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INSTITUTE FOR ECONOMIC FREEDOM

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This paper, in its entirety, can be found at **http://report.heritage.org/sr256**

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Lands and Habitat in the United States: A Reality Check

Rob Gordon

Contrary to the familiar, agenda-driven narrative, development or conversion of natural landscapes to agricultural and urban use in the United States is not rapidly growing, nor are all U.S. species generally becoming ever more endangered. Left unchallenged, misinformation regarding the environment provides undue support for those who wish to impose wrong-headed, economically harmful polices upon an already enormous government estate, to enlarge it even further, and to impose economically destructive and burdensome regimes on those private lands that escape. Americans should be generally optimistic about the state of our lands and wildlife.

I. Introduction

For too long, the environmental left has pushed a narrative that undeveloped land and wildlife are disappearing. This narrative has justified programs that expand government land ownership and the regulation of natural resources. The current Administration's "30 by 30" proposal—that 30 percent of the nation's land be conserved by 2030 to protect biodiversity—is a good example.

However, the reality regarding U.S. lands, habitat, and wildlife is encouraging, with many positive trends. Using actual data, this *Special Report* will show:

- Forests, grasslands, range, and other lands in a generally natural state are not disappearing to development at an alarming rate, and urban sprawl is not a threat at the national level.

- Government, predominantly federal, already owns over a third of the nation, and the federal government has regulatory powers that apply to likely hundreds of millions of acres of private lands. Additionally, private lands provide hundreds of millions of acres of habitat without necessarily being removed from tax rolls and often contribute to the economy. There is no reason to expect these private lands to be developed on a massive scale.

- Many species have increased in population and range within the last century, indicating the availability of habitat and, for carnivores, the availability of prey necessary to support them.

This report serves as a detailed but concise primer for understanding land-use trends, land ownership, and management regimes, and it provides some information on wildlife populations as an indicator of habitat availability. The data provided here stand in stark contrast to what one typically hears in discussions of many environmental policies including the current Administration's 30 by 30 proposal, which will also be addressed. While the Administration's proposal is promoted as directed to threats to biodiversity and climate, the latter is not within the scope of this report.

II. 30 by 30

The Administration's 30 by 30 proposal is a perfect example of the need for policymakers to have additional context and baseline data to be used as a measure of conservation and land-use policies.

A campaign to get nations to commit to protecting 30 percent of their land by 2030 gained momentum just prior to the 2020 U.S. presidential election. A National Geographic press release notes that "key world leaders announced their support for the science based target to protect 30% of the planet by 2030...days before a United Nations Biodiversity Summit—where Heads of State will lay down their proposals to curb biodiversity loss before next year's 15th Conference of the Parties to the Convention on Biological Diversity meeting in Kunming, China."[1]

The "United Nations Summit on Biodiversity: Urgent Action on Biodiversity for Sustainable Development" was convened in September 2020.[2] The summit website states:

> The main direct causes and impacts of biodiversity loss and ecosystem degradation are well known.... The underlying causes include consumption and

> production patterns, human population dynamics, trade, and the use of technology, which are all affected by societal values, inequality, and behaviors. Although sustainable production practices exist, our food systems are currently the single biggest underlying source of decline in nature, responsible for three-quarters of deforestation.[3]

Within a week of the Biden Administration assuming power, ambitious action came in the form of Executive Order 14008, *Tackling the Climate Crisis at Home and Abroad*, which states:

> We must listen to science—and act.... It is the policy of my Administration to organize and deploy the full capacity of its agencies to combat the climate crisis to implement a Government-wide approach that...conserves our lands, waters, and biodiversity.[4]

Under the section titled *Conserving Our Nation's Land and Waters*, the executive order calls for the Secretary of the Interior to prepare a report "recommending steps the United States should take, working with State, local, Tribal, and territorial governments, agricultural and forest landowners, fishermen, and other key stakeholders, to achieve the goal of conserving at least 30 percent of our lands and waters by 2030."[5]

An accompanying Department of the Interior press release states, "Approximately 60% of land in the continental U.S. is in a natural state, but we are losing a football field worth of it every 30 seconds.... The U.S. Geological Survey reports that only 12% of lands are permanently protected."[6]

These statements are intended to buttress the Administration's dramatic policy adoption, but without additional context they do little more than provoke an emotive response. Are only 12 percent of the nation's natural lands protected, and is a football field of land in a natural state lost every 30 seconds?

III. Land Use in the United States

Land-use trends do not support claims that natural lands in the United States are disappearing at an alarming rate or portend of an ecological disaster. These trends are discernable through satellite imagery.

Landsat, a joint effort of the National Aeronautics and Space Administration (NASA) and the U.S. Geological Survey (USGS), is a series of satellites that has acquired images of the earth's land surface, producing the world's longest continuously acquired collection of space-based

moderate-resolution land remote-sensing data.[7] The National Land Cover Database (NLCD) has been created and continually expanded using these Landsat images and supplementary data.[8]

Conterminous United States (48 States)

Using data from the NLCD, USGS, and other researchers recently published an assessment of the land cover change patterns from 2001 to 2016 for the 48 conterminous U.S states.[9] The analysis divides the area of the conterminous United States among land cover classes that are depicted for 2016 in Table 1.

The agricultural land classes (cropland and pasture and hay) combined account for 22.5 percent, and all the development land classes combined account for only 5.3 percent. The combined area of the remaining classes—over 70 percent—is, with some exception, composed of a variety of generally natural landscapes. On some of these lands, human-related activity—such as cattle grazing, timber harvest, or, on a small fraction, surface mining—is taking place, but generally these areas are more reflective of natural processes than intensive management.

Land change is constantly occurring as a result of both natural and human activities. The rate of change can be immediately apparent or so slow that it is more difficult to observe. For example, natural grassland may transition to shrub/scrub that is eventually succeeded by climax forest. At the other end of the cycle, forest cover may change back to grassland following fires, loss to insects or disease, or timber harvest. Agricultural use may change pasture to cultivated crop or to shrub/scrub if farming is abandoned, fields are idled, or land is entered into easements, or it may be developed. A unit of land may change from one land cover class to another over time.

However, as can be seen in the accompanying graphic and table, between 2001 and 2016, the land area within each land cover class remained rather stable. Forest cover decreased the most in absolute terms, and developed land increased the most on a percentile basis. Each of the classes showed some change between 2001 and 2016, with the sole exception of a small area of permanent ice and snow that remained a constant 198.5 square miles over the decade and a half.[10] The authors reported no land cover change for the vast majority of remaining land—about 92 percent—from 2001 to 2016.[11] (See Chart 1.)

Of the 7.6 percent where change was observed, nearly half involved forest change driven by harvest, fire, disease, and pests resulting in an overall forest decline.[12] "The bulk of this change," covering an area somewhat

TABLE 1

Breakdown of U.S. Land in 48 Conterminous States

	Area in Square Kilometers	Share of U.S. Total
Forest	**1,973,760**	**24.43%**
Conifer Forest	923,780	11.43%
Deciduous Forest	756,813	9.37%
Mixed Forest	293,167	3.63%
Shrub/Scrub	**1,760,135**	**21.78%**
Cultivated Crops	**1,313,114**	**16.25%**
Grassland Herbaceous	**1,118,412**	**13.84%**
Pasture, Hay	**507,568**	**6.28%**
Wetlands	**471,433**	**5.83%**
Woody Wetlands	352,719	4.37%
Herbaceous Wetlands	118,714	1.47%
Developed	**428,575**	**5.30%**
Open Space	232,276	2.87%
Low Intensity	119,756	1.48%
Medium Intensity	56,283	0.70%
High Intensity	20,260	0.25%
Open Water	**423,670**	**5.24%**
Barren Land	**82,897**	**1.03%**
Perennial Ice/Snow	**514**	**0.01%**
TOTAL	**8,080,078**	**100.00%**

NOTES:

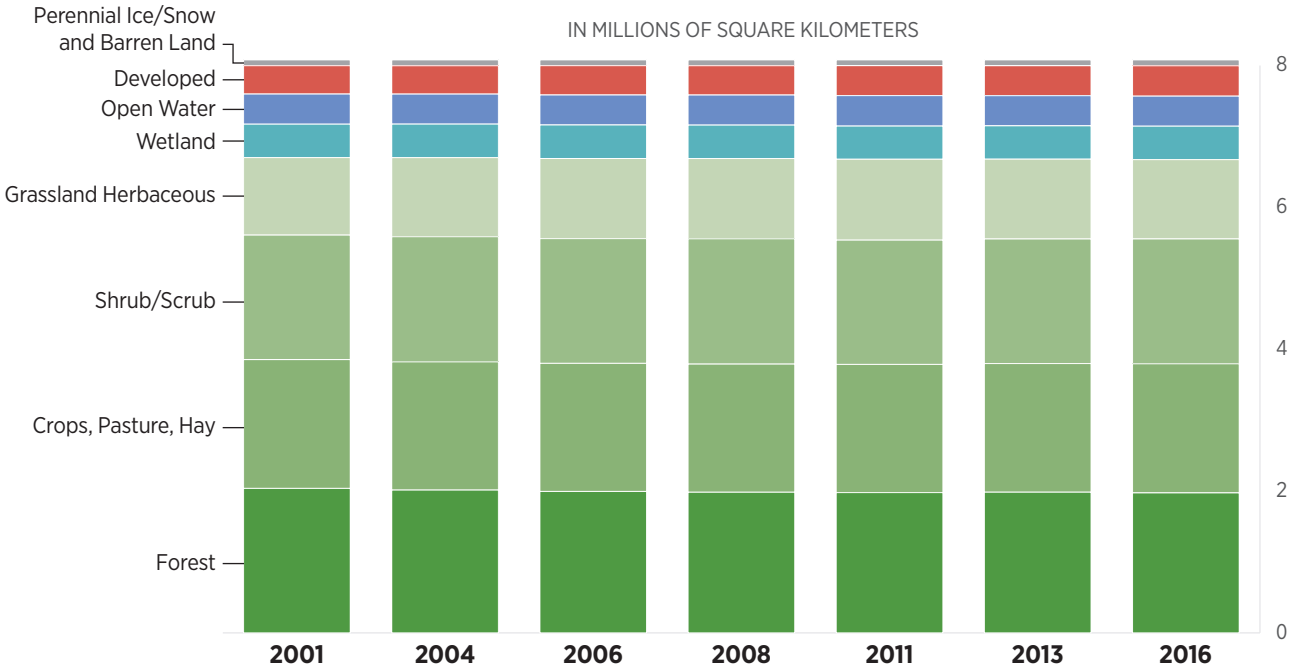
- **Shrub and Scrub:** Areas dominated by shrubs, less than 5 meters tall with shrub canopy typically greater than 20 percent of total vegetation. This class includes true shrubs, young trees in an early successional stage, and trees stunted from environmental conditions.
- **Grassland Herbaceous:** Areas dominated by gramanoid or herbaceous vegetation, generally greater than 80 percent of total vegetation. These areas are not subject to intensive management such as tilling but can be utilized for grazing.
- **Barren Land:** Areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits, and other accumulations of earthen material.
- **Developed Land, Open Space:** Less than 20% impervious surface.
- **Developed Land, Low Intensity:** 20%–49% impervious surface.
- **Developed Land, Medium Intensity:** 50%–79% impervious surface.
- **Developed Land, High Intensity:** 80%+ impervious surface.

SOURCE: Collin Homer et al., "Conterminous United States Land Cover Change Patterns 2001–2016 from the 2016 National Land Cover Database," *ISPRS Journal of Photogrammetry and Remote Sensing*, Vol. 162 (2020), pp. 184–199, https://www.sciencedirect.com/science/article/pii/S0924271620300587 (accessed April 12, 2021).

CHART 1

Changes to Composition of U.S. Lands Since 2001

For the 48 conterminous states



IN SQUARE KILOMETERS

	2001	2004	2006	2008	2011	2013	2016
Forest	2,037,298	2,013,534	1,994,319	1,982,771	1,977,935	1,983,387	1,973,760
Crops, Pasture, Hay	1,815,904	1,807,896	1,806,057	1,807,145	1,807,454	1,814,167	1,820,682
Shrub/Scrub	1,755,623	1,764,682	1,758,856	1,766,856	1,752,378	1,756,432	1,760,135
Grassland Herbaceous	1,092,991	1,115,338	1,129,833	1,131,729	1,140,488	1,125,422	1,118,412
Wetland	471,015	472,426	472,783	471,367	467,884	470,551	471,433
Open Water	424,962	423,241	422,740	424,108	429,541	424,784	423,670
Developed	399,950	399,950	413,561	413,561	422,489	422,489	428,575
Barren Land	81,820	82,497	81,416	82,026	81,394	82,332	82,897
Perennial Ice/Snow	514	514	514	514	514	514	514

SOURCE: Collin Homer et al., "Conterminous United States Land Cover Change Patterns 2001–2016 from the 2016 National Land Cover Database," *ISPRS Journal of Photogrammetry and Remote Sensing,* Vol. 162 (2020), pp. 184–199, https://www.sciencedirect.com/science/article/pii/S0924271620300587 (accessed April 12, 2021).

smaller than West Virginia, "is because of forest harvest and regrowth… with much of the rest coming from stand-replacing forest fires primarily in the West."[13]

Alaska and Hawaii

Separate land cover data for Hawaii and Alaska show that only a small percentage of land is developed and intensively managed for agriculture in the two states. In Hawaii, developed land classes and agricultural land cover account for 6.7 percent and 4.8 percent, respectively.[14] The remaining 88.4 percent is accounted for by shrubland, forest, grassland, open water, and other generally natural land covers.[15] Only 0.08 percent of Alaska is developed, with just another 0.02 percent in agricultural land cover.[16] This leaves almost 99.9 percent of Alaska, which accounts for about 16 percent of total U.S. land, in generally natural landscapes.[17] To give some sense of just how immense and "untouched" Alaska is, the land area of Connecticut, which is over 60 percent forested, would fit into Alaska over 117 times, even though it has 45 percent more roadway (total lane miles) and almost five times the population of Alaska.[18]

Developed Areas and "Urban Sprawl"

Development, referred to in some cases as "urban sprawl," is not a national threat. In 2016 only 5.3 percent of the conterminous United States fell within one of the four developed land classes, leaving almost 95 percent of the lower 48 states for agricultural covers, forests, and other generally natural settings.[19]

The developed land classes are differentiated from one another by the percentage of impervious surface, which includes "constructed surfaces such as buildings, roads, parking lots, brick, asphalt, and concrete."[20] The greater the man-made impervious surface area inhibiting plant growth, the more intense the development is considered. The four developed land categories are:

1. "Developed open space" (< 20 percent),

2. "Developed low intensity" (20–49 percent),

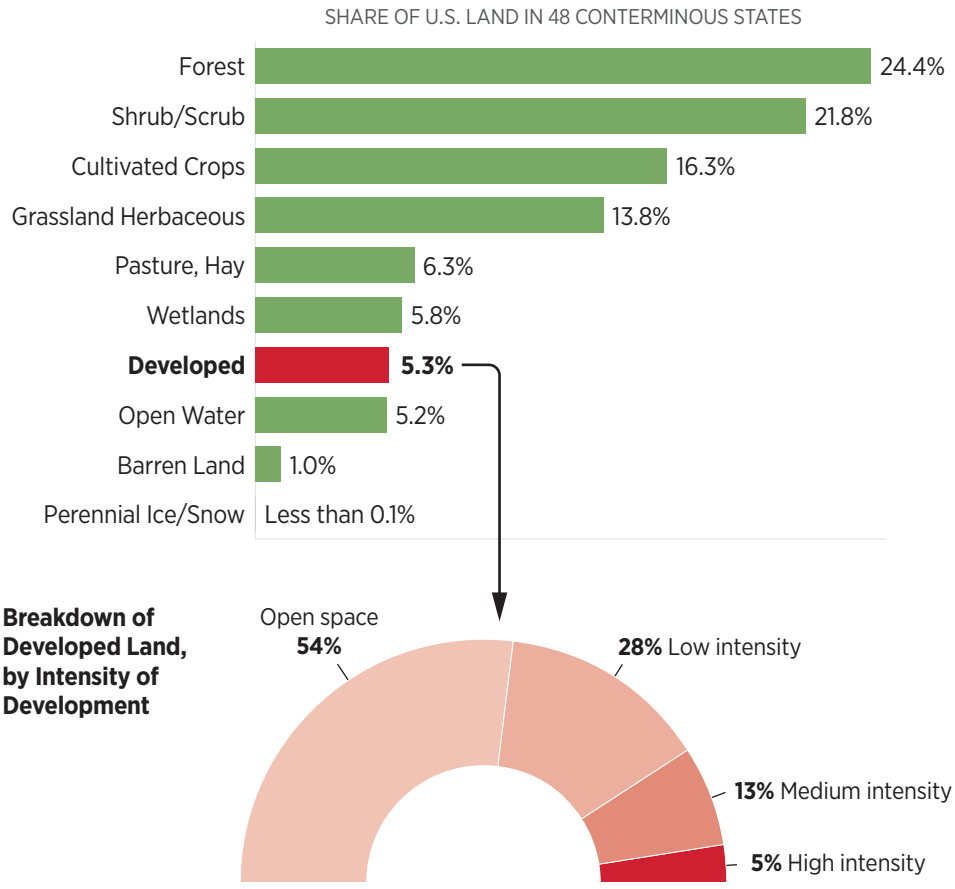
3. "Developed medium intensity" (50–79 percent), and

4. "Developed high intensity" (80–100 percent).[21]

As depicted in Chart 2, over half (54 percent) of all developed land in the conterminous United States is developed open space,

CHART 2

Five Percent of U.S. Land in Lower 48 States Is Developed



NOTES:

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which the USGS states most commonly includes "large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes."[22]

In the decade-and-a-half between 2001 and 2016, all developed land classes combined increased as a percentage of the conterminous 48 states by just 0.3 percent.[23] At this rate, it would take another four decades for developed areas to encompass about another 1 percent of the conterminous United States. While some of these acres may be "lost" from the Biden Administration's perspective, for others these lands now have neighborhoods, schools, grocery stores, churches, or places of work. Further, for the 2001–2016 period, the "overall trend is a declining rate of urbanization, suggesting that such factors as the 2008 global recession may have dampened urban growth."[24] High-intensity developed land, where 80 percent or more of the land area is impervious, took up an additional 0.05 percent of the conterminous United States in the 2001–2016 period and accounts for just one-quarter of 1 percent of the lower 48.[25]

Forest Land

When the United Nations states that "our food systems [are] currently the single biggest underlying source of decline in nature, responsible for three-quarters of deforestation,"[26] it is either not speaking about the United States or is misinformed.

According to the U.S. Forest Service's (USFS's) report on sustainable forests, total U.S. forest area "currently amounts to 751 million acres, or about one-third of the Nation's total land area. Since the beginning of the past century, the size of this inventory has been relatively stable, and the forests it represents remain largely intact. This stability is in spite of a nearly three-fold increase in population over the same period and is in marked contrast with many countries where wide scale deforestation remains a pressing concern.[27] For the conterminous United States, 2016 NLCD data indicate that deciduous, conifer, and mixed forests account for just under a quarter of the land.[28]

It is estimated that about a third of some 1 billion acres of forest cover was converted to agricultural land beginning with European settlement until about 1900, with most of this occurring before the Civil War and ending a century ago.[29] By the mid-1800s, Connecticut, Massachusetts, Rhode Island, and Vermont had been reduced to about 35 percent forest cover and New Hampshire to about 50 percent.[30]

However, vast areas that had been denuded of forest cover, often marginally productive agricultural land that was abandoned, have been reclaimed by forest. As reported in *The Atlantic* 25 years ago, "less than two centuries later, despite great increases in the state's population, 90 percent of New Hampshire is covered by forest. Vermont was 35 percent woods in 1850 and is 80 percent today, and even Massachusetts, Connecticut, and Rhode Island have seen woodlands rebound to the point where they cover nearly three-fifths of southern New England."[31] When Natural Resources Conservation Service (NRCS) categories of forest land and "Special Use Lands"—the majority of which is park and wildlife land—are combined, the data show Maine, Vermont, and New Hampshire with about 90 percent, 86 percent, and 84 percent forest cover in 2012, respectively.[32] This spectacular regeneration is a testament to the fact that, in general, renewable natural resources are resilient and dynamic.

NRCS data for the near four decades from 1982 to 2017 also show that nonfederal forests grew from about 412 million acres to 417 million acres.[33] These forests include not only state and other government forests but also private forests that, according to the USFS, account for 56 percent of U.S. forests and, in 2007, provided 92 percent of the timber harvest.[34]

In addition to a significant amount of forest land being regenerated and the amount of forest cover stabilizing, for the near-half-century period from 1953 to 2002, the proportion of forests where an average stand of trees is 10 inches in diameter or greater in the three USFS conterminous regions (North, South and West) increased.[35] While the proportion of forest in different diameter size classes can vary with harvest, more recent data show that in the southern states—where 80 percent to over 90 percent of forests are privately owned, with the exception of Florida (63 percent), and where most timber comes from—growth has exceeded removals by 34 percent to 70 percent.[36]

Agricultural Land

The U.N.'s warning about large-scale forest land conversions to agricultural land does not apply to the United States, either. NLCD data for the 2001–2016 period shows that the number of acres dedicated to agricultural uses (cropland, and hay and pasture combined) was basically flat, with 449 million acres in 2001 and 450 million acres in 2016.[37] Different analysis by the NRCS for the longer period from 1982 to 2017 shows that cropland and pasture combined declined from about 552 million acres to 489 million acres.[38] It should be noted that these figures do not reflect livestock

grazing that occurs on NRCS rangelands or NLCD land cover classes such as "grassland/herbaceous," but these land cover classes are generally "not subject to intensive management" because of grazing.[39]

Greater agricultural productivity has meant less deforestation. While conversion of forest cover to agricultural use occurred on a large scale from colonial times into the first part of the 20th century, American farmers have been able to feed a population that more than tripled to over 330 million and export $150 billion worth of agricultural products in 2020 without converting more forest land.[40] In fact, over the past 75 years, while using less land, farmers almost tripled farm output, and by 2019, Americans spent a historically low percentage of their disposable income on total food.[41]

NASA has pictures to prove just how productive American agriculture is. NASA scientists used satellites to measure the amount of light plants emitted during photosynthesis when plants take in and convert carbon dioxide into food and release oxygen as a byproduct. The light, bioluminescence, which is invisible to the naked eye, can be used to estimate plant productivity. NASA scientists found that the during the Northern Hemisphere's growing season, the Midwest region of the United States boasts more photosynthetic activity than any other spot on earth.[42] In fact, data showed that fluorescence from the Corn Belt, which extends from Ohio to Nebraska and Kansas, peaks in July at levels 40 percent greater than those observed in the Amazon, which is often referred to as "the lungs of the Earth."[43] The remarkable productivity of modern agriculture evidences that the learning curve is green. As arts and science and technology advance, farmers learn how to get more from less.

Wetlands

While the area of wetlands fluctuated with variables such as precipitation, NLCD data show little change to wetlands extent from 2001 to 2016, with 116.4 million acres and 116.5 million acres, respectively.[44] NRCS data, though measured differently, report 111.4 million acres for 1992 and 111.2 million acres in 2017.[45]

IV. Government Land Ownership, Federal Regulations, and Designations

Consideration of land-use and conservation policies, in general—and 30 by 30, in particular—requires establishing some basic facts about the extensive land ownership by government in the United States. Additionally,

it is important to have an idea of the more important federal management regimes affecting those lands as well as some of the natural resource regulations and conservation designations that can apply to government land or private property.

Government Ownership

Government, predominantly federal, owns over a third of the nation.[46] This does not include some 57.2 million acres of mineral rights held by the Bureau of Land Management (BLM) beneath private or other nonfederal property.[47]

The USGS's Protected Areas Database (PAD-US) is "America's official national inventory of U.S. terrestrial and marine protected areas that are dedicated to the preservation of biological diversity and to other natural, recreation and cultural uses, managed for these purposes through legal or other effective means."[48] PAD-US data includes not only federal land, but also state, county, municipal, and other government lands, as well as some private lands, such as those held by nongovernmental organizations (NGOs) that have conservation easements. This land is addressed in Appendix 1.[49]

The data reveal that the federal government is a massive landowner, with the four largest land-holding agencies, in order, being BLM, USFS, National Park Service (NPS), and U.S. Fish and Wildlife Service (USFWS). According to the USGS, together these agencies are charged with managing 973,000 square miles, a quarter of the nation.[50] With other federal agencies such as the Department of Defense, Army Corps of Engineers, and Department of Energy included, the USGS figure rises to over a million square miles, about 27 percent of the United States.[51] When USGS figures for state, regional, local, and other government entities are added, the square miles swell to more than 1.3 million, almost 36 percent of the United States—an area larger than India.[52]

Additional land holdings of note include American Indian lands that take up an area larger than the combined lands of California and Maryland and NGO-held easements totaling an area larger than the lands of Maryland and Vermont combined. There may be a significant area of easements that have not been integrated into these figures.[53]

Federal Management Regimes, Regulations, and Designations

Also relevant are the many different environmental regulatory regimes that can affect governmental and private land as well as the designation programs related to land use and conservation, in general, and 30 by 30, in particular. Appendix 2 provides some metrics for these programs.

Worthy of particular note are the vast areas designated as critical habitat under the Endangered Species Act (ESA)—from over 110 million acres to over 250 million acres depending on counting method—and wetland acreage of a similar extent that is potentially subject to wetlands regulations.[54] With regard to the ESA, even if private or public lands are not designated as critical habitat, activities on them may still be subject to prohibitions against the "take" of a listed species.[55]

Some designations, such as Wild and Scenic Rivers, can have regulatory consequences, while others may not. However, even federal "non-regulatory" designated properties may be subject to additional reviews if there is a nexus to a federal action on the property or, indirectly, if states, counties, or local governments have laws related to such properties.[56]

There are also extensive international land designations. They include World Heritage Areas, Wetlands of International Significance, and U.N. biosphere reserves. Lands with these designations are also included in the World Database on Protected Areas (WDPA), a joint effort of the U.N. Environmental Programme and the International Union for the Conservation of Nature (IUCN) that is similar to the PAD-US. The WPDA also includes records of other U.S. lands from the PAD-US that the USGS assigned a sufficiently high ranking known as a GAP status code. As the U.N. Environmental Programme explains, "Protected areas from the PAD-US that meet the IUCN definition are incorporated into the...WDPA... on an annual basis with ad-hoc updates completed as necessary. Areas which do not meet the IUCN definition of a protected area are removed by USGS before data are submitted."[57]

Appendices 1 and 2 clearly demonstrate that government owns a vast amount of the nation, already has an expansive regulatory reach onto private lands, and is tracking designated properties for various reasons.

V. Habitat for Wildlife

Conservation of land ensures that there is adequate habitat to support wildlife, a primary mission of the largest U.S. land-holding agencies. Laws such as the ESA were enacted to conserve endangered species, and regulations such as those governing wetlands were adopted in large part because of wetlands' value as habitat. The USGS explains that "detailed information about the conservation status of our country's protected areas is crucial to improving our understanding of how well we are protecting the animals and plants that inhabit those areas."[58]

However, the vast area of the United States and the fact that so much of it currently provides habitat—in combination with the nation's biodiversity—makes it impossible to determine the status of all these species. Often proponents of various conservation policies cite statistics such as species estimated to be vulnerable or endangered. There are, for example, some 94 federally endangered U.S. insects, of which 20 are beetles.[59] The significance, however, of 20 out of perhaps 30,000 kinds of beetle in North America being declared federally endangered is unclear.[60]

Similarly, pre-colonial ranges and guesstimated populations for wildlife from that time are compared with more recently estimated populations and ranges, implying a straight-line—and usually miserable—trajectory. These grim numbers are then compared to statistics on habitat alteration or the growth of the nation's economy or population and presented as evidence of the need for urgent action. Again, the reality is much better than the popular misconception: Many species have increased in number, including many larger carnivores and ungulates (hooved mammals), indicating availability of habitat and prey.

An oft-cited example of this approach is *Range Contractions of North American Carnivores and Ungulates*.[61]

Rather than report the area of an animal's current range as a percentage of its historical range, the authors report a species' "area of persistence."[62] A table legend indicates that this measure is the percentage of the species' historical range that is currently occupied. It excludes any areas into which the species has expanded beyond its historical range. The paper then focuses on just those species that the authors calculate to have range contractions of 20 percent or more.[63]

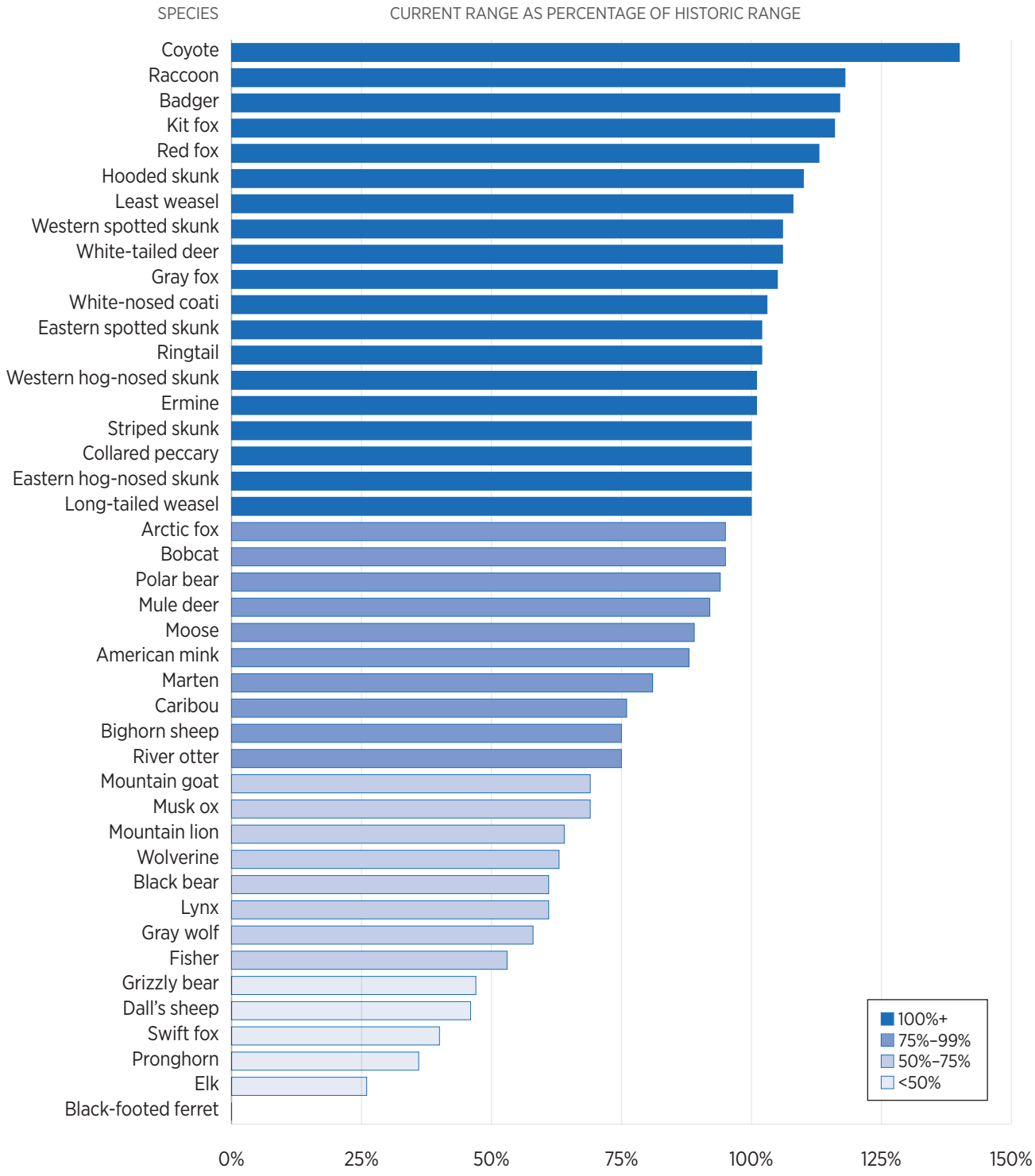
When all the species are considered and range expansions included in the calculation, however, 37 of the 43 species occupy 50 percent or more of their historical ranges. For well over half of the species, the current range is at least 75 percent of the historical range. For almost half of the species, the current range is equal to or greater than the historical range.[64] (See Chart 3.)

The authors state, "We are aware that species ranges are dynamic and that there may have been contractions and expansions between the two time periods we considered. We stress that this study was conducted on a relatively coarse scale and that we examined broad changes."[65] This caveat seeks to inoculate the authors from the fact that their grim characterization can conceal changes in the rate of decline as well as trend direction for many species.

One such species is *Puma concolor*, popularly known as the mountain lion or cougar. It has one of the largest range requirements among North American mammals, generally 200 square kilometers or more for a single male.[66]

CHART 3

Area of Current Habitat Compared to Historic Habitat for Selected Mammals



SOURCE: Andrea S. Laliberte and William J. Ripple, "Range Contractions of North American Carnivores and Ungulates," *BioScience*, Vol. 54, No. 2, February 2004, pp. 123–138, https://academic.oup.com/bioscience/article/54/2/123/255016 (accessed April 12, 2021).

NatureServe reported the total U.S. mountain lion population as 15,000 in 1976.[67] Although the population estimate cited by NatureServe was four decades old when it was reviewed in 2016, the record affirms a global conservation ranking of G5 and an equivalent national conservation ranking of N5.[68] A G5 ranking means the species is at very low risk of extinction or collapse due to a very extensive range, abundant populations or occurrences, and little or no concern from decline or threats. It is the best ranking NatureServe has to offer.[69]

The actual mountain lion population today is likely substantially larger. A 2017 Humane Society report provides state agency population estimates that, when aggregated, range from almost 30,000 to almost 40,000.[70] This excludes mountain lions in Wyoming and Texas as estimates were reportedly unavailable but the report does provide an estimated adult population potential for these states derived by multiplying potential habitat by a density figure.[71] These population potential estimates may be off, as, for example, density of mountain lions likely varies significantly across Texas and Wyoming. However, using the report's figures yields an additional 9,569 mountain lions.[72] While aggregating state population estimates from different years, derived with different methodologies that may vary in which mountain lions are counted clearly yields a rough estimation, a reasonable estimate for the U.S. mountain lion population today is at least double the number cited by NatureServe, perhaps substantially more.

A growing mountain lion population has likely contributed to the species dispersing eastward. At least 10 state agencies outside the big cat's current range have verified multiple observations.[73] Some observations have included female mountain lions that generally do not disperse as far as males do but are essential for the establishment of new resident populations.[74]

Without providing such context, many in the public arena present a much more pessimistic view of the mountain lion's conservation status. For example, "educational resources" from the National Wildlife Federation state that mountain lion populations are "far lower than they were historically. While there are still several thousand mountain lions in the wild, their population has significantly decreased from their historical population due to unsustainable hunting, habitat destruction, and conflicts with livestock."[75] Of course, mountain lion numbers are lower than what they were historically. How could the cat have the same population it did in pre-colonial times? The reality is that there are now 332 million Americans who need food, fiber, and energy, as well as a place to live, and who provide others

around the world with food and other goods they need. That requires using land, and some of the land use will be incompatible with or detrimental to mountain lions. However, despite the U.N. statement placing modern ills on conversion of forests to agricultural fields as well as partially on the doorstep of technology, the good news is that increasingly efficient natural resource management has enabled not only the nation's population and economy to grow but also the number of mountain lions and to substantially more than "a few thousand."

More Than Just Mountain Lions[76]

As with the mountain lion, the period from the late 1800s to the beginning decades of the 1900s was the low point for many U.S. wildlife species.

Low populations followed centuries of sustenance hunting, market hunting with boat-mounted punt guns that kill a hundred waterfowl at a time, trainloads of dear carcasses shipped to the cities, and innumerable campaigns to reduce or eliminate "nuisance" species that were considered threats and competitors.[77] Things had been rough enough that according to the NPS, "Poachers, squatters, woodcutters, and vandals ravaged Yellowstone," and the Secretary of the Interior had to call on the U.S. Army, which "took charge of Yellowstone," guarding the major attractions, evicting troublemakers, and patrolling the vast interior.[78]

Back East, a survey of southern forests showed that by 1919, 92 million acres had most of their trees removed.[79] One of the contributing factors was likely a series of laws Congress passed in the mid-1800s that granted swamp and overflow lands to states and established a century-long federal promotion of reclaiming (draining) wetlands.[80]

Large-scale deforestation and the accompanying massive wildfires and erosion prompted the creation of the National Park System. Eventually, even dirt had hit a low and got its own agency. The "national menace" of soil erosion was so severe that winds carried clouds of dust from the plains states to the East Coast, prompting establishment of the Soil Conservation Service.[81] The Taylor Grazing Act was adopted in part to address over-grazing.[82] Numerous large federal and state tree nurseries were established, and the Civilian Conservation Corps planted over 3 billion trees.[83] Wildlife refuges were created and scads of fish hatcheries were built.[84] While all this occurred, the USFS, the NPS, the USFWS, and, later, the BLM, as well as numerous similar state agencies, had been created and were eventually charged with managing hundreds of millions of acres under various conservation regimes.

With large-scale efforts, trial and error, cultural changes, advances in arts and sciences, and economic growth—along with nature's resilient and dynamic characteristics—things got much better.

Conversion of forest to agriculture land leveled out. Efficiency increases provided more food and shelter without substantially harvesting larger areas. Use of wood for fuel declined, as did use of draft animals that require allocation of land to hay. For these and other reasons, marginally productive lands became available for wildlife habitat or other uses. Economic growth fueled the growth of cities, towns, and suburbs that would eventually account for little more than 5 percent of the landmass of the lower 48 and virtually nothing in Alaska.

With new conservation laws, overhunting stopped. State and fish game agencies began campaigns to conserve, restore, and manage wildlife populations with funding coming from hunters and fishermen paying excise taxes under the Pittman–Robertson and Dingell–Johnson Acts that continue to provide funding to this day.[85]

During this period, the conservation movement was born, as were innumerable private efforts, from the purchase of Hawk Mountain in Pennsylvania as a private refuge to conserve birds of prey where they had once been slaughtered to the purchase of Sea Lion Caves in Oregon, an important refuge for Stellar sea lions, which the private owners had to protect at gunpoint.[86] Both continue to provide valuable habitat to this day. In quintessential de Tocquevillian tradition, private organizations such as the American Bison Society and Ducks Unlimited were created by those interested in the welfare of those species.[87] More would eventually follow.[88]

Equally if not more important for many wildlife species, substantial cultural changes took place. The proportion of the population that farmed, hunted, or fished for their sustenance declined dramatically. Moreover, broad and often indiscriminate efforts to eliminate those species perceived as dangerous and efforts to eradicate or reduce those species that present or were perceived to present a threat to livestock, poultry, crops, or to the populations of "desirable" game and fish also declined. It is difficult to comprehend the massive impact these activities had on wildlife populations or the similarly dramatic impact that ending them has had, but it was clearly profound.

As a consequence of such changes, as mountain lions expand eastward, they will find not only habitat including regenerated forests but also an abundance of their favorite prey: deer. Numerous other predator and prey species have also dramatically increased in population, following often rock-bottom numbers, and have recolonized former habitat or expanded their ranges.

The accompanying table (Appendix Table 1 available by hyperlink) includes all native North American ungulates and mammalian predators: canids, felines, ursids (bears), mustelids (members of the weasel family), mephitids (skunks), and procyonids (raccoons and allies) that were included in the aforementioned paper on range contractions. Also included are additional predators—sea otters; island foxes; red wolves; jaguars; ocelots; and the pinnipeds (seals, sea lions, and walruses); some of the other medium-sized terrestrial mammals (armadillos, beavers, opossums, porcupines, woodchucks); birds of prey (eagles, hawks, falcons, owls, etc.); waterfowl that are commonly hunted members of the family Anatidae; a few additional larger bird species that are hunted; and a few large reptiles that are on the federal endangered species list. These animals are, with few exceptions, full species, which is a less subjective taxonomic unit than subspecies.

In many instances, the table includes changes in the estimated populations of a species since earlier last century or, in some cases, the late 1800s. Upon review of these species, a much more positive picture for U.S. wildlife emerges. The improvements attest to the basic requirements of suitable habitat and, for predators, sufficient prey. Some species—such as the red fox, javelina, armadillo, and opossum—have continued range expansions that began long ago, while still others—such as the coyote, raccoon, and snow goose—have proven highly adaptable to the altered landscape and are expanding. Additionally, many of these species are considered game species (for example, almost all the ungulates and waterfowl) and are therefore subject to the additional population pressure of hunting and/or trapping, yet many have exhibited growing populations. And the numbers are dramatic, with elk, pronghorn, white-tailed and mule deer, musk oxen, black bears, bobcats, red foxes, otters, beavers, northern elephant and gray seals, wild turkeys, red-tailed hawks, merlins, wood ducks, sandhill cranes, trumpeter swans, and many other species increasing substantially—doubling, tripling, or even more. Many of these species were depleted to mere thousands and now number in the hundreds of thousands, a million, or more.

Indicators of Available Habitat

Many of these species have substantial habitat requirements. If these species are increasing, their habitats are likely available for many other species that may not be as well monitored or the specific focus of conservation measures. Many smaller, less popular, or less charismatic animals are habitat generalists and essentially ride the habitat coattails of larger, more popular species. While some animals are "narrow endemics," areas of

habitat large enough to support large species likely have a variety of features, many of which are likely to be supportive of some species requiring more precise ecological niches.

Estimating Wildlife Populations

Estimating wildlife populations is challenging for many species. For example, CNN reported in 2008 that "researchers feared only around 50,000 Western lowland gorillas left worldwide" until they found an estimated 125,000 Western lowland gorillas, "double the number of the endangered primates thought to survive worldwide."[89] If 125,000 gorillas can evade detection, it raises questions about just how reliable population assessments of a particular insect or cryptic salamander can be.[90] As wildlife can be difficult to track, species thought extinct or absent from parts of their range are often rediscovered, as was the case with black-footed ferrets on a Wyoming ranch, sea otters in a cove on the California coast, trumpeter swans in Alaska and an isolated bison herd in Canada.[91] In fact, the rediscovery of species incorrectly believed to have gone extinct occurs enough for some to refer to rediscovered animals and plants as "Lazarus" species, and there are 180 listed on Wikipedia's Lazarus species page.[92] The popular game species and some of the high-profile endangered species, many of which are included in Appendix 3, are, however, generally the focus of surveys that are more rigorous than average. Consequently, as a group, there are likely more reliable population estimates for many of the species listed in the table than for many reportedly "vulnerable" species for which there may be scant data.[93]

Biodiversity Loss: "Endangered Species" in Context

In public discussion of habitat and biodiversity, the term *species* is typically being used in a legal rather than a biological sense, and as such, it may encompass subspecies, varieties, or distinct population segments (DPS), important context that is often omitted.[94] With each division of a species into subspecies or DPSs, the population (and likely the range) is, by definition, reduced, and therefore any perceived threat to it is magnified. This not only affects perceptions of how wildlife is faring but may also increase the number of animals added to the endangered list that otherwise would not be. The result may be the poor allocation of conservation resources.[95]

For example, the federally endangered Sonoran pronghorn was determined to be a pronghorn subspecies based on the smaller size and paler color of a single specimen, while the pronghorn as a species has swelled

from about 10,000 to around 1 million over the past century.[96] Similarly, the federally endangered Columbian white-tailed deer is a subset of one subspecies of the roughly 38 subspecies of white-tailed deer that, as a species, have exploded in the United States from perhaps as few as 300,000 to perhaps 30 million or more.[97]

The vast majority of animals included in Appendix 3 are biological species. In comparison, many of the "species" that are included on the U.S. federal endangered species list are actually subspecies or DPSs—the latter being a term with its origins in Congress. Of some 72 different kinds of U.S. mammals on the federal endangered list, 16 percent are accounted for by four subspecies of the same species of mouse and six of 16 subspecies of one species of pocket gopher.[98] About 70 percent of listed U.S. mammals are subspecies or distinct population segments.[99] As Appendix 3 indicates, the population estimates for many full species, a more objectively defined and therefore relative to subspecies, more reliable taxonomic unit, are generally secure. For example, according to the Integrated Taxonomic Information System, the federally listed Florida panther, wood bison, and Audubon's crested caracara are not valid taxa.[100] Data from Appendix 3 show that the species to which they belong—the mountain lion, bison, and caracara—have increased in population.

This is likely, at least in part, why Congress limited the listing of DPSs to vertebrates and, perhaps fruitlessly, indicated the provision was to be used sparingly.[101] Simply stating this reality is not to argue that conservation measures should not be applied below the species level (for example, the Florida panther). It is, however, axiomatic that full biological species are above subspecies and DPSs in taxonomic hierarchy and, other factors being equal, higher taxonomic units are generally more important to conservation. The validity of subspecies or varieties is generally more subject to debate. This should be borne in mind when discussing various conservation challenges.

Reason for Optimism, Always Challenges

Recognizing that many species have generally had stable or growing populations is not to assert that there are not real and continuing challenges in wildlife conservation. Moose, for example, are suffering from brainworm, a parasite, while deer in general are susceptible to a prion causing Chronic Wasting Disease.[102]Wildlife managers and researchers seeking to reintroduce federally endangered black-footed ferrets are struggling, frighteningly, with protecting the small carnivores from devastating outbreaks of sylvatic plague transmitted by fleas that feast on the ferret's prey, prairie dogs. The

bacterium causing the disease and wreaking havoc on prairie dog colonies and the ferret is the same bacterium that causes bubonic and pneumonic plague in humans.[103] There are and have always been significant challenges in wildlife conservation, as nature is not static and cannot be managed as an unchanging museum piece.

At any given point, some species are likely to be increasing while others may be stable and still others are decreasing given natural phenomenon and cyclical events and habitat changes or other events occurring naturally or at the hands of humans. Some biologists today are focused on threats like "edge effects" to and "fragmentation" of wildlife habitat. The edge of one habitat—for example, a forest—may not support as many of a particular species as denser, interior parts. Fragmentation of habitat—for example, development that separates a forest into two non-contiguous "fragments"—may also reduce value the remaining habitat to some species.

It is important to keep in perspective, however, that a hundred years ago or so, in many places there was less wildlife to affect or even habitat to fragment. It is clear that over roughly the past century there have been dramatic improvements in the status of many U.S. species and, consequently, there is reason to be optimistic about biodiversity in the United States. Much of what was done over a half century ago has worked. Wildlife, like so many other renewable natural resources, is generally resilient and dynamic. Clearly, one of if not the major reason so many of the species on Appendix 3 have increased in number is simply because we stopped intentionally eradicating them or harvesting them on such a massive scale.

VI. The Context and Ambiguity of 30 by 30

Even if the Administration's figure of a football field "lost" every 30 seconds is true, at that rate it would take over eight centuries to "lose" it all (not including Alaska and Hawaii).[104] The United States would have to more than double the land in agricultural covers—while it has been declining—or increase the land developed since colonial times more than ten-fold. There is absolutely nothing that supports such a projection. Using this figure without context to scare people, including youth, is misleading and cruel.

With respect to the claim that only 12 percent of the United States is protected, it depends upon how one measures, but the 12 percent figure excludes, for example, 73 percent of national forest lands—an area substantially larger than the lands of France.[105] Understanding the 12 percent figure requires some discussion of the source: The USGS's US-PADUS.[106]

The PAD-US assigns land units a Gap Analysis Project (GAP) status code of 1 through 4, with 1 being the most "protected." The ranking scheme incorporates the assumption "that retention of natural land cover is of prime importance to maintaining biodiversity."[107] Consequently, the agency considers "management that allows or mimics natural disturbance regimes, such as fire, will maintain biodiversity better than land units that suppress disturbance."[108] The USGS defined *natural land cover* "simplistically as areas not maintained in an unnatural state...by human activities" and "arbitrarily set 5 percent as the maximum amount of a land unit that can be managed in an unnatural state" if the land unit is to be accorded the highest protected area ranking.[109] The USGS states that "other status ranks allow human disturbance to varying degrees."[110]

The agency discerns what it terms "management intent" from documents, interviews, or "local knowledge as resources allow."[111] This includes whether "low anthropogenic disturbance, renewable resource use, or high levels of human visitation" or "resource extraction, military exercises, or developed or motorized recreation" will be prohibited. It also includes whether any such activities will exceed the arbitrary 5 percent threshold and if the management is intended to be permanent.[112] The USGS relies on the management documents rather than actual use data to determine land use.[113] The agency then filters the gathered information through a 10-step dichotomous key to determine and assign a GAP status. If the "management intent is unknown" for the land—as would be the case for almost all private property—it is assigned the lowest protection ranking, a four.[114]

Following the USGS's process, presumably, even actions in management documents that do not take place could reduce rankings. If a hypothetical forest management plan indicated up to 10,000 acres of a 100,000-acre forest may be available for harvest while in reality only 2,000 acres are so used, the GAP status rank of the entire 100,000-acre forest might still be reduced. As the USGS notes, as the assigned GAP codes "generally reflect the least conservation value relevant for a Designation Type across the nation, it is likely they underestimate management intent to protect biodiversity."[115]

For perspective, additional context is needed for land that is managed for multiple uses. For example, the Government Accountability Office reported that as of September 2018, authorized mining operations occur on about 1.3 million acres of federal land—about one-half percent of just the BLM's lands—and typically only a portion of the land authorized for mining operations is used for mining.[116] Similarly, while timber harvest on national forests was much greater in times past, the USFS reported that in 2017 only 240,000 acres are annually harvested.[117] This is about a tenth of a percent of the 192 million USFS acres.

GAP status 1 and 2 lands have corresponding IUCN codes that are used in the U.N. Environmental Programme's database. In the PAD-US map viewer, land ranked GAP 1 or 2 usually has a corresponding IUCN code and a unique U.N. database identifier that will appear in a pop-up window. However, a national forest or BLM unit assigned GAP code 3 does not. The 12 percent figure includes only PAD-US GAP 1 and 2 lands, the lands that are also included in the U.N.'s WDPA.

However, when federal, state, and other GAP 1 through 3 lands are aggregated, the figure reaches 29.9 percent—just 0.01 percent shy of the 30 percent threshold.[118] Removing GAP 3 lands eliminates 86 percent of the BLM's lands and 73 percent of national forests—hundreds of millions of acres that are subject to the National Environmental Policy Act and other laws and support bears, bobcats, and mountain lions as well as endangered species covered by the ESA.[119] Additionally, about 50 million acres of state GAP 3 lands and more than 99 percent of all American Indian lands are excluded from consideration, as are over 28 million acres owned by the Army Corps of Engineers and the Departments of Defense and Energy combined, as well as over 100 million acres of state-owned GAP 4 lands managed predominantly by state natural resources departments.[120] Simply accepting a dichotomous key's output and its "arbitrarily set 5 percent" as the "maximum amount...managed in an unnatural state" or assignment of GAP 4 when "management intent is unknown" relegates hundreds of millions of acres of habitat to some perceived, but not necessarily actual, lesser conservation value.

Advocates of 30 by 30 are well aware that vast GAP 3 areas are excluded from the 12 percent figure. For example, a report from the environmental group Defenders of Wildlife states, "An option for more rapidly reaching or surpassing 30% in some regions includes establishing additional protections on GAP 3 lands.... For example, up to 29.8% of terrestrial...habitats in the U.S. would be protected if regulatory changes to GAP 3 [protected areas] emphasized biodiversity protection over other uses."[121] In other words, if these hundreds of millions of acres of national forest and BLM land were essentially transformed into wilderness areas, national parks, or some other more restrictive regime, they could be ranked as GAP 1 or 2, be eligible for inclusion in the U.N.'s database, and be considered by 30 by 30 advocates as "protected." It is worth noting that the *User Manual for the World Database on Protected Areas* does not appear to require "emphasiz[ing] biodiversity protection over other uses" for its protected areas. The document states that in "a protected area, conservation must be the primary, *or joint-primary, objective*."[122]

Private Lands and 30 by 30

Simply imposing even more restrictions on federal lands, however, does not seem to be the intent of all 30 by 30 advocates. As the environmental group's report states, "[t]errestrial areas classified as GAP 4 are, by far, the most extensive in the U.S., but would require more effort and investment from decision-makers to establish biodiversity protections as priorities."[123] The report describes this land as including "most of the areas of greatest biodiversity and carbon potential" (an estimated ability of an area of land to sequester carbon dioxide through various natural processes).[124]

The GAP 4 lands include the rest of that nation that is "not included in PAD-US database"—1,453 million acres.[125] This massive acreage where the "management intent" is largely unknown to the federal government includes farms, ranches, privately owned woodlands, and most other private property as well as American Indian lands—the 64.5 percent of the country not owned by federal, state, or local government. Undoubtedly, "more effort and investment from decision-makers" would be needed to either acquire a substantial portion of this land or establish permanent "biodiversity protections as priorities" upon it. As the Defenders of Wildlife sees it, "private lands lacking formal conservation designations are critically important to addressing biodiversity and climate goals."[126] More specifically it states:

> Current federal conservation incentive programs…are inadequate to address the need. As such, there is a need for significant efforts to advance conservation on private lands in key parts of the country.... In particular, states across the Southeast harbor [have] particularly high levels of biodiversity and very few protected areas. Similarly, key areas for biodiversity in California, the Ozarks and the Edwards Plateau are dominated by private lands. Recent calls for deep investment in private lands conservation to help advance conservation and support farmers and ranchers…need greater attention and quick action.[127]

The report goes on: "The key to operationalizing 30x30 will be planning beyond the numerical target for a protected areas network that can be established in a way that ensures a long-term commitment to biodiversity and climate."[128] Some have indicated that 30 by 30 is a milepost on the way to a grander goal of 50 percent by 2050.[129]

The reality is, however, that hundreds of millions of acres of private lands already provide valuable wildlife habitat and are not going to disappear. Four centuries after the pilgrims landed at Plymouth Rock, only 5.3 percent

of the nation is developed, and agricultural conversion and deforestation no longer pose national threats to biodiversity. The United States could not develop all that private land if it tried.

Implementation of 30 by 30

Pursuant to the Biden Administration executive order, the Secretary of the Interior chaired a task force that released "a preliminary report" entitled *Conserving and Restoring America the Beautiful*. It states that a "commitment to collaboration, support for voluntary and locally led conservation, and honoring of Tribal sovereignty and private property rights... are essential ingredients to building and maintaining broad support, enthusiasm, and trust for this effort."[130] Much of the language in the report may seem reassuring to those concerned about government expansion, property rights, and economic vitality, but exactly what the report portends is unknowable.

The document reports that, "at its core, President Biden's conservation vision is about doing better for people, for fish and wildlife, and for the planet." With this vague vision, the report then muddies the water on the 30 percent goal: "There is no single metric—including a percentage target—that could fully measure progress toward the fulfillment of those interrelated goals."[131]

The report does not repeat the language of "only 12 percent protected," but neither does it clarify what lands would or would not be counted toward whatever goal is envisioned. It notes that "the President's challenge specifically emphasizes the notion of 'conservation' of the nation's natural resources...rather than the related but different concept of 'protection' or 'preservation.'" It states that "there were differing views...of how broadly or narrowly to define 'conservation' and how to measure progress toward a 2030 conservation goal."[132] This statement alone provides policy grounds for including hundreds of millions of acres of working national forests and BLM lands in calculating a 30 percent goal.[133]

While leaving the terms *conserved* and *protected* undefined, the report then recommends that the U.S. government take two complementary steps to measure and report. One appears to be a database, the "American Conservation and Stewardship Atlas," of the "lands and waters that are being managed for conservation and restoration purposes." The other is to produce annual "America the Beautiful updates on the health of nature in America and on the Federal Government's efforts to support locally led conservation and restoration efforts."[134]

Yet the report states that "there is no single database that could capture the texture and nuance of the economic and social values of every restoration or conservation action" and notes those assembling the data "could consider how to reflect State- and county-presented information, how to capture conservation outcomes on multiple use lands and ocean areas, and how to protect the privacy of landowners, and sensitive or proprietary information."[135] What this means or what the reports and database will measure differently than what is already in countless federal maps or databases is unclear.[136]

A Report, a Database, and an Ambiguous Goal

How the Administration will meet its 30 percent target if all the BLM and USFS GAP 3 lands are taken out of consideration is unclear. The Administration could seek to transform all federal lands into nothing but parks or wilderness areas, earning the lands a GAP status meriting inclusion in the U.N.'s database. This would be akin to more than quintupling the National Park System, and it would contradict laws governing how some of these lands are to be managed. It would have profound consequences where the federal government is a huge landowner.

Alternatively, the Administration could seek to somehow "conserve" or "protect" around 440 million additional acres—some 18 percent of the United States—that is outside the federal government's current enormous footprint.[137] Assuming developed areas are removed from consideration, that leaves about 1.145 billion acres of private land that is composed of cropland, pasture, range, and the majority of the nation's forestland.[138] These lands already easily support hundreds of millions of acres of habitat, including critical habitat, and perhaps 75 percent of the wetlands in the conterminous United States, and they are already subject to numerous federal, state, and local environmental laws and regulations.[139]

For many of these lands, Congress already provided "approved acquisition boundaries" that are mapped by the USFWS and depict where the agency "has authority to acquire [land and/or water] in whole or in part for inclusion in the National Wildlife Refuge System."[140] More importantly, this land is part of the complicated and interconnected tapestry that supplies the stuff necessary for existence. Just how a third of private land could meet the standard of "protected" or "conserved" with permanent "biodiversity protections as priorities"—yet still feed, house, and fuel the nation when the relatively smaller level of economic activity on national forest and BLM lands may disqualify them as "protected"—is unclear.

The consequences of the federal government consuming another 18 percent of the nation are hard to even contemplate, as are new or increased requirements for property owners to have land management papers explaining their "management intent" so the federal government may track it. Expanding the regulatory authorities over private lands or the portfolios of land management agencies that the Congressional Research Service reports already have a $19.38 billion maintenance backlog would seem a factor to consider as well.[141]

VII. Recommendations

Reject 30 by 30 as an Ineffective Conservation Tool and Expansion of the Federal Estate. The notion that United States is losing habitat and wildlife on a grand scale is not supported by the data. More than double the 30 percent target of the conterminous United States is in a generally natural state now. Further, government at all levels already owns over 30 percent of the United States, and, as demonstrated, numerous species of wildlife are doing well. Consequently, an "urgent biodiversity crisis" across the United States is an unfounded basis for the adoption of 30 by 30 policies. Policymakers should reject 30 by 30 as a conservation mechanism and expansion of the federal estate.

Reform Federal Land-Use Categories and Definitions to Better Describe the Positive Conservation Value of Multiple-Use Lands. The argument that only 12 percent of U.S. lands are protected is based upon poor assumptions used in the PAD-US database and an effort to conform with definitions used by the U.N. These U.S. definitions should be corrected to recognize that multiple-use national forests and BLM lands are valuable conservation lands, as are many other federal lands. Further, federal ranking that scores private property low just because the government does not know an owner's "management intent" is Orwellian. A simple solution is to not rank private property at all unless a landowner has opted to be included in the database.

Track New and Re-examine Existing State and Local Land-Management Programs. State officials should be wary of state and county land-management regulations and landowner-planning requirements—as well as federal grants and similar agreements—that may be used to establish additional controls over private property.

VIII. Conclusion

Too often, common knowledge is missing the knowledge component. Examining the actual data on land use, ownership, regulation—and the populations of carnivores, ungulates, birds or prey, and many other species—exposes just such a case. Contrary to the familiar, agenda-driven story, development or conversion of habitat to urban and agricultural use is not rapidly growing, nor are all U.S. species generally becoming ever more endangered. Left unchallenged, this misinformation provides undue support for wrong-headed, economically harmful polices upon an already enormous government estate, to enlarge it even further and impose economically destructive and burdensome regimes on those private lands that have, so far, escaped it.

Because of the vast geography involved, it can be difficult to reconcile one's own observations with larger trends, and statements about rapidly disappearing football fields of nature can seem to ring true. Most Americans make observations of land cover from within suburban or urban areas that are by definition more developed.[142] Areas in closer proximity to developed areas are more likely to be developed and thus are more likely to be observed, and such development affects a larger proportion of the natural land covers that are rarer in generally developed areas. Americans move about by road, and land along roads, being accessible and possibly having access to utilities, is more likely to be developed and seen. Concerns about sprawl along a more developed coastal area or loss of habitat within large areas that were converted to agricultural use such as the Corn Belt can be real, but they should be put in perspective. Even long distances travelled by road are a small sample. Americans often go to a park, forest, or other natural area as if it is the exception and they are coming from the norm when, in fact, the opposite is true. Scroll across the nation—or, better yet, Alaska—on Google Earth to see firsthand.

There are specific sites or situations where wildlife or other natural resources are somehow threatened, but deforestation, agricultural conversion, and urbanization are nowhere near posing a national threat to biodiversity. The nation's lands and wildlife are in generally much better condition than portrayed. Americans are the beneficiaries of this legacy right now and have a truly positive story and invaluable experience that can guide others. Americans should be generally optimistic about the state of their lands and wildlife.

Appendix 1: Land Ownership

Methodology: Data are provided below and in a linked table. In the linked table, columns "Manager Name" and "Acres" are drawn from the file "PADUS Version 2.1: PROTECTION STATUS by Manager Name and GAP Status Code; ACRES BY National (US States and Territories)."[143] These columns identify acreage of lands managed by federal agencies; states with state agencies aggregated by type; county, local, or regional government entities (aggregated by type); and with easements held by nongovernmental entities. Some of the smaller acreage land managers identified by the USGS are not included.

The column titled "Comparison" uses acreage data for states from the U.S. Census Bureau.[144]

A separate column, "CRS Acreage Figures," includes acreage reported by the Congressional Research Service (CRS) for some of the same agencies using data drawn from those agencies.[145] Methodologies used by the USGS and the CRS, as well as the dates the data were gathered, differ. The CRS, for example, excludes lands administered by federal agencies under easements, leases, contracts, or other arrangements. With some exceptions, the figures are generally similar.

The column "Agency Acreage Figure" generally provides acreage figures drawn directly from documents or websites of the relevant agencies.

FEDERAL LAND MANAGERS

Total Federal Land Managers

Acres/Square Miles: 657,413,198/1,027,208

Comparison: Alaska, California, Maine, Texas, and Vermont (1,027,712 square miles)

Bureau of Land Management (DOI)

Acres/Square Miles: 243,397,601/380,309

Comparison: Arkansas, Texas, and Washington (379,723)

CRS Acres Figure[146]*/Agency Acres Figure:* 244,400,000/245 million

Notes and Comments: The BLM states that it oversees 245 million surface acres and that it is "a little bit less than the size of Texas." The BLM also manages 700 million acres of the subsurface mineral estate.[147]

U.S. Forest Service (USDA)

Acres/Square Miles: 191,821,323/299,721

Comparison: California and Montana (301,325)
CRS Acres Figure/Agency Acres Figure: 192,900,000/193 million
Notes and Comments: The USFS reports 193 million acres, 154 national forests, 20 national grasslands, 36.6 million acres of wilderness, and 5,000 miles of Wild and Scenic Rivers.[148]

U.S. Fish and Wildlife Service (DOI)
Acres/Square Miles: 107,310,588/167,673
Comparison: California, Delaware, and Maryland (167,435)
CRS Acres Figure/Agency Acres Figure: 89,200,000/95 million
Notes and Comments: The USFWS reports 95 million acres and 760 million acres of submerged lands and waters in 567 National Wildlife Refuges.[149]

National Park Service (DOI)
Acres/Square Miles: 80,407,562/125,637
Comparison: Iowa and North Dakota (124,858)
CRS Acres Figure/Agency Acres Figure: 79,900,000/more than 85 million
Notes and Comments: The NPS reports 85 million acres in 423 individual units that include national parks, monuments, preserves, lakeshores, seashores, rivers, wild and scenic riverways, scenic trails, historic trails, military parks, battlefield parks, battlefield sites, battlefields, historical parks, historic sites, memorials, recreation areas, and parkways.[150]

U.S. Department of Defense
Acres/Square Miles: 20,038,302/31,310
Comparison: New Jersey and West Virginia (31,392)
CRS Acres Figure/Agency Acres Figure: 8.8 million acres[151]/26,362,000[152]
Notes and Comments: "DoD manages a reported 26.9 million acres of land worldwide...[and] [i]ncludes government owned land, public land, public land withdrawn for military use, licensed and permitted land and acreage of foreign land used by DoD.... More than 98% of that land is located in the United States or in U.S. Territories."[153]

Army Corps of Engineers (DOD)
Acres/Square Miles: 6,308,829/9,858
Comparison: Maryland (9,707)
CRS Acres Figure/Agency Acres Figure: Not reported.
Notes and Comments: n/a

Natural Resources Conservation Service (USDA)

Acres/Square Miles: 4,187,803/6,543

Comparison: Hawaii (6,423)

CRS Acres Figure/Agency Acres Figure: Not reported/more than 5 million

Notes and Comments: The NRCS reports more than 5 million acres in conservation easements.[154] There are NRCS easements of varying duration, including permanent easements.[155] "NRCS works with regulators to help producers get predictability for their use of voluntary conservation systems or practices, giving them peace of mind they can sustain agricultural production in the future.... Under the Agricultural Land Easements component, NRCS helps Indian tribes, state and local governments and non-governmental organizations protect working agricultural lands and limit non-agricultural uses of the land. Under the Wetlands Reserve Easements component, NRCS helps to restore, protect and enhance enrolled wetlands.... The Healthy Forests Reserve Program (HFRP) helps landowners restore, enhance and protect forestland resources on private lands through easements and financial assistance."[156]

U.S. Department of Energy

Acres/Square Miles: 1,711,338/2,674

Comparison: > Delaware (1,949)

CRS Acres Figure/Agency Acres Figure: Not Reported/2.4 million acres

Notes and Comments: "DOE is the fourth largest federal land manager, conducting its mission at 50 major sites on 2.4 million acres across the country."[157] The NPS is actually the fourth-largest federal land manager.

Bureau of Reclamation (DOI)

Acres/Square Miles: 1,582,615/2,473

Comparison: > Delaware (1,949)

CRS Acres Figure/Agency Acres Figure: approximately 6 million acres/7.8 million acres including 1.7 million in easements

Notes and Comments: The Bureau of Reclamation reports 7.8 million acres of Reclamation land and easements.[158] Some of the acreage reported by the Bureau of Reclamation may have been included in other PAD-US land manager categories such as "Regional Water Agency."

Agricultural Research Service (USDA)

Acres/Square Miles: 331,289/518

Comparison: < Rhode Island (1,034)

CRS Acres Figure/Agency Acres Figure: Not reported/around 400,000 (includes three foreign locations)

Notes and Comments: "ARS-owned real property assets include...approximately 400,000 acres of land at 105 domestic [locations], 3 foreign locations, and 60 worksites."[159]

Tennessee Valley Authority (TVA)
Acres/Square Miles: 293,820/459
Comparison: < Rhode Island (1,034)
CRS Acres Figure/Agency Acres Figure: not reported/around 293,000
Notes and Comments: The TVA reports 293,000 acres.[160]
National Oceanic and Atmospheric Administration (DOC)
Acres/Square Miles: 1,168/2
Comparison: n/a
CRS Acres Figure/Agency Acres Figure: n/a
Notes and Comments: n/a
Other or Unknown Federal Land
Acres/Square Miles: 20,960 / 33
Comparison: n/a
CRS Acres Figure/Agency Acres Figure: n/a
Notes and Comments: n/a

STATE LAND MANAGERS

Total State Lands
Acres/Square Miles: 194,773,760/304,334
Comparison: Louisiana and Texas (304,436)

State Departments of Natural Resources: 122,641,142 acres/91,627 square miles
State Land Boards: 25,890,318 acres/40,454 square miles
State Fish and Wildlife: 16,265,942 acres/25,416 square miles
State Departments of Land: 12,948,552 acres/20,232 square miles
State Park and Recreation: 7,176,679 acres/11,214 square miles
State Departments of Conservation: 5,566,590 acres/8,698 square miles
Other or Unknown State Land: 4,284,825 acres/6,695 square miles

County, Local, Other Government Land Managers (aggregated)

Total County Land
Acres/Square Miles: 10,007,258 /15,637
Comparison: Hawaii and New Hampshire (15,376)
County Land: 5,800,890 acres/9,064 square miles
Regional Water Districts: 2,087,665 acres/3,262 square miles
Regional Agency Land: 1,047,830 acres/1,637 square miles
City Land: 478,738 acres/748 square miles
Other Unknown Local Government: 592,135 acres/925 square miles

American Indian Lands

Total American Indian Lands
Acres/Square Miles: 101,717,474/158,934
Comparison: > California (155,779)

NGO LAND and Easements

Nongovernmental Organizations
Acres/Square Miles: 13,209,388/20,640
Comparison: > Maryland and Vermont (18,924)

Appendix 2: Federal Regulatory Regimes, Designations, and Federally Regulated Resources

Methodology: Data are provided below and in a linked table. This table includes federal land regulatory regimes; acreage of land with natural resources that are subject to additional regulatory provisions when occurring on federal or nonfederal lands; and federal designations that range from those having direct or potentially indirect regulatory consequences to others that effectively constitute recognition of some environmental, historic, or other attribute of the land in question. The table is not exhaustive (excluding, for example, BLM Areas of Critical Environmental Concern or USFS Research Natural Areas) but captures some of the important regulatory regimes or areas potentially subject to them and designations. This includes wilderness areas and areas reserved for consideration as wilderness; national monuments; the acreage and river miles of currently designated and areas proposed to be designated as ESA critical habitat, an estimated acreage of privately owned wetlands (much of which is subject to regulation under the Clean Water Act); and a number of national and some international designations. Information on the table is drawn predominantly from the reports or websites of administering agencies.

Wilderness Areas

Units: >800 designated wilderness areas

Notes and Comments: "A network of more than 800 designated wilderness areas managed by four federal agencies that protect over 111 million acres of land and water in the United States."[161] "The Wilderness Act, directly and by cross-reference in virtually all subsequent wilderness statutes, generally prohibits commercial activities; motorized uses; and roads, structures, and facilities in designated wilderness areas."[162]

Wilderness Study Area

Units: 491 BLM Wilderness Study Areas

Notes and Comments: "Bureau of Land Management and National Forest System (Forest Service) Wilderness Study Areas (WSAs) are designated by Congress for further study before final designation as wilderness. Fish and Wildlife Service WSAs are identified and established through the inventory component of a wilderness review and include all areas that are still undergoing the wilderness review process. These lands are managed in the same manner as designated wilderness, so that, if they become wilderness, their

wilderness character is preserved."[163] "The Bureau of Land Management is responsible for...491 wilderness study areas...that contain about 12.6 million acres."[164]

National Forest Roadless Areas

Units: Inventoried roadless areas

Notes and Comments: "To address the management and protection of the 58.5 million acres of inventoried roadless areas...the Clinton Administration developed regulations that would keep all roadless areas free from most development.... [U]nder the Clinton policy, road construction, reconstruction, and timber harvesting are prohibited on most of the inventoried roadless areas within the National Forest System."[165]

National Monuments

Units: 129 National Monuments

Notes and Comments: As large as the 372,848,597-acre Papahānaumokuākea Marine National Monument in the Pacific or the 2,294,072-acre Misty Fords in Alaska on land with some sites smaller than an acre.[166] Five marine national monuments totaling almost 760 million acres have been proclaimed. Unlike national parks, national monuments are simply established by presidential proclamation under the Antiquities Act, which states that the monuments shall be "historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated upon the lands owned or controlled by the Government of the United States" and "the limits of which in all cases shall be confined to the smallest area compatible with proper care and management of the objects to be protected.[167] Presidential proclamations for marine national monuments refer to "submerged lands."[168]

Wild and Scenic Rivers

Units: 226 rivers/river segments

Notes and Comments: "As of March 12, 2019...the National System protects 13,413 miles of 226 rivers in 41 states and the Commonwealth of Puerto Rico; this is less than one half of one percent of the nation's rivers.... Currently, there are three rivers or river systems under 'authorized' study—two under Section 5(a) of the Wild and Scenic Rivers Act and one under Section 2(a)(ii). This does not include those that might be under assessment as part of normal agency land-planning processes."[169]

National Heritage Areas / Corridors

Units: 55 National Heritage Areas

Notes and Comments: "55 National Heritage Areas."[170]

National Historic Site and National Register of Historic Places

Units: 96,000 listed properties

Notes and Comments: "The more than 96,000 properties listed (as of 2020) in the National Register represent 1.8 million contributing resources—buildings, sites, districts, structures, and objects."[171] The NPS has stated, "Some States and communities have enacted preservation laws or ordinances that apply to National Register listed properties.... Section 106 of the National Historic Preservation Act of 1966 requires that Federal agencies allow the Advisory Council on Historic Preservation an opportunity to comment on all projects affecting historic properties either listed in or determined eligible for listing in the National Register. The Advisory Council oversees and ensures the consideration of historic properties in the Federal planning process."[172]

National Historic Landmarks (NHLs)

Units: > 2,600 National Historic Landmarks

Notes and Comments: "over 2,600 NHLs."[173]

National Natural Landmarks (NNLs)

Units: about 600 National Natural Landmarks

Notes and Comments: "Sites are designated by the Secretary of the Interior, with landowner concurrence, and...nearly 600 landmarks have received the NNL designation."[174] "Of the existing landmark sites approximately one-half are administered solely by public agencies (e.g., Federal, State, county, or municipal governments), nearly one-third are owned entirely by private parties and the remaining are owned or administered by a mixture of public and private owners."[175]

Endangered Species Critical Habitat (Land)

Units: Final 111,896,952 acres/Proposed 2,182,795 acres

Notes and Comments: For comparison, California's land area is 99,698,701 acres. USFWS reports "distinct critical habitat acres." Calculation of critical habitat acres from the accessed USFWS CSV file indicates 254,317,624 acres or 397,371 square miles final critical habitat and 2,188,542 acres or 3,420 square miles proposed critical habitat. (Figures are rounded.) The distinction from the column labeled "units" may

be that this larger figure includes overlapping acres of critical habitats, and the USFWS's figure does not.[176] According to the USFWS: "Critical habitat designations do not affect activities by private landowners if there is no federal 'nexus'—that is, no federal funding or permits required to carry out the activity."[177]

Endangered Species Critical Habitat (CH) (River)

Units: Final: 34,166 river miles/Proposed: 2083 river miles

Notes and Comments: The USFWS reports "distinct critical habitat river miles." Calculation of critical habitat river miles from the accessed USFWS CSV file indicates 48,823 final CH river miles and 2,227 proposed CH river miles (figures rounded). The distinction from the column labeled "units" may be that this larger figure includes overlapping river miles of critical habitats, and the USFWS's figure does not.[178] According to the USFWS: "Critical habitat designations do not affect activities by private landowners if there is no federal 'nexus'—that is, no federal funding or permits required to carry out the activity."[179]

Wetlands (Nonfederal)

Units: 111,227,500 acres/173,793 square miles

Notes and Comments: "NRCS estimated 111,227,500 acres of palustrine and estuarine wetlands on non-Federal lands in 2017."[180] "Estimated 110.1 million acres...of wetlands in the conterminous United States in 2009.... The difference in the national estimates of wetland acreage between 2004 and 2009 was not statistically significant."[181]

International Designations in the U.S.

Biosphere Reserves

Units: 28 biosphere reserves

Notes and Comments: "The US Biosphere Network (USBN) is made up of 28 internationally recognized areas" that incorporate "national parks, state parks, national forests, national marine sanctuaries as well as private lands.... Communities and partners within them work together to advance positive relationships between people and nature at large geographic scales" to achieve "a harmonious relationship between people and the environment."[182] Biosphere reserves include a "Core Area" (e.g., National Park or National Forest land), a surrounding "Managed Use Area," and an outer ring called an "Area of Partnership and Cooperation." The Congragee Biosphere Reserve in South Carolina has a Core Protected Area that "includes 15,269

acres of Congaree National Park," the "Managed Use Area contains 5,557 acres of wilderness and 5,713 acres of non-wilderness," and the "Area of Partnership and Cooperation...where people work together to conserve and use resources. This area surrounds the Park, and contains large portions of Calhoun, Kershaw, Richland, and Sumter counties."[183] During the Trump Administration, seventeen U.S. Biosphere Reserves were removed at the request of the United States.[184]

World Heritage Sites

Units: 24 World Heritage Sites/19 tentative sites

Notes and Comments: There are 24 U.S. "[p]roperties inscribed on the World Heritage List" and 19 "[s]ites on the Tentative List."[185]

Ramsar / Wetland of International Significance

Units: 41 sites

Notes and Comments: "41 sites designated as Wetlands of International Importance (Ramsar Sites), with a surface area of 1,884,551 hectares [4,656,827 acres]."[186]

Appendix 3: Wildlife Populations

Methodology: Data for Appendix 3 was drawn primarily from the International Union for Conservation of Nature's (IUCN's) Red List, the NatureServe Explorer database (NatureServe), the USFWS's Environmental Conservation Online System (ECOS), the National Marine Fisheries Service (NMFS) species directory for endangered and threatened species, and NMFS's webpage for marine mammal stock assessments (MMSA). Data for bird species was also drawn from the Cornell Ornithology Lab's All About Birds website (AAB) and the Partners in Flight database of bird populations (PIF). These websites can be searched by a species common name and/or scientific name. Population statistics for some birds was drawn from the USFWS's Migratory Bird Data Center (MBDC), where reports are available by year and species or for the group waterfowl. Taxonomic information was taken from the Integrated Taxonomic Information System (ITIS), a database managed by U.S., Canadian, and Mexican agencies including the USFWS, USGS, NPS, USDA, National Oceanic and Atmospheric and Administration, Environmental Protection Agency, NASA, and NatureServe. ITIS may also be searched by common or scientific name as well. Data in Appendix 3 drawn from these sources are indicated in the table by the acronyms found above.

For the IUCN ranking, ranks range (best to worst) as follows: LC (Least Concern), NT (Near Threatened), VU (Vulnerable), EN (Endangered), CR (Critically Endangered), EW (Extinct in the Wild). EW would include, for example, a species for which there are no known wild populations but living members in a zoo, aquarium, or captive breeding facility. The IUCN may also rank species as NE (Not Evaluated) or DD (Data Deficient).[187]

NatureServe's ranking system (from worst to best) for a species globally is as follows: GX (Presumed Extinct), GH (Possibly Extinct), G1 (Critically Imperiled), G2 (Imperiled), G3 (Vulnerable), G4 (Apparently Secure), G5 (Secure). NatureServe has the additional rankings of GU (Unrankable), GNR (Not Ranked), and GNA (Not Applicable). The system is also used at the national and state levels by substituting an N or an S for the G, respectively.[188] Individual state rankings are not included.

The column "AAB [All About Birds] Conservation Status" notes whether a bird is on a watch list and usually includes a numerical value indicating the Continental Concern Score. Birds are assigned a numerical score from 4 to 20.[189] A score of up to 13 corresponds with an AAB "Low Concern" ranking, with the exception of birds that rate 13 but also have a steeply declining population trend. These and birds scoring 14 or higher are included on a watch

list.[190] In some instances, the numerical score provided on the AAB website appears to be dated. For purposes of comparison with a familiar species, the AAB record for the blue jay, *Cyanocitta cristata*, indicates the species is of "low concern," scores an 8, and has a U.S. population of 15,000,000.[191]

The final column indicating if the species, subspecies, or DPS of the species is or was included on the federal list of threatened and endangered species relies upon data from ECOS, typically drawing from the text of a species profile or linked documents such as listing rules, species status assessments, and recovery plans.[192]

Appendix Table 1 is available online.

Endnotes

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10. Ibid., Table 2, p. 188.
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12. Ibid., p. 184.
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14. Multi-Resolution Land Characteristics Consortium, "National Land Cover Database 2001 (NLCD2001) Statistics," https://www.mrlc.gov/data/statistics/national-land-cover-database-2001-nlcd2001-statistics (accessed April 13, 2021). Figures do not total 100 percent due to rounding.
15. Ibid.
16. Ibid. Other land covers in Alaska include 38.37 percent dwarf shrub and shrub/scrub; 22.42 percent forest; 14.18 percent open water; 7.65 percent bare rock, sand, or clay; 6.53 percent grassland, herbaceous, or sedge; 6.46 percent wetlands; 4.26 percent perennial ice and snow; and 0.03 percent moss.
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