

GREATER YELLOWSTONE

EXECUTIVE
SUMMARY

AN ECOSYSTEM AT RISK

Unending Population Growth
and Development Threaten the
Greater Yellowstone Ecosystem



By Leon Kolankiewicz, with Roy Beck and Eric A. Ruark

Foreword by Todd Wilkinson

Autumn 2024

A scientific study by



NumbersUSA

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Cover Photo by Holly Pippel: Bison overlooking the rapidly growing Gallatin Valley of Montana, north of Yellowstone National Park. This icon of the American West (as well as public wildlife that benefit from habitat protection) inhabits the Flying D Ranch, which is protected by one of the largest conservation easements in the country. The easement provides a buffering effect against sprawl in one of the fastest growing rural counties in the Lower 48, whose continued landscape health is critical to maintaining wildlife populations in the globally-renowned Greater Yellowstone Ecosystem.

About the Authors

LEON KOLANKIEWICZ is Scientific Director for NumbersUSA. He is a wildlife biologist and natural resources planner and former environmental planner with the Orange County (California) Environmental Management Agency. Leon has a B.S. in forestry and wildlife management from Virginia Tech and an M.Sc. in environmental planning from the University of British Columbia. He has worked as an environmental professional for more than three decades in three countries and all 50 states, including stints with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, Alaska Department of Environmental Conservation, Alaska Department of Fish and Game, University of Washington, University of New Mexico, and as a Peace Corps Volunteer promoting tropical rainforest and wildlife conservation in Honduras. He has managed Environmental Impact Statements (EIS's) on projects ranging from dams and reservoirs to flood control facilities, roads, parks, power plants, oil/gas drilling, and mines. He prepared management plans at some 50 national wildlife refuges in many states for the U.S. Fish and Wildlife Service. He has written or edited more than 400 articles, blog posts, reports, conservation plans, and EIS's (under the National Environmental Policy Act). He is the author of *Where Salmon Come to Die: An Autumn on Alaska's Raincoast* (Pruett, 1993) and contributor of a chapter on biodiversity in *Life on the Brink: Environmentalists Confront Overpopulation* (University of Georgia Press, 2012) and the anthology of classic and contemporary environmental writing *Environment and Society: A Reader* (NYU Press, 2017). He has been the lead author of 16 studies on sprawl and loss of wildlife habitat, open space, and farmland for NumbersUSA over the past 24 years.

ROY BECK was one of the nation's first environment-beat newspaper reporters in the 1960s. A graduate of the University of Missouri School of Journalism, he won national recognition for his coverage of urban expansion issues. A former Washington bureau chief for a chain of daily newspapers, he is the author of five public policy books, including *Recharting America's Future*, and the latest, *Back of The Hiring Line: a 200-year history of immigration surges, employer bias, and depression of Black wealth*. His articles have appeared in scores of magazines, newspapers and journals. He has lectured widely on the ethical aspects of U.S. population issues and testified before Congress on many occasions. He has co-authored more than a dozen studies on sprawl in the last two decades. He founded NumbersUSA in 1996 to educate the public on the recommendations of two federal commissions on population and environmental sustainability and on economic justice.

ERIC A. RUARK is the Director of Research of NumbersUSA Education & Research Foundation. He attended Virginia Commonwealth University and the University of Maryland, College Park and has a M.S. in modern European history. He has worked as a researcher on U.S. immigration policy since 2008 and has written extensively on the effects of population growth. His work has been cited in national and international media reports and in his testimony in the U.S. Senate. He is an original signatory in the International Network for Immigration Research.

America's Most Iconic Wildlife Ecosystem at a Crossroad

How Sprawl and Expanding Human Imprint Are Threatening the Survival of the Greater Yellowstone Bioregion

Foreword by Todd Wilkinson

In nearly four decades of writing about wildlife conservation issues and their intersection with human-built environments, I've often confronted this challenge: how to make the consequences of population growth more understandable to readers who believe "growth just happens" to both places and people. Routinely, they harbor the mistaken impression there's little that can be done to mitigate it. Few, in fact, do much reflecting on their own ecological footprint and how it ripples collectively on a landscape level.

A few short years ago, I was working on an investigative story about the impacts of inward migration — of Americans moving from one place to another for largely lifestyle considerations. Their primary motives were wanting to escape crowded urban areas, to take advantage of remote working options, and, frequently, out of a desire to "live closer to nature."

The focus of my narrative was not on just any region. The area of interest was the Greater Yellowstone Ecosystem, a vast complex of public and private lands readily visible from my home in Bozeman, Montana.

Greater Yellowstone, if you're unfamiliar with it, has Yellowstone, the first national park in the world, at its geographic heart. The ecosystem that encompasses the park is today considered the most iconic wildlife-rich bioregion in the Lower 48 states, renowned especially for its concentration and diversity of large free-ranging native mammal species rescued from near-annihilation at the end of the 19th century.

There are compelling scientific reasons why Greater Yellowstone is often compared with another famous reference point for large mammals—the Serengeti Plain in East Africa.

Somewhat surprisingly, I've discovered, many Americans are more familiar with species on the Serengeti, owed to the popular Disney animated film, *The Lion King*, than they are with Greater Yellowstone. Many are shocked to discover that equal levels of drama can be found in the backyard of the West. One can watch howling wolves hunting bugling elk; see wild herds of bison and pretend it's a scene from 200 years in the past; savor the presence of famous Jackson Hole Grizzly 399 and generations of her cubs; and stroll through the ethereal geothermal basins of Yellowstone and believe you're on another planet.

Here, where I live, there are Yellowstone and neighboring Grand Teton National Park. Encircling them are five different national forests, three national wildlife refuges, a large sweep of federal land administered by the Bureau of Land Management and the Wind River Indian Reservation, home to the Northern Arapaho and Eastern Shoshone nations.

Notably, Wind River is almost identical in size to Yellowstone and its 2.2 million acres, which at roughly 3500 square miles is larger than Rhode Island and Delaware combined.

In all, of Greater Yellowstone's roughly 23 million acres, three quarters of it is public land and the last quarter is comprised of private property, including working farms and ranches.

While the private land component is a fraction of the amount of public acreage that belongs to all American citizens, it serves a critical ecological function. Located mostly in lower-elevation river valleys, these private lands are like vital connective tissue holding together the superstructure of public lands. Wildlife do not recognize nor abide artificial human boundaries put down on maps. The survival of more than four-fifths of Greater Yellowstone's biological diversity involving animals larger than insects relies on habitat found on private land, permanently or seasonally.

In the larger picture of the American West, Greater Yellowstone resides at the intersection of three states—Wyoming, Montana and Idaho. Rising from it are the headwaters of three major U.S. river systems—the Yellowstone-Missouri-Mississippi; the Snake-Columbia; and the Green-Colorado that, in turn, empty, respectively, into the Atlantic, the Pacific, and the waters of Baja, Mexico.

Historically, Greater Yellowstone has benefitted from four factors: its geographic remoteness, sheer mass of public lands, low human population and the fact that the preponderance of private land was either agricultural or undeveloped. Three of those variables—remoteness, low human population and development that is clustered primarily around cities and towns—no longer exist.

As I was doing my research about the impacts of population growth and the corresponding expanding footprint of development in Greater Yellowstone, I met with a highly respected conservation biologist named Brent Brock who had devised a computer modeling program that he called Wild Planner. During one of our many visits, he invited me over to his computer and said, "Hey, look at this."

In rapid succession, Brock typed in data that came from a number of reputable sources ranging from the U.S. Census Bureau to state cadastral maps. Soon we were looking at the proliferation of recent residential subdivisions that had sprouted in exurban areas of three counties – Gallatin, Park and Madison – in the northern tier of Greater Yellowstone. The results were jaw dropping, and then Brock plotted in the likely locations of new development and how they would replace working farms and ranches. It revealed a pattern that, if left unchecked in coming decades, would leave some of Greater Yellowstone's major wildlife migration corridors, important to the movement of elk, pronghorn, mule deer and other species blocked or severely constricted. The longest known migrations for elk, pronghorn and mule deer in the world exist in this ecosystem.

While standing next to Brock, who passed away tragically from cancer in October 2023, I will never forget something this forward-thinking conservation biologist said: "Sprawl kills."

It has an established record of being a destroyer of wild ecosystems, and unless things change, unbridled growth is going to ruin many of the things that still set Greater Yellowstone apart as an American national natural treasure. The most obvious manifestation, Brock said, will be fragmented landscapes that result in wildlife being no longer able to navigate between key seasonal habitats.

Two large landscape thinkers, Dr. Matthew Kauffman, a federal USGS scientist spearheading the Wyoming Migration Initiative, and Dr. Arthur Middleton, based at the University of California-Berkeley, have likened Greater Yellowstone's migration corridors to the circulatory system of a human body. Block the arteries or passageways leading to the heart or lungs and serious negative consequences are certain.

Where Greater Yellowstone is considered a beacon of modern wildlife conservation globally, touted as the emblem of a healthy intact ecosystem in America and known for its successful rewilding of several species, its legacy, Brock said, could be one of permanent de-wilding unless trendlines are altered.

Here, I will invoke the perspective of another big picture thinker, former Yellowstone science chief David Hallac who said there is the usual array of large obvious challenges facing Greater Yellowstone but more insidious is what he calls "death by 10,000 scratches" involving a constant onslaught of new structures, roads, and infrastructure, much of it taking scattershot form across rural lands.

Sprawl kills because it permanently destroys wildlife habitat that is finite and irreplaceable. It erases rare species and leaves wildlife homeless. Sprawl turns family ranchers and farmers into artifacts. As cost of services studies note, it also causes local government to become submerged in a flood of red ink. And sprawl creates homogenized human spaces that all look the same and lack character.

Assessing the impacts of sprawl is important no matter what the geographical setting, but in here it takes on added significance. Greater Yellowstone is the only bioregion remaining in the Lower 48 states with all of its original species that were present in 1491, the year before Europeans arrived on the continent. A crucial question readers should ask is: why have the caliber of wildlife attributes present in Greater Yellowstone been lost mostly everywhere else?

Once you've pondered that query, pay special attention now to this study you hold in your hands—a scientific examination/overview of how the rapidly-expanding human footprint on private land in Greater Yellowstone is shaping the prospects for species survival today and in the future.

To date, few studies have taken a deep dive look at the intensifying effects of sprawl on a wildland-wildlife ecosystem like Greater Yellowstone. Not only is such an examination long overdue, but it is especially poignant—and timely. Inward population growth and an ever-expanding human footprint were serious concerns before the arrival of Covid. But during the pandemic three things happened: the pace of exurban sprawl on private rural

land accelerated as more newcomers moved into the region; subdivisions supplanted former farms and ranches like never before; and the intensity of outdoor recreation pressure on public lands increased markedly.

The result is wildlife being squeezed out of optimal habitat formerly available on private land, and recreation pressure displacing species on public land. On top of it, whether one believes that climate change is caused by humans or not, meteorological data show the region has become warmer and drier; a testament to that is not only that there are 30 additional days each year in which the temperature doesn't fall below freezing, but larger forests fires are becoming more common. Dr. Cathy Whitlock, a Montana ecologist and fellow with the National Academy of Sciences, led a series of reports on climate change, including one for Greater Yellowstone that forecasts major ecological disruptions related to water availability and use, fires and drought.

Why is the risk of property loss growing every day? Because more people than ever before are building their dream homes inside the forested wildland-urban interface, which also happens to represent a critical zone of connectivity for species moving between public and private lands.

One may wonder: what's the connection between healthy ecology and economy in Greater Yellowstone? Every year, the National Park Service releases findings of an annual assessment gauging economic impact. One recent analysis found that Yellowstone and Grand Teton parks alone generated \$1.5 billion in economic activity for the surrounding communities and that commerce was responsible for creation of 15,000 jobs. Besides the allure of seeing Old Faithful Geyser erupt, grizzly bear and wolf watching opportunities were the top attractions.

In 1995, researcher William Newmark published a peer-reviewed paper titled *Extinction of Mammal Populations in Western North American National Parks*. He noted that even in other large parks similar to Yellowstone, species over time still vanished. The reason was they were inadequate, by themselves, to sustain wide-ranging terrestrial species.

In 2023, Newmark and colleagues published an updated analysis in the respected journal, *Nature*, and again observed that big parks aren't big enough. In particular, he alluded to national parks becoming isolated and islandized inside a sea of sprawl: "Protected areas are the cornerstone of biodiversity conservation worldwide. Yet the capacity of most protected areas to conserve biodiversity over the long-term is under threat from many factors including habitat loss and fragmentation, climate change, and over-exploitation of wildlife populations: Of these threats, habitat loss and fragmentation on lands adjacent to protected areas are the most immediate and overarching threats facing most national parks and related reserves in western North America. As a result, most parks and related reserves in western North America are becoming increasingly spatially and functionally isolated in a matrix of human-altered habitats. This is particularly problematic because few parks and related reserves worldwide are large enough to conserve intact plant and animal communities and many large-scale ecological processes, such as mammal

migrations and disturbance regimes [such as wildfires, floods, droughts and disease outbreaks affecting species].”

Yellowstone and Grand Teton are not drive-thru zoos. They have no fences encircling their perimeters. As Newmark noted, these national parks are not big enough, by themselves, to maintain the survival of species found inside them. Wildlife needs room to roam. The vast majority of species in Greater Yellowstone rely upon private land habitat to stay alive and indeed private lands function as critical passageways between public lands.

When it comes to migration routes and particularly “pinch points” where the size of the corridor is narrow, a new subdivision of just 100 homes and organized as 20-acre ranchettes could, in some places, impair the ability of wildlife to migrate. This is an example of what Kauffman and Middleton say is analogous to a blood clot in a human body, blocking the circulatory system.

Allow me to offer some added context. A few decades ago, a group of researchers concluded that a new residence and outbuildings constructed on a section of land (640 acres or one square mile) would displace a grizzly bear mother and cubs. It’s important to note that a different scientific analysis showed that secure habitat which supports grizzlies is beneficial to more than 230 other species of mammals, birds, fish, and amphibians. During a recent chat, the head of the Gallatin Valley Land Trust told me that for every acre being protected through conservation easements, two acres are being lost to development—and that trend does not include the amount of acreage that already is covered by leapfrog sprawl. That ratio is comparable to many valleys in Greater Yellowstone.

Only a generation ago, the total human population for the entire ecosystem was around 460,000. In 2017, I met with population demographers and planners and wrote a story about growth trends in Greater Yellowstone. Remember, this was prior to Covid and the effects it brought. I turned first to Bozeman and Gallatin County which had a combined population of about 110,000.

Less than a decade ago, Bozeman and Gallatin County were growing at rates of around three to four percent annually. Based on a conservative trajectory of three percent, that meant that Bozeman/Gallatin would double in population in 24 years, meaning that it would have a population equal to today’s Salt Lake City proper. It also means that if that growth rate continues, it would double again in 48 years, becoming the size of Minneapolis proper (440,000) by around 2065.

In the southern half of Greater Yellowstone, a corridor of towns between Idaho Falls, Idaho, running through Jackson Hole and connecting other mountain valley communities, there is today a population roughly equivalent to the size of Salt Lake City proper (250,000). That total volume of humans is expected to double within a generation. In addition, there are many spillover effects happening from Bozeman and Jackson Hole into neighboring valleys.

In recent years, especially during the Covid exodus of people moving to Greater Yellowstone, the number has surged. The truth is that the influx of people into any rural valley need not be that explosive for major negative ecological impacts to register. The impacts of suburbanization are permanent. Subdivisions do not go away and their cumulative effects only deepen over time to the point that, eventually, species simply disappear and human tolerance for having them in their backyards also goes away. That's why the consequences of de-wilding a previously wild landscape are so pervasive.

Sure, you might have highly-adaptable white-tailed deer and coyotes roaming golf course fairways on land that was previously a ranch with a tiny imprint of buildings, but gone is secure habitat for more sensitive species such as free-ranging elk, mule deer, pronghorn, moose, grizzlies, wolves, bighorn sheep and wolverines. No matter how one feels about livestock, working ranches with cows are far better than a meadow covered in condos, for as long as the land base is intact, wildness has a better chance of persisting and it represents places where re-wilding can occur.

Recall again my earlier reference made by scientist David Hallac about Greater Yellowstone suffering a death by 10,000 scratches. While individually each of these scratches may be insignificant, it's the cumulative effects that exact a mighty consequential toll.

Public land managers can take steps to address the impacts of traditional natural resource extraction or lessen the pressure of outdoor recreation on wildlife by limiting numbers of users, but on private land, infrastructures of concrete, steel, wood and asphalt cannot be undone. Every new subdivision comes replete with buildings, driveways, fences, non-native vegetation, roaming and barking dogs, domestic cats that kill songbirds, non-natural foods that can serve as wildlife attractants and result in animals getting removed, a cacophony of noises, and light pollution that drowns out of the starry night skies. People who build their dream homes on the edge of national forests and then get worried about fire after the fact often end up logging the forest as a tactic of prevention yet they don't realize it destroys habitat.

I have file drawers full of papers written by leading scientists that speak to the points above. As has been conclusively established, island populations of species disappear at higher rates than those which are sustained over large unfragmented areas. Destruction is subtle and by the time it becomes visible to humans it may be too late to reverse. Newmark and co-authors wrote: "Most species extinctions in habitat remnants, including protected areas, following habitat loss are not immediate, but occur after a time lag. The lag in species loss over time is because many species that occur in habitat remnants do not have viable populations. The delayed loss of species over time in habitat remnants is referred to as relaxation or faunal collapse."

In 2009, Dr. Andrew J. Hansen, a professor of ecology at Montana State University wrote an analysis titled "Species and Habitats Most at Risk in Greater Yellowstone" for the

journal *Yellowstone Science*. He shared his ongoing analysis of development patterns at dozens of different sites in the ecosystem.

“Developed land has increased faster than the rate of population growth. While the GYE experienced a 58 percent increase in population from 1970 to 1999, the area of rural lands supporting exurban development increased 350 percent,” Hansen wrote. He noted that riverside habitats, also known as riparian areas, rank among the most important for maintaining biodiversity. “Of the many miles of rivers flowing through private lands in the area, 89 percent of the streamsides are within one mile of homes, farms or cities. Among aspen and willow habitats, critical for wildlife, only 51 percent of those on private lands in the Greater Yellowstone area are more than one mile from those more intense human land uses.”

Hansen laid out a litany of negative cascading effects of sprawl and rural development on a wide range of species and showed that development was occurring disproportionately in exurban settings which still provide high quality wildlife habitat. Chastening is that when I spoke with Dr. Hansen again in 2024, those breathtaking trends that he identified in 2009 accelerated prior to Covid and then erupted during the pandemic. In 2022, Hansen was lead author on a paper, “Informing conservation decisions to target private lands of highest ecological value and risk of loss,” that appeared in the journal *Ecological Applications*. Scientists said protection of the last best remaining private land habitats needs to be prioritized.

What this important study led by Leon Kolankiewicz with Roy Beck and Eric Ruark does is put the permanent ecological costs of sprawl into perspective, clear-mindedly providing an overview that citizens, elected officials, public land managers, private property owners, business people and conservationists can understand. Essentially, it puts us all on the same page. Sorely lacking in the assessment of threats to Greater Yellowstone has been a vision for pondering the future and the consequences of knee-jerk, short-term thinking.

Even if one doesn't care about wildlife or something as precious as the ecological well-being of Yellowstone and the wild inheritance that Greater Yellowstone represents to this country, there are compelling reasons why it makes sense to pay attention to poorly-planned growth. Sprawl is the enemy to mom and pop farmers and ranchers, making it incredibly difficult to keep operating at scale. Rural communities have been an invaluable part of local identity. Rural sprawl also represents a financial liability to counties and should be of major concern to elected leaders who pride themselves on being fiscally responsible.

Cost-of-service studies show that many counties are struggling to meet the added need for expanded law enforcement, fire-fighting, emergency services, road maintenance, water and sewer services that new exurban denizens demand. This means that citizens who are already deeply concerned about how sprawl is already transforming the natural character of their community are given the added indignity of subsidizing the very kind of sprawl they don't want.

Just as Americans are rightfully concerned about the lack of a coherent immigration policy on the U.S. southern border with Mexico, so, too, are longtime inhabitants of Greater Yellowstone worried about the downsides of inward migration to their region. A common lament is that rural valleys prized for their peaceful ambiance, unblighted views and presence of wildlife are being transformed into the kind of sprawl synonymous with the Front Range of the Rockies in Colorado or the west side of the Wasatch pressing north and south of Salt Lake City. There, the kind of wildlife values which still exist in Greater Yellowstone are long gone and no amount of expensive re-wilding can ever recover them.

Here, I wish to offer one last aside. Today, billions upon billions of public and private dollars are being spent trying to restore the ecological function of the Florida Everglades. Billions more are being spent to try to save imperiled wild salmon populations by retrofitting or tearing down dams that have destroyed ancient spawning runs. In southern California, upwards of \$100 million is being spent completing an unprecedented wildlife overpass, across 10 lanes of traffic, to accommodate a relative handful of mountain lions and other species that are barely able to persist in that highly fractured megalopolis. Prominent scientists say the least expensive way of maintaining wild nature is not to mess up what isn't already broken and to prevent de-wilding rather than trying to address it in a reactionary way after the fact.

While NumbersUSA has produced several important analyses on the negative impacts of sprawl, this one, which you now hold in your hands or view on a screen, is arguably one of the most consequential. This study provides an opportunity for those in charge of charting Greater Yellowstone's future to think differently and depart from following the script of growth that has brought the thoughtless ruination of wildlife ecosystems in other places.

Such an overview can be useful as a policy tool for two reasons: First, it helps identify areas of high value to wildlife that need to be protected. Secondly, it highlights places that can be sensibly developed and, in that way, brings predictability, order and better efficiency to elected officials and investors in the business community. Currently, this is *not* happening in Greater Yellowstone, and, in fact, most leaders will admit that the approach to dealing with growth to date has been haphazard, contentious, poorly articulated and not well understood by the public.

Remember this about Greater Yellowstone. Yellowstone National Park, its beating heart, is one of the most recognized place names on Earth. It ranks high on bucket lists of millions of people around the world as an essential destination to visit before they die. It is also a source of common national pride for Americans and an icon of intergenerational pilgrimage whose value has only grown over time and will continue to so long as we keep it healthy.

Before you digest the findings of this unprecedented analysis, let me leave you with a couple of lessons I've learned in writing about conservation on assignments that have taken me around the world. Land conservation typifies what it means to be conservative and it invites us to contemplate how we can do positive things that benefit others beyond

the span of our own lives. In the history of the world, there are few examples where conservation has not, over time, demonstrated a profound accruing value in ways too manifold to mention. Finally, there is only one Yellowstone and one Greater Yellowstone Ecosystem. If we can't succeed in protecting this bioregion, then what hope, really, do we have for saving anyplace else?

Todd Wilkinson has been a professional journalist since 1985 and is recognized nationally for his reporting on the Greater Yellowstone Ecosystem and other wildlands of the world. His work has appeared in dozens of national magazines and newspapers, including National Geographic, The Guardian, Christian Science Monitor and The Washington Post. He has won several awards and he has penned several acclaimed books on such topics as scientific whistleblowers, the journey of Ted Turner as an eco-capitalist/philanthropist/conservationist, the life of Jackson Hole Grizzly 399 and several books on art and business. His recent book, *Ripple Effects: How to Save Yellowstone and America's Most Iconic Wildlife Ecosystem*, won three awards. He also is founder of a new conservation journalism site, *Yellowstonian* (yellowstonian.org), devoted to exploring the importance of wildlife and wildness in Greater Yellowstone, the American West and beyond.

GREATER YELLOWSTONE: AN ECOSYSTEM AT RISK

Unending Population Growth and Development Threaten the Greater Yellowstone Ecosystem

Executive Summary

AUTHORS' NOTE: One thing we know: There is an almost universal recognition of the downsides and negative side-effects of sprawl on nature and humans, no matter who we are. Another thing we know is that sprawl is the result of not thoughtfully planning for the future. And in the case of what sprawl brings to landscapes the physical impacts are often permanent, costly to remedy and cumulative. Sprawl is an expression of how and where people live. The paradox of this report is that the most serious ecological impacts in the Greater Yellowstone Ecosystem are being exacted today by a rapid influx of what could be called “lifestyle migrants” with economic upward mobility but whose ecological footprint is disproportionately larger than that which, per capita, has historically existed in the region.

We understand there are some general concerns and preconceived opinions about efforts to reduce overall immigration to the United States, especially when it comes to enforcing laws against illegal immigration. It is our desire to address these concerns and opinions up front and in good faith with a sincere hope that our unprecedented analysis on how sprawl is transforming the ecological function of Greater Yellowstone will be reviewed and digested by readers from all backgrounds and political dispositions with an open mind and an open heart.

Just as investigative journalist Todd Wilkinson writes in his inspiring Foreword to this study, let's be clear: Unless things change, unbridled growth is going to ruin many of the things that still set Greater Yellowstone apart as a national natural treasure. One of the things Todd says that is often missing from the conservation equation is empathy and compassion for wildlife being impacted by sprawl and our inability or lack of awareness in seeing the impact of human development through the eyes of those non-humans whose habitats (living spaces) are being permanently erased – this in a country and world where already much has been lost.

The fate of Greater Yellowstone is in our collective hands, so what will we do with the opportunity and responsibility to act?

Many people ask: why advocate for less immigration to America? NumbersUSA was [founded in 1996](#) to promote the recommendations of two federal commissions from the Clinton administration – the [U.S. Commission on Immigration Reform](#) and the [President's Council on Sustainable Development](#). Both commissions called for a lower annual immigration admission level for economic and environmental reasons. We encourage you, the reader, to familiarize yourself with

the history, the intentions, and the specific recommendations of these two federal commissions. Context is important.

We, the authors at NumbersUSA, have been especially influenced and inspired by the late, great landscape-scale conservationist [Dave Foreman](#). Foreman called himself a Barry Goldwater Republican in his youth but he evolved into what he self-described as “a citizen with a social and ecological conscience.” He often emphasized at public events that healthy landscapes benefit everyone and the best kind are those that inspire and are paid forward into the future. Landscapes that hold their biological diversity serve as a gauge for measuring ecological health and sound ecological health is the foundation for healthier human living. Such places are not only the wellspring for flora and fauna but clean air and water, counterpoints to the crowded blight of megacities, and safeguarding nature is a shrewd investment in the hope of having a more livable world. Of immigration and intra-migration, Foreman [wrote](#):

“We need to speak more from the question of *how many* not *who*. To get out of the thicket, we need to help people understand that cutting immigration is not anti-immigrant and not tied to nativism or racism, but tied directly to our ecological future.”

That is a powerful statement! Its power rests in its truth and it gets at the vexing question of humans loving wild fragile places to death and the more recent trend of building upon them, sealing them forever in tombs of asphalt, concrete, steel and fragmentation that disconnects us from the healthy, health-nurturing biota. There is a parallel between unplanned immigration that occurs across national borders and “intra-migration” that occurs inside countries.

By now it shouldn't be a secret that America's immigration policy (including legal and illegal admissions) is the primary driver of population growth nationally. Growth in our numbers has long been linked to environmental degradation and a deteriorating quality of life for humans and non-humans alike. One compelling example of this is [sprawl](#), which Todd Wilkinson rightly asserts has an established record of being a thoughtless destroyer of wild ecosystems. Sprawl is not only a serious ecological concern and an economic, social and cultural one, but it represents the greatest ongoing threat to the integrity of public lands and public wildlife of which *all of us* are stakeholders. This is empowering, not disempowering. A rare wonder like Greater Yellowstone is something that we, together, can choose to bequeath intact to future generations. Fifty years from today, people can look back and say we protected habitat for grizzlies and wolves, bison, game species, open space and terrain vital to working ranchers and farmers and be grateful. Or, we can ignore the trendlines visible on the ground. It's our choice.

This is why NumbersUSA has produced the report you have in front of you. We hope it helps serve as a tool for thinking about a special ecosystem. We welcome your open-minded consideration and your critical review of this analysis. Our goal is your goal: to preserve a wild and thriving Greater Yellowstone and prevent the loss of this uniquely beloved national natural treasure. We have one chance to get this right. Together, let's have a meaningful discussion. Let's succeed together.

America’s Crucible of Wildlife and Wilderness Conservation

In his Foreword to this study, veteran Greater Yellowstone investigative journalist and author Todd Wilkinson writes that:

Greater Yellowstone, if you’re unfamiliar with it, has Yellowstone, the first national park in the world, at its geographic heart. The ecosystem that encompasses the park is today considered the most iconic wildlife-rich bioregion in the Lower 48 states, renowned especially for its concentration and diversity of large free-ranging native mammal species rescued from near-annihilation at the end of the 19th century.



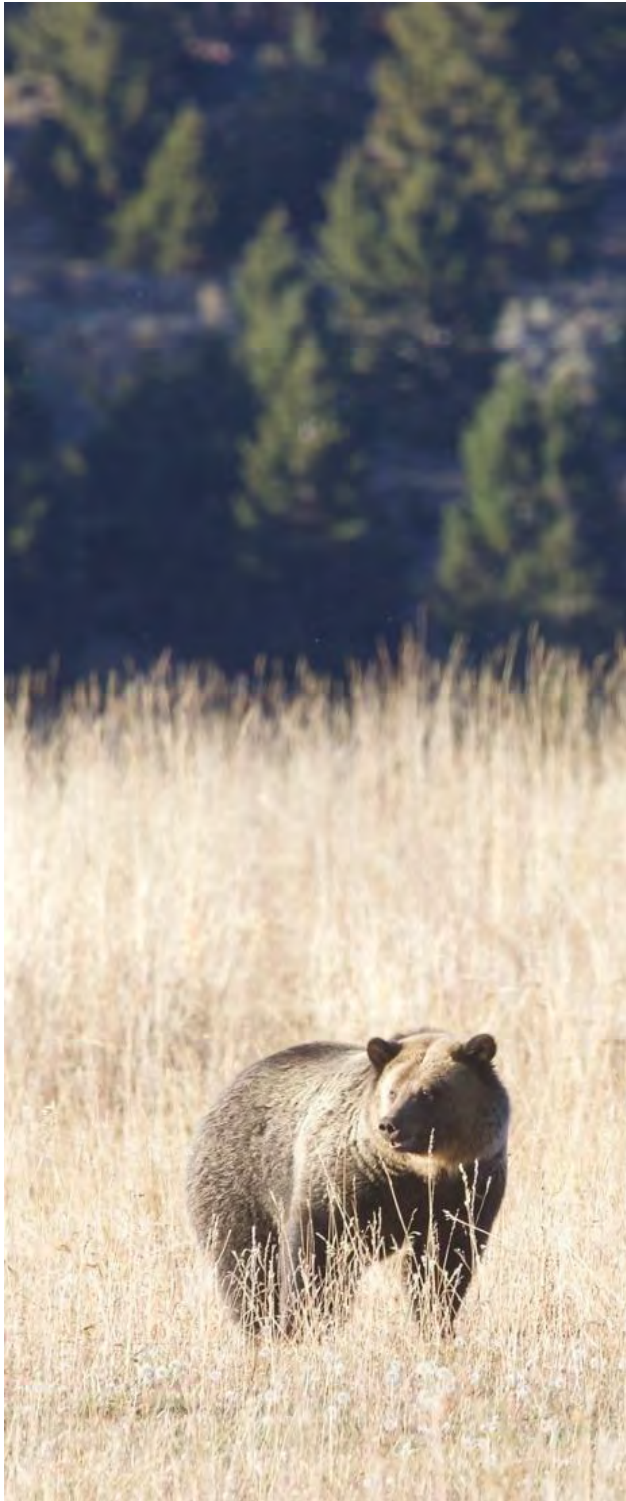
Figure ES-1. Bison overlooking the rapidly growing Gallatin Valley of Montana, in the Greater Yellowstone Ecosystem north of Yellowstone National Park

Unless otherwise noted, photos in the Executive Summary are by wildlife photographer Holly Pippel

Wilkinson goes on to compare the Greater Yellowstone Ecosystem (GYE) with the world-renowned Serengeti Plain in East Africa, a comparison also invoked in our study’s first chapter: “Greater Yellowstone Ecosystem: America’s Besieged Serengeti.” A visitor to Yellowstone and Grand Teton national parks at the core of the GYE will soon notice their international reputation. This is borne out by the sight of many foreign visitors paying homage to the majestic mammals of America’s own Serengeti and the sound of the many languages in which they extol the parks’ scenic and geological extravaganzas.

The GYE is the only substantial ecosystem remaining in the Lower 48 states (i.e., excluding Alaska and Hawaii) which still boasts the entire array of species here in 1491, the year before Europeans

“discovered” the Western Hemisphere. Among the charismatic megafauna found then and now are grizzly and black bears, timber wolves, coyotes, mountain lions, wolverines, moose, elk, mule deer, bison, pronghorn, and mountain sheep.



Yet a century ago, three of these species – the grizzly bear, wolf, and bison – had already been virtually eliminated from Greater Yellowstone and much of the American West – or were well on the way to being so. The relative recoveries of their GYE populations to stable or increasing numbers are in fact great success stories in wildlife conservation, and the science, management, and crucial popular support that undergird that.

Of the GYE’s 23 million acres, about three-quarters are public lands and the remaining one-quarter privately-owned, mostly working farms and ranches, although that is changing as the region’s human population burgeons and more and more areas are paved over or built upon. Such development accommodates the needs and demands of the newcomers for developed or urbanized land, not just their homes, driveways, and patios, but related commercial areas, utility infrastructure, streets and roads, schools, office parks and other job sites, recreation areas (e.g., soccer fields, tennis courts, golf courses), and so forth. In aggregate, the average resident uses or “consumes” more than half an acre of developed or urbanized land.

Figure ES-2. Grizzly bear in the GYE



Figure ES-3. Working farms and ranches are an important land use on lower elevations in the GYE

As Wilkinson notes, four factors once helped safeguard the GYE’s wild character: geographic remoteness, the sheer extent of public lands, low human population, and the fact that most private lands were either agricultural (farmland/ranchland) or undeveloped open space. Nowadays however, three of these four factors – remoteness or geographic isolation, low human population, and development confined to urban areas – no longer prevail.

The GYE’s private lands are situated mostly in river valleys and lower-elevation settings. Because of this they play a pivotal ecological role out of proportion to their relatively small area. As Wilkinson says, they “are like vital connective tissue holding together the superstructure of public lands.” Larger mammalian species in particular depend on habitats on these private lands, especially in the punishing Northern Rockies winters.

A short hike from the visitor center at Grand Teton National Park sits the Murie Ranch, dubbed the “heart of American wilderness” by the National Park Service. Here for much of the 20th century lived various members of the Murie family: Wilderness Society director and wildlife biologist Olaus Murie, his conservationist wife and author Margaret (Mardy), his brother and fellow wildlife biologist Adolf (author of the classic study *The Wolves of Mount McKinley*), and an evolving assortment of family members, friends, colleagues, and wilderness enthusiasts and advocates.

Greater Yellowstone is a crucible of the American wilderness preservation movement nearly as much as it is for conservation biology. As writer, filmmaker, and conservationist Lois Crisler famously observed in her 1956 classic *Arctic Wild*: “Wilderness without wildlife is just scenery.” Human overpopulation is incompatible with both authentic wilderness and the wildlife denizens of wilderness. This was recognized clearly and forcefully by the late U.S. Senator Gaylord Nelson, the “father” of Earth Day, and in the final stages of his illustrious career, a counselor to the Wilderness Society. At a March 2000 speech in Madison, Wisconsin, Nelson asked the audience: “With twice the population, will there be any wilderness left? Any quiet place? Any habitat for songbirds? Waterfalls? Other wild creatures? Not much.”

A searing expression of this fundamental incompatibility reached us as we were drafting this executive summary. According to an October 23, 2024 press release of the National Park Service:

On the evening of Tuesday, October 22, 2024, grizzly bear 399 was fatally struck by a vehicle on Highway 26/89 in Snake River Canyon, south of Jackson, WY outside of Grand Teton National Park. The bear's identity was confirmed through ear tags and a microchip.



Figure ES-4. Grizzly bear 399 with one of her 18 cubs
National Park Service photo by C.J. Adams

Grizzly bear 399, known as "the Queen of the Tetons," was a 28-year-old female believed to have been born in 1996; she was documented to have birthed 18 cubs, raising eight of them to maturity. She was the most beloved bear in America and perhaps the world. 399 was even the subject of an adoring PBS *Nature* documentary earlier this year. But in the wake of the news of

the all-too-predictable manner of her demise, one heartbroken conservationist wrote: “Such a dishonorable end to her majestic life and contribution to the GYE.”

399’s tragic death sadly symbolizes the implacable, unrelenting reality faced by Greater Yellowstone’s large mammals as the human population, visitation, development/sprawl, and vehicular traffic all increase without apparent limit in this beleaguered wildlife paradise. **This is what our Greater Yellowstone sprawl study is about.**



Figure ES-5. It’s not just grizzly bears; elk startled by oncoming vehicle

Population Growth, Development, Sprawl, and Habitat Loss in the GYE

Greater Yellowstone’s iconic wildlife populations – while in many respects better off today than they were half a century ago or a century ago due to scientific, modern wildlife management and broad public support – nonetheless face a number of pernicious, stubborn, and growing threats, among them novel diseases, invasive species, jurisdictional squabbles, and climate change. Arguably the most significant threat of all though is habitat loss, fragmentation, and blockage of ancient ungulate migration corridors because of widespread, rampant development.

In recent decades, population growth, development, and sprawl on private lands within the 20 counties that comprise the GYE have permanently converted hundreds of square miles of open space – all of it agricultural land, wildlife habitat, or both – into developed or urbanized land.

Resulting habitat loss and obstruction of traditional wildlife migration corridors have adversely impacted the ecological integrity of the GYE and its extant populations of large ungulates and carnivores. Worldwide, habitat loss and fragmentation are widely acknowledged as the single greatest threat to biodiversity and viable wildlife populations.



Figure ES-6. Squeezed out: Wintering elk in the GYE’s Gallatin Valley are crowded into fragmented patches of habitat as they lose ground to sprawling residential development

The GYE supports long migration corridors for elk, pronghorn, and mule deer that extend well beyond national park and forest boundaries into and across private lands vulnerable to development. Over the coming decades, current and projected rates and patterns of development in much of the GYE would severely constrict or wipe out key wildlife migration corridors.

Study Methods and Data Sources

This study quantifies the respective roles of two fundamental factors that drive increasing development on non-federal (mostly private) lands in the 20 counties that comprise the GYE: 1) population growth, and 2) increasing per capita land consumption (i.e., declining population density).

Our team uses a mathematical formula originally developed to assess the relative weights of increasing population size and per capita energy use in determining the nation’s aggregate energy consumption. This “apportioning” approach can be applied to any natural resource whose aggregate consumption is increasing over time, due to a changing number of resource consumers,

changing per capita resource consumption, or both. In this study, rural, undeveloped land – that is, farmland/ranchland and wildlife habitat – is the natural resource in question.

We use “longitudinal” data (which track changes over time in something we are measuring) from two federal agencies: the Natural Resources Conservation Service (NRCS, formerly the Soil Conservation Service or SCS) of the U.S. Department of Agriculture and the U.S. Census Bureau (USCB). NRCS National Resources Inventories (NRIs) have estimated land use and cover on America’s non-federal lands county-by-county every five years since 1982.

One of the NRI’s land use categories is “developed land,” which documents changes in 5-year intervals in the estimated area of developed or built-up/paved lands in any given county, such as the 20 counties of the GYE. USCB estimates county populations annually. With both datasets available from 1982 to 2017 (35 years), we derived estimates of the percentage of sprawl (defined as conversion of rural to developed land) in the GYE related to population growth and to increasing per capita developed land consumption.

“Per capita developed land consumption” refers to how much developed or urbanized land is associated with any given resident of a county on average, and it is simply the area of developed land in a county (according to the NRI) divided by the county’s population (according to the USCB).



Figure ES-7. Example in the GYE of what would count as “Developed Land” in the NRI

Study Results: Population Growth is the Major Driver of Sprawl in the GYE

The area of developed non-federal land in the 20 GYE counties grew from 345,300 acres (9539.5 square miles) in 1982 to 497,400 acres (777.2 square miles) in 2017, an increase of 44% or 152,100 acres (237.7 square miles). Approximately 67% (161 square miles) of this increase was related to population growth and 33% (79 square miles) to increasing per capita developed land consumption (Figures ES-8 and ES-9).

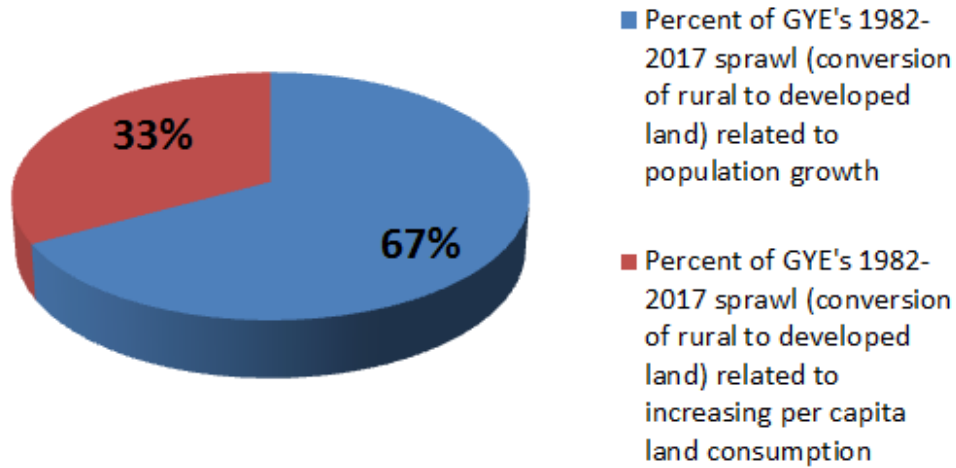


Figure ES-8. Sprawl Factors (Increasing Population and Increasing Per Capita Land Consumption) in GYE Counties, 1982-2017

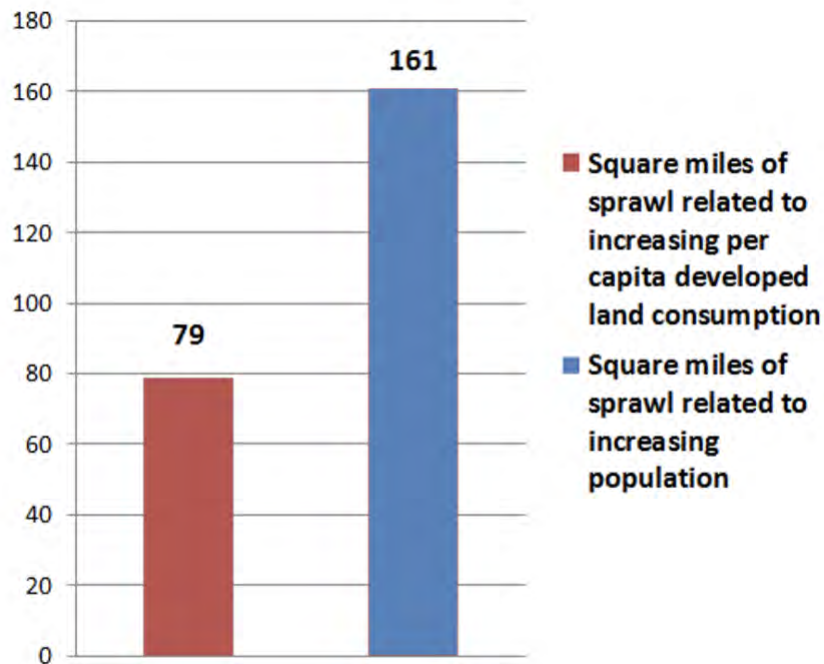


Figure ES-9. Rural Land Lost to Population Growth vs. Per Capita Sprawl in the 20 Greater Yellowstone Ecosystem Counties, 1982-2017

In the most recent 2002-2017 subset, an even higher portion of the sprawl, 85%, and rural land lost to development were related to population growth (Figures ES-10 and ES-11). These results may underestimate the adverse effects of low-density exurban sprawl on habitat fragmentation and large mammal migration. This driver has grown especially pronounced since the Covid-19 pandemic, as wealthy out-of-staters have moved into the GYE from places like California, building large homes and ranchettes on often fenced large lots, which themselves can pose barriers to large mammal movement (Figure ES-12); this trend shows no sign of letting up.

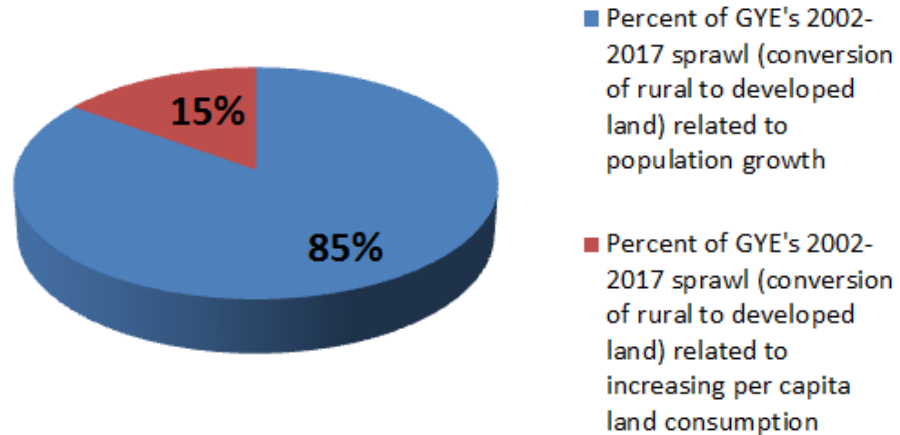


Figure ES-10. Recent Sprawl Factors (Increasing Population and Increasing Per Capita Land Consumption) in GYE Counties, 2002-2017

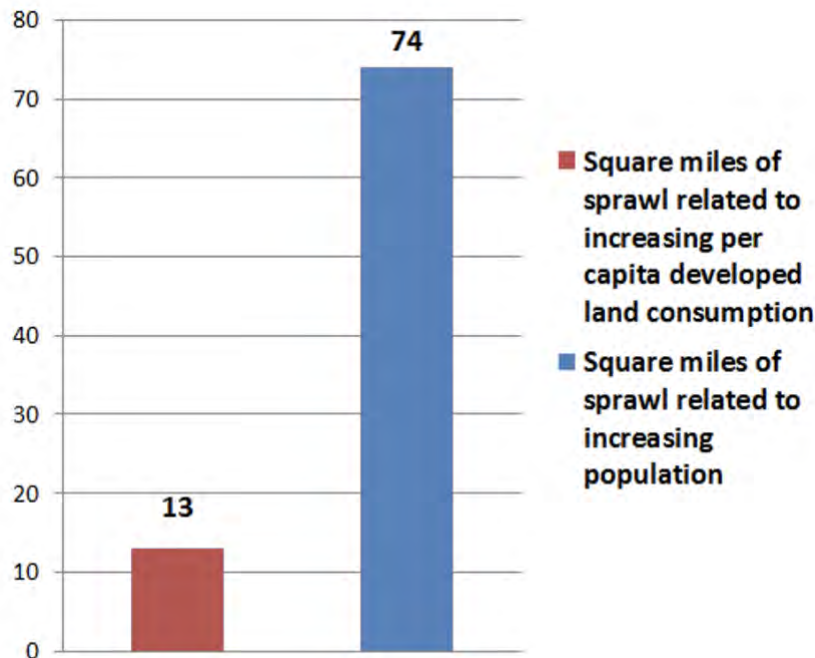


Figure ES-11. Recent Rural Land Lost to Population Growth vs. Per Capita Sprawl in the 20 Greater Yellowstone Ecosystem Counties, 2002-2017



Figure ES-12. Leaping over a property fence; not all wildlife can or do make it across such proliferating barriers

Action needed at both local and national scales to avoid de-wilding the GYE

Under current demographic trends in the region, by 2060, the aggregate population of the GYE counties is projected to grow to 763,471, from 538,702 in 2022, an increase of 224,769 or 42%.

If average population density were to remain constant, this growth would lead to the conversion of approximately another 231,500 acres (362 square miles) of non-federal rural land (e.g., natural habitat, ranchland) to developed properties. These newly developed areas would be unevenly distributed at varying densities throughout the GYE. In sum, their aggregate area and configuration – and the concomitant habitat loss and fragmentation – would entail potentially significant adverse, long-term direct, indirect, and cumulative effects on wildlife, especially large mammals with large home ranges and/or long seasonal migration routes.

Avoiding this unacceptable, unthinkable outcome will require a combination of: 1) effective local, regional, and statewide planning measures and 2) commitment to national population stabilization. Each is necessary, neither is sufficient in itself, to preserve the unique character and iconic wildlife of the world-class GYE.

With regard to #1, examples of such measures include:

- Smart growth and growth management tools

- Land use zoning
- Transfer of development rights
- New funding sources for land protection
- Urban growth boundaries
- Open space bonds and local land trusts
- Compact development

These measures and others have all been implemented with varying degrees of success in communities throughout the country. They would have the net effect of accommodating – not stopping – new population growth by increasing population density on new and already developed areas. In the GYE, these planning measures would require local political support and cooperation within and across three states and multiple jurisdictions.

A public opinion survey conducted of Idaho, Montana, and Wyoming likely voters by Rasmussen Reports in conjunction with our study indicates that nearly two-thirds do favor using such planning tools as a means of limiting sprawl.

It should be noted that these measures, even if effective at reducing the rate of habitat loss and fragmentation, would do little to slow the growth of vehicular traffic on regional highways that in and of itself will increase wildlife mortality from more collisions.

With regard to #2 above – commitment to national population stabilization – this is also crucial because demographic pressures to migrate to “last, best places” like Greater Yellowstone will only intensify in coming decades if overpopulated states such as California and Texas continue to fill up and see their quality of life eroded.

Figure ES-13 depicts four population projections to the year 2100 for the United States based on Census Bureau methodology; these scenarios differ by assumed levels of net immigration into the country. With U.S. fertility predicted to remain well below replacement level (where it has been for the past half century), immigration is expected to drive almost all future U.S. population growth. Net migration of 3 million in the highest projection in ES-13 would lead to **a U.S population of 650 million by 2100, a near-doubling of our present numbers.**

It is worth noting that in 2023, under the Biden administration’s policies, America experienced net migration of approximately 3 million, thus these numbers, while unprecedented and unsustainable, are not far-fetched.

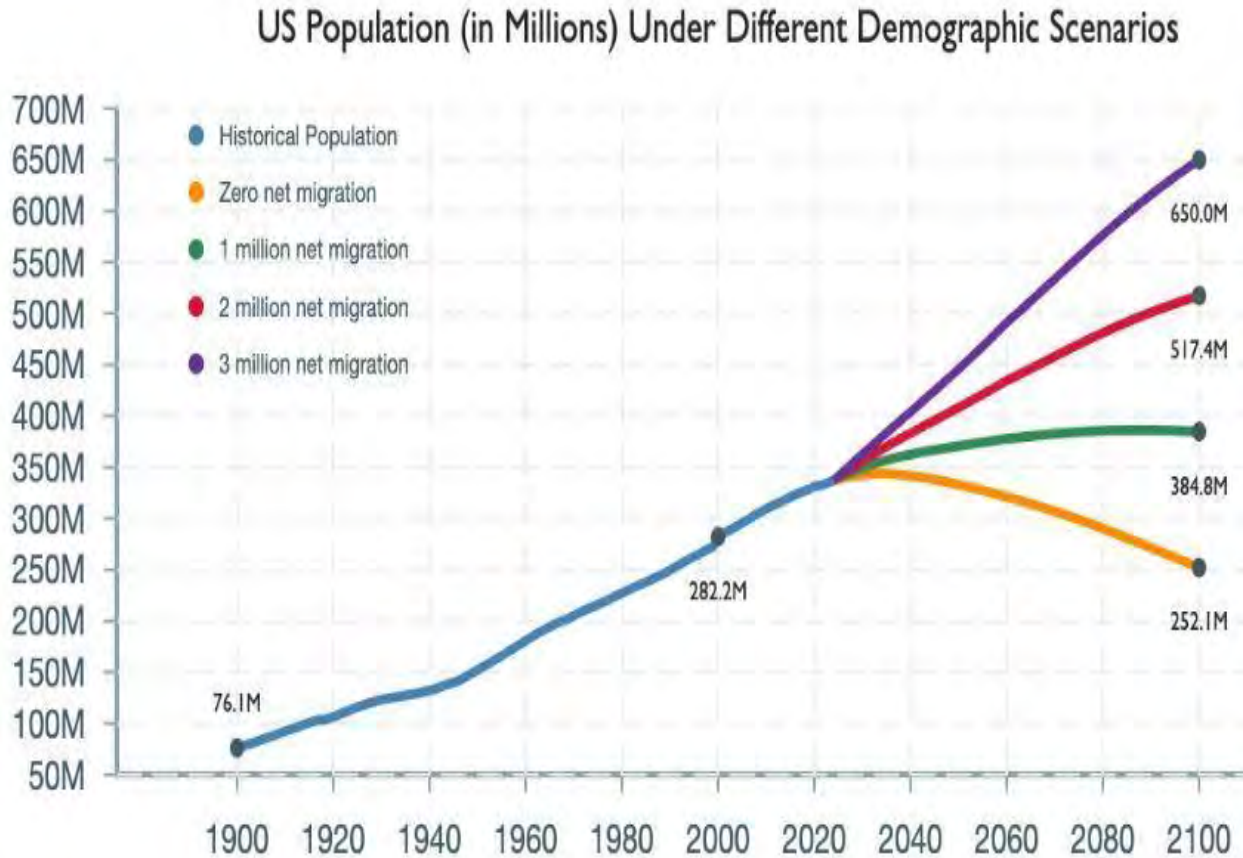


Figure ES-13. U.S. Population Projections to 2100 under Various Immigration Scenarios

Americans in general and residents of the three GYE states in particular are concerned about population growth and support stronger measures to slow it down, at both the national and regional levels. In the July 2024 Rasmussen Reports survey of 839 likely voters in Idaho, Montana, and Wyoming that accompanied our study:

- 68% of respondents indicated that projected future population growth and development would have a very or somewhat negative effect on Greater Yellowstone’s wildlife.
- 68% indicated that local and state governments should make it more difficult for people to move to the region from other states by restricting development.
- 59% supported the federal government reducing annual immigration rates to slow down national population growth.

To reiterate, both local and national efforts are essential to ensuring the future of wildlife in Greater Yellowstone.

Final Thoughts and Parting Words

Earlier we mentioned the sad symbolism of the tragic death of grizzly bear 399 in late October 2024, fatally struck at night by a moving vehicle on a highway in the Snake River Canyon near Jackson. She was the single most beloved bear in America and likely the world.

Our colleague and Greater Yellowstone's most eloquent defender Todd Wilkinson wrote a moving essay for *National Geographic* on why 399 mattered to Americans and the world. He shared some additional thoughts with us via text message:

...399 was struck and killed on a highway, one of many in Greater Yellowstone being busier due to growth-related issues and those traffic lanes are fragmenting habitat.

The solution is not merely to build more expensive wildlife bridges but better plan to protect habitat on both sides of the highway, as sprawl is rapidly shrinking options for the region's world-class wildlife to navigate...

399's tragic death should be part of a wake-up call and the best way people can honor her legacy is by engaging in serious ecological thinking that ensures grizzlies following in her wake have the secure habitat they need to sustain a healthy population of bears. What's good for bears is also good for hundreds of other species, large and small.



Figure ES-14. This should be the future of the GYE...



Figure ES-15. ...not this

The Greater Yellowstone Ecosystem is a national treasure, without a doubt, but even this “pristine” area is under threat by growth and development. The allure of “wild, wide open” spaces is why so many people wish to visit, and why an increasing number of people are choosing to live there permanently. This is the conundrum we have created for ourselves. We are inherently drawn to the beauty of undeveloped land, and in order to be nearer to “nature,” we develop those lands, destroying their wild character forever.

As environmental activist Jordan Perry so succinctly put it, “The nature of consumption is the consumption of nature.” There is no way around it, humans must consume in order to survive and propagate. But at no time before us has so much been consumed by so many. There is more to life than maintaining three percent annual GDP growth, but you wouldn’t know it by listening to experts, elected leaders, and even many of the louder voices within the environmental movement, who mostly support perpetual growth as long as it’s “smart” or powered by supposedly “green, renewable” energy sources.

Most Americans have been conditioned to think of “the environment” in abstract terms, not as the place where we all live, wherever we live. We need to change that way of thinking. Every action an individual takes has an effect on *our* environment, and the diminution of “wild, wide open” spaces is essential to human flourishing. Collectively we must come to terms with that reality while committing ourselves to minimizing irreversible damage to ecosystems. When it comes to the Greater Yellowstone Ecosystem, that means realizing that there are limits to growth and acting accordingly; or admitting that we are committed to the proposition, as ludicrous as it is, that we can grow forever while still managing somehow to live sustainably.

Those who wish to read the entire sprawl study can find it at:
<https://www.yellowstonesprawl.com>



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