Wild For All: The Rationale

Eric W. Sanderson[1], Everett W. Sanderson[2], and Caleb McClennen[1]

[1]Wildlife Conservation Society, 2300 Southern Boulevard, Bronx NY 10460 USA

[2]Cornell University, Ithaca, NY 14850 USA

About the authors: Dr. Eric W. Sanderson is a Senior Conservation Ecologist in the Global Conservation Program of the Wildlife Conservation Society (WCS), specializing in landscape and urban ecology, and the best-selling author of Mannahatta: A Natural History of New York City and the critically-acclaimed, Terra Nova: The New World after Oil, Cars and Suburbs, and editor of three other scientific volumes. Everett W. Sanderson is a recent graduate of Cornell University with a degree in Environmental Science and Applied Economics. Dr. Caleb McClennen, trained in marine science and environmental policy, is Vice President for Global Conservation at WCS. Comments about this white paper can be addressed to esanderson@wcs.org.

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Introduction

We live on a fabulously beautiful world, elegantly shaped to support our lives and the lives of every other organism on planet Earth. Today only fragments of this natural beauty and functional diversity remain, protected in parks, community reserves, and other well-conserved areas. These places are strongholds for wildlife and wild places and critical reminders of the abundance, productivity, and daily spectacle of nature that once enlivened the entire planet.

On a global scale, these strongholds are under increasing threat from the needs, appetites, and inventions of today's human population. Human civilization has labored for the last 12,000 years to domesticate nature (Ellis et al., 2021; Kareiva et al., 2007), and here in the early 21st century, humanity had reaped the rewards: a diverse and growing population nearing eight billion (Dyson 2010; United Nations 2019); declines in extreme poverty (World Bank 2018; though see World Bank 2020); improvements in health (Pozzi and Farinas 2015) and education (Kaestle 1985; Vágvölgyi et al., 2016); advances in arts, literature, science, and technology; increased freedoms for some (Treisman 2020; Cranmer et al., 2020); modest wealth for many and extraordinary wealth for a few (Maddison 2007; Piketty 2014). However,

the costs have also been enormous in terms of human-induced climate change (Masson-Delmotte et al., 2021), altered disturbance regimes including fires, floods, hurricanes, and droughts (IPCC 2022); loss of biodiversity (IPBES 2019) and reductions in abundance (WWF 2020) and the outright extinction of species (Harfoot et al., 2021); depletion of ecosystem services such as the provision of clean air, water, seafood, and fertile soil (IPBES 2019); disappearing wilderness (Watson et al., 2018); pressures on indigenous people and lands (de Araujo Lima Constantino 2016; O'Bryan et al., 2021); and increased vulnerability to pandemic disease (Guégan et al., 2020; Guernier et al., 2004). We inhabit our shared world and pursue our ambitions under the assumption that the planet provides a safe and hospitable environment, but the science is clear (Steffen et al., 2015; Watson and Venter 2019): we are rapidly and seriously undercutting the planetary integrity on which all earthly life depends, including our own. Experiencing wild places reminds visitors both of what can be gained (Sanderson et al., 2018; Sandifer et al., 2015) and what we stand to lose (IPBES 2019; IPCC 2022) if we continue this course.

Seen more positively, national parks and other wild spaces are causes for celebration of the enduring wonders of the natural world. They testify to the remarkable efforts that created them, maintained them, and ensured that national parks and protected areas work for people and nature (Locke 2009; Woodley et al.,

2019). Nature conservation through protection is an effective method for keeping the natural world alive (e.g. Geldmann et al., 2019), but in the crowded, challenged 21st century, is not in itself sufficient. Drivers of habitat and species loss are often far removed the parks and wild spaces. The food people eat, the cell phones we use, the way we travel, even the time we spend in nature, are all linked to the health of the planet. By choosing to act for nature, we not only contribute to the sustainability of life on Earth but enhance our own quality of life.

The purpose of this white paper is to support an initial set of recommended individual actions for Wild for All, an effort to encourage more people to experience the wonders of nature, and to take steps to protect the world's wildlife and wild spaces – not only in faraway places, but also the everyday wild at our doorsteps too. Wild For All is a collaborative initiative with the Wildlife Conservation Society (WCS), Freeborne Impact, and Higher Ground. The campaign was launched in conjunction with the Netflix series Our Great National Parks, a five-part series narrated by President Barack Obama. Wild For All is powered by Count Us In."

Simple personal choices from altering eating patterns to reducing waste can have globally significant effects for biodiversity and ecosystems (IPBES 2019). The choices individuals make not only directly reduces one's personal ecological footprint, but also has the potential to positively influence others who see or hear about a person's

behavior (Maki et al., 2019). Examination of shared socioeconomic pathways illustrates that globally, if society turned toward sustainability, gains could be made in health, climate change, and the environment without sacrificing economic development (O'Neill et al., 2014; Dellink et al., 2017; Chaudhary and Mooers 2018; van Puijenbroek et al., 2019). Although society-at-large needs to make a shift, each of us individually can make a difference. And our examples make a difference too.

This paper suggests an initial list of twenty-one actions (Table 1) that individuals can take now to make better choices for nature. This list is not exhaustive or even a list of the most effective actions. Rather here we have focused on actions most relevant to individuals in developed nations such as the United States. Although on a global scale, high-income countries and individuals represent a minority of the total population, they have a disproportionate impact on the climate (Hickel, 2020) and nature writ large (Lenzen et al., 2013; Koslowski et al. 2020). These are actions designed to be what people can choose to do right now to make a difference for nature. Hence the campaign: Wild for All.

In choosing these initial actions, we were guided by the following four criteria:

- Accessibility –actions anyone choose to do today, right now, no matter where they live;

- Shareable/Replicable –actions that a person can do more than once and/or can share with someone else, including by taking a selfie or writing a social media post;
- Effective –actions that science has empirically shown have an impact; and
- Nature-focused –actions that help address the six key drivers of decline in the natural world outlined below.

In the following sections of this report, we review briefly drivers of global environmental decline, then describe a set of 21 recommended actions mapped qualitatively to those drivers. For each action, we provide a brief rationale for those activities and suggest what individual people can do.

We accompany this narrative with two appendices. In Appendix 1, we describe the calculation methodology for the Wild for All impact metrics associated with each action. In Appendix 2, we describe the Wild for All bonus point system, which is based on the impact metric calculations as well as a qualitative assessment of accessibility, wildness, and other factors. Appendix 3 acknowledges our reviewers and Appendix 4 provides a glossary of measurement units and abbreviations.

Drivers of Global Environmental Decline

The last fifty years have been an enormously difficult period for planet Earth. The Global Assessment of Biodiversity and Ecosystem Services (IPBES; see IPBES 2019) succinctly summarizes the challenges based on a review of over 2,000 scientific studies. According to the IPBES, five categories of human impact on nature are driving declines in species status and ecosystem function: habitat loss, direct exploitation of species, climate change, pollution, and invasive alien species. To these threats, we add a sixth: the loss of a connection to nature. Some of these troubling trends are global and consistent, others vary from place to place; yet all signs shows that society needs to plot a new course toward reinforcing, rather than degrading, the Earth's ecological potential (Steffen et al., 2015; Sanderson et al., 2002; Wackernagel and Rees 1998).

In terms of wildlife and wild places, the following threats need special attention (IPBES 2019):

> Habitat loss: Approximately two-thirds (66%) of global biodiversity loss was caused by direct land use, such as conversion for agriculture, clear cutting and harvests of forests, and human encroachment on previously wild places by the insertion of new roads (Wilting et al., 2017). Bottom trawling fisheries destroy vulnerable and long-lived

communities in the seabed, impacting the structure and function of unique marine habitats (Sala et al., 2021). A critical way we slow, and in some cases halt, habitat loss is through protection, for example, in natural parks and reserves, indigenous areas, and other effective area-based conservation measures (OECMs) (Maxwell et al., 2020). Such places place legal or normative limits on human activities in order to conserve nature and natural processes. Such efforts have been shown to be broadly effective in limiting anthropogenic pressures (Geldmann et al., 2019), restoring wildlife populations (Zupan et al., 2018; Watson et al., 2014), and amplifying ecosystem services (Xu et al., 2017; Benetti & Langemeyer 2021; Leenhardt et al., 2015) while providing locales where people can visit, connect to, and in some cases, sustainably use (e.g. Gosal et al., 2021; Campos-Silva et al., 2021).

Direct exploitation: Some 70% of threatened species, including fish, shellfish and sea birds, are threatenedby fishing (O'Hara et al., 2021). Among other fishery-associated drivers, both direct catch and inadvertent catch (i.e. bycatch) contribute to this decline (Pauly & Christensen 1995; Guilllen et al., 2019; Kroodsma et al., 2018). On land, direct exploitation (especially hunting and capture) for the illegal

wildlife trade ('t Sas-Rolfes et al., 2019) is driving declines in many iconic species, especially megafauna, long celebrated in myth and culture, including elephants (Underwood 2013; Zhou et al., 2018), rhinoceros (Haas and Ferreira 2016; Chanyandura et al., 2021), tigers (Nijman et al., 2019; Villalva and Moracho 2019), jaguars (Arias et al., 2021), macaws (Chan et al., 2021; Tella and Hiraldo 2014), and turtles (Sung et al., 2021; Veríssimo 2020). Other species are threatened simply by overconsumption, meaning more individuals are taken than can be naturally produced each year (Robinson & Bennett 2000).

Climate change: Land use change, exploitation of the seas, and particularly fossil fuel consumption for industrialization, transportation, and heating and cooling have changed the climate (IPCC 2022). Human activities have increased the concentration of heat-capturing "greenhouse gases" and caused changes in the reflectivity and absorption of the sun's energy, leading to climate change (US EPA 2021). Climatic shifts are estimated to have caused 34% of total loss in species abundance already, with greater losses to be expected into the future as the climate changes more (Wilting et al., 2017). The climate influences every living creature on Earth in some way (Parmesan and

Singer 2022). Changing climates misalign the timing of biological phenomenon (e.g. is the pollinator present when the flower opens? Is the bird or fish present when the insects are flying?), causes species to migrate forcing them into conflict with human structures, decreases biological productivity, increases extreme weather and fire, and otherwise changes the template which evolution has trained plants and animals to expect (Walther et al., 2002; Burrows et al., 2014; Parmesan and Yohe 2003). In the oceans, the reaction of increased CO_2 with the water results in chemical changes, causing the seawater to become more acidic leading to unknown ecological effects (Laffoley et al., 2017). Bottom trawling, a fishing technique of scraping of the sea floor, has recently been shown to release trapped greenhouse gases in ocean sediments (Sala et al., 2021), further contributing to climate change.

Pollution: Aside from carbon pollution, humanity dumps an inordinate amount and diversity of waste into the environment each year. Over 80% of global wastewater is discharged into the environment without treatment (UN Water 2022). Between 300 – 400 million tons of heavy metals, chemical solvents, toxic sludge, and other wastes from industrial facilities are dumped into the world's waterways each year

(IPBES 2019). Excessive or inappropriate application of fertilizers change the chemistry of waters by increasing nitrates and phosphates, causing algal blooms that seize up coastal and freshwater streams and lakes and ecosystems (Breitburg et al., 2018). More than 400 low-oxygen ("hypoxic") zones caused by fertilizer pollution have been identified, collectively impacting an area of more than 245,000 km^2, equivalent to the area of the state of Wyoming (IPBES 2019). Municipal solid wastes discarded per person more than doubled in the first decade of the 21st century (Hoornweg & Bhada-Tata, 2012). An enormous amount of plastic waste ends up in the ocean: one study estimated that by 2050, 12,000 metric tons of plastic waste will accumulate in the environment, with worrying effects on biodiversity from plankton to top predators (IPBES 2019).

Invasive alien species: An invasive alien species is one that has been released from the constraints of its home environment and reproduces uncontrollably, wresting space and resources from the native species (Meyerson and Mooney 2007; Richardson and Rejmánek 2011): such as the invasive annual grasses on California's hills (HilleRisLambers et al., 2010), zebra mussels threatening the Great Lakes (Strayer 2009), or

> invasive vines taking over New York City parks (McPhearson et al., 2013). In some cases, the spread of these species are caused by human choices in the past; in other cases, new introductions, including of disease organisms such as COVID, are made by choices of people today (Roche et al., 2020). The Intergovernmental Panel on Biodiversity and Ecosystem Services estimated that nearly one-fifth of the Earth's surface is at risk of plant and animal invasions and that the number of alien species has doubled in the last 50 years (IPBES 2019).

The expansion of the human footprint over the past half century has had dramatic impact on human populations as well (Venter et al., 2016). The town of Paradise, CA, burned to the ground because of deadly fires exacerbated by climate change (Goss et al., 2020; Williams et al., 2019); floods break levees and submerge towns and fields in the Midwest (Davenport and Diffenbaugh 2021; Byun et al., 2019); and heavy rains swell basements in New York City, drowning people too poor to live anywhere else (Hanchey et al., 2021). The long-term degradation of ecosystems has depleted soils, poisoned water, and dirtied air, making the world less habitable for people and other species (Smith et al., 2013; Borelli et al., 2017; Borelli et al., 2020; Biswas and Torajada 2018; Fowler et al., 2020). The COVID pandemic taught that no matter how much wealth one has, a person's life can be irrevocably changed by a faraway

microscopic virus brought into contact by humanity intruding on the world's last wild places (Nicola et al., 2020; Dobson et al., 2020). COVID became a global public health catastrophe but began as the ecological mistake of bringing a virus, which appears formerly to have been confined in bats (Mallapaty 2021), into a city where it had proximity to people (Maxmen 2022). Health, environmental protection, and climate change all have a common root in the undermining of ecological integrity through human activities.

It is also important to note that the burdens of a depleted environment are not equally distributed either among wildlife or people. Environmental burdens tend to fall on the poor, the powerless, and the voiceless (Giljum and Eisenmenger 2004; Schüle et al., 2019). International trade displaces environmental impacts, disconnecting the individual from environmental impacts their consumption choices cause. One study found that 30% of global threats to biodiversity are driven by international trade (Lenzen et al., 2013). Simple acts like drinking coffee, stopping for a burger, or choosing from a one fish dish over another have real effects on wildlife and wild places on the other side of the world.

Finally, as humanity is increasingly online, urbanized, and otherwise removed from day-to-day contact with natural processes the indirect social, economic, technological, governance, and conflict associated drivers of nature's decline are

compounded by a lack of connection to nature (Keaulana et al., 2021; Ives et al., 2018; Dorninger et al., 2017). The world is large and nature complex (e.g. Klapwijk et al., 2018), which can make it difficult for everyday citizens, caught up in everyday concerns, to understand the danger posed by human threats to nature (McAfee et al., 2019; Selinkske et al., 2018). People make decisions; what they are thinking matters for the decisions they make (Dewulf et al., 2020). Measuring, understanding, and acting to improve everyone's connection with nature is imperative in the 21st century (Keaulana et al., 2021; Kleespies et al., 2021; Hatty et al., 2020).

Wild Actions for All

Below we review the impacts of 21 individual actions that anyone can take to reduce their impact on nature and wild spaces as related to the drivers of biodiversity decline (Table 1). We discuss them through seven impact categories regarding the choices we all make about what to eat and how to use energy, to move, to limit waste, to help nature directly, to connect to nature, and how we talk about nature and our lives. It is important to note that some of these actions directly contribute to nature and our connection to it, while others work indirectly by decreasing the impact of our consumption choices, with near and far effects (e.g. Zeng & Ramaswami 2020, Hatty et al., 2020).

Table 1. Relative impacts of consumption choices in terms of the diminishing the drivers of biodiversity loss

Choices Recommended Actions	Drivers of Biodiversity Loss Habitat Loss	Direct Exploit-ation	Climate Change	Pollution	Invasive Alien Species	Loss of Connection to Nature
What to Eat						
Eat more veggies****	↓↓↓↓	↓	↓↓↓	↓↓↓		
Love your leftovers****	↓↓↓	↓	↓↓↓	↓↓↓		
Eat ocean friendly seafood**	↓↓↓↓	↓↓↓↓	↓↓	↓	↓	
Eat local**	↓		↓↓↓	↓	↓	↓
How to Use Energy						
Turn down the AC/the heat****	↓↓		↓↓			
Switch to a clean energy plan			↓↓↓↓			
How to Go						
Take public transit****	↓↓↓		↓↓↓			
Walk there****	↓↓		↓↓			
Cycle there****	↓↓		↓↓			
To limit Waste						
Recycle old electronics****	↓		↓			
Reuse a shopping bag****	↓↓		↓			
To help nature directly						
Grow native plants**	↓↓				↓↓↓	↓↓↓
Follow a nature org.****	↓		↓		↓	↓↓↓
Sign on to protect nature****	↓↓↓↓	↓↓↓	↓↓↓	↓	↓↓	↓↓↓
To connect with nature						
Visit a wildlife center**	↓↓					↓↓↓↓
Discover wild spaces****	↓				↓	↓↓↓
Exercise outdoors****	↓↓				↓	↓↓↓↓
Play in nature****	↓↓				↓	↓↓↓↓
Go nature gazing****	↓↓				↓	↓↓↓
Recommend a wild space****	↓					↓↓↓

Talk about nature****	↓	↓	↓	↓	↓	↓↓↓↓↓

↓ = arrows and shading indicate qualitative estimate of impact, with more downward arrows indicating relatively more benefit for an action taken over the course of a year. See Appendices 1 and 2 and discussion under each action below.

* = qualitative assessment of accessibility based on financial cost per action; see Appendix 2

Choosing what to eat

Why does it matter?

We all need to eat. Yet what and how we eat has tremendous consequences on the amount of land and water needed to produce food. Each year, the United States loses more than 1.5 million acres of potential natural lands to farms and pasture (Theobald et al., 2019). Globally, the Earth loses more than 70,000 hectares of tree cover every day (Global Forest Watch, 2022). Much of that deforestation is for raising livestock. By some estimates, converting forest to pasture for cows is responsible for more than half of the tropical deforestation in South America (UCSUSA, 2016). Deforestation, along with the destruction of other natural ecosystems such as grasslands and wetlands leads to the loss of valuable habitat for native species (Laroche et al., 2020) and the impairment of ecosystem services (Polasky et al., 2011). At the same time, livestock can degrade the land where they live on both the global and local scales. Some livestock, especially cows, also produce methane, a greenhouse gas that is many times more potent than carbon dioxide (Thornton and Herrero 2010). Animal wastes can pollute nearby water sources if improperly managed (Gregorini, 2017).

At sea, overfishing is a huge problem. Overfishing occurs when the rate at which fish are caught exceeds the rate at which the fish reproduce. In the last forty years,

marine fish populations have been reduced by 38%. It is estimated that more than a third of global fisheries are currently overfished (McCauley et al., 2015; Srinivasan et al., 2012). Pauly and Christensen (1995) estimated that approximately 8% of global aquatic primary productivity was captured for human consumption or through "bycatch" of fish and other animals unintentionally caught in the process of fishing. While some fisheries have bycatch rates over 10:1 such as shrimp and other trawl fisheries, global estimates suggest bycatch rates of over 40% (Davies et al., 2009). Bottom trawling, which requires dragging a net along the bottom of the ocean, is another significant problem (O'Neill and Ivanovic 2015). The heavy gear involved often damages habitat for fish and other marine life, including coral reefs, compounding the impacts of overfishing (Sustain, 2022; Dimarchopoulou et al., 2018; Takeshige et al., 2021).

Fishing at the top of the marine food web for large predator fish such as tunas and their relatives, is particularly damaging. Populations of tuna and related species have declined 60% over the last fifty years (Juan-Jordá et al., 2011). The destruction of these populations has profound implications for the stability of the ecosystems in which they live (Branch et al., 2010). The lack of predator fish – sharks, for example, can lead to the collapse of whole ecosystems (Maureaud et al., 2017; Scheffer et al., 2005).

Eating locally-produced food is also important in terms of reducing the carbon footprint of your diet, due to reduced emission of transport, refrigeration and packaging.

Eat more veggies

Plants require less land than animals to produce the same number of calories, and are healthier (Clark et al., 2019). Plants also act as carbon sinks, absorbing carbon dioxide from the air rather than releasing greenhouse gases like livestock do (Aertsens et al., 2013). If every average American switched to a meatless diet, emissions from their food would be cut by 61% (Sun et al., 2022). That's the equivalent of cutting out just over 1,000 kg (2205 lbs) of CO_2 per person per year, about as much a transatlantic flight emits (Rose et al., 2019). Eggs and dairy products have a lower carbon footprint than meat, but they still have a significant impact on carbon emissions and habitat destruction (Gaillac and Marbach, 2021). Cutting out eggs and dairy, to adopt a vegan diet, results in an average of roughly 75 fewer kg (165 lbs) of CO_2 per year as compared to a vegetarian diet (Rosi et al., 2017).

Eat up your leftovers

Regardless of whether households are vegetarian, vegan, or eating a diet that includes meat, food waste is a major concern. The United States wastes roughly 40% of its food (Foodprint, 2018). Households make up the largest portion of that waste,

with more than two-thirds of the food thrown away being potentially edible in the average home (NRDC, 2017). That costs the average family $1,500 a year in uneaten food (USDA, 2022). It's also a big problem for nature – the more food we waste, the more food we need to produce, which means we need to clear more forests and natural lands for agriculture and livestock and deal with the attendant pollution. Reducing household food waste in the average American household by half would prevent approximate 653 kg (1,440 lbs) of CO_2e each year from entering the atmosphere (USDA, 2022). By eating leftovers a household can save approximately 10,533 ft^2 (978.55 m^2) of habitat otherwise lost to agricultural production (Zeng & Ramaswami 2021).

Choose ocean friendly seafood

Many Americans choose not to eat seafood at all (FMI 2019), but if one does, then it is important to understand the consequences of seafood choices (Pauly & Christensen 1995). Selection of certified sustainable fisheries or aquaculture systems is a common consumer practice (e.g. Seafood Watch, 2022), although the effectiveness of certification schemes is somewhat controversial (Agnew 2019; van Putten et al., 2020). Consideration of the fishing or production methods are not built into all certification processes. A review of all major fishery and food categories across energy use, emissions, eutrophication and acidification found small pelagic fisheries

and mollusk aquaculture had the lowest environmental impacts (Hilborne et al. 2018). Smaller fish are lower down the food chain and require less of nature's energy to get to your plate than a larger fish such tuna or salmon would (NOAA Fisheries, 2022). Hallstein and Villas-Boas (2013) found that a campaign to eat more sustainable seafood in a US grocery chain resulted in a 15.3% decline in all seafood sales and a 34.9% decline in yellow-labeled ("proceed with caution") seafood sales. Hatty et al. (2020) found that making deliberate sustainable seafood choices was moderately correlated with feeling connected to nature.

Eat local

Buying a container of strawberries in New York in January generally means your berries are coming from California or Mexico or Chile. That geographic difference means a lot of emissions are a consequence of getting that berry to a New Yorker, for example. One study showed that getting produce from local sources can cut the carbon emissions of food transportation by up to 75% (Striebig et al., 2019). In a recent comparative analysis, Boyer and Ramaswami (2020) found that, on average, food travels 1,640 km (1,019 miles) in the United States. Many foods and drinks in the typical American diet contain ingredients that are rarely or never grown in the United States – items like palm oil, coffee, and tea are almost exclusively produced in the tropics far away from where we consume them (Wilcove and Koh, 2010). These

products have a huge cost to nature, both because they need to be transported across the world and because producing them requires extensive habitat destruction in countries in South America and Southeast Asia (Wilcove and Koh, 2010; Lenzen et al., 2013; Kastner et al., 2021; Chaudhary and Kastner 2016).

Choosing to how to use energy

Why does it matter?

Climate change is an existential threat to our world, a problem not just for people, but for all species. Ecosystems too depend on the climate in fundamental ways. In the coldest places on Earth, climate change has led to the loss of massive amounts of sea ice, destroying biomes home to some of the most unique animals in existence (Shah, 2014). Climate change has also led to dramatic increases in ocean temperatures and higher rates of acidification, fundamentally changing the conditions that ocean species need to survive (Shah, 2014). On land, changing patterns of precipitation, temperature, and extreme weather events destroy the suitability of habitats for different species (García-Palacios et al., 2018). For those with limited habitats already, these changes can mean extinction, especially when they force species into the paths of people who are also adjusting to new climate norms.

The primary cause of climate change is the anthropogenic production of greenhouse gases (GHGs) released into the atmosphere through land use change,

fossil fuel use, and agriculture (EIA, 2021). A large component of personal emissions come from heating buildings; in fact, heating, cooling, and power account for 20% of the U.S. total GHG emissions, with about 2.8 tons (2540 kg) of carbon dioxide equivalent per person per year (Goldstein et al., 2020).

Energy also has implications for the environment beyond climate change (Trainor et al., 2016). Modern energy production requires supporting infrastructure including power plants, pipelines, dams, overhead wires and more that can lead to habitat loss and environmental disasters (Invernizzi et al., 2020). Much energy provision also produces waste that must be dealt with – in some cases carbon dioxide or other air pollution, but also physical waste that takes millions of years to decay, like in the production of nuclear energy. There are a range of things that you can do to make a difference. Insulating and retrofitting buildings reduces energy costs by 12% in the average American home (Energy Star, 2021). Making bigger changes, like installing solar panels, reduces carbon emissions equivalent to taking your car off the road for a year (EIA, 2020). Other options, like installing a heat pump, can cut your home's emissions by over 50% (Brockway and Delforge, 2018).

Turn down the AC / the heat

Using technology like smart thermostats that turns down the heat or reduces air conditioning while you're sleeping can reduce your home carbon emissions from

energy by 10-15% (DOE, 2022). That's the equivalent of planting twenty trees a year per household (Viessman, 2021). If 60% of global households adopted smart thermostats by 2050, that would reduce our carbon emissions by seven gigatons and save approximately two trillion dollars (Project Drawdown, 2020). Installing a smart thermostat would save on average an equivalent of 283 kg (624 lbs) of carbon emissions per household (Goldstein et al., 2020; DOE, 2022). If the average American lowered their household energy use by just 1% a year, they would save approximately 732 ft^2 (68 m^2) of habitat (Trainor et al., 2016), though the actual effect depends on where a person lives, and the energy mix the local power company supplies. Lowering the heat also had a moderate correlation with feeling a connection to nature (Hatty et al., 2020).

Switch to a clean energy plan

One easy way to switch your electricity footprint to be more sustainable is to buy green energy. Hundreds of utility providers in the United States already offer the option to buy renewable energy (Climate Reality Project, 2017). Often this requires paying a small premium over your current energy costs, but it has huge payouts for protecting nature. If half of United States households shifted their electricity generation to renewables, that would prevent over 400 million tons of carbon emissions (Goldstein et al., 2020). Switching to a clean energy provider is one of the

most impactful actions the average American can take. It would prevent on average an equivalent of 2,000 kg (4409.24 lbs) of CO_2 emissions per year (Goldstein et al., 2020).

Choosing how to go

Why does it matter?

For many Americans, how we choose to get around has large impacts on nature (Sanderson 2013). Transportation accounts for 27% of the United States' total carbon emissions, with 41% of that coming from passenger cars (Center for Sustainable Systems, 2021). On a more personal level, every mile (1.6 km) traveled in an average gasoline-fueled car releases 0.78 pounds (0.35 kg) of CO_2e, and every mile traveled on a plane produces the equivalent of 0.38 pounds (0.17 kg) of CO_2 (Center for Sustainable Systems, 2021).

Transportation is also damaging to nature because it requires such an infrastructure of paved roads. Roads destroy the natural land by paving through and fragmenting habitats on either side (Ree et al., 2015). As roads are created, they divide natural areas into fragmented habitats. Wildlife find roads to be dangerous places, often dying in attempting to cross the road, suffering injuries, or more often, avoiding roads all together, thus disconnecting blocks of otherwise adjacent habitat (e.g. Whittington et al., 2019; Vanlaar et al., 2019). Thus, roads decrease habitat, limit

access to necessary resources, divvy up populations, and reduce genetic diversity (van der Ree et al., 2015). Roads are also sources of air, soil, and water pollutants. Salt and sand added to snowy winter roads runs off into ecosystems after the snow melts while bits of eroding tires scatter pieces of plastic and rubber into the environment (Bignal et al., 2007, Sager 2020).

Take public transit

One of the most impactful actions an individual can take to reduce the impact of their transport is to ride with other people. In the US, 85% of cars have only one occupant in them (Mackie, 2018). That's inefficient – it means we're producing much more pollution, and roads are significantly more congested, than necessary. Switching to options like trains, buses, or even carpooling can make a big difference. The more people travelling in a vehicle, the lower the carbon emissions per person. An average American switching a twenty-mile commute from driving to public transport can cut their total carbon emissions by 10% (American Public Transportation Association, 2021). It also helps that in many American jurisdictions, public transportation options are electrified, reducing their carbon emissions relative to gasoline or diesel consuming alternatives (Glotz-Richter and Koch, 2016). For trains, railroads also have significantly less impact on nature than cars, since tracks tend to take up less space and don't allow for stops along the track (Sanderson et al.,

2002). If public transportation isn't an option, then try car-pooling. Thus decreasing the number of cars on roads ultimately means less pollution, less climate change, and perhaps someday, fewer roads (Sanderson 2013). Changing 1 in 5 trips driving to taking public transport would prevent an estimated equivalent of 756 kg (1667 lbs) of carbon emissions per year (American Public Transportation Association, 2021).

Walk there

Another alternative is to change your patterns of transportation from an emphasis on a personal car to encouraging walking. Walking is a method of transportation that is healthy for you, requires little to no infrastructure, and is emissions-free (Palmer, 2011). Public transportation for most people won't take you to your doorstep, so couple it with walking to provide the healthy first or last mile of a daily commute. One thing to keep in mind with walking is where you live – it becomes a lot easier to walk to work or the grocery store if you live close to them. In fact, research shows that the distance between you and your destination greatly influences your choice on how you get there – if something is very close, you are much more likely to walk; if a bit farther, to cycle; and farther than that, shared transport is probably the best choice (Sanderson et al., 2013). If the average American switched from driving to walking just one day per week, it would prevent an equivalent of 644 kg (1420 lbs) of CO_2 emissions per year (American Public Transportation Association, 2021).

Cycle there

As enjoyable as walking is, it isn't always a practical choice if you need to go longer distances. An alternative is riding a bike. Cycling offers a healthy, active alternative to driving, and in many cases can be a time-efficient choice as well. In New York City, where there is lots of traffic, research showed that riding a bike instead of taking a taxi was a faster choice for 40% of weekday trips (Schneider, 2017). Some of the ease of switching to cycling depends upon what kind of infrastructure your city or town has to support biking. Separate bike lanes, for example, have been shown to drastically improve people's comfort with cycling as well as improve safety (Cambridge Department of Public Works, 2022). Make sure you are aware of your options before you start cycling. For example, find out what if there are bike lanes on your route to work, or when you look for a new home, ask about the viability of biking. If the average American switched their travel just one day a week from driving to cycling, it is estimated that would prevent an equivalent of 644 kg (1420 lbs) of CO_2 emissions over the course of a year (American Public Transportation Association, 2021).

Choosing to limit waste

Why does it matter?

Over 97% of American adults own a cell phone (Pew Research Center, 2021). Each of those cell phones contain specialized parts that contain hazardous materials like lead, mercury, and arsenic (Yashim and Dallatu, 2017). For example, mercury appears in cell phone batteries, crystal displays, and circuit boards. Just one cell phone can have up to two grams of mercury in it, which if ever unintentionally consumed, could lead to brain and kidney damage (e-Cycle, 2013). Used electronics is the quickest growing category of waste in the United States (Campbell, 2016). When these electronics are placed in landfills or burnt, they release their hazardous materials into the surrounding environment. These same raw materials must be mined from the ground to be supplied to cell phone manufacturers. This mining has extensive environmental impacts, disturbing habitats, encouraging road construction, and producing more pollution (Li et al., 2012). Recycling gadgets at the end of their use means less mining for raw materials. It also saves the energy consumption and climate change effects of having to make new versions of those same components.

Plastics are amazing materials made from oil. Depending on how they are formulated, they can carry different shapes, colors, strengths, and flexibility. Given the amount of oil the world consumes each day and the variety of ways of plastics can

be used, plastics have become deeply entrenched in American life. The average American consumes 234 pounds (106 kg) of plastic a year, mostly in the form of packaging (Holden, 2019). Globally, it is estimated that in 2015, 6,300 million tons of plastic waste were generated, around 9% of which were recycled, 12% were incinerated; and 79% ended up in landfills or nature (Geyer et al., 2017). The half-life of each piece of plastic waste varies from just under sixty years to over one-thousand years (Chamas et al., 2020). Plastics, whether left in a landfill or discarded in a natural area, release toxic chemicals as they break down, potentially poisoning the surrounding soil and water. An estimated eight million tons of plastic end up in the oceans each year, degrading the marine environment and impacting wildlife (Alabi et al., 2019).

Recycle old electronics

Electronic waste should not be disposed of in regular garbage bins due to the hazardous materials contained in cell phones, computers, televisions, and other electronic devices (US EPA, 2021). Instead, they should be recycled through appropriate recycling programs. For every million cell phones Americans recycle, we save 35,000 pounds (15,876 kg) of copper, 772 pounds (350 kg) of silver, 75 pounds (34 kg) of gold, and 33 pounds (15 kg) of palladium (US EPA, 2021), thus saving the land use effects of mining. A recent study estimated mining areas globally disturb

over approximately 57,277 km^2 (22,114.77 mi^2) of land surface (Maus et al., 2020). Of particular importance are some rare metals that happen to be found in important wildlife habitat. For example, some 60% of the world's supply of coltan is found in Kivu Province in the eastern part of the Democratic of Republic of Congo, which is also where critically endangered Grauer's Gorillas (*Gorilla beringei graueri*) live. Worse, many of the people forced to mine for coltan are children (Ojewale 2021). Coltan contains the elements tantalum and niobium, which used for superconductors and other electronics (National Minerals Information Center, 2017). An estimated billion phones are retired annually (Litchfield et al., 2016). A campaign conducted by Zoos Victoria, in Australia, resulted in over 115,000 cell phones recycled over a six-year period, approximately one phone for every 28 people who heard a zoo keeper tell of the importance of phone recycling to gorillas (Litchfield et al., 2018). If the average American recycled a laptop instead of throwing it away, it would prevent on average 25 kg of CO_2-equivalent (CO_2e) emissions (US EPA, 2014). Ercan et al. (2016) estimated that the global warming potential of a smartphone, from cradle to grave, was approximately 57 kg (125.67 lbs) CO_2e, not accounting for network usage, over three years.

Reuse a shopping bag

If just a quarter of Americans used tote bags in their everyday life instead of disposable plastic bags, that would save the equivalent of three million barrels of oil (Aust, 2017). Tote bags can be reused many times, while most plastic bags given by stores while shopping are single-use. Switching from disposable bags to reusable ones is an action anyone can take to reduce the amount of plastic litter flowing into rivers and oceans (Marazzi et al., 2020). Reduce when a person can, otherwise reuse what is on hand, and if recycle a person must, then take care of how one recycles. One quarter of all recycled items don't belong in the bins they are placed in (Rachelson, 2018). Check with your local recycling authority or check out the EPA's website for some rules of thumb (US EPA, 2013). One life cycle analysis of plastic bags finds that production of 1,500 plastic bags requires 15 kg (33 lbs). of fossil fuels, produces 7 kg (15 lbs.) of municipal wastes, and produces 40 kg (88 lb) of CO_2e greenhouse gas emissions (Greene 2011). Greene (2011) cites a study from Australia that estaimtes that the average person uses approximately 520 bags per year. Thus, every time a person substitutes their own shopping bag for a plastic bag they are saving approximately 0.03 kg CO_2e greenhouse gas emissions and 4 g (0.009 lbs.) of municipal waste. If a person avoided plastic bags completely for a year, they would save 13 kg (29 lbs.) of CO_2e and 2 kg (4.4 lbs.) of garbage. Reusable bags are not

without their impact but by reusing them, we spread that impact over many uses (Cook 2021).

Choosing to help nature

Why does it matter?

In addition to changing our lifestyles, each of us can make a direct difference for wildlife and habitat. As described in the introduction, invasive species are one of the biggest threats to biodiversity alongside climate change and habitat loss. Damages from invasive species are estimated at around 138 billion dollars annually, and they are responsible for 70% of the extinctions of aquatic species this century (US EPA, 2016). Invasive mammalian predators are estimated to have caused 58% of the extinctions of bird, mammal, and reptile species globally (Doherty et al., 2016). Invasive plants are similarly problematic, competing for resources and sometimes literally choking native plants with their explosive growth (Jose et al., 2013).

Americans can also encourage elected leaders to take a role in protecting nature. One particularly impactful petition is the 30x30 for Nature Petition, which aims to protect at least 30% of the world's land and ocean by 2030. Currently, only 15% of the Earth's land and 7% of its oceans are protected, leaving the rest open to exploitation and destruction as nature is rapidly degraded (Campaign for Nature, 2022). In the United States, areas protected for nature in some way cover 13% of the country's

area, so committing to 30% would more than double the amount of nature under protection. It is also important to know how protected areas are managed. Effectively managed protected areas provide ecological benefits that positively impact economies and society (Grorud-Colvert et al., 2021; Nyaupane et al., 2020; Task Force on Economic Benefits of Protected Areas, 1998)

More generally, one can also get involved in local nature conservation. By following a nature organization on social media, one can learn more about the issues, meet new people, participate in citizen science, or volunteer to help in restoring nature.

Grow native plants

The solution is to help create habitat for native species. As habitat is destroyed by the pressures of human development, climate change, and invasive species expansion, it is essential that we help protect existing habitat and create new areas (Mainka and Howard, 2010). If a person has a garden, then native plantings are a great way to start. Native plants are adapted to the local climate, so they often require less water, pesticides, and other resources than a lawn or other non-native landscaping (U.S. Forest Service, 2022). Having native plants in your garden is not only helping protect the habitat from invasive species but also helps create habitat for native insects (Tallamy, 2020). Native insects and plants, in turn, attract native birds, as they have done for centuries. These new spots of native-friendly habitat

provide respite for migrating animals and a safe area for native plants. Hatty et al. (2020) found that native gardening had an average 0.39 correlation with a person's sense of connection to nature.

Discover wild spaces near you

Parks and green spaces are usually free, often easily accessible, and closer than one might think. Even small areas can be restful and full of nature. Pregitzer et al. (2021) found that urban nature areas account for 68% of total city parkland across 96 of the most populous cities in the United States. Research has shown that visiting a local park, even just once a week, helps a person connect with nature (Shanahan et al., 2015). There are many options for activities in parks, and people tend to frequent the ones that are nearest to them (Ramsay et al., 2017). Hatty et al. (2020) found across two studies that visiting parks was correlated with a person feeling moderately more connected to nature.

Follow a nature organization

Organizations help amplify individual voices into collective action. Nature organizations at local, state, national, and international scale have experts in nature conservation and restoration. These organizations help draft legislation, create petitions, organize meetings, do research, work with park staff, protect and restore habitats, and spread information to inform and motivate the wider community to

care for nature. Research has shown a 0.30 correlation coefficient between donating to a nature organization and feeling connected to nature (Hatty et al., 2020).

Sign on for nature

About 20% of the world's vertebrates and plants are threatened with extinction, mostly because humans have degraded or converted more than half of the terrestrial natural habitat (Baillie and Zhang 2018). In 2021, according to the IUCN's World Database on Protected areas, nearly 17% of land and just over 7% of the world's oceans, are under protection. A high ambition coalition of over 80 countries are pushing in 2022 for the 15th Conference of the Parties of the Convention on Biological Diversity to adopt a global target of at least 30% of land and sea protected by 2030. Some (e.g. Woodley et al., 2019) suggest that number should be closer to 50%, Griscom et al. (2017) estimated that nature climate solutions, including conserving and restoring nature and improving land management could result in 23.8 petagrams of equivalent carbon dioxide emissions avoided. Signing the petition itself may also help with connecting to nature – research suggests a significant correlation coefficient of 0.32 (moderate strength) between advocating for the environment and connection to nature (Hatty et al., 2020).

Choosing to connect to nature

Why does it matter?

Over 80% of Americans live in urban areas (U.S. Census, 2019). For many, that means they have more limited access to nature than their ancestors did. This lack of daily exposure to the natural world can lead to something called Nature Deficit Disorder – the idea that people, especially children, are spending less and less time outdoors, to their detriment and the detriment of the world at large (Children and Nature Network, 2019). People most often form connections when they're young, and the easiest way to form those connections is to consistently visit natural places (Luck et al., 2011). It encourages our inherent biophilia, the connection we feel with nature and other living things. When Americans, whether children or adults, visit nature, they engage with the environment. It gives a specific example of what nature might mean to them and encourages becoming more active in nature conservation. Local nature also provides more tangible benefits, such as reduced pollution, cooling services, habitat for migrating species, and recreational spaces for humans. We call these benefits "ecosystem services": the services nature provides to people (Bryant, 2006; Shanahan et al., 2015). Finally, many local parks, zoos, gardens, and aquariums are part of organizations that work to conserve wildlife and wild places. When you visit

them, you are supporting the protection of biodiversity and ecosystems far away as well as those institutions and learning why this work matters.

Some organizations that operate parks, zoos, and aquariums do more than provide a wonderful experience of nature; they also work to save nature out in the world. By visiting them, supporting their work, and staying in the loop on social media, you ensure the continuation of nature locally and globally. Also, by keeping yourself better informed, you are in a better position to act on issues that matter to you. Without these organizations and sources of information, it can be hard to know what's happening to nature half a world away, even if it's something that you care deeply about. As well as making you better informed, signing up for a newsletter or donating to an organization has a positive correlation with being connected to nature.

Visit a wildlife center (zoo, aquarium, botanical garden, etc.)

Visiting a wildlife center is a way to demonstrate to oneself and loved ones that nature and wildlife matters. Trips can be educational, social, and an opportunity to connect with nature. Also, many zoos, aquariums, and botanical gardens are research and conservation centers for wildlife and wild spaces locally and around the world. On average, for example, the Association of Zoos and Aquariums estimates that its members spend over $200 million per year on nature conservation.

Wildlife centers vary greatly in size, shape and level of development. The biggest natural habitat zoo in the US is the North Carolina Zoo, which is located on 2600 forested acres, of which only 500 are developed (Marcy 2021). Other zoos are much smaller or more intensively developed. Detailed data were not available for the 238 zoos and aquariums accredited by the Association of Zoos and Aquariums (AZA), so we assumed an average size of 50 acres (20 hectares) , of which we assumed that 50% of the space provided some wildlife habitat for native plants and animals (not the collection animals). AZA wildlife centers receive over 183 million annual visits, which implies that just by visiting, each visitor is helping support approximately 1.4 ft^2 (0.13 m^2) of habitat per visit. Hatty et al. (2020) found a moderate correlation between donating to a nature organization and one's connection to nature. Bruni et al., (2008) found visiting the zoo significantly enhanced a sense of connection to nature.

Exercise outdoors

Another way to engage with nature is to exercise outdoors. For those who are interested in health, nature offers many opportunities. On land, many parks and natural areas offer opportunities for hiking, jogging, biking, or, where the weather is right for it, cross-country skiing. In other natural areas with water, you can surf, kayak, swim, and all kinds of activities. Research shows that exercising in nature has

benefits for your self-esteem, mood, and general mental health (Barton and Pretty, 2010). Walking outdoors made people happier than walking indoors in a study by Nisbet and Zelenski (2011). Exercising outdoors is moderately correlated with a connection to nature (Hatty et al., 2020).

Play in nature

It is also very important for kids to spend time in nature. America's children are spending more and more time indoors in highly structured activities, but research shows that unstructured play time in nature is very important for the cognitive, behavioral, and even physical development of young children (Mann et al., 2021; Austin 2019; Starling, 2011). Building snowmen, sandcastles, or forts offer great opportunities for children to use their imagination and improve development outcomes. These activities are particularly important for children to develop their connection to nature. Research shows that people are more likely to feel a strong connection to nature if they play in nature, with a coefficient of 0.41, signaling a significant but moderate correlation (Hatty et al., 2020).

Go nature gazing

For those who just want to spend some time learning more about the environment we live in and relax, activities like bird watching, tree spotting, snorkeling, cloud hunting, and more can be a great way to better understand how you personally

connect to nature. More than 45 million Americans already spend time bird-watching every year (Carver 2013). It's easy to start – just find a local organization to join, or head over to the park by yourself! It also has tangible benefits for connection to nature. Research demonstrates that just observing nature makes people more likely to feel connected to nature, with a correlation coefficient of 0.41 (Hatty et al., 2020). National parks are wonderful places to visit but also consider visiting some place close to home, where you can visit on a regular basis. Many have "friends of" groups that enable one to make new connections and support parks at the same time.

Choosing to talk about nature

Why does it matter?

People are social creatures. Conservation psychology research has shown that talking about nature and your emotional connection to it both helps you and the person you are talking to develop and deepen your connection to nature (Guiney and Oberhauser, 2009). Talking about your emotional connection to nature with other people helps us see natural environments as something we exist with and in rather than separate from (Schultz, 2002). In turn, being connected to nature helps provide motivations to take other actions to protect and heal nature as discussed above.

Recommend a wild space

Connecting to nature is a social activity (Pyle 2003). The connection to nature is predicted by family values and social norms in addition to personal experiences of nature (Oh et al., 2021). Conversation in turn is critical for shaping social norms and teaching the next generation (Koudenburg et al., 2017). By starting a conversation about nature, one helps tell friends and family that nature is important to you. Research suggests that recommending a wild space to another person is correlated to a person's connection to nature (Pyle 2003; Oh et al., 2021).

Talk about nature

Stories are a key part of the human psyche and a critical part of human evolution (Boyd 2018). Some have even suggested that the evolution of language arose out of the need to share information and enlarge the pool of shared human experience. Shepard (1997) writes that it was through our experience and stories of other animals that we realized critical parts of human nature. It helps that nature is full of fascinating puzzles, strange ways of doing things, and charismatic characters. People and organizations are working every day to protect nature; making people aware of that provides hope and motivates us all to keep working on it (Guiney and Oberhauser, 2009). Talking about nature, especially around children, increases the likelihood of deep connection to nature and a desire to protect it later on (Chawla

and Derr, 2012). Research indicates that simply talking about nature to another person is correlated to a person's connection to nature (Chawla and Derr, 2012) and for making us feel more human (Shepard 1997).

Appendix 1: Impact Metric Calculations for Wild for All

Table S1. Habitat and Climate Impact Metrics for Suggested Actions

Suggested actions	Feasible frequency	Impact per action at feasible frequency: Approximate Habitat Change (m^2)	Impact per action at feasible frequency: Approximate Climate Savings (kg CO_2e)
Eat more veggies	Daily	12.8	1.81
Eat local	Daily	0.03	0.49
Love your leftovers	Daily	2.68	0.31
Eat ocean friendly seafood	Weekly	99.58	0.35
Turn down the AC	Monthly	5.44	1.97
Turn down the heat	Monthly	5.44	0.80
Switch to a clean energy plan	One-off	--	4,131.61
Take public transit	Daily	0.54	1.39
Walk there	Daily	0.18	0.05
Cycle there	Daily	0.18	0.15
Recycle old electronics	Monthly	0.77	0.17
Reuse a shopping bag	Daily	0.13	0.01
Grow native plants	Monthly	1.58	--
Visit a wildlife center	Monthly	1.78	--
Discover wild spaces near you	Weekly	0.04	--
Exercise outdoors	Daily	0.06	--
Play in nature	Daily	0.06	--
Go nature gazing	Daily	0.06	--
Follow a nature organization	Monthly	0.77	--
Sign on to protect nature	One-off	5,177.96	455.24
Recommend a wild space	Weekly	0.18	--
Talk about why nature matters	Daily	0.01	--

Note on units: Habitat change as result of action is given in square meters (m^2), where 1 m^2 is equivalent to 10.75 square feet (ft^2). Carbon dioxide equivalent (CO_2e) means the number of kilograms (kg) of CO_2 emissions with the same global warming potential as one kilogram of another greenhouse gas**.**

Calculation details

Eat more veggies

Habitat impact: Zeng & Ramaswami (2020) estimated the embodied land use in consumption for a variety of sectors in the United States based on data from 2012. They found that the average American requires 95,655 ft^2 (8887 m^2) of land use change to support their individual consumption of food and beverages at home (Figure 3), which represents 47.5% of the total indirect land use requirement per capita (201,206 ft^2 or 18693 m^2). They further found that not eating meat one day per week ("Meatless Mondays") would drop the land use requirement by 3.3%, equivalent to 7,174 ft^2 (666 m^2) per year, which is equivalent to 12.8 m^2 (138 ft^2) per meatless day. This calculation does not take into account how many people would need to shift their diet to create a permanent change in the land use patterns associated with food and beverage production, nor whether some other form of non-habitat use (i.e. housing) would fill the void if that area were not dedicated to food and beverage production.

Climate impact: We assumed that an average American replaced one meal per week of mostly beef and lamb with pulses and vegetables instead. To estimate the climate impact, we used Project Drawdown's (2021) Solution framework meta-analysis based on Poore & Nemecek (2018) and Kim et al. (2020), which suggests replacing 100 g (0.22 lbs.) of protein meal per day for a month would result in 18.12 kg (39.95 lbs.) CO_2e less emissions. If one did not eat meat for a day per week (three meals per day), that is the equivalent of 1.81 kg (4 lbs.) CO_2e per day.

Eat local

Habitat impact: International trade has been associated with up to 30% of global biodiversity impacts (Lenzen et al., 2012) because land conversion in more species rich environments (e.g. the tropics) is more damaging than conversion in less species rich environments (e.g. the temperate zone, such as the US) (Kastner et al., 2021; Chaudhary & Kastner 2016). Similarly, while most US fisheries are sustainably managed, many fisheries globally are not (FAO 2020). The impact of eating local depends a lot on the details of the substitution, season, and other factors, but it reasonable to say eat locally versus eating from the globalized food chain is beneficial for biodiversity writ large. Plus, there are other marginal benefits including ensuring local greenspace, supporting diverse economies, and connecting nearby

cities and rural areas. We assume a marginal habitat benefit (100 ft^2 or 9.2 m^2 per year), which works out to 0.03 m^2 (0.32 ft^2) per day from eating local food.

Climate impact: The climate impacts of eating locally depend a lot of what you eat, whether the food is in season, and the agricultural details of local production in contrast to production elsewhere. Weber and Matthews (2008) estimated that if an average American reduced to zero the food miles associated with moving food and drink from the place of production to the place of consumption, it would reduce emissions by 0.36 tons CO_2e per year. Here we assume that eating locally for a day reduces the associated food miles by 50%, equivalent to 0.49 kg (1.1 lbs.) CO_2e per day.

Love your leftovers

Habitat impact: Zeng & Ramaswami (2020) estimated the embodied land use in consumption for a variety of sectors in the United States based on data from 2012. They found that the average American requires 95,655 ft^2 (8,887 m^2) of land use change to support their individual consumption of food and beverages at home (Figure 3), including production, transportation to market, wholesale trade, and retail trade land use, which represents 47.5% of the total indirect land use requirement per capita (201,206 ft^2 or 18,693 m^2). Following Zeng & Ramaswami (2020), we note that the food weight availability at the consumer level is 77% of the primary availability, in

which 18% is estimated as avoidable food waste. Therefore, the induced expenditure reduction by halving avoidable food waste at consumer level is estimated as 9%/77% or 11.7%, equivalent to avoiding 10,533 ft^2 (979 m^2) per household per year, which is equivalent to 2.68 m^2 (28.84 ft^2) per day of eating up your leftovers rather than throwing them away.

Climate impact: Carbon emissions from food waste depend first on the amount of food Americans normally waste – 10.1 kg (22.3 lbs.) of waste per month, of which approximately 80.4% ends up in landfill, according to World Bank (2021). The remainder is assumed to be diverted to a municipal composting facility or composted at home. We follow Poore & Nemecek (2018) in assuming that food waste results in 1.7 kg CO_2e per kg (3.5 lb CO_2 per lb) of food produced and the Project Drawdown (2021) meta-analysis suggesting that 0.56 kg CO_2e is emitted per kg of food (1.23 lbs. CO_2e per lb of food) left to rot in a land fill and 0.16 kg CO_2e per kg (3.5 lb CO_2 per lb) of is emitted from food waste properly composted. On a per month basis, the result is 17.5 kg (38.6 lb) CO_2e emissions, or daily, 0.58 kg (1.3 lb) CO_2e emissions saved per day of action.

Eat ocean friendly seafood

Habitat impact: We assume that eating ocean friendly seafood on averages reduces the trophic level of seafood catch by 1 level. Pauly & Christensen (1995)

estimate that each trophic level reduced requires approximately 10% less primary productivity. American consumption of seafood is estimated to be 4.6% of total seafood consumption (Guillen et al., 2019). Kroodsma et al. (2018) estimated, based on analysis of fishing boat tracking data, that 55% of the world ocean, 200 million km^2 (77,220,432 mi^2) is impacted by fishing. In effect, this means that reducing the American seafood trophic level by 1 translates into roughly 0.46% of the ocean less fished, or 920,000 km^2 (355,214 mi^2). Since 44% of American's don't eat sea food at all (FMI 2019), we estimate that eating more ocean friendly seafood for a year translates into 0.0052 km^2 (55,737 ft^2) per American fish-eater. If said fish-eater were to eat ocean friendly seafood once per week for a year, the equivalent area of ocean not fished works out to 99.58 m^2 (1,071.87 ft^2) per week.

Climate impact: Sala et al. (2021) estimated that bottom trawling fisheries have carbon emissions because trawling turns over ocean floor sediments, releasing carbon dioxide. Sala et al. (2021) estimated those emissions at 0.58 Petagrams CO_2 globally for repeatedly trawled areas (figures are three times higher for areas trawled the first time.) If, as described above, eating more ocean friendly food resulted in 0.46% less fishing, then we estimated the carbon emissions associated with American seafood consumption would drop roughly on average 0.35 kg (0.77 lb) CO_2e per week by choosing more ocean friendly seafood.

Turn down the AC / the heat

Habitat impact: Trainor et al. (2016) estimated that a 1% reduction in energy consumption would reduce energy sprawl by 8,214 km^2 (3,171 mi^2). There are approximately 126 million households in the US in 2016, so on a per-household basis reducing energy usage by 1% is equivalent to 702 ft^2 (65 m^2) per household per year, or on a monthly basis, 5.44 m^2 (58.56 ft^2) per household per month. Renewable energy sprawl, according to Trainor et al.'s analysis, is not much different in the area impacted than non-renewable energy sprawl, though it occurs in different places and impacts biodiversity in different ways.

Climate impact: (Turn down the heat): According to the 2015 Residential Energy Consumption Survey, 35.3 million Btu (British Thermal Units) of energy per American household were used for space heating in 2015 (US EIA 2018). The energy totals consumed for space heating in the same survey were 187 million kWh of electricity, 2,678 billion ft^3 (about 99 billion m^3) of natural gas, 2,549 million gallons of propane (about 11 billion liters), and 2,891 million gallons (about 13 billion liters) of fuel oil / kerosene. We used the emission factors for greenhouse gas inventories from the US EPA (2014) to convert these totals into greenhouse gas emissions in carbon dioxide equivalents, and then calculated the average CO_2e emissions per household from space heating to be, on average, 2,370 kg (5225 lb) CO_2e per household per year,

noting that the US had approximately 124.59 million households in 2015. Reducing space heating energy usage by 1% would be the equivalent of 23.70 kg (52.25 lb) CO_2e per household per year, or 1.97 kg (4.34 lb) CO_2e per month.

Climate impact: (Turn down the AC): According to the 2015 Residential Energy Consumption Survey, 7.1 million Btu (British Thermal Units) of energy per American household were used for air conditioning in 2015 (US EIA 2018). All of the energy used for air conditioning was supplied by electricity, equivalent to 214 billion kWh, equivalent to 964 kg (2125.26 lb) CO_2e per household per year, noting that the US had approximately 124.59 million households in 2015. Reducing air conditioning energy usage by 1% would be the equivalent of saving 9.65 kg (21.27 lb) CO_2e pe.r year or 0.80 kg (176.37 lb) CO_2e per month.

Switch to a clean energy plan

Habitat impact: Trainor et al. (2016) found that renewable energy sprawl is similar in area impacted as non-renewable energy sprawl, though different in distribution and effect. We assume there is no net land use of switching one's energy plan.

Climate impact: We assume that by switching to a clean energy plan, the respondents are choosing a 100% renewable energy plan or the equivalent using Energy Attribute Certificates, and that the energy is supplied by distributed

renewable energy sources such as windmills, photovoltaic facilities, etc., via the US electric grid, following the definitions used by Project Drawdown (2021) Solutions analysis. We assumed an average American electricity consumption rate of 893 kWh per month per person and an emissions rate of 0.85 lbs (0.39 kg) of CO_2e per kWh of electricity production and transmission (US EIA 2021). On an annual basis, using electricity only from renewable sources would result in a savings of approximately 4132 kg (9,110 lb) CO_2e per year for as long as the clean energy plan was in effect.

Take public transit

Habitat impact: Zeng & Ramaswami (2020) estimated the embodied land use in consumption for a variety of sectors in the United States based on data from 2012. They found that after food consumption, transportation requires the second most indirect land use consumption: to produce vehicles and fuel, repairs, parking and tolls, coupled with direct land use effects of roads. On a per capita basis they found the average American requires 10,652 ft^2 (990 m^2) of land per year as a result of car ownership, so reducing car ownership by 20% on average (for example, by some households having one less car and taking some trips by public transit instead) would save 2,128 ft^2 (198 m^2) per year, or on average, 0.54 m^2 (5.8 ft^2) per day.

Climate impact: We assume that for the purpose of estimating the greenhouse gas reductions associated with taking public transit, a person is substituting a trip by electric train for a trip by gas-fueled, internal combustion engine car in the United States. Following the Project Drawdown (2021) Solutions framework, we assume a car with average fuel economy of 26 mpg (11 km per l) (US EPA 2018) and that distance travelled is 20 miles (32 km) (Sanderson 2013). We assume that the fuel efficiency of the electric train is 84 Wh/mile (0.62 Wh/km) per passenger (ABB 2018) and that the electricity to move the train is produced with the average American energy mix that generates 0.39 kg (0.86 lb) of CO_2e per kWh of electricity produced and transmitted (US EPA 2018). We estimate that taking a train instead of the car for a month would result in a carbon savings of 41.67 kg (91.86 lb) CO_2e per month, or 1.39 kg (3.06 lb) CO_2e per day.

Walk there

Habitat impact: Zeng & Ramaswami (2020) estimated the embodied land use in consumption for a variety of sectors in the United States based on data from 2012. As discussed under "Take public transit", they estimated the land use impact of car ownership. Separately, Zeng & Ramaswami (2020) also estimated the effect of reducing travel by vehicle by driving one day less per week, for example, by substituting some trips by walking or bicycling, even if the average American

retained their complement of cars. These authors found that replacing driving with another travel mode one day less per week would reduce the land footprint by 715 ft^2 (66.4 m^2) if done consistently for a year, or the equivalent of 0.18 m^2 (1.93 ft^2) per day.

Climate impact: We assume that for the purpose of estimating the greenhouse gas reductions associated with "Walk there", the person is substituting a trip in a gas-fueled car with walking in the United States. We assume that the car travelled with an average fuel economy of 26 mpg (11.05 km per l) and that distance travelled is 0.6 miles (1 km) (Sanderson 2013). We estimate that walking instead of using the car for a month would result in a carbon savings of 1.467 kg (3.23 lb) CO_2e per month, or of 0.05 kg (0.11 lb) CO_2e per day.

Cycle there

Habitat impact: The logic and impact calculations are the same as for "Walk there" with respect to habitat.

Climate impact: We assume that for the purpose of estimating the greenhouse gas reductions associated "Cycle there", the person is substituting a trip in a gas-fueled car with bicycling in the United States. Following the Project Drawdown (2021) Solutions framework, we assume that the car travelled with an average fuel economy of 26 mpg (22 km per l) (US EPA 2018) and that the distance travelled by

bike is 1.86 miles (3 km) (Sanderson 2013). We estimate that biking instead of driving the car for a month would result in a carbon savings of 4.4 kg (9.70 lb) CO_2e per month, or of 0.15 kg (0.33 lb) CO_2e per day.

Recycle old electronics

Habitat impact: We assume a minimal but important impact on species residing where rare elements used in electronics are sourced (i.e. eastern Democratic Republic of Congo, parts of China, the US West). Unfortunately, given the variety of materials in each electronic device, differences between devices, and the complexities of international sourcing, it's not possible to estimate the impact exactly, or even really approximately. Yet to give this action a zero score would also be incorrect. For this purpose, we assume it works out to at least 100 ft^2 (9.29 m^2) per year, or if one were to recycle one electronic device per month, 0.77 m^2 (8.29 ft^2) per device. See Litchfield et al. (2018) and Ojewale (2021.)

Climate impact: The US EPA estimates that the net emissions saved from recycling mixed electronic devices is 0.79 metric tons of CO_2e per short ton of material, which translates into 0.17 kg (0.37 lb) CO_2e for a 200 g (0.44 lb) electronic device, such as a cell phone.

Reuse a shopping bag

Habitat impact: Greene (2011) suggested that the average American consumes on average 520 plastic bags per year. We assume that each shopping bag that ends up in a stream or lake or a land fill despoils approximately 1 square foot (0.09 m^2) of habitat based on the size of the average plastic grocery bag, which works out to 0.13 m^2 (1.39 ft^2) of less despoiled habitat for each day one uses an alternative.

Climate impact: Wynes & Nichols (2017) estimate that using a reusable shopping bag for a year would result in a savings of 5 kg (11.02 l) CO_2e per year, equivalent to approximately 0.01 kg (0.02 lb) CO_2e per day.

Grow native plants

Habitat impact: Recognizing that not everyone has access to a garden while others have large gardens, we assume that were one to have a garden, it would cover around 2000 ft^2 (186 m^2). (A study by Davies et al. (2009) found gardens in the United Kingdom were on average 190 m^2 (2,045 ft^2).) If one uses native plants to restore 10% of an average garden with native plants, that works out to 200 ft^2 (18.58 m^2) per year, or on a monthly basis, 1.58 m^2 (17 ft^2) per month.

Visit a wildlife center

Habitat impact: Pregitzer et al. (2020) found in a survey of 96 American cities that urban parks are on average 68% natural area as opposed to pavement, ball fields, bathrooms, or other amenities. McCabe et al. (2018) estimated that urban parks

across the country covered 2,120,174 acres (858,004 ha). Given that an estimated 83% of Americans live in urban areas, we estimate that per urban American, there exists approximately 230 ft^2 (21 m^2) of urban natural area. If wildlife centers (e.g. zoos, botanical gardens, aquaria, etc.) are similarly situated in natural areas supported by visits from interested persons, and if one visits once per month, then that area works out to 1.78 m^2 (19.16 ft^2) of habitat per month supported by visits.

Discover wild spaces near you

Habitat impact: The logic and impact calculations are the same as for "Visit a wildlife center" with respect to habitat, except we assume this action is taken on a weekly rather than monthly basis. We further assume that only 1 in 10 internet searches leads to a new visit, so the effect works out to 0.04 m^2 (0.43 ft^2) per week.

Exercise outdoors

Habitat impact: The logic and impact calculations are the same as for "Visit a wildlife center" with respect to habitat, except we assume this action is taken on a daily rather than monthly basis, which works out to an impact of 0.06 m^2 (0.65 ft^2) per day.

Play in nature

Habitat impact: The logic and impact calculations are the same as for "Exercise outdoors."

Go nature watching

Habitat impact: The logic and impact calculations are the same as for "Exercise outdoors."

Follow a nature organization

Habitat impact: We assume that by following and supporting the work of conservation organizations, a person is contributing directly or indirectly to their work. How that interest and support translates into on-the-ground success is hard to gauge both because of the diversity of activities that different organizations do and because conservation success so often depends on factors outside the control of the organizations (such as political action or socioeconomic changes). Here we give it an assumed non-zero, minimal effect of 100 ft^2 (9.29 m^2) per year, which on a monthly basis translates to an impact of 0.77 m^2 (8.28 ft^2) per action.

Sign on to protect nature

Habitat impact. If 30% of the United States land and water area were protected, as proposed by the Campaign for Nature (Campaign for Nature, 2021; Dinerstein et al., 2019) as part of the global 30 x 30 movement, it would increase protection over an additional 654,490 mi^2 (1,695,121 km^2) of land and water in the United States, equivalent to 55,375 ft^2 (5, 145 m^2) per American, or 5,1778 m^2 (557,334 ft^2) per person.

Climate impact: The Center for American Progress (2020) analyzed the potential carbon savings if 30 x 30 were enacted, considering decreased disturbance and enhanced carbon sequestration that would come from protecting native ecosystems (Richards 2020; Conservation Science Partners 2021). They estimate net 150 million metric tons of less carbon emissions, equivalent to approximately 455 kg (1,003.1 lb) CO_2e for each person in the United States.

Recommend a wild space

Habitat impact: The logic and impact calculations are the same as for "Discover wild spaces near you."

Talk about why nature matters

Habitat impact: The logic and impact calculations are the same as for "Discover wild spaces near you," except calculated daily, resulting an estimated impact of 0.01 m^2 (.11 ft^2) per action.

Appendix 2: Bonus Points for Wild for All

Table S2. Bonus points for the Wild for All

Actions	Estimated Annual Habitat Impact (m^2 / year)	Estimated Annual Climate Impact (kg CO_2e/year)	Habitat Change Points	Access-ibility Points	Bonus points: Habitat Bonus	Bonus points: Climate Bonus	Bonus points: Wild Bonus
Eat more veggies	4,383	661	4	4	8	3	0
Love your leftovers	979	112	3	4	7	3	0
Eat ocean friendly seafood	5,178	18	4	2	6	2	0
Eat local	9	180	1	2	3	3	0
Turn down the AC	65	24	2	4	6	2	0
Turn down the heat	65	10	2	4	6	2	0
Switch to a clean energy plan	--	4,132	0	0	0	4	0
Take public transit	198	507	3	4	7	3	0
Walk there	66	18	2	4	6	2	0
Cycle there	66	54	2	4	6	2	0
Recycle old electronics	9	2	1	4	5	1	0
Reuse a shopping bag	48	5	2	4	6	1	0
Grow native plants	19	--	2	2	4	0	3
Follow a nature organization	9	--	1	4	5	0	3
Sign on to protect nature	5,178	455	4	4	8	3	3
Visit a wildlife center	21	--	2	2	4	0	5
Discover wild spaces near you	2	--	1	4	5	0	5
Exercise outdoors	21	--	2	4	6	0	5
Play in nature	21	--	2	4	6	0	5
Go nature gazing	21	--	2	4	6	0	5
Recommend a wild space	9	--	1	4	5	0	3
Talk about why nature matters	2	--	1	4	5	0	3

The goal of these bonus points is to advance the goals for Wild for All, which are "to create a compelling, accessible campaign to activate new audiences and encourage audiences to enjoy nature, learn about sustainability and find new ways to reduce their environmental impact." Therefore, we include four category of points reflecting these goals: habitat change points, climate change points, accessibility points, and wild points. For ease of use with the app, the accessibility points and habitat change points are added together for a "habitat bonus"; the climate change points are relabeled "climate bonus"; and wild points equate to the "wild bonus." These points are assigned as follows based on the impact metrics above.

Habitat change points: We calculated the habitat impact for each action if it were performed consistently for a year at the feasible frequency in areas of expected habitat change expressed in square meters (m^2). Most of these actions will have maximum impact if done consistently so that the influence the underlying economic decisions of companies and producers. We gave 1 point if the annual sum of expected habitat change ranged from 1 - <10 m^2 per year; 2 points if the sum ranged from 10 - < 100 m^2 per year; 3 points if the sum ranged from 100 - < 1000 m^2 per year; and 4 if the sum of expected habitat change exceeded 1000 m^2 per year.

Accessibility points: We also want to encourage people to take actions that are accessible regardless of income or location. To this end, we added an accessibility

bonus based on the assumed cost of taking the action in the following categories. We gave 4 points if no or minimal investment (<$10 per action) was required, 2 points if the costs ranged between $10 – $100 per action, and no accessibility points if the action would require an expenditure of greater than $100.

Climate impact points (climate bonus): Many of the actions that impact habitat also make a different for the climate. To reflect these impacts, we added climate impact points (same as climate bonus) reflecting the carbon dioxide equivalent greenhouse gas emission savings (in kg CO_2e) per action as if that action were taken at the feasible frequency over a year. We gave 1 point if the annual sum of avoided greenhouse gas emissions ranged from 1 - < 10 kg CO_2e per year, 2 points if the sum ranged from 10 - < 100 kg CO_2e per year, 3 points if the sum ranged from 100 - < 1000 kg CO_2e per year, and 4 points if the sum exceeded 1000 kg CO_2e.

Wild points (wild bonus): Finally, we wanted to encourage people to get out into nature to take actions, enhancing their connection to environments. We gave wild points to actions intended to incent time in nature or time imagining nature, as in talking with someone about why nature matters. We gave 3 points for actions that consciously brought nature to mind and 5 points for actions that take one into wild nature, even if that wild nature is a wood lot or streamside near one's home.

Additional bonuses: Additional bonus for actions may be added for actions that save money (Wallet Bonus), contribute to a person's health (Health Bonus), for sharing actions with others, and other social media incentives to act Wild for All.

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Appendix 4. Units

Abbreviation	unit
ft	feet
mi	mile
kg	kilogram
g	gram
l	liter
lb/lbs	pound/pounds
mpg	miles per gallon
km per l	kilometers per liter
km	kilometers
m	meter
mi^2	square mile
m^2	square meter
ft^2	square foot
m^3	meter cubed
ft^3	cubed foot

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