and propose this parcel would strengthen the conservation value of this area. By expanding the existing refuge boundary to include this parcel of privately owned land, a continuous wildlife corridor would be created by connecting the boundaries of the Paint Rock River NWR with that of Bear Hollow Wildlife Management Area. The evidence I present supports the argument for a major boundary expansion of the Paint Rock River NWR.

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I. INTRODUCTION

The U.S. National Wildlife Refuge System was established in 1903 by President Theodore Roosevelt to protect critical habitats for wildlife conservation. Its primary mission is to conserve fish, wildlife, and plant species while maintaining ecological integrity. Refuges provide safe havens for endangered species, migratory birds, and diverse ecosystems, from wetlands to forests. They also support scientific research, habitat restoration, and climate resilience efforts. Public access for recreation, such as birdwatching and hiking, fosters environmental awareness and stewardship. The system collaborates with private landowners and local communities to promote sustainable conservation. Managed by the U.S. Fish and Wildlife Service, it balances wildlife protection with responsible resource use. Over time, legislative acts like the National Wildlife Refuge System Improvement Act of 1997 have reinforced its conservation priorities [1]. Today, the refuge system remains a cornerstone of U.S. environmental policy and national wildlife refuges are America's living sanctuaries.

The expansion of National Wildlife Refuge (NWR) boundaries is a strategic, administrative effort to enhance habitat protection, conserve biodiversity, and support ecosystem resilience. Expanding refuge boundaries is a vital step towards creating critical wildlife corridors, mitigating climate change impacts by protecting space for habitat shifts, and promoting sustainable land management.

However, refuge boundary expansion is just the beginning. As I will discuss in this study, land acquisition, after a new or bigger boundary has been established, is the final phase of the expansion process. After a series of administrative steps are complete, the land acquired within the expanded refuge boundary is then protected through the U.S. National Wildlife Refuge System.

One significant initiative is the establishment of the Paint Rock River National Wildlife Refuge in southern Tennessee, just north of the Alabama border. This refuge is a biologically rich region known for its diverse aquatic and terrestrial species. It aims to protect vital riparian habitats, support threatened and endangered species, protect hardwood forest, and enhance water quality in the Tennessee River watershed [2]. Expansion of Paint Rock River NWR would involve partnerships with nearby landowners, local communities, conservation groups, and state agencies to balance ecological preservation with responsible land use. Land acquisition after

boundary expansion can happen several ways. Fee purchase, conservation easements, donation, and voluntary easement acquisition are all methods of securing additional protected areas [3]. The Paint Rock River refuge contributes to the broader network of protected lands ensuring long-term ecological sustainability. Expanding the boundaries of this refuge would align with national conservation goals to strengthen habitat connectivity and protect threatened and endangered species.

II. WHAT IS A WILDLIFE REFUGE?

A. History of the National Wildlife Refuge System and Key Legislation

On March 14, 1903, history was made when the U.S federal government first protected land solely for the purpose of conserving wildlife. On that date, President Theodore Roosevelt designated a small island in Florida as the first National Wildlife Refuge in the nation. Pelican Island National Wildlife Refuge was established to protect brown pelicans and other waterfowl from overhunting and habitat destruction. It was the nation's first federal bird reservation and was the beginning of the National Wildlife Refuge System (NWRS) [4,5,6]. From its modest beginning in 1903, the NWRS has grown to encompass nearly 570 reserves covering more than 95 million acres, scattered across all U.S. States and territories. See [Figure 1](#).

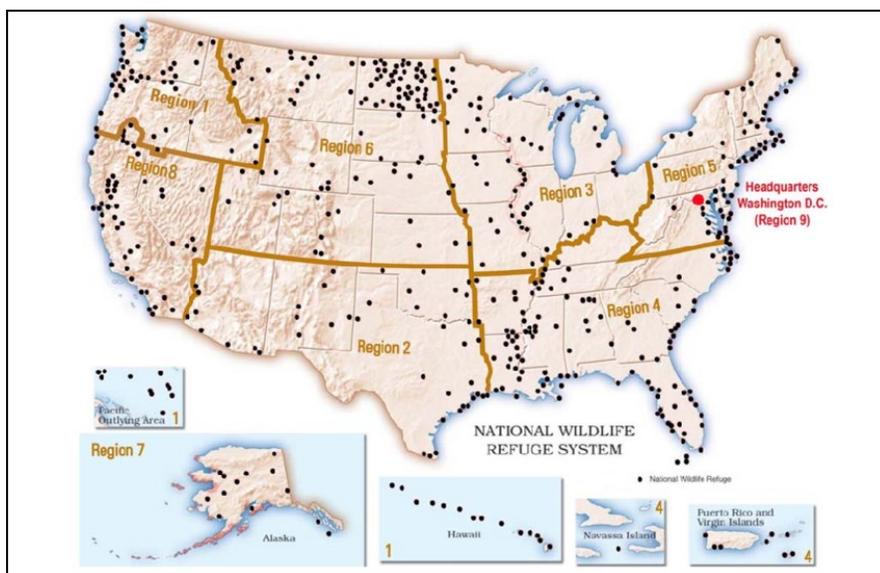


Figure 1: The National Wildlife Refuge System. Map compiled by the US Fish and Wildlife Service, Division of Realty, Washington, DC. Base map courtesy of Tibor G. Toth (<http://www.tothgraphix.com>)

America's sweeping and diverse network of protected public lands and waters, the NWRS, is managed by the U.S. Fish and Wildlife Service and is dedicated to restoring and conserving the nation's plants, animals, and ecosystems [1].

During the Great Depression, the Migratory Bird Conservation Act (MBCA) of 1929 and the Migratory Bird Hunting Stamp Act of 1934 (commonly referred to as the Duck Stamp Act) provided funding to purchase wetlands for waterfowl conservation. The Duck Stamp Act requires

the annual purchase of a Duck Stamp for anybody hunting waterfowl. The money generated by these stamps is placed in a fund that is then approved for use by the Migratory Bird Conservation Commission for land acquisition of migratory bird habitat. The MBCA and the Duck Stamp Act have resulted in the conservation of over six million acres of wetlands and raised over \$1.2 billion dollars. Ninety-eight percent of these proceeds go directly towards land purchases for habitat on national wildlife refuges [7,8,9].

The Civilian Conservation Corps (CCC), 1933-1942, was a government program established as part of The New Deal to provide employment during the Great Depression. The CCC helped develop infrastructure in many refuges by coordinating activities such as reforestation, building ponds for fish, developing springs, fire prevention, and planting food for birds [10].

During the decades since Pelican Island was established as a refuge, there was no single law governing these protected wildlife refuges. It was not until 1966 when the National Wildlife Refuge System Administration Act (NWRSA) was passed that the mission and policies of the refuge system were officially defined. This act made clear that the priorities of these refuges are the conservation of birds, fish, and other wildlife against human and natural threats. Additionally, it established the requirement that wildlife-dependent recreation must be compatible with the refuge uses. Lastly, this act directs the development of comprehensive conservation plans for refuges [11,12].

The Endangered Species Act (ESA) passed in 1973, expanding the role of wildlife refuges in protecting endangered and threatened species. The NWRS provides protected habitat for 513 threatened and endangered species in 444 wildlife refuges across the United States [13]. Some wildlife refuges are the only place in the world where some exceptionally rare endangered species are found. Ash Meadows NWR in Nevada, for example, is home to the endangered Ash Meadows Armargosa pupfish (*Cyprinodon nevadensis mionectes*) and the endangered Ash Meadows speckled dace (*Rinichtys osculus nevadensis*) [14]. Another example is Okefenokee NWR that protects a number of regionally endemic endangered species [15]. The ESA and the NWRS work hand-in-hand preventing the extinction of species all over the nation [16].

In 1997, the National Wildlife Refuge System Improvement Act passed, building on and reinforcing the policies in the NWRSA of 1966 [17]. This new statute ensures that biological integrity, diversity, and environmental health are maintained in wildlife refuges. It also

strengthened the mission of wildlife conservation while allowing compatible activities like hunting, fishing, and environmental education [18].

As decades passed, Roosevelt and his successors expanded the system, adding refuges across the country. Today, the NWRS covers more than 95 million acres, making it the world's largest network of protected lands dedicated to wildlife conservation [12]. The system plays a crucial role in habitat preservation and restoration, climate resilience, and outdoor recreation, serving as a model for global conservation efforts. Today the NWRS is a vast network of lands and waters that are protected to restore and conserve wildlife and plant resources and their habitats for present and future generations [1].

B. Purpose of National Wildlife Refuges

The purpose of the vast network of the National Wildlife Refuge System is to guard habitat for wildlife while also offering opportunities for people to enjoy and connect with nature through activities like hiking, birdwatching, fishing, and boating. As discussed above, these purposes are defined by law, most notably the 1997 National Wildlife System Improvement Act. And as previously stated, the overarching mission of NWRs is conservation of wildlife. The Fish and Wildlife Service states clearly, “Wildlife conservation drives everything on national wildlife refuges...” [19].

Wildlife refuges also support biodiversity. They are protected stopovers for migratory birds and form “virtual highways”. They safeguard nesting sites for sea turtles and birthing grounds for a variety of mammals. They help maintain a large variety of ecosystems including wetlands, forests, grasslands, deserts, and coral reefs [20].

National wildlife refuges offer educational programs to inform the public about conservation and the importance of wildlife protection. And when compatible, they support outdoor activities like photography, hiking, and responsible hunting and fishing [20, 21].

Lastly, refuges buffer and protect ecosystems from climate change impacts and natural disasters like storms and flooding [22]. Coastal refuges like the McFaddin National Wildlife Refuge in Texas play an important role in mitigating storm surges during hurricanes [23].

C. How National Wildlife Refuges are Established

National Wildlife Refuges are established through several methods, depending on the purpose of the refuge and the authority under which it is created. As previously discussed,

wildlife refuges can be established by Presidential Executive Order, like Pelican Island NWR. The President can establish refuges through an executive order to protect important wildlife habitats.

There are other ways that wildlife refuges are established. A few common methods are congressional legislation, land acquisition by the U.S. Fish and Wildlife Service, and private land easements or conservation easements [24].

Congress can pass laws to establish new refuges, often through administrative acts or public land bills. Congress reviews proposals to create wildlife refuges and allocates money for land acquisition [23]. The creation of a refuge is either authorized by Congress or by the Fish and Wildlife Service Director, who approves the acquisition boundary [25].

The USFWS can purchase or accept donated land for conservation. Funding can come from sources like from the sale of Duck Stamps and the Land and Water Conservation Fund, or private donations from conservation groups [25, 26]. Purchased land is considered a fee-title acquisition and comes strictly from willing sellers. Refuges that are established by fee-title acquisitions can offer wildlife-dependent recreational activities, such as fishing and environmental education programs. In contrast, conservation easements (or less-than-fee-title acquisitions) allow landowners to maintain ownership of their land while protecting wildlife habitats and supporting the conservation goals of the refuge while [27].

III. BOUNDARY EXPANSION OF A NATIONAL WILDLIFE REFUGE

Expanding refuge boundaries is a complex process with many administrative steps that can vary depending on purpose and size of the proposed expansion. When the size of a refuge is increased by 15% or more of the authorized acquisition acreage, the expansion is major. Conversely, when the size of a refuge is increased by 15% or less of the authorized acquisition acreage, the expansion is minor. This percentage is defined by the U.S. FWS Service Manual Land Protection Planning policy [25]. These designations determine the steps required for expanding the refuge boundary and increasing the area of protected land. A major expansion takes the same steps as establishing a new refuge. A minor expansion requires the approval of the Regional Director, but a Land Protection Strategy or a Land Protection Plan is not required [25].

Although boundary expansions can be administratively complicated and time-consuming, the benefits of expanded refuge boundaries are immense. First and foremost, expanding boundaries enables the refuge to protect even more critical habitats for threatened and

endangered species. Larger stretches of protected land increases recovery for iconic animals like the Whooping Crane and the Atlantic Sturgeon [28]. Furthermore, with greater spans of protected land, the creation of wildlife corridors becomes more likely. Wildlife corridors allow safe passage of all animals on the move. The larger wildlife refuges are, they can more often be connected to other protected areas creating a vast wildlife corridor system and facilitating landscape-scale conservation [29].

National wildlife refuge boundary expansion also mitigates the effects of climate change. Larger boundaries have created fuel-reduction zones, strengthened protections for the hydrological integrity of wetlands, and reduced wildfire impacts [30]. Additionally, expanding the boundaries of refuges protects against threats such as habitat fragmentation and industrial development like roads and mines [29].

In my review of criteria for boundary expansion of a National Wildlife Refuge, I examined eight refuges in the Southeast. The sites reviewed included a variety of sizes and ages spanning over 50,000 thousand acres and over one hundred years. The refuges I reviewed for boundary expansion potential are listed below in [Table 1](#).

| National Wildlife Refuge | State | Size in Acres | Year Established |
|---------------------------------|--------------------------|----------------------|-------------------------|
| Paint Rock River | Tennessee | 87 | 2023 |
| Key Cave | Alabama | 1060 | 1997 |
| Harris Neck | Georgia | 2,824 | 1962 |
| Choctaw | Alabama | 4,218 | 1964 |
| Pee Dee | North Carolina | 8,443 | 1963 |
| Rappahannock River Valley | Virginia | 9,030 | 1996 |
| Savannah | Georgia & South Carolina | 29,175 | 1927 |
| Mattamuskeet | North Carolina | 50,173 | 1934 |

[Table 1](#). National Wildlife Refuges reviewed for boundary expansion potential.

To determine boundary expansion potential, I used the following criteria:

- Endangered species
- Connectivity opportunities
- Proximity to protected areas
- Climate change & potential habitat shifts
- Nearby National Forests
- Acquisition opportunities

Table 2 shows an overview of my results from this initial determination. As seen in the top row, Paint Rock River NWR has high potential for nearly all criteria, making it a great candidate for boundary expansion.

| REFUGE NAME | STATE | YEAR | SIZE IN ACRES | ENDANGERED SPECIES | CONNECTIVITY OPPORTUNITIES | PROXIMITY TO PROTECTED AREAS | HABITAT SHIFTS | NEARBY NATIONAL FORESTS | ACQUISITION OPPORTUNITIES |
|---------------------------|-------|------|---------------|--------------------|----------------------------|------------------------------|----------------|-------------------------|---------------------------|
| PAINT ROCK RIVER | TN | 2023 | 87 | ● | ● | ● | ● | ● | ● |
| KEY CAVE | AL | 1997 | 1,060 | ● | ● | ● | ● | ● | ● |
| HARRIS NECK | GA | 1962 | 2,762 | ● | ● | ● | ● | ● | ● |
| CHOCTAW | AL | 1964 | 4,218 | ● | ● | ● | ● | ● | ● |
| PEE DEE | NC | 1963 | 8,443 | ● | ● | ● | ● | ● | ● |
| RAPPAHANNOCK RIVER VALLEY | VA | 1996 | 9,030 | ● | ● | ● | ● | ● | ● |
| SAVANNAH | GA/SC | 1927 | 29,175 | ● | ● | ● | ● | ● | ● |
| MATTAMUSKEET | NC | 1937 | 50,173 | ● | ● | ● | ● | ● | ● |

Table 2. Results of review of wildlife refuges for boundary expansion potential. Green dots determine high potential; yellow dots determine medium potential; red dots determine low potential.

IV. PAINT ROCK RIVER NATIONAL WILDLIFE REFUGE BOUNDARY EXPANSION

Paint Rock River runs through southern Tennessee and into northeastern Alabama. Its watershed has a remarkable abundance of unique fish and mussel species, some of which are found nowhere else in the world [31,32].

The land that is now Paint Rock River National Wildlife Refuge was originally privately owned. The landowner sold to The Nature Conservancy at a discount, with most of the funding coming from a conservation organization called Open Space Institute. The Nature Conservancy then donated to the U.S. FWS [33].

The refuge helps to conserve the Paint Rock River watershed, which encompasses about 460 square miles. It provides habitat for migratory birds and helps protect one of the largest contiguous stretches of hardwood forest in the Southeast. It protects habitat for 15 federally listed species, four of which I discuss in detail below. [34,35]

A. Endangered Species

Paint Rock River National Wildlife Refuge provides sanctuary for many animals, imperiled and otherwise. Morefield’s leather flower (*Clematis morefieldii*), the Palezone Shiner (*Notropis albizonatus*), the gray bat (*Myotis grisescens*), and the Tennessee cave salamander (*Gyrinophilus palleucus*) are endangered species within Paint Rock River NWR [2].

The Morefield's Leather Flower often grows near seeps in limestone-rich woodlands on south-facing mountain slopes in Paint Rock River NWR's forests. There are now 21 populations of Morefield's Leather Flower near Paint Rock River NRW, only 10 of which are protected, and one has been extirpated by a road-widening project [34].

The Palezone shiner is increasingly rare and found only in two rivers, the Little South Fork Cumberland River and the Paint Rock River. The species is continuously threatened by pollution from badly maintained silvicultural and agricultural methods [35]. The Palezone shiner is believed to be extirpated from Tennessee [36]. But perhaps if more of this area is protected by means of a larger refuge boundary, the Palezone shiner population has a higher likelihood of recovery in Tennessee.

Tennessee cave salamanders live their entire lives in caves but are sometimes found near surface pools. More than half of the known populations of Tennessee cave salamanders exist near the Paint Rock River watershed. The biggest threats are agricultural runoff, pesticide-use, changes in water flow, and habitat degradation. Currently the Paint Rock River watershed represents a population range of high resiliency [37]. The best way to maintain that resiliency is to increase protected land.

Gray bat habitat is limited to karst areas in the Southeast and nearly all gray bats in the United States are estimated to hibernate in only 15 caves. The karst cave system near Paint Rock River NWRs is home to at least one of those caves. In addition to the major threat of human disturbance, other threats are pesticide-use and water pollution. Both are affecting the major food source of these bats [38].

To strengthen the argument that this refuge holds high potential for boundary expansion, I analyzed the locations where these species are known to occur around the refuge. Using ArcGIS, I mapped the species distribution overlaid with the current refuge boundary. The results are shown in [Figure 2](#).

All of these species are on or near Paint Rock River NWR and the more protections that are added to their habitats, the better the chance they have of recovery.

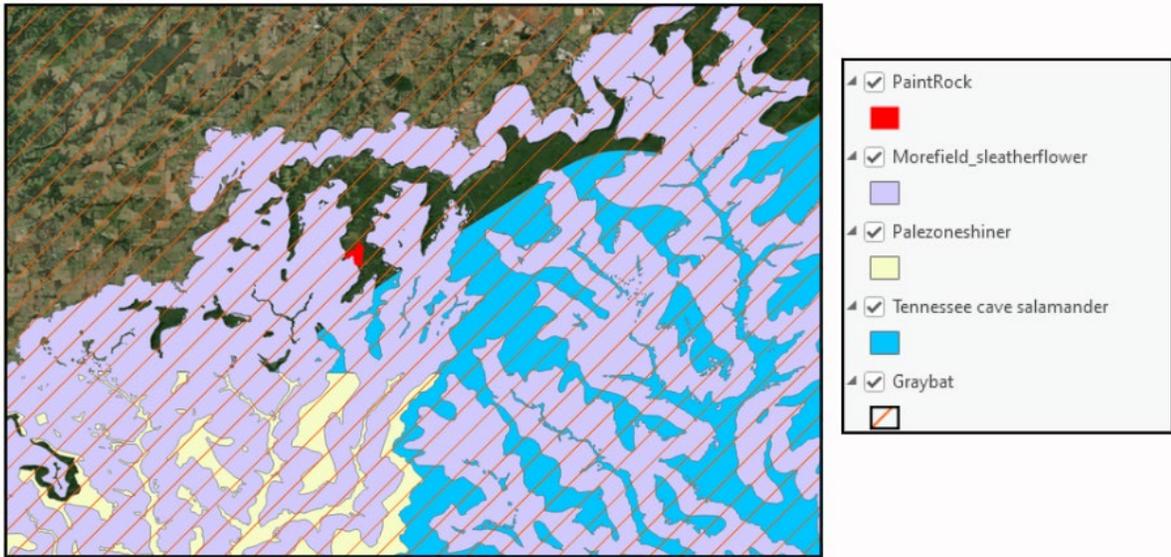


Figure 2: Habitat distribution for Morefield’s leatherflower, Palezone shiner, Tennessee cave salamanders, and gray bats. Shapefile data sourced from the U.S. Fish and Wildlife Service.

B. Proximity to Protected Areas and Connectivity Opportunities

To further validate the argument for boundary expansion of Paint Rock River NWR, I determined who owned the surrounding land and what it was being used for. Figure 3 shows state owned land in blue: Bear Hollow Wildlife Management Area and The Walls of Jericho, a Class II Natural-Scientific Sate Natural Area. These areas have state protections very similar to the federal protections of the National Wildlife Refuges.

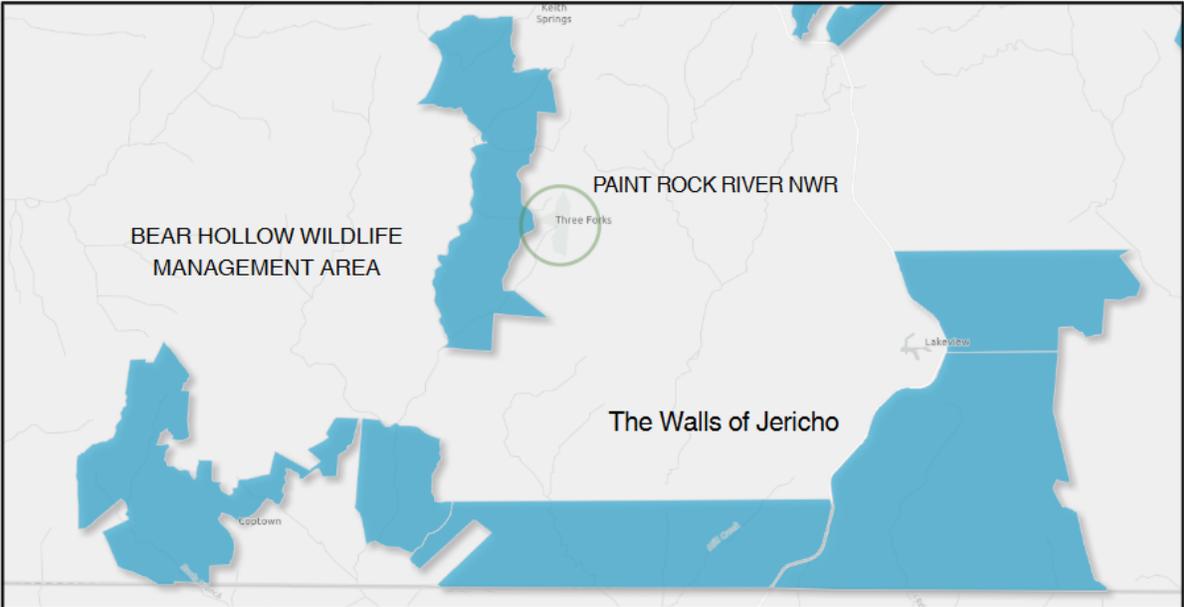


Figure 3: Protected areas surrounding Paint Rock River NWR – Bear Hollow Wildlife Management Area and the Walls of Jericho. Paint Rock River NWR is circled indicating its proximity and shared border with Bear Hollow Wildlife Management Area. (tnmap.tn.gov/tnstateownedland)

Although there is a significant amount of state protected land in close proximity to Paint Rock River National Wildlife Refuge, the majority of the land sharing a border with the refuge is privately owned. Figure 3 shows the boundary of Paint Rock River NWR in green, state-owned property (Bear Hollow Wildlife Management Area) in red, and privately owned parcels in blue. Circled in white is the parcel of private land that would offer significant connectivity opportunities through boundary expansion of Paint Rock River NWR.

By expanding the existing refuge boundary to include this parcel of privately owned land, a continuous wildlife corridor would be created by connecting the boundaries Paint Rock River NWR with that of Bear Hollow Wildlife Management Area.

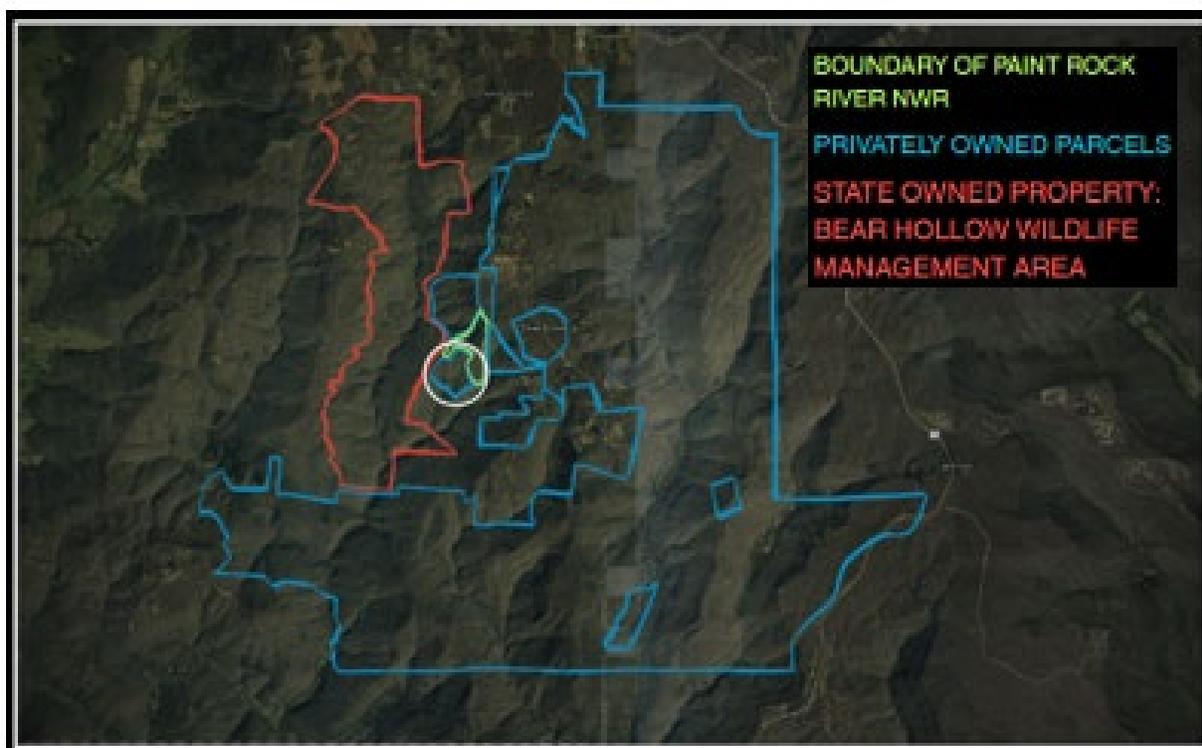


Figure 2: State- and privately-owned parcel of land nearby Paint Rock River NWR. Circled in white is the privately owned parcel that I propose be acquired for boundary expansion. (tnmap.tb.gov/assessment)

C. Acquisition Opportunities

Once this privately-owned parcel has been identified, the next step is considering potential land acquisition opportunities. It is important to note here that the FWS can expand the refuge boundary line long before acquiring the land is acquired. After a boundary is approved for expansion by Congress or the Director of the U.S. Fish and Wildlife Service, land can be acquired by fee-title acquisition from a willing seller, or by a legal agreement known as a

conservation easement which allows the landowner to maintain full ownership, but with some land use limitations. Land can also be donated or exchanged for boundary expansions [39].

V. LAND ACQUISITION FOR THE EXPANSION OF PAINT ROCK RIVER NATIONAL WILDLIFE REFUGE

The evidence presented supports the argument for a major boundary expansion of the Paint Rock River NWR. I gathered general information on a privately-owned parcel that lies between the existing refuge boundary and a nearby protected area—Bear Hollow Wildlife Management Area, and propose this parcel would strengthen the conservation value of this area. There are no buildings on this 99.21-acre parcel of land, and it is designated as woodland, making it a great candidate for boundary expansion and land acquisition [40]. This would connect these two protected areas all along this border, creating safe passage for the species moving about these lands.

Expanding the refuge boundary happens before land acquisition. These processes occur one at a time. The first step in the administrative process of expansion, is providing the argument and accompanying evidence for boundary expansion to the FWS. The Refuge System then develops a Land Protection Strategy or a Land Protection Plan (LPP). The Director of the USFWS must approve the LPP, which then formally establishes the new acquisition boundary and authorizes land acquisition within that area. However, once the new boundary line is drawn, it means very little until the land is acquired. At this point it is not part of the refuge; the land is not protected until the land within the new boundary is acquired. This Land Protection Planning process can take years, so while that is ongoing, conversations are initiated with stakeholders about the best way to transfer ownership for the FWS to officially acquire the land [39].

As mentioned before, funding for the purchase of the land can come from different sources, like partnership with conservation organizations and non-profits, funds from the Duck Stamp Act, or other conservation funds like the Land and Water Conservation Fund [23]. After acquisition, the land is officially added to the National Wildlife Refuge System.

VI. CONCLUSION

National Wildlife Refuges are America's living sanctuaries. Expanding the boundaries of the National Wildlife Refuge System is essential to protecting America's natural heritage. As habitats shrink and shift due to development and climate change, expanding refuge boundaries ensures that wildlife have room to move, migrate, and adapt.

Based upon a close review of Refuge sites, including an examination of endangered species and the status of adjacent lands, this report identifies the Paint Rock River Refuge in Tennessee as a site that would be particularly susceptible to boundary expansion. The methodology employed here can provide a model for future NWR expansion efforts, which are likely to become increasingly important to protect wildlife and habitat from emerging threats.

REFERENCES

1. O'Brian, B. (2024). A beginner's guide to the National Wildlife Refuge System: U.S. Fish & Wildlife Service. FWS.gov. <https://www.fws.gov/story/beginners-guide-national-wildlife-refuge-system>
2. Rolling along: U.S. Fish & Wildlife Service. FWS.gov. (2022, January 10). <https://www.fws.gov/story/2022-01/rolling-along?page=13>
3. Federal Land Ownership: Acquisition and Disposal Authorities (2023). Washington, District of Columbia; Congressional Research Service.
4. *Pelican Island National Wildlife Refuge*. Pelican Island National Wildlife Refuge: U.S. Fish & Wildlife Service. (n.d.). <https://www.fws.gov/refuge/pelican-island/about-us>
5. Portas, A. (2024). "So I Declare It!": Pelican Island, Theodore Roosevelt, and Executive Decision Theory. *Political Science*.
6. Reffalt, William. (2003). The First Refuge is Born. *U.S Fish & Wildlife Service*.
7. Hofberg, M. (2014). Policy Brief Series. *The Wildlife Society: Leaders in Wildlife Science, Management and Conservation*.
8. Taylor, E. (2020). *Duck stamps conserve wildlife habitat*. The National Wildlife Refuge Association.
9. *Federal duck stamp: U.S. Fish & Wildlife Service*. FWS.gov. (2025, January 23). <https://www.fws.gov/program/federal-duck-stamp>
10. Salmond, J. A. (1967). Chapter 7: The Success of the Experiment. In *The Civilian Conservation Corps, 1933-1942: A new deal case study*. Duke University Press.
11. *National Wildlife Refuge System Administration act: U.S. Fish & Wildlife Service*. FWS.gov. (n.d.). <https://www.fws.gov/law/national-wildlife-refuge-system-administration-act>
12. *National Wildlife Refuge System: What we do*. U.S. Fish & Wildlife Service. FWS.gov. (2011, October 1). <https://www.fws.gov/program/national-wildlife-refuge-system/what-we-do>
13. *Advocacy: Endangered Species*. The National Wildlife Refuge Association. (n.d.). <https://www.refugeassociation.org/advocacy-endangered-species-e>
14. Voehl, M. (2024, December 5). Discover: Ash meadows national wildlife refuge. Amargosa Conservancy. <https://www.amargosaconservancy.org/discover-ash-meadows-national-wildlife-refuge/>
15. National Wildlife Refuges abound with wetlands of international importance: U.S. fish & wildlife service. FWS.gov. (2021, May 21). <https://www.fws.gov/story/2021-05/national-wildlife-refuges-abound-wetlands-international-importance>
16. Rosa, L. (2020). Where (endangered) wildlife come first. Defenders of Wildlife. <https://defenders.org/blog/2020/07/where-endangered-wildlife-come-first>

17. Digest of Federal Resource Laws of interest to the United States Fish and wildlife Service. (n.d.). <https://corporate.findlaw.com/law-library/digest-of-federal-resource-laws-of-interest-to-the-united-states.html>
18. Keeping wildlife first in our National Wildlife Refuge System. Defenders of Wildlife. (2017). <https://defenders.org/sites/default/files/publications/keeping-wildlife-first-in-our-national-wildlife-refuge-system.pdf>
19. *National Wildlife Refuge System: About us*. U.S. Fish & Wildlife Service. FWS.gov. (n.d.-c). <https://www.fws.gov/program/national-wildlife-refuge-system/about-us>
20. Keatinge, J. (n.d.). The National Wildlife Refuge System: Protecting wildlife for future generations. <https://defenders.org/sites/default/files/publications/National-Wildlife-Refuge-System.pdf>
21. *The Pillars Of Our Work: Enhancing the National Wildlife Refuge System*. The National Wildlife Refuge Association. (n.d.-b). <https://www.refugeassociation.org/enhance>
22. *Celebrating our National Wildlife Refuges*. U.S. Department of the Interior. (2024, October 11). <https://www.doi.gov/blog/celebrating-national-wildlife-refuges>
23. *National Wildlife Refuge System (NWRs): Overview and Issues for Congress*. (2025). Washington, District of Columbia; Congressional Research Service
24. Curtin, C.G. (1993), The Evolution of the U.S. National Wildlife Refuge System and the Doctrine of Compatibility. *Conservation Biology*, 7: 29-38. <https://doi.org/10.1046/j.1523-1739.1993.07010029.x>
25. *Land Protection Planning: U.S. fish & wildlife service*. FWS.gov. (n.d.-a). <https://www.fws.gov/policy-library/602fw2>
26. *Meet the National Wildlife Refuge System: Special Places Where Wildlife and People Thrive*. (2015). U.S. Fish and Wildlife Service
27. *Interior Department announces establishment of two new National Wildlife Refuges in Wyoming and Tennessee*. U.S. Department of the Interior. (2023). <https://www.doi.gov/pressreleases/interior-department-announces-establishment-two-new-national-wildlife-refuges-wyoming>
28. Taylor, E. (2024). *Landmark expansion for 4 national wildlife refuges with help from the National Wildlife Refuge Association*. The National Wildlife Refuge Association.
29. *Advocacy: Wildlife corridors*. The National Wildlife Refuge Association. (n.d.-b). <https://www.refugeassociation.org/wildlife-corridors>
30. *Minor expansion of acquisition boundary: U.S. Fish & Wildlife Service*. FWS.gov. (2025b, January 3). <https://www.fws.gov/press-release/2025-01/minor-expansion-acquisition-boundary>
31. *A refuge for clean water: Tennessee's Paint Rock Refuge is born (2023)*. Open Space Institute. (n.d.). <https://www.openspaceinstitute.org/stories/a-refuge-for-clean-water-tennessees-paint-rock-refuge-is-born>
32. *Rolling along: U.S. Fish & Wildlife Service*. FWS.gov. (2022, January 10). <https://www.fws.gov/story/2022-01/rolling-along?page=13>

33. *Paint Rock River National Wildlife Refuge*. FWS.gov. (n.d.-d).
<https://www.fws.gov/refuge/paint-rock-river>
34. U.S. Fish and Wildlife Service. (2024). 5-Year Review of Morefield's Leather Flower (*Clematis morefieldii*)
35. U.S. Fish and Wildlife Service. (2014). 5-Year Review of the Palezone Shiner (*Notropis albizonatus*)
36. Species profile: Palezone shiner (*Notropis albizonatus*). ECOS. (n.d.).
<https://ecos.fws.gov/ecp/species/6064>
37. U.S. Fish and Wildlife Service Species Assessment and Listing Priority Assignment Form: Tennessee cave salamander. (2023). https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/publication/12.pdf
38. Gray Bat (*Myotis grisescens*): U.S. Fish & Wildlife Service. FWS.gov. (n.d.-a).
<https://www.fws.gov/species/gray-bat-myotis-grisescens>
39. *U.S. Fish and Wildlife Service Manual. Land Protection Planning (602 FW 2)*. FWS.gov. (2024). <https://www.fws.gov/policy-library/602fw2>
40. TN Map Parcel Details. Tennessee Property Assessment Data | Parcel Details. (n.d.).
<https://assessment.cot.tn.gov>