

# Idaho Climate-Economy Impacts Assessment

## Recreation and Tourism Report

Alexander Maas<sup>1</sup> and Katherine Himes<sup>2</sup>

<sup>1</sup> Assistant Professor, Department of Agricultural Economics and Rural Sociology, College of Agricultural and Life Sciences, University of Idaho

<sup>2</sup> Director, James A. & Louise McClure Center for Public Policy Research, University of Idaho

Recommended citation: Maas, A. and Himes, K. E. 2021. Recreation and Tourism Report. *Idaho Climate-Economy Impacts Assessment*. James A. & Louise McClure Center for Public Policy Research, University of Idaho. Boise, ID.

### Key Messages

- Idaho has a substantial and growing tourism sector, largely based on the outdoor recreation opportunities provided by land, lakes, and rivers. Climate change is likely to influence the economic risks and opportunities this sector experiences and affect the overall wellbeing of Idahoans who engage in recreation and tourism.
- The duration of natural snow cover has decreased, and in many locations, ski and snowmobile seasons are projected to grow shorter and have decreasing snow quality throughout the 21<sup>st</sup> century.
- There may be opportunities to attract winter sport enthusiasts from areas of the country more severely affected by the changing climate. There is an opportunity for snow-secure parts of Idaho to attract tourists from states like Vermont, where snow-based activities are becoming less viable.
- Smoke from wildfires and high temperatures impacts motorized and non-motorized visitation and use of public lands and poses health risks to humans and wildlife.
- Altered timing of precipitation and warmer air temperatures affect water temperature and streamflow. This puts fish species and fisheries at risk and impacts revenue from recreational fishers and revenue for outfitters and guides.
- While warming temperatures present some risks to boating, such as harmful algal blooms, recreation opportunities may be available earlier in spring.
- Extreme heat, smoke, and cold may reduce the number of recreators boating, fishing, hunting, hiking, camping, and more. However, some of these visitation losses may be offset by increased participation in spring and fall months. Communities that develop tourism adaptation strategies and anticipate these changes may be able to capitalize on changing visitation patterns.

### 1. Overview of Recreation and Tourism in Idaho

Idaho is well known for its outdoor recreation, from world class rivers and lakes to sand dunes in summer, hunting and fishing through fall, and skiing and snowmobiling from winter through

spring. While estimates vary by study and year, in 2019, over 37,000 Idahoans were employed in sectors related to recreation and tourism (U.S. Bureau of Economic Analysis (BEA), 2021a); this number jumps to over 100,000 if food services (restaurants and bars) are included. In 2017, tourism accounted for \$3.7 billion in direct spending (TravelStats) and provided substantial tax revenues for the state. In 2019, direct revenue from the travel and convention tax was approximately \$13.5 million (Idaho Department of Commerce, 2021) and total tax revenues associated with the tourism sector accounted for roughly \$475 million across the state (TravelStats).

Although exact estimates are difficult to determine, the outdoor recreation sector accounted for over 2.7% of Idaho's total value-added economy in 2020; only seven states had a higher percentage of Gross Domestic Product (GDP) associated with outdoor recreation (U.S. BEA, 2021b). With projected population growth and a significant increase in demand for outdoor recreation, these numbers are likely to grow over the next 10 years (Headwaters Economics, 2019).<sup>1</sup>

The annual economic impact of outfitting and guiding in Idaho is approximately \$1.2 billion, slightly less than one-third of Idaho's recreation and tourism economy.<sup>2</sup> Approximately 80% of resident Idaho outfitters live in and contribute to economies of local communities with an average population of 500.<sup>2</sup> In 1993, a comprehensive study of the economic impacts of outfitting and guiding in Idaho found that outfitters had been in business an average of 14.5 years and that the average outfitter had been operating in Idaho for 13 years (Leidner and Krumpke, 1995). To run their businesses, outfitters incurred 81% percent of their total expenditures within the state.<sup>2</sup>

Idaho State Park visitation has increased by over 300,000 visits per year since 2014. A 2016 joint study between Idaho Department of Parks and Recreation (IDPR) and Boise State University estimated that Idaho State Parks account for over \$184 million (over \$200 million when adjusted for inflation) in economic activity and roughly 3,000 jobs across the state (Fragkias et al., 2018). In typical years, Idaho State Parks attract over 6 million visitors annually, while the seven National Park Service units in Idaho attract over 600,000 recreational visits each year. During the unprecedented events of the COVID-19 pandemic, visitation to Idaho State Parks jumped to nearly 8 million visitors annually (Figure 1). Public lands and state parks provided recreational opportunities while theaters, bars, and restaurants remained closed. The increased use of public lands highlights the importance of accounting for implicit benefits of public lands beyond what is measured in GDP. Access to green spaces and parks has been linked to improved mental and physical health (White et al., 2019), which have significant implications for not only wellbeing (particularly during the recent pandemic (Slater et al., 2020)), but also health care costs and employee productivity (Frumkin et al., 2017; Wood et al., 2017; Dadvand and Nieuwenhuijsen, 2019).

---

<sup>1</sup> Inferring future trends based on Headwaters Economics (2019).

<sup>2</sup> Modeling conducted by the Idaho Department of Commerce.

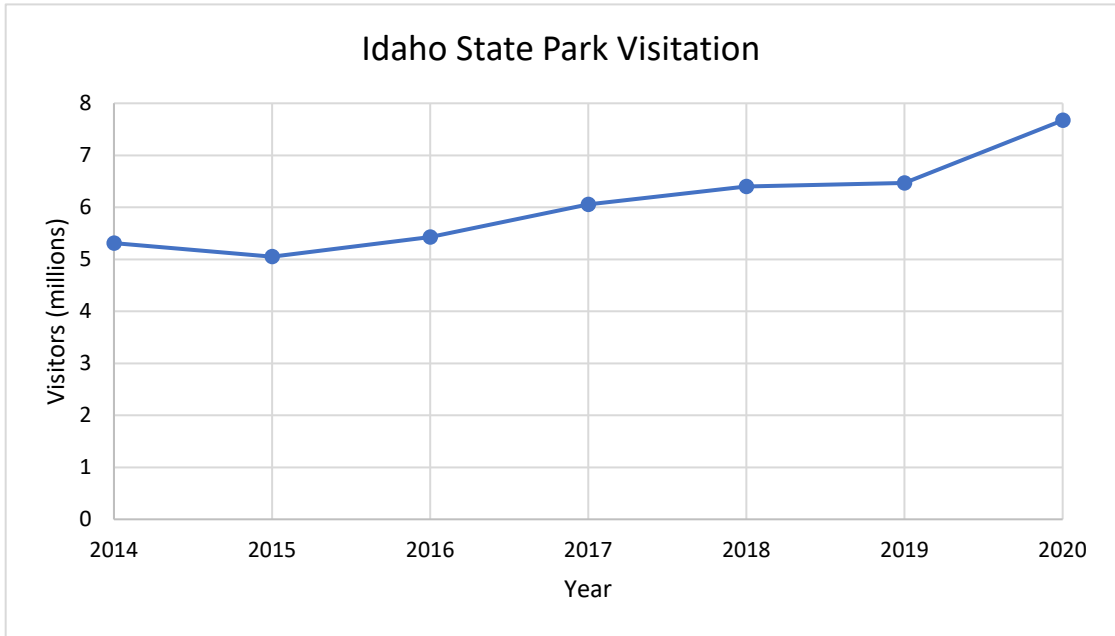


Figure 1. Idaho State Park visitation (Idaho Department of Parks and Recreation, 2021).

According to industry journals, recreation like rock climbing and OHV use are experiencing over 10% growth each year (Burgman, 2019; National Off-Highway Vehicle Conservation Council (NOHVCC), 2020; Tucker Williams, n.d.), while the outdoor recreation economy overall is growing by nearly 4% annually (U.S. BEA, 2021c). Idaho is rife with natural amenities and likely to prosper from increasing outdoor recreation; however, there are risks to this growth in a changing climate.

This report summarizes recreation and tourism in Idaho, highlights key drivers of demand that may be vulnerable to shifts in climate, and discusses opportunities for adaptation. Broadly speaking, outdoor recreation will be presented as 1) skiing, 2) snowmobiling, 3) fishing, 4) off-highway vehicle (OHV) recreation, 5) boating, 6) hunting, 7) hiking and camping, and 8) mountain biking.<sup>3</sup> Tourism to—and within—Idaho is broadly defined as all commercial activity due to travel to and from places of interest.

This report focuses on nature-based or natural resource-based recreation and tourism. The potential impact of changing weather systems on indoor recreation (e.g., gambling) and conventional sports (e.g., baseball or golf) is not discussed, although increased smoke exposure and extreme weather likely will affect these activities as well (International Olympic Committee (IOC), 2020; ClimateNexus). Changes in temperature, precipitation, and snowpack are likely to affect the recreation and tourism economy in three ways: 1) decreased implicit benefit, 2) decreased visitation and indirect revenues, and 3) decreased direct revenues.

<sup>3</sup> Economic contributions, including for local economies, and data availability were factors.

## 2. Climate Change and Recreation and Tourism

Changes in temperature, precipitation, and snowpack (details in the assessment's [Climate Report](#) and [Water Report](#)) will impact recreation and tourism in Idaho. The increase in disease, pests, and invasive species can lead to unhealthy and fragile landscapes. For example, increased pest and disease pressure on trees can lead to widespread tree mortality and increased risk for wildfires. Warmer temperatures and lower summer precipitation will impact fish and wildlife species.

More frequent extreme weather events will induce stress on roads, trails, facilities, campgrounds, and other infrastructure necessary to facilitate outdoor recreation. Extreme weather events also may lead to temporary or long-term closures of recreational areas if they are damaged or at risk for wildfires and flooding. Decreased recreation due to climate-related events like wildfire, smoke, and extreme heat, along with significant changes to river flow patterns—generally earlier and increased spring runoff—put additional pressure on places where outdoor activities take place.

Additionally, risks for outdoor recreation and the supporting infrastructure include challenges to the feasibility of future snow-based recreation at lower elevations. Decreasing snowfall and increasing rainfall impact the quality of the snow for winter sport recreation, which, overall, will continue to shorten ski and snowmobile seasons. These changes in climate can impact the local communities dependent upon winter recreation revenue.

## 3. Understanding the Economics of Recreation and Tourism

Before discussing the economic impacts of extreme weather events on the recreation and tourism sector, it is crucial to understand the difference between *implicit* and *explicit* costs and benefits. While the revenue and jobs generated from tourism and recreation are important, natural amenities also provide substantial non-monetary benefits that do not appear on a balance sheet. These benefits are referred to as *non-market benefits* and include any wellbeing improvements that do not require specific market transactions. For example, Idaho has well over 100 usable hot springs, many of which are free to the public. Residents and visitors gain benefits from an afternoon soak, but such activities remain largely unaccounted for in traditional GDP or explicit economic measures.

In some cases, a portion of this benefit is measurable, although the true value is difficult to estimate. For example, the Idaho Department of Fish and Game (IDFG) awarded nearly 300,000 deer tags in 2020 at the prescribed price of \$24.75 for residents (\$351 for non-residents) and 168,000 elk tags at the price of \$36.75 for residents (\$651 for non-residents).<sup>4</sup> Because game is managed by the state, the prices set do not reflect market value; indeed, research suggests that hunters gain considerably more benefit than the tag price suggests. A study in Colorado found that elk hunters had a willingness to pay of \$438 for an adult elk tag, well beyond the price paid (Buschena et al., 2001). Indeed, when non-market entities set prices in resource settings, the

---

<sup>4</sup> Information from multiple pages on the IDFG website, <https://idfg.idaho.gov/>.

observed price is usually a lower bound, since all that can be inferred is people bought it and therefore must value it at least as much as they were willing to pay. If the analysis of recreation and tourism only focuses on explicit economic metrics, then one could never explain why, for instance, a stroll in the woods is enjoyable. It is difficult to account for the total economic valuation of activities like hunting, as challenges would exist if every tag sold was auctioned to the highest bidder. As such, many of the benefits in recreation are implicit, since they generally do not show up on a balance sheet or in GDP; however, they are equally important in terms of the benefits they provide Idahoans.

#### **4. Public Land, Recreation, and Tourism**

Recreation and tourism in Idaho also are based on access to large portions of public land. Approximately 66% of the state's area is designated as public lands, the vast majority of which are managed by the federal government. The U.S. Bureau of Land Management (BLM) manages nearly 12 million acres, the U.S. Forest Service (USFS) manages about 21 million acres, and Idaho Department of Lands (IDL) operates another 2.5 million acres (BLM, 2021; U.S. Department of Agriculture (USDA), 2017; IDL, 2021). While these lands are managed for multiple use, including grazing, mineral rights, and forestry, they also provide opportunities for recreation, which can drive tourism and local spending. For example, Idaho State Parks make up only a small fraction of these public lands, but a recent analysis (2018) suggested that total visitor spending was \$75.66 million within 50 miles of the Idaho State Park they were visiting and over \$51 million outside of 50 miles on an annual basis (Fragkias et al., 2018).

Currently, Idaho is home to six National Park Service (NPS) units.<sup>5</sup> A recent study by Thomas and Koontz (2020), released by the U.S. Department of Interior, estimated visitor spending in communities near national parks across the U.S. created \$41.7 billion in benefits to these nearby communities. NPS units in Idaho accounted for \$29.9 million in visitor spending. The report estimated that tourism to NPS units in Idaho created 452 jobs and a labor income of \$12.5 million. Across all NPS units examined in the study, lodging accounted for the largest portion of visitor spending, followed by restaurants, motor vehicle fuel, and retail (Thomas and Koontz, 2020).

Institutional considerations also affect visitation numbers and the benefits those visitors receive. For example, the designation from national monument to national park results in a significant increase in long-term visitation to the public site (Weiler and Seidl, 2004). This increase in visitation can be an important source of revenue for local communities, since many of these lands are in rural areas where tourism is a vital component of local economies. A recent economic study suggests that national park designations and expansions lead to significant increase in overall employment and incomes in the local economy (NPS, 2020).

---

<sup>5</sup> City of Rocks National Reserve, Craters of the Moon National Monument and Preserve, Hagerman Fossil Beds National Monument, Minidoka National Historic Site, Nez Perce National Historic Park, and Yellowstone National Park, as well as the California and Oregon National Historic Trails and Ice Age National Geologic Trail

Climate change is likely to affect not only the character of parks and amenities, but the associated tourism and visitation patterns as well. State and federal land supports boating, camping, hiking, skiing, snowmobiling, and other recreational activities; many of these activities are affected by weather and climate (e.g., Verbos et al., 2017; Zajchowski et al., 2019; Gattie et al., 2021).

### *Risks*

Fischelli et al. (2015) conducted a study utilizing U.S. National Park recreation data from 1979 to 2013 and found that moderate heat increased visitation, but extreme heat resulted in a significant curtailment of recreation. For example, 91°F was identified as a daytime temperature threshold, beyond which park visitation was greatly diminished (Hewer, et al., 2016), though other evidence suggests this threshold may be considerably lower (Smith, et al., 2018; Zajchowski, et al., 2021). If similar results hold in Idaho, then this decrease in visitation can both reduce revenues and individual wellbeing, since visitors would prefer to visit the park in more moderate temperatures. Climate models suggest that by 2050, this temperature threshold will be crossed more frequently. For example, analyzing temperatures from 2000 to 2020, Ada County experienced an annual average of 41 days with temperatures exceeding 91°F (the majority of which occur in July and August). By 2050, this number is projected to grow to 63.18 days under RCP 4.5 and 67.90 days under RCP8.5.<sup>6,7</sup>

A recent study in Utah found that seasonal wildfires significantly decrease recreational visits to national parks (Arches, Bryce Canyon, Canyonlands, Capitol Reef, and Zion), even if wildfires occur outside park boundaries. Aggregate annual visitation losses at each national park were between 0.5% and 1.5% during a typical wildfire year, but losses may increase with the frequency and severity of wildfire. The study further estimated the regional economic losses due to seasonal wildfire to be as high as \$4.5 million annually for the state of Utah (Kim and Jakus, 2019). No similar study exists for Idaho, but estimates likely are comparable.

In addition to direct and indirect business revenues, tertiary effects are anticipated with climate change. Notably, property value in winter resort towns is highly dependent on reliable snow conditions. Even under moderate climate change predictions, property values in ski resort towns may decrease by as much as 30% by 2050 (in real terms), depending on the location, future climate, and the resort's ability to adapt to new conditions (Butsic et al., 2011). When the increased dangers of wildfire—and corresponding insurance costs—are considered, these losses in property values may be significantly larger (Hansen et al., 2014).

### *Opportunities*

Climate change will lead to warmer temperatures and affect precipitation and snowpack (see details in the assessment's [Climate Report](#)). Associated increasing hazards include avalanches, drought, floods, smoke, and wildfires. However, warmer temperatures generally translate to

---

<sup>6</sup> Calculated using data from The Climate Toolbox, <https://climatetoolbox.org>

<sup>7</sup> Two emissions scenarios are used for this report to project future change, RCP4.5 (moderate-warming) and RCP8.5 (high-warming). Mid-century projections are less sensitive to choice of RCP; differences between RCP4.5 and RCP8.5 are most important for late century projections. More detail about RCP is provided in the assessment's [Climate Report](#).

increasing length of summer and shoulder seasons. It is anticipated that public lands will see increased visitation during shoulder seasons in particular.<sup>8</sup>

While a changing climate is likely to have complex effects on public land recreation and visitation, proactive planning can help mitigate impacts on local economies. Communities that develop tourism adaptation strategies and anticipate these changes may be able to capitalize on changing visitation patterns (e.g., increased spring and fall tourism).

## 5. Outdoor Recreation

### *Snow-based Sports*

In recent years, snow-based sports have seen significant growth in participation across the U.S., providing additional revenue to areas that have little other winter business. Snowsports Industries, a member-owned trade association, estimates winter recreators total over 25 million people annually, with a growth rate of roughly 2%. Estimates suggest that winter sports and recreation support over 191,000 jobs nationally, create almost \$7 billion in wages, and generate \$20 billion in economic activity each year (Hagenstad et al., 2018).

Snow-based sports, compared to sports based on other seasons, are among the most vulnerable to increasing temperature, as resort and backcountry skiing, snowmobiling, and snowshoeing depend on reliable snowpack. For resorts, early season snow is particularly important, since winter break (approximately December 20 to January 3) represents a significant portion of annual income. Although mountainous winter activities are highly reliant on snow, snowpack variability and its drivers remain difficult to forecast. Since 1982, annual maximum snow mass has decreased by as much as 41% for various locations in the mountainous west, with a significantly curtailed snow season (over 34 days for some areas) (Zeng et al., 2018).

Across the U.S. as a whole, the duration of natural snow cover also has decreased and in many locations, ski seasons are projected to grow shorter throughout the 21<sup>st</sup> century (Pierce et al., 2008; Brown and Mote, 2009; Wobus et al., 2017). In Idaho, though winter precipitation overall may slightly increase in coming years, depending on location, more will come in the form of rain, which increases the rate of snowmelt while decreasing the quality of snow for winter recreation (see the assessment's [Climate Report](#) and [Water Report](#) for additional detail).

### *Skiing*

Idaho is home to 18 ski resorts, ranging in size (60 to 2,900 acres) and elevation (peak of 4,800 to nearly 9,500 feet). These resorts include backcountry, groomed runs, and terrain parks with 28,000 vertical feet over 18,000 acres. Most have been open for over 50 years. Idaho's ski resorts are spread across the state, with some being quite small and principally used by local Idahoans and others, such as Sun Valley, are world famous and draw visitors from near and far. During the 2016-2017 season, resorts provided 5,345 year-round equivalent jobs and \$242 million in revenue (Becher, 2018). Revenue includes lift tickets/ski passes, lodging, restaurants/bars, ski

---

<sup>8</sup> Described in detail: <https://toolkit.climate.gov/>

purchase/rental, groceries, childcare/ski school, ground transportation, airfare, USFS fees, and more (Becher, 2018).

Ski resort visitation has increased, with one ski resort in northern Idaho drawing approximately 230,000 visitors per year in the last decade. Ski revenue has grown by 50% over the last decade at a different ski resort in the northern portion of the state, from \$1.7 million to \$2.5 million. In the Grand Teton area alone, in 2013, skiing and snowboarding contributed nearly \$23 million to the local economy (Newcomb, 2013). Nordic skiing and snowshoeing are often connected to Idaho's ski resorts, though these types of recreation also can occur at other locations across the state.

### *Risks*

While ski resort feasibility analyses have not been published publicly, some regional and national studies provide insight into possible outcomes. First, it is well-documented that both trip demand and enjoyment are strongly affected by snow conditions (Englin and Moeltner, 2004; Falk, 2010). Second, the detrimental impacts of increasing temperature are not uniform. Instead, revenue and customer losses are likely to occur disproportionately at lower elevation resorts. Numerous studies conducted across three continents each concluded that dry, warm years lead to a significant decrease in skier days at low elevation resorts (Englin and Moeltner, 2004; Falk, 2010; Marina Pickering et al., 2010). However, there is evidence that at least some of this decrease is due to resort substitution, such that higher elevation resorts may experience an increase in visitation (Marina Pickering et al., 2010; Falk, 2015). Summarizing the results of 119 different studies, researchers from Austria found that worldwide, one should expect decreased reliability of slopes dependent on natural snow, increased snowmaking requirements, shortened and more variable ski seasons, a contraction in the number of operating ski areas, altered competitiveness among and within regional ski markets, and negative implications for ski tourism employment and vacation property real estate values (Steiger et al., 2019).

Additionally, ski season length—particularly for those mountains without snowmaking capabilities—has been decreasing and will continue to decrease (Notaro et al., 2014). Today, Bogus Basin opens on average nearly a month later than 1969 due to reduced snowpack in the early season (Figure 2). This decreased early season snowpack is a particular challenge, since much of the industry's revenue comes from winter break.



## HISTORICAL OPENING DATE: BOGUS BASIN

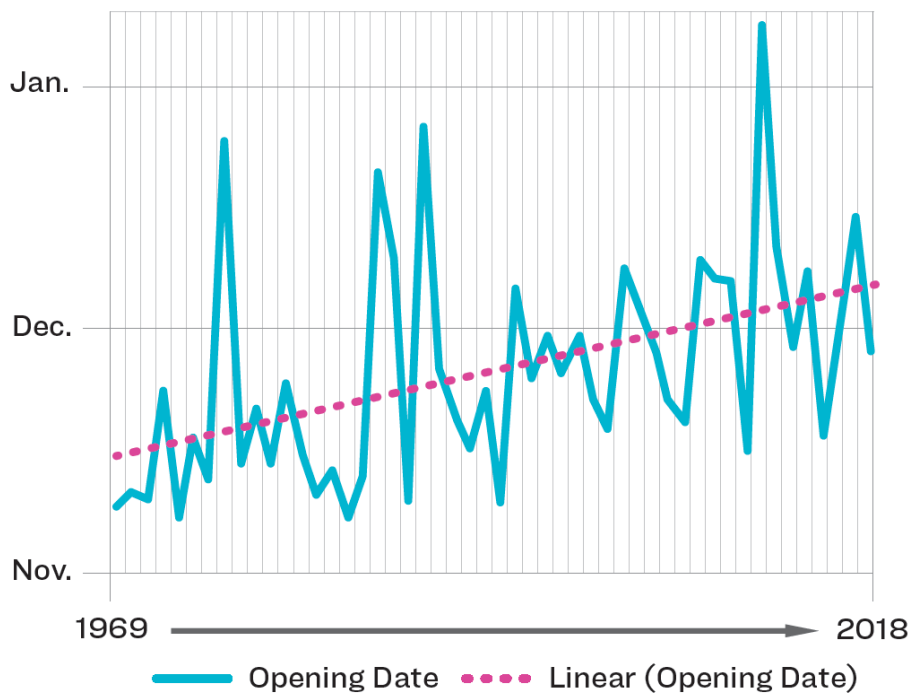


Figure 2: Bogus Basin opening dates, 1969-2018 (data provided by resort).

Early January snowpack has decreased across the state since the 1980s, though the rate of snowpack loss varies by location (Figure 3) (Natural Resources Conservation Service). Swede Peak's early January snowpack has decreased at a rate of 0.7 snow water equivalent (SWE)-inches per decade, while Schweitzer Mountain has decreased at a rate of over 1.5 SWE-inches per decade. This decrease in snow conditions during winter break has significant implications for not only ski resorts, but for the entire winter recreation economy. For example, the Climate Impact Lab<sup>9</sup> predicts that Blaine County can expect a 40% decline in the number of days at or below freezing by late century; similar results are predicted across Idaho (McCusker and Hess, 2018).

<sup>9</sup> The Climate Impact Lab is comprised of experts from University of California, Berkeley; Energy Policy Institute at the University of Chicago (EPIC); Rhodium Group; and Rutgers University.

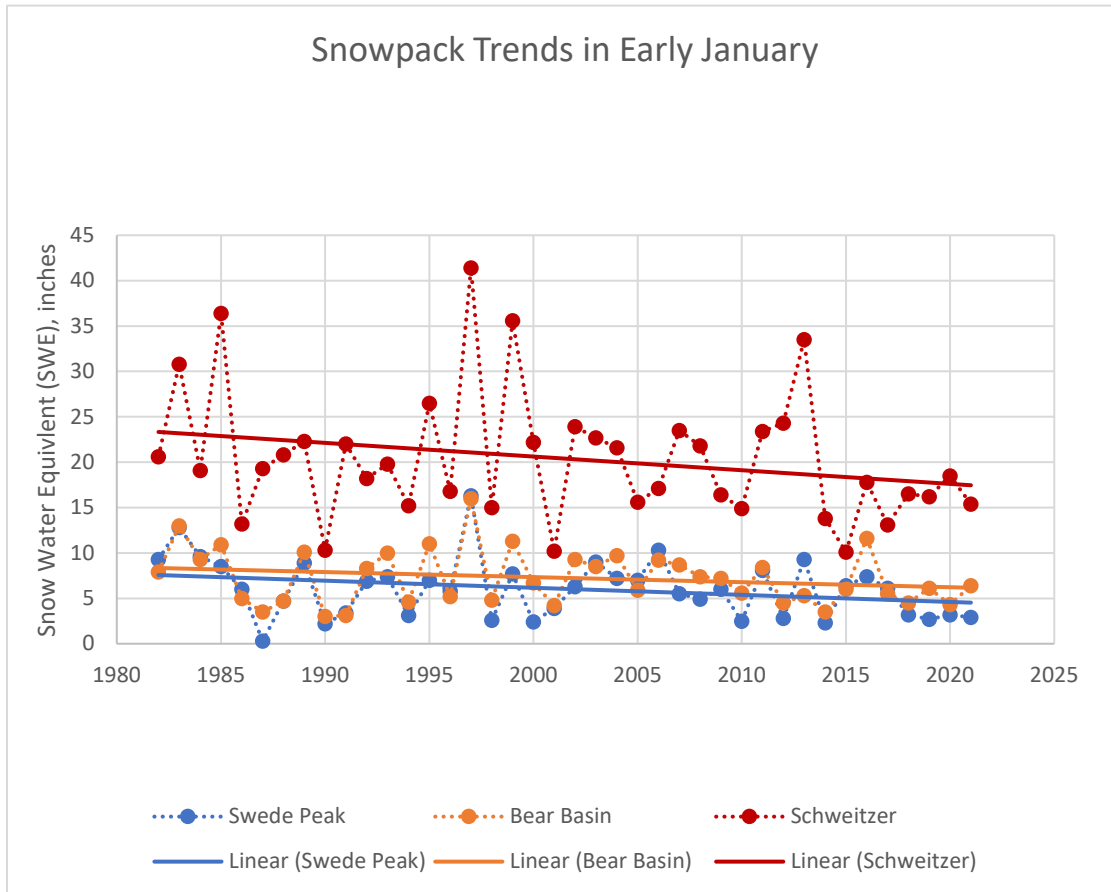


Figure 3. Snowpack trends in early January for three resorts in Idaho, 1980-2021 (Natural Resources Conservation Service). Snow water equivalent (SWE) is the amount of water that will be released from the snowpack when it melts.

### Opportunities

Although significant vulnerabilities exist in the ski sector, opportunities and adaptation strategies can reduce many of these impacts. In Arizona, where snowpack has been decreasing since the 1950s (U.S. Environmental Protection Agency, 2016), the adverse effects of warming winters may already be impacting the industry (Bark et al., 2010). As such, their experiences can be used to inform decisions in Idaho. For example, two large ski resorts in Arizona have significantly increased their snowmaking capacity, but this requires increased energy and water use, the availability of which may be constrained in the future. Even with additional snowmaking capacity, projections suggest that by 2050, temperatures likely will exceed technical thresholds in the shoulder seasons, meaning that in years when natural snowfalls are poor, the ski season may be significantly curtailed (Bark et al., 2010). Bogus Basin has acknowledged their creeping open date and began making snow for the first time in the 2019-2020 season. Snowmaking allowed both Bogus Basin and Sun Valley to open on Thanksgiving Day 2021, earlier than other ski areas in Idaho.

It is important to note that while overall ski conditions will deteriorate over this next century, the relative advantage of some resorts over others likely will drive economic effects. Lower

elevation and warmer resorts will lose competitive advantage to those that maintain better snow quality. Larger resorts and ski resort conglomerates also are likely to have better access to capital, which will be necessary to upgrade existing facilities or create new recreation opportunities. It is unclear how Idaho ski resorts will fare under these new conditions, since resorts in other states (the Northeast, for example) are experiencing more immediate impacts from climate change. While substantial evidence suggests skiers substitute poor snow quality resorts for better snow quality resorts in proximate locales, the substitutability across regions remains an open question. Idaho may have an opportunity to capture ski demand from regions where local skiing is no longer a worthwhile option. For example, the Northeast ski sector is particularly vulnerable to climate change (Beaudin and Huang, 2014). Idaho ski resorts could partner with resorts in the Northeast or conduct a concerted marketing campaign to attract skiers from areas of the country more severely affected by the changing climate.

Some resorts, including Bogus Basin, have diversified revenue streams through expanded summer recreation, conference, and concert series. In 2016, summer revenue from eight ski resorts in Idaho totaled \$43 million (Becher, 2018)

### ***Snowmobiling***

Snowmobiling is a popular winter activity across Idaho. In 2017, there were over 35,000 snowmobiles registered with the state. A recent study by Boise State University found that annual snowmobile trips totaled nearly 200,000, accounting for \$17 million in lodging and over \$60 million in snowmobile equipment sales and maintenance (Black et al., 2017).

### ***Risks***

Many of the snowpack issues discussed in the skiing section of this report also will affect snowmobiling. Decreased snowpack in December and January will shorten the season and likely lead to structural changes in recreator behavior over the winter break; for example, winter sports enthusiasts may substitute their traditional winter holiday trip for a different location. Some research suggests that this already is happening (Craig-Smith and Ruhanen, 2005; Steiger et al., 2020). Stated preference methods suggest that snowmobiling under “good” snow conditions is over three times more valuable than poor conditions (Larsen et al., 2020). This value is largely implicit, since winter passes are not set at market rates and the activity often occurs on public land. While some potential losses can be measured (e.g., decreased revenue for power sports retailers and other associated industries), much of the loss will be non-market and only experienced as a decrease in quality and opportunity to the recreator.

Snowmobiling can be an area of tension with other winter recreators. The tension and conflict between snowmobilers and Nordic and backcountry skiers has been documented since at least the 1970s (Knopp and Tyger, 1973; Vitters et al., 2004). A commonly proposed solution is zoning, or segregation, of recreation—often by non-motorized and motorized activity, as in the Sawtooth National Recreation Area—but limited destinations will make this solution less tenable in the future. As such, conflict around use-type is likely to increase in coming years.

## *Opportunities*

Generally, snowmobiling is less dependent on “high quality” snow than skiing, and thus, the effect of climate change may be less noticeable. As with skiing, there may be opportunities to attract snowmobiling enthusiasts from areas of the country more severely affected by the changing climate. For example, in Vermont, the number of days with more than one inch of snow has dropped from 130 in 1960 to 75 today (Perry et al., 2018). According to a recent study of the Vermont Association of Snow Travelers, 45% of respondents acknowledged a decline in the length of the season and roughly one-third claimed that this decrease has caused them to reduce the time spent snowmobiling (Perry et al., 2018).

While it will not eliminate use-type conflict between motorized and non-motorized recreationists, electric snowmobiles have recently become available in North America. These vehicles are considerably quieter than traditional machines and do not emit the exhaust of a traditional combustion engine.

## ***Fishing***

Fishing in Idaho takes many forms—fly fishing on rivers and lakes, family fishing in easy-to-access parks and ponds, fishing on lakes and reservoirs with and without watercraft, fishing in remote and urban areas, fishing interwoven with tribal livelihoods and treaty rights, and more. Idaho’s waters support over ninety species of native and non-native fishes that are resident to freshwater and anadromous. (See the assessment’s [Fish Report](#) for additional details.)

Fishing contributed \$5 billion to the U.S. GDP in 2019 (Headwaters Economics, 2021). In FY2020, IDFG sold 651,511 fishing, hunting, and combination licenses and permits, with total revenue of approximately \$55 million (IDFG, 2021a). In FY2019, IDFG sold 593,782 fishing, hunting, and combination licenses and permits, with total revenue over \$45 million (IDFG, 2020). Of this, 367,551 were fishing, hunting, and combination resident licenses and 226,231 were fishing, hunting, and combination non-resident licenses (IDFG, 2020). Single-day non-resident fishing licenses totaled 137,432; sales have increased steadily since 2011, when sales totaled 110,777 such licenses (IDFG, 2020). In 2019, IDFG spent over \$38 million on management of Idaho’s fisheries, with 171 full-time employees (IDFG, 2020). Expenditures were directly related to fish habitat, health, and population management; fish marking; fish screens and diversions; monitoring, evaluation, and special projects; regional support and coordination; resident fish hatcheries; and fishing and boating access (IDFG, 2020). The Nez Perce Fisheries Resource Management Department is focused on recovering and restoring all populations and all species of anadromous and resident fish within the Nez Perce Territory. The Nez Perce Fisheries Resource Management Department is one of the largest tribal fisheries programs in the U.S., with an annual budget over \$20 million that supports nearly 200 full-time jobs in north-central Idaho (Nez Perce Tribe Department of Fisheries Resources Management, 2020). The Department manages several hatcheries on the reservation and works on facilities both on and off the reservation in the three-state area.

In 2018, anglers spent nearly \$785 million on fishing-related expenses in Idaho, generating \$1.2 billion in economic output and supporting 8,750 jobs (American Sportfishing Association, 2021). Results from a 2003 IDFG county-by-county survey indicated that anglers spent more than 3.9 million days (2.9 million trips) on Idaho waters, with an average of 1.3 days per trip, 5.1 hours per day fishing, and \$150 per trip in spending (Grunder et al., 2008). Recreational fishing in Idaho generated nearly \$450 million in statewide retail sales that year (Grunder et al., 2008). Some benefits do not appear as black ink on a balance sheet, since these benefits are accrued internally (implicit) to the individual. A comprehensive analysis of 450 studies published in 2006 found that on average, anglers realize roughly the equivalent of \$22 in satisfaction per fishing trip, though there is significant variation (Johnston et al., 2006).

Fishing is an important source of income for many local economies in Idaho. Salmon and steelhead outfitters and guides contribute an estimated \$180-200 million in Idaho each year, not including excise taxes that outfitted clients pay on fishing equipment or license/tag sales, etc.<sup>2</sup> For every employed salmon and steelhead fishing guide, 2.10 jobs are added to the local economy.<sup>2</sup> In 2016, the recreational fishery in the Big Wood River Valley contributed \$2.5 million to Blaine County's economy (Cook and Becker, 2016). Salmon and steelhead fishing brings in over \$8.6 million per month (over \$34 million total) to communities in the Clearwater River region (American Rivers, 2021). In 2001, the Chinook fishery contributed an estimated \$10 million to the town of Riggins alone; the estimated total spending in Riggins that year was \$44 million (Fredericks, 2019). Anadromous fish are inextricably linked to Idaho's tribal communities and are integral to tribal religion, culture, and physical sustenance. Multiple tribal communities have called this contribution immeasurable.

### *Risks*

Climate-related weather and human-related pressures create vulnerability for Idaho's fishing. As described in the [Fish Report](#), altered seasonal timing of precipitation and warmer air temperatures are affecting stream temperatures and valuable fisheries. Habitat quality is predicted to decline in large rivers that support the highest quality fisheries for native natural-origin salmon and trout. Warming waters impact the distributions and abundance of fish species. Generally, for most fish species, distribution is expected to expand upstream and decline downstream, where waters are warmer. The stream areas suitable for bull trout and cutthroat trout are expected to decline 46% and 11%, respectively, with 2°C warming, as temperatures in larger rivers exceed their tolerance. Suitable areas for smallmouth bass, a predator of juvenile salmonids, is predicted to nearly double in size with 2°C warming. (See the assessment's [Fish Report](#) for more information.) Changing predation patterns and invasive species also may impact fish populations.

At present, anadromous fish populations in Idaho<sup>10</sup> and across the Pacific Northwest are a fraction of historical numbers. Declines are caused by many factors, including habitat, harvest, hatcheries, hydropower, ocean conditions, and predation (the 4Hs, O, and P). Population decline impacts Idaho's tribal and fishing communities and many species in Idaho's ecosystems that

---

<sup>10</sup> Idaho's anadromous fish include lamprey, salmon, steelhead, and sturgeon. Contributions of wild fish: <https://idfg.idaho.gov/fish/wild/about>

depend on the nutrients Idaho's anadromous fish provide to local habitat and river systems (described in Idaho Governor's Salmon Workgroup, 2020). Within the Columbia River Basin, including the Snake River and its tributaries, 16 salmon and steelhead stocks are listed under the Endangered Species Act (ESA) and some stocks have gone extinct (Idaho Governor's Salmon Workgroup, 2020). A detailed explanation of anadromous fish in Idaho and the region, including a discussion of factors leading to the decline, is available in the Phase 1 and Phase 2 reports of the Columbia Basin Partnership (CBP) (CBP Task Force, 2019; CBP Task Force, 2020).

Quality of recreational fishing is a significant driver in attracting anglers from out-of-state. If quality of recreational fishing decreases, then economic expenditures that support local and state economies will decrease. As well, residents may shift behavior, fishing recreationally in locations where quality is not as impacted. Altered timing of precipitation, warmer air temperatures, and smoke also may impact revenue from recreational fishers and revenue for outfitters and guides.

### *Opportunities*

Idaho remains a premier destination for anglers. This designation may increase as parts of southwestern U.S. experience more drought and extreme heat, both of which negatively affect fishing. Idaho's comparative advantage in providing a high-quality fishing experience may allow the state to substantially increase out-of-state licenses, which provide additional revenue. Given the high inelasticity of demand for fishing, price increases will likely increase revenues, which can be (and are) used to promote conservation and healthy fisheries (Bilgic and Florkowski, 2007). However, it is equally important to understand that fishing quality (particularly the "effort to catch") also plays an important role in fishing choice. For example, a study in Colorado suggests that a decrease in 1.0% of catchable trout leads to a 0.43% decrease in lake fishing and 0.23% decrease in stream/river fishing (Loomis and Fix, 1998). Identification of thermal refuges, management of riparian vegetation, beaver restoration and/or beaver dam analog installation may be important components of adaptation for Idaho fishes as stream temperatures warm (see the assessment's [Fish Report](#)).

There likely will be opportunity to fish for different species. For example, a number of fishing records were broken in 2020 and 2021 (IDFG, 2021b). In 2019, a burbot fishery (IDFG, 2021c) opened on the Kootenai River for the first time in 26 years, the result of a partnership among the Kootenai Tribe of Idaho, IDFG, University of Idaho, fisheries managers from British Columbia and Montana, and local communities in the Kootenai Valley. While species may shift, Idaho's fishing and guiding infrastructure and local communities will continue to support fishing-focused recreation and tourism.

### ***Off-Highway Vehicle (OHV) Recreation***

OHVs include motorized two-wheel, three-wheel, four-wheel, and some track vehicles. OHVs are connected to a variety of recreational activities. For example, some backcountry hunting trips involve OHVs; similarly, camping trips may connect with OHV recreation. As well, OHV use can be the sole focus of the recreation.

From August to November 2012, the University of Idaho, in partnership with IDPR, surveyed Idaho OHV recreationalists about their trips and expenditures (Anderson and Taylor, 2014). Snow and water machines were excluded from the survey. Out-of-state OHV recreationists who traveled to Idaho to recreate or make capital expenditures were not included. Expenditures by Idaho residents on out-of-state OHV trips with related trip expenditures in Idaho also were not included. Thus, the total economic footprint of OHV recreation in Idaho is higher than was estimated in this report (Anderson and Taylor, 2014).

In 2012, Idahoans took nearly 1 million OHV recreation trips within Idaho, accounting for approximately \$434 million (\$186 million on OHV recreation trip expenditures and \$248 million on OHV capital expenditures, including the vehicles themselves) (Anderson and Taylor, 2014). Lodging, restaurant dining, groceries, fuel, retail purchases, and other purchases were captured in trip expenditures (Anderson and Taylor, 2014). Of the \$186 million in recreation trip expenditures, \$84 million was spent on trips in the home county and just over \$100 million was spent on trips outside the home county (Anderson and Taylor, 2014). Nearly 76% of expenditures for out-of-county trips occurred in the home county; the remaining 24% were in the destination county (Anderson and Taylor, 2014). Expenditure patterns and amount varied considerably, depending on trip location (local or distant county) and county of residence (Anderson and Taylor, 2014). Capital expenditure categories included ATV/OHV purchases; trailer purchases; equipment (helmet, tools, etc.) purchases; repairs or modifications; fees (registration, taxes, club dues, etc.); towing vehicles; and other expenses (Anderson and Taylor, 2014). Capital expenditures averaged \$4,500 per OHV household per year (Anderson and Taylor, 2014). Six counties (Ada, Kootenai, Bonneville, Bannock, Twin Falls, and Canyon) captured over half the \$248 million in capital expenditures (Anderson and Taylor, 2014). All-terrain vehicles and dirt bikes accounted for 91% of the vehicles used for OHV recreation trips (Anderson and Taylor, 2014).

While no comprehensive study on the economic impacts of OHV recreation in Idaho has been conducted since 2012, it is worth noting that the number of registered OHVs continues to increase. From 2012 to 2019, the number of registered OHVs in Idaho increased from approximately 120,000 to nearly 168,000 (NOHVCC, 2020; IDPR, 2021). Given that, it is likely that the economic impacts of OHV recreation in Idaho similarly have increased since 2012.

### *Risks*

OHV recreation is subject to challenges connected to a changing climate. During periods of drought, trails may become excessively sandy and dusty. Similarly, periods of intense precipitation can degrade trail quality, leaving some trails potentially impassable, seasonally closed, and/or requiring additional maintenance. Excessive heat likely will impact OHV recreation, depending on activity type. Smoke and wildfire impact OHV recreation. Participation may decrease, due to unfavorable conditions and/or area closures. Such events are likely to increase as summers grow drier and hotter.

## *Opportunities*

Warmer temperatures generally translate to increasing length of summer and shoulder seasons. It is anticipated that OHV recreation may utilize shoulder seasons in particular.<sup>11</sup>

Economic opportunities exist for land managers, natural resource managers, and recreation organizations to modify and develop infrastructure that can adapt to a changing climate and continue to support OHV recreation. O'Toole et al. (2019) identified several key areas for adaptive infrastructure, including:

- Protecting and sustaining key infrastructure: Employing protective measures to minimize damage from disturbance events;
- Enhancing measures to prevent ecological damage from variable precipitation: Enhancing the capacity of natural systems to accommodate variable precipitation;
- Managing impacts from shifting visitation and use trends: Reducing impacts to vulnerable areas, optimizing timing of opportunities to align with changing conditions, and providing alternative means of access; and
- Managing recreational opportunities to address impacts of expected conditions: Reconditioning recreation-related infrastructure located in vulnerable areas and using appropriate vegetation to increase resilience of recreation settings to climate-related stressors (O'Toole et al., 2019).

## ***Boating***

Recreating on Idaho waterways, lakes, and reservoirs takes many forms. Motorized and non-motorized forms of boating and rafting contribute to the economy and culture in every corner of the state. Rafting and kayaking contribute to local and mostly rural Idaho communities, almost exclusively in the summer months. Towns like Riggins and Kooskia use rafting as a way to bring tourism dollars into the local community. In 2015, Middle Fork of the Salmon River-related spending, by outfitted clients, was estimated to be between \$8.26 and \$8.55 million directly to the local economy (Neher, 2016). Boating, whether motorized or non-motorized boating on lakes and reservoirs, guided or unguided rafting and kayaking on Idaho rivers, is directly related to the availability of and access to Idaho water and is an important source of revenue for local economies.

Nationally, boating contributed \$36 billion dollars to the U.S. GDP in 2019 (Headwaters Economics, 2021). In Idaho, boating and fishing contributed over \$175 million to outdoor recreation in 2020 (U.S. BEA, 2021a). In 2020, 82,434 boats were registered in Idaho (primary designation) (IDPR, 2020).

In 2015, IDPR contracted with the Department of Economics at Boise State University to study the economic impacts of powerboating in Idaho, both statewide and at the county level (Black et al., 2016). At the time, 81,189 powerboats were registered to 70,745 households in Idaho (Black et al., 2016). (The research did not include powerboats registered to businesses.) In 2015, \$335.3

---

<sup>11</sup> Recreation opportunities described in detail: <https://toolkit.climate.gov/>



million, including boats that came to Idaho from other western states,<sup>12</sup> was spent on activities related to boating: \$124 million on boats and equipment, \$64.8 million on fuel, \$60.1 million on food and beverage, \$40.3 million on other retail, \$21.9 million on maintenance and repair, \$13.3 million on lodging/camping, and \$11.0 million on moorage and storage (Black et al., 2016).

Powerboat ownership and usage was concentrated in the populated counties and those that have water: Ada, Bannock, Bonner, Bonneville, Canyon, Kootenai, Nez Perce, and Twin Falls (Black et al., 2016). In some counties, it was estimated that up to one-third of households had a boat (Black et al., 2016). The top counties, with respect to total expenditures, were Ada, Bonner, Canyon, Kootenai, Nez Perce, and Valley (Black et al., 2016).

It was found that the \$335.3 million increased employment by 3,088; increased labor income by \$88.0 million; increased value-added (the summation of labor income, interest, rent, and profit) by \$133.9 million; and increased output of locally-produced goods and services by \$227.9 million (Black et al., 2016). These results can be summarized through spending and employment multipliers (Table 1) (Black et al., 2016).

Spending Multipliers: Each \$1 million increase in spending by powerboat owners is associated with a:	Employment multipliers: Spending by powerboat owners that causes a 1 unit increase in employment is associated with a:
9.2 unit increase in employment	1.26 unit change in employment
\$262,452 increase in labor income	\$28,493 increase in labor income
\$399,744 increase in labor income, interest, rent, and profit	\$43,353 increase in labor income, interest, rent, and profit
\$679,680 increase in the output and sales of locally produced goods and services	\$73,787 increase in the output and sales of locally produced goods and services

Table 1: Spending and employment multipliers to calculate the economic impacts of powerboating in Idaho (Black et al., 2016).

A 2006 economic impacts study included all boat categories and explored the economic significance of recreational boating by Congressional District (National Marine Manufacturers Association, 2008). At that time, in Idaho, there were nearly 1.4 million total days spent boating and, including secondary effects (total impact of craft and trip spending), almost 3,500 jobs and \$132 million in labor income, \$409 million in sales, and \$222 million in value-added.

### Risks

Warming temperatures, decreasing snowpack, increasing harmful algal blooms (described in the assessment’s [Water Report](#)), wildfire smoke, and closures due to water quality, quantity, and wildfire are likely to shorten boating seasons in Idaho. Additional impacts to boating will vary across the state and likely will be location-specific. For example, spring water levels may be too high in some locations. Significant water flow and water turbidity also could be factors. Increases in precipitation events and storm intensity may decrease the number of boating days.

<sup>12</sup> California, Montana, Oregon, Utah, Washington, Wyoming.

### *Opportunities*

Warming spring temperatures may afford an earlier start to the boating season, particularly in locations that have been inaccessible into late spring (due to ice, for example). Depending on water levels, boating seasons may lengthen.

### ***Hunting***

Idaho remains a prime hunting location for residents and visitors. In FY2020, IDFG sold 651,511 fishing, hunting, and combination licenses and permits, with total revenue approximately \$55 million (IDFG, 2021a). In FY2019, IDFG sold 593,782 fishing, hunting, and combination licenses and permits, with total revenue over \$45 million (IDFG, 2020). Of this, 367,551 were fishing, hunting, and combination resident licenses and 226,231 were fishing, hunting, and combination non-resident licenses (IDFG, 2020). In FY2019, 376,097 resident tags and 60,695 non-resident tags were sold (IDFG, 2020). In 2019, IDFG tag data suggested the state had approximately 38,000 deer hunters, 83,000 elk hunters, and a sizable number of trophy hunters (IDFG, 2021d). Including fees, federal reimbursements, and other sources, IDFG generates over \$103 million in annual receipts, which goes towards objectives like maintaining land access, compensating landowners for depredation, population management, and conservation (IDFG, 2020). IDFG estimates that hunting, fishing, and trapping generate more than \$1.4 billion per year and support 14,000 jobs (IDFG, 2020).

### *Risks*

Idaho contains wet mesic forests and high deserts and numerous ecoregions in between. Changes to temperature, precipitation, and snowpack will affect these land types (see the assessment's [Ecosystems and Species Report](#)). For example, wildfire risk will increase under nearly every climate projection.<sup>13</sup> For some hunting activity, increased smoke and active wildfires reduce hunters' ability and enjoyment. Wildfires also negatively affect populations and change migration patterns (see the assessment's [Ungulate Report](#)).

In addition to wildfire, water availability also may impact the health, location, and interactions of numerous game species (McCluney et al., 2011). Major droughts have contributed to declines of western ungulate species and may increase ecosystem and disease pressure on key game species. Fragmentation has been shown to have negative and positive effects on both population genetics and disease pressures, such as chronic wasting disease (Lang and Blanchong, 2011). Climate change is likely to affect terrestrial species through changes in habitat, predator-prey relationships, physiological responses and sensitivities, and alterations in life cycles, though there is considerable uncertainty around the magnitude of these impacts on each species (Friggens et al., 2018).

### *Opportunities*

Although climate change presents risks, opportunities for big game hunters could increase. For example, severe winters from 2016 to 2019 led to a decrease in Mule deer tags (and harvests),

---

<sup>13</sup> See the assessment's [Climate Report](#) and [Smoke Report](#) for more information.

since fawn survival rates were below average. (Milder winters may improve fawn survival, though there is a dearth of research in this area.) Moreover, these gains may be offset by worsening conditions throughout the year (e.g., increasing droughts). Past wildfires can improve current hunting conditions (Loomis et al., 2002; Proffitt et al., 2019; Warren, n.d.). For many ungulates, wildfires can provide new habitat and food sources, leading to additional hunting opportunities. The aggregate effect of climate change on many big game species is unclear, though the timing and location of such species is likely to change.

As Idaho's population continues to increase, there is an opportunity to proactively plan development to account for changes in range and habitat. As well, there could be lessons learned from other states. If development in Idaho is well thought-out, habitat losses can be avoided, which can serve to keep game populations healthy.

### ***Hiking and Camping***

Hiking and camping are popular outdoor activities in Idaho and like other outdoor recreation opportunities provide both explicit and implicit economic benefits for residents. Numerous case studies from across the country demonstrate the value of hiking trails and campsites to local economies, though the size of the effect depends on the characteristics of the area. For example, a recent study in Washington state estimated \$8.4 billion per year is spent by non-motorized trail users over a total of 292 million annual destination-based trips (ECONorthwest and Washington State Recreation and Conservation Office, 2019). Although the benefits to the consumer are difficult to estimate (since they rarely are included directly in balance sheets), properties near hiking trails and outdoor amenities have a large and statistically significant price premium (Asabere and Huffman, 2009; Ham et al., 2012).

#### *Risks*

Hiking and camping are sensitive to extreme temperatures and smoke. Both survey and revealed preference research suggest that extreme temperatures reduce nature-based recreation and camping, as was noted in the public land section of this report. Thus, park and public land visitation may decrease in prime summer months, which could decrease spending in tourism-dependent local communities.

Although not expressly related to climate change, IDPR already is experiencing overcrowding at many of their water-adjacent campgrounds. Many locations in the state (Priest Lake State Park, for example) are fully booked throughout the summer reservation season. Increased summer temperatures are likely to create additional demand for water-adjacent campgrounds, which are already in low supply.

#### *Opportunities*

While extreme heat, smoke, and cold may reduce hiking and camping use, visitation losses in the summer may be partially offset by increased participation in spring and fall months. For example, a study of Parks Canada found that national park visitation may increase under climate change due to a lengthened and improved warm-weather tourism season (Jones and Scott, 2006). Idaho may experience a similar phenomenon, with higher elevation, more northern, and water-

adjacent parks gaining additional visitors. Thus, state and local communities have an opportunity to capture additional recreation by facilitating and accommodating the changing seasonality and location of nature-based recreation.

### ***Mountain Biking***

For mountain bikers, Idaho has more than 12,000 miles of single-track trails and at least twice that in four-wheel-drive dirt roads (IDPR, 2021). Trailforks (a user-populated app) also reports over 12,000 miles of mountain bike trails across Idaho.<sup>14</sup> Only a handful of states rank higher on this app.

The increased popularity of mountain biking has led to increased investment strategies to diversify and revitalize communities featuring desirable geographic terrain. These strategies often include trail system development, specialized mountain parks, and events (Moularde and Weaver, 2016). Expenditures of mountain biking tourists are relatively high compared to many sports. A recent study found mountain bike tourists are predominately middle-aged affluent males who take an average of five short-break trips annually of about 400 miles per trip during the spring and summer months and in the process spend approximately \$400 per trip (Buning et al., 2019). These expenditures represent significant revenues for local communities that successfully market themselves as biking “destinations.”

### *Risks*

Mountain biking participation is particularly important for ski resorts and other winter destinations that are looking to diversify activities offered. While the creation of summer recreation opportunities is a worthwhile adaptation strategy, it is also subject to challenges connected to a changing climate. Mountain biking trail quality varies by trail system and soil type; generally, a balance of moisture and dryness are required for optimal conditions. Extreme conditions (dryness and wetness) can lead to erosion. Risks outlined in the OHV recreation section also apply to mountain biking.

Smoke and wildfire pose particular threats to mountain biking recreation. Resorts like Tamarack and Silver Mountain have been successful in attracting summer mountain bikers, but wildfires and smoke events may decrease participation. Moreover, resorts themselves could be threatened, as they are often located in areas of high wildfire risk. In 2020, the Phillips Creek Fire burned the majority of Soldier Mountain just before the launch of their new mountain bike trail system. Such events are likely to increase as summers grow drier and hotter.

### *Opportunities*

Though they do not have the recognition of Moab, Utah or Crested Butte, Colorado, many Idaho areas are quickly becoming mountain biking destinations. This trend is likely to continue as the summer biking season in the southwest warms and four-season mountain resorts continue to develop downhill and cross-country mountain bike riding infrastructure. Members of the Idaho

---

<sup>14</sup> Accessed November 12, 2021.

Snow Sports Association have acknowledged the growth in summer recreation over the past year, much of which was centered around mountain biking.

Increased wildfire mitigation efforts, not only at the resort, but also on adjacent lands, may help reduce wildfire risk that threatens to impact summer recreation growth.<sup>15</sup> Opportunities for public and private partnerships may exist among resorts; local, state, and federal governments; and Idaho residents more generally, the benefits of which go beyond mountain biking. Some states, including Idaho, have instituted cost sharing programs or grant assistance for landowners willing to participate in wildfire mitigation programs (Colorado State Forest Service).<sup>16</sup> Given the substantial capital and infrastructure investments associated with ski resorts, successfully reducing wildfire risk is paramount.

Opportunities outlined in the OHV recreation section also apply to mountain biking.

## 6. Summary

Idaho has a substantial and growing recreation and tourism sector, largely based on the outdoor recreation opportunities provided by land, lakes, and rivers. Climate change is likely to influence economic risks and opportunities and affect the overall wellbeing of Idahoans who engage in recreation and tourism.

Smoke from wildfires and high temperatures impacts motorized and non-motorized visitation and use of public lands and poses health risks to humans and wildlife. Altered timing of precipitation and warmer air temperatures affect water temperature and streamflow, putting fish species and fisheries at risk and impacting revenue from recreational fishers and revenue for outfitters and guides. Extreme heat, smoke, and cold may reduce the number of recreators boating, fishing, hunting, hiking, camping, and more, although seasons may be lengthened.

Climate change presents opportunities for recreation and tourism in Idaho. For example, the warm weather recreation season may be extended for many parts of the state. Moreover, Idaho may fare relatively better than other states in the nation in the ability to provide high-quality outdoor recreation. Idaho has an opportunity to attract tourists from these regions, as well as expand opportunities for residents. To ensure the continued strength of Idaho's recreation and tourism sector and associated economic activity and position this sector for future growth and contribution to the state's economy, Idahoans can begin to plan now for climate change-related impacts.

---

<sup>15</sup> Resorts often are adjacent to state and federal land. Some resorts operate on federal land under a lease.

<sup>16</sup> For example: <https://csfs.colostate.edu/funding-assistance/>

## References

- Abatzoglou, J. T., S. Z. Dobrowski, S. A. Parks, K. C. Hegewisch. 2018. "Terraclimate, a high-resolution global dataset of monthly climate and climatic water balance from 1958-2015." *Scientific Data* 5, 170191. <https://doi.org/10.1038/sdata.2017.191>
- American Rivers. 2021. "America's Most Endangered Rivers 2021." [https://www.americanrivers.org/wp-content/uploads/2021/04/MER2021\\_FINAL\\_Report\\_ReducedSize-1-1.pdf](https://www.americanrivers.org/wp-content/uploads/2021/04/MER2021_FINAL_Report_ReducedSize-1-1.pdf). Accessed Nov. 2021.
- American Sportfishing Association (ASA). 2021. "Economic Contributions of Recreational Fishing: Idaho." <https://asafishing.org/wp-content/uploads/2021/01/Idaho-2021.pdf>. Accessed Nov. 2021.
- Anderson, C. and G. Taylor. 2014. "Economics of Idaho Off-Highway Vehicle Recreation." Idaho Department of Parks and Recreation, University of Idaho. [https://cdn2.assets-servd.host/material-civet/production/images/documents/id\\_ohveconomicimpacttechreport\\_2015.pdf](https://cdn2.assets-servd.host/material-civet/production/images/documents/id_ohveconomicimpacttechreport_2015.pdf). Accessed Nov. 2021.
- Asabere, P. K. and F. E. Huffman. 2009. "The Relative Impacts of Trails and Greenbelts on Home Price." *The Journal of Real Estate Finance and Economics* 38, 408-419. <https://doi.org/10.1007/s11146-007-9089-8>.
- Bark, R. H., B. G. Colby, F. Dominguez. 2010. "Snow days? Snowmaking adaptation and the future of low latitude, high elevation skiing in Arizona, USA." *Climatic Change* 102, 467-491. <https://doi.org/10.1007/s10584-009-9708-x>
- Beaudin, L. and J-C. Huang. 2014. "Weather conditions and outdoor recreation: A study of New England ski areas." *Ecological Economics* 106, 56-68. <https://doi.org/10.1016/j.ecolecon.2014.07.011>
- Becher, D. 2018. Presentation to: Idaho Ski Areas Association. "Ski Idaho Economic Impact Analysis." June 5, 2018.
- Bilgic, A. and W. J. Florkowski. 2007. "Application of a hurdle negative binomial count data model to demand for bass fishing in the southeastern United States." *Journal of Environmental Management* 83(4), 478-490. <https://doi.org/10.1016/j.jenvman.2006.10.009>
- Black, G., M. Fragkias, Z. Hansen, D. Holley, R. Humphrey, S. Lowe. 2016. "Economic Impact and Importance of Power Boating in Idaho: A County-Level Study." Idaho Department of Parks and Recreation, Boise State University. [https://parksandrecreation.idaho.gov/wp-content/uploads/IDPR-Powerboating-Report\\_December-2016\\_0.pdf](https://parksandrecreation.idaho.gov/wp-content/uploads/IDPR-Powerboating-Report_December-2016_0.pdf). Accessed Nov. 2021.
- Black, G., M. Fragkias, Z. Hansen, D. Holley, R. Humphrey, S. Lowe. 2017. "Economic Impact and Importance of Snowmobiling in Idaho." Idaho Department of Parks and Recreation, Boise State University. <https://parksandrecreation.idaho.gov/wp-content/uploads/Snowmobile-Econ-Study-FINAL.pdf>. Accessed Nov. 2021.
- Bureau of Land Management (BLM). 2021. "What We Manage". U.S. Department of the Interior. <https://www.blm.gov/about/what-we-manage/idaho>. Accessed Nov. 2021.
- Brown, R. D. and P. W. Mote. 2009. "The Response of Northern Hemisphere Snow Cover to a Changing Climate." *Journal of Climate* 22(8), 2124-2145. <https://doi.org/10.1175/2008JCLI2665.1>
- Buning, R. J., Z. Cole, M. Lamont. 2019. "A case study of the US mountain bike tourism market." *Journal of Vacation Marketing* 25(4), 515-527. <https://doi.org/10.1177%2F1356766719842321>.
- Burgman, J. 2019. "Gyms and Trends 2018." *Climbing Business Journal*. <https://www.climbingbusinessjournal.com/gyms-and-trends-2018/>. Accessed Nov. 2021.

- Buschena, D. E., T. L. Anderson, J. L. Leonard. 2001. “Valuing Non-Marketed Goods: The Case of Elk Permit Lotteries.” *Journal of Environmental Economics and Management* 41(1), 33-43.  
<https://doi.org/10.1006/jeem.2000.1129>
- Butsic, V., E. Hanak, R. G. Valletta. 2011. “Climate Change and Housing Prices: Hedonic Estimates for Ski Resorts in Western North America.” *Land Economics* 87(1), 75-91.  
<https://doi.org/10.3368/le.87.1.75>
- ClimateNexus. “Climate Change and Sports.” <https://climatenexus.org/climate-issues/climate-change-and-sports/>. Accessed Nov. 2021.
- Colorado State Forest Service. “Grants and Funding Assistance.” <https://csfs.colostate.edu/funding-assistance/>. Accessed Nov. 2021.
- Columbia Basin Partnership (CBP) Task Force. 2019. “A Vision of Salmon and Steelhead: Goals to Restore Thriving Salmon and Steelhead to the Columbia River Basin. Phase 1 Report of the Columbia Basin Partnership Task Force of the Marine Fisheries Advisory Committee.” [https://media.fisheries.noaa.gov/dammigration/mafac\\_report\\_cbp\\_phase\\_1\\_recommendations\\_full\\_report.pdf](https://media.fisheries.noaa.gov/dammigration/mafac_report_cbp_phase_1_recommendations_full_report.pdf). Accessed Nov. 2021.
- CBP Task Force. 2020. “A Vision of Salmon and Steelhead: Goals to Restore Thriving Salmon and Steelhead to the Columbia River Basin. Phase 2 Report of the Columbia Basin Partnership Task Force of the Marine Fisheries Advisory Committee.” [https://media.fisheries.noaa.gov/2020-10/MAFAC\\_CRB\\_Phase2ReportFinal\\_508.pdf](https://media.fisheries.noaa.gov/2020-10/MAFAC_CRB_Phase2ReportFinal_508.pdf). Accessed Nov. 2021.
- Cook, P. S. and D. R. Becker. 2016. “Preliminary Estimates of the Economic Effects of Stream Restoration on the Big Wood River Valley, Idaho.” University of Idaho College of Natural Resources Policy Analysis Group, Issue Brief No. 18. <https://www.uidaho.edu/-/media/UIdaho-Responsive/Files/cnr/research/PAG/Issue/IB18-final-PAG-20160729.pdf>. Accessed Nov. 2021.
- Craig-Smith, S. and L. Ruhanen. 2005. “Chapter 12. Implications of Climate Change on Tourism in Oceania.” In: C. M. Hall and J. Higham (eds) *Tourism, Recreation and Climate Change*. Channel View Publications. pp. 181-191. <https://doi.org/10.21832/9781845410056-014>
- Cullinane Thomas, C. and L. Koontz. 2020. “2019 National Park Visitor Spending Effects: Economic Contributions to Local Communities, States, and the Nation.” Natural Resource Report NPS/NRSS/EQD/NRR—2020/2110.  
[https://www.nps.gov/nature/customcf/NPS\\_Data\\_Visualization/docs/NPS\\_2019\\_Visitor\\_Spending\\_Effects.pdf](https://www.nps.gov/nature/customcf/NPS_Data_Visualization/docs/NPS_2019_Visitor_Spending_Effects.pdf). Accessed Nov. 2021.
- Dadvand P., and M. Nieuwenhuijsen. 2019. “Green Space and Health.” In: M. Nieuwenhuijsen, H. Khreis (eds) *Integrating Human Health into Urban and Transport Planning*. Springer.  
[https://doi.org/10.1007/978-3-319-74983-9\\_20](https://doi.org/10.1007/978-3-319-74983-9_20).
- ECONorthwest and Washington State Recreation and Conservation Office. 2019. “Economic, Environmental, & Social Benefits of Recreational Trails in Washington State.” <https://rco.wa.gov/wp-content/uploads/2020/01/HikingBikingStudy.pdf>. Accessed Nov. 2021.
- Englin, J. and K. Moeltner. 2004. “The Value of Snowfall to Skiers and Boarders.” *Environmental and Resource Economics* 29, 123-136. <https://doi.org/10.1023/B:EARE.0000035453.78041.71>
- Falk, M. 2010. “A dynamic panel data analysis of snow depth and winter tourism.” *Tourism Management* 31(6), 912-924. <https://doi.org/10.1016/j.tourman.2009.11.010>
- Falk, M. 2015. “The Demand for Winter Sports: Empirical Evidence for the Largest French Ski-Lift Operator.” *Tourism Economics* 21(3), 561-580. <https://doi.org/10.5367/2Fte.2013.0366>.

- Fisichelli, N. A., G. W. Schuurman, W. B. Monahan, P. S. Ziesler. 2015. "Protected Area Tourism in a Changing Climate: Will Visitation at US National Parks Warm Up or Overheat?" *PLOS ONE* 10(6), e0128226. <https://doi.org/10.1371/journal.pone.0128226>
- Fragkias, M., Z. Hansen, D. Holley, R. Humphrey, S. Lowe. 2018. "Economic Impact and Importance of State Parks in Idaho: A Park-Level Study." Idaho Department of Parks and Recreation, Boise State University. <https://parksandrecreation.idaho.gov/wp-content/uploads/Economic-Impact-and-Importance-of-State-Parks-in-Idaho.pdf>. Idaho Department of Parks and Recreation. Accessed Nov. 2021.
- Fredericks, J. 2019. "Idaho Salmon and Steelhead: Overview of Management, Status and Factors Affecting Abundance." Presentation to the Idaho Governor's Salmon Workgroup. <https://species.idaho.gov/wp-content/uploads/2019/06/Gov-Working-Group-final.pdf>. Accessed Nov. 2021.
- Friggens, M. M., M. I. Williams, K. E. Bagne, T. T. Wixom, S. A. Cushman. 2018. "Chapter 9: Effects of Climate Change on Terrestrial Animals." In: J. E. Halofsky, D. L. Peterson, J. J. Ho, N. J. Little, L. A. Joyce (eds), *Climate change vulnerability and adaptation in the Intermountain Region Part 2*. U.S. Department of Agriculture, RMRS-GTR-375, pp. 264-315. <https://doi.org/10.2737/RMRS-GTR-375PART2>
- Frumkin, H., G. N. Bratman, S. J. Breslow, B. Cochran, P. H. Kahn, Jr., J. J. Lawler, P. S. Levin, P. S. Tandon, U. Varanasi, K. L. Wolf, S. A. Wood. 2017. "Nature Contact and Human Health: A Research Agenda." *Environmental Health Perspectives* 125(7), 075001-1 - 075001-18. <https://doi.org/10.1289/EHP1663>
- Gatti, E. T. J., M. T. J. Brownlee, K. S. Bricker. 2021. "Winter recreationists' perspectives on seasonal differences in the outdoor recreation setting." *Journal of Outdoor Recreation and Tourism*. 100366. <https://doi.org/10.1016/j.jort.2021.100366>
- Grunder, S. A., T. J. McArthur, S. Clark, V. K. Moore. 2008. "2003 Economic Survey Report." Idaho Department of Fish and Game (IDFG) 08-129. <https://collaboration.idfg.idaho.gov/FisheriesTechnicalReports/Mgt08-129Grunder2003%20Economic%20Survey%20Report.pdf>. Accessed Nov. 2021.
- Hagenstad, M., E. A. Burakowski, and R. Hill. 2018. "Economic Contributions of Winter Sports in a Changing Climate." Protect Our Winters, Boulder, CO, USA. Feb. 23, 2018.
- Ham, C., P. A. Champ, J. B. Loomis, R. M. Reich. 2012. "Accounting for Heterogeneity of Public Lands in Hedonic Property Models." *Land Economics* 88(3), 444-456.
- Hansen, W. D., J. M. Mueller, H. T. Naughton. 2014. "Wildfire in Hedonic Property Value Studies." *Western Economics Forum* 13(1), 23-35.
- Headwaters Economics. 2019. "Recreation Counties Attracting New Residents and Higher Incomes." <https://headwaterseconomics.org/wp-content/uploads/recreation-counties-attract-report.pdf>. Accessed Nov. 2021.
- Headwaters Economics. 2021. "Inspiring the Future Outdoor Recreation Economy." [https://headwaterseconomics.org/wp-content/uploads/2021HE-SOBAN-Report-FINAL-DOWNLOAD\\_2.pdf](https://headwaterseconomics.org/wp-content/uploads/2021HE-SOBAN-Report-FINAL-DOWNLOAD_2.pdf). Accessed Nov. 2021.
- Hewer, M., D. Scott, A. Fenech. 2016. "Seasonal weather sensitivity, temperature thresholds, and climate change impacts for park visitation." *Tourism Geographies* 18(3), 297-321. <https://doi.org/10.1080/14616688.2016.1172662>



- Idaho Department of Commerce. 2021. "Tourism Research." <https://commerce.idaho.gov/tourism-resources/research/>. Accessed Nov. 2021.
- Idaho Department of Fish and Game (IDFG). 2020. "Director's Annual Report to the Commission, FY 2019." <https://idfg.idaho.gov/sites/default/files/directors-report-commission-2019.pdf>. Accessed Nov. 2021.
- IDFG. 2021a. "Department of Fish and Game," pp. 4-15 – 4-20. In: *Idaho 2021 Legislative Budget Book: Fiscal Year 2022*. Presentation to Idaho Joint Senate Finance House Appropriations Committee. <https://legislature.idaho.gov/wp-content/uploads/budget/publications/Legislative-Budget-Book/2021/Legislative%20Budget%20Book.pdf>. Accessed Nov. 2021.
- IDFG. 2021b. "Record Fish in Idaho." <https://idfg.idaho.gov/fish/record/certified-weight>. Accessed Nov. 2021.
- IDFG. 2021c. "Burbot." <https://idfg.idaho.gov/spp/4937>. Accessed Nov. 2021.
- IDFG. 2021d. "2020 General Hunt Harvest Statistics." <https://idfg.idaho.gov/ifwis/huntplanner/stats/>. Accessed Nov. 2021.
- Idaho Department of Lands (IDL). 2021. <https://www.idl.idaho.gov/about-us/>. Accessed Nov. 2021.
- Idaho Department of Parks and Recreation (IDPR). 2020. "Idaho 2020 Boat Distribution Numbers." [https://parksandrecreation.idaho.gov/wp-content/uploads/Idaho\\_2020\\_Boat\\_Distribution\\_Numbers.pdf](https://parksandrecreation.idaho.gov/wp-content/uploads/Idaho_2020_Boat_Distribution_Numbers.pdf). Accessed Nov. 2021.
- IDPR. 2021. "Department of Parks and Recreation," pp. 4-39 – 4-45. In: *Idaho 2021 Legislative Budget Book: Fiscal Year 2022*. Presentation to Idaho Joint Senate Finance House Appropriations Committee. <https://legislature.idaho.gov/wp-content/uploads/budget/publications/Legislative-Budget-Book/2021/Legislative%20Budget%20Book.pdf>. Accessed Nov. 2021.
- Idaho Governor's Salmon Workgroup. 2020. "Policy Recommendations from Idaho Governor Brad Little's Salmon Workgroup." <https://species.idaho.gov/wp-content/uploads/2020/12/Idaho-Salmon-Workgroup-Report-December-2020.pdf>. Accessed Nov. 2021.
- International Olympic Committee (IOC). 2020. "Sports for Climate Action." <https://stillmed.olympic.org/media/Document%20Library/OlympicOrg/IOC/What-We-Do/celebrate-olympic-games/Sustainability/sustainability-essentials/SUSTAINABILITY-ESSENTIALS-ISSUE-2.pdf>. Accessed Nov. 2021.
- Johnston, R. J., M. H. Ranson, E. Y. Besedin, E. C. Helm. 2006. "What Determines Willingness to Pay per Fish? A Meta-Analysis of Recreational Fishing Values." *Marine Resource Economics* 21(1), 1-32. <https://doi.org/10.1086/mre.21.1.42629492>
- Jones, B. and D. Scott. 2006. "Climate Change, Seasonality and Visitation to Canada's National Parks." *Journal of Park and Recreation Administration* 24(2).
- Kim, M-K., P. M. Jakus. 2019. "Wildfire, national park visitation, and changes in regional economic activity." *Journal of Outdoor Recreation and Tourism* 26, 34-42. <https://doi.org/10.1016/j.jort.2019.03.007>
- Knopp, T. B. and J. D. Tyger. 1973. "A Study of Conflict in Recreational Land Use: Snowmobiling vs. Ski-Touring." *Journal of Leisure Research* 5, 6-17. <https://doi.org/10.1080/00222216.1973.11970138>
- Lang, K. R. and J. A. Blanchong. 2011. "Population genetic structure of white-tailed deer: Understanding risk of chronic wasting disease spread." *The Journal of Wildlife Management* 76(4), 832-840. <https://doi.org/10.1002/jwmg.292>

- Larsen, R., R. G. Taylor, J. R. McKean, D. M. Johnson. 2020. "Willingness-to-pay for snowmobile recreation: travel cost method models with and without post-season resurvey of trip count." *Applied Economics* 52, 2178-2190. <https://doi.org/10.1080/00036846.2019.1686112>
- Leidner, S. R. and E. Krumpke. 1995. "Idaho Outfitters and Guides Economic Contribution to the Idaho Economy 1993." Report 775. University of Idaho Forest, Wildlife and Range Experimental Station.
- Loomis, J. and P. Fix. 1998. "Testing the importance of fish stocking as a determinant of the demand for fishing licenses and fishing effort in Colorado." *Human Dimensions of Wildlife* 3, 46-61. <https://doi-org.uidaho.idm.oclc.org/10.1080/10871209809359131>
- Loomis, J., D. Griffin, E. Wu, A. Gonzalez-Caban, A. 2002. "Estimating the economic value of big game habitat production from prescribed fire using a time series approach". *Journal of Forest Economics* 8, 119-129.
- Marina Pickering, C., J. G. Castley, M. Burt. 2010. "Skiing Less Often in a Warmer World: Attitudes of Tourists to Climate Change in an Australian Ski Resort." *Geographical Research* 48(2), 137-147. <https://doi.org/10.1111/j.1745-5871.2009.00614.x>
- McCluney, K. E., J. Belnap, S. L. Collins, A. L. González, E. M. Hagen, J. N. Holland, B. P. Kotler, F. T. Maestre, S. D. Smith, B. O. Wolf. 2011. "Shifting species interactions in terrestrial dryland ecosystems under altered water availability and climate change." *Biological Reviews* 87(3), 563-582.
- McCusker, K. and H. Hess. 2018. "America's Shrinking Ski Season." <https://impactlab.org/news-insights/americas-shrinking-ski-season/>. Accessed Nov. 2021.
- Moularde, J. and A. Weaver. 2016. "Serious about leisure, serious about destinations: mountain bikers and destination attractiveness." *Journal of Sport & Tourism* 20(3-4), 285-303. <https://doi.org/10.1080/14775085.2016.1164069>
- National Marine Manufacturers Association (NMMA). 2008. "Economic Significance of Recreational Boating: The Idaho 1st Congressional District." [http://www.nmma.org/lib/docs/nmma/gr/state/id/ID\\_3.pdf](http://www.nmma.org/lib/docs/nmma/gr/state/id/ID_3.pdf). Accessed Nov. 2021.
- National Off-Highway Vehicle Conservation Council (NOHVCC). 2020. "Idaho's Billion Dollar Motorized Recreation Industry." <https://nohvcc.org/srv/htdocs/wp-content/uploads/2020/06/Idahos-Billion-Dollar-Industry.pdf>. Accessed Nov. 2021.
- National Park Service (NPS). 2020. "National Park Service Visitor Spending Generates Economic Impact of More Than \$41 Billion." <https://www.nps.gov/orgs/1207/06-11-20-nps-visitor-spending-generates-economic-impact-of-more-than-41-billion.htm>. Accessed Nov. 2021.
- Natural Resources Conservation Service (NRCS). "Snow Telemetry (SNOTEL) and Snow Course Data and Products." <https://www.wcc.nrcs.usda.gov/snow/>. Accessed Nov. 2021.
- Neher, C. 2016. "Economic Significance of Middle Fork of the Salmon Floater Spending on Local Economies." <https://st11.ning.com/topology/rest/1.0/file/get/2411744?profile=original>. Accessed Nov. 2021.
- Newcomb, M. 2013. "Teton-West Yellowstone Region Backcountry Winter Recreation Economic Impact Analysis." Boise, ID: Winter Wildlands Alliance.
- Nez Perce Tribe Department of Fisheries Resources Management. 2020. "Management Plan: 2013-2028." <https://nezperce.org/wp-content/uploads/2020/09/DFRM-Management-Plan-2013-2028.pdf>. Accessed Nov. 2021.
- Notaro, M., D. Lorenz, C. Hoving, M. Schummer. 2014. "Twenty-First-Century Projections of Snowfall and Winter Severity across Central-Eastern North America." *Journal of Climate* 27(17), 6526-6550. <https://doi.org/10.1175/JCLI-D-13-00520.1>

- O'Toole, D., L. A. Brandt, M. K Janowiak, K. M. Schmitt, P. D. Shannon, P. R. Leopold, S. D. Handler, T. A. Ontl, C. W. Swanston. 2019. "Climate Change Adaptation Strategies and Approaches for Outdoor Recreation." *Sustainability* 11(24), 7030. <https://doi.org/10.3390/su11247030>
- Perry, E., R. Manning, X. Xiao, W. Valliere, N. Reigner. 2018. "Social Climate Change: The Advancing Extirpation of Snowmobilers in Vermont." *Journal of Park and Recreation Administration* 36, 31-51. <https://doi.org/10.18666/JPRA-2018-V36-I2-8307>
- Pierce, D. W., T. P. Barnett, H. G. Hidalgo, T. Das, C. Bonfils, B. D. Santer, G. Bala, M. D. Dettinger, D. R. Cayan, A. Mirin, A. W. Wood, T. Nozawa. 2008. "Attribution of Declining Western Snowpack to Human Effects." *Journal of Climate* 21(23), 6425-6444. <https://doi.org/10.1175/2008JCLI2405.1>
- Proffitt, K. M., J. DeVoe, K. Barker, R. Durham, T. Hayes, M. Hebblewhite, C. Jourdonnais, P. Ramsey, J. Shamhart. 2019. "A century of changing fire management alters ungulate forage in wildfire-dominated landscape." *Forestry: An International Journal of Forest Research* 92(5), 523-537. <https://doi.org/10.1093/forestry/cpz017>
- Roerick, T. M., J. W. Cain III, J. V. Gedir. 2019. "Forest restoration, wildfire, and habitat selection by female mule deer." *Forest Ecology and Management* 447, 169-179. <https://doi.org/10.1016/j.foreco.2019.05.067>
- Slater, S. J., R. W. Christiana, J. Gustat. 2020. "Recommendations for Keeping Parks and Green Space Accessible for Mental and Physical Health During COVID-19 and Other Pandemics." *Preventing Chronic Disease* 17, E59. <https://doi.org/10.5888/pcd17.200204>.
- Smith, J. W., E. Wilkins, R. Gayle, C. C. Lamborn. 2018. "Climate and visitation to Utah's 'Mighty 5' national parks." *Tourism Geographies* 20(2), 250-272. <https://doi.org/10.1080/14616688.2018.1437767>
- Steiger, R., D. Scott, B. Abegg, M. Pons, C. Aall. 2019. "A critical review of climate change risk for ski tourism." *Current Issues in Tourism* 22(1), 1343-1379. <https://doi.org/10.1080/13683500.2017.1410110>
- Steiger, R., E. Posch, G. Tappeiner, J. Walde. 2020. "The impact of climate change on demand of ski tourism - a simulation study based on stated preferences." *Ecological Economics* 170, 106589. <https://doi.org/10.1016/j.ecolecon.2019.106589>
- TravelStats. "Idaho." <https://www.travelstats.com/dashboard/idaho>. Accessed Nov. 2021.
- Tucker Williams, E. "Off Highway Vehicles (OHV)." Congressional Sportsmen's Foundation. <https://congressionalsportsmen.org/policies/state/off-highway-vehicles-ohvs>. Accessed Nov. 2021.
- U.S. Bureau of Economic Analysis (BEA). 2021a. "Outdoor Recreation." <https://www.bea.gov/data/special-topics/outdoor-recreation>. Accessed Nov. 2021
- U.S. BEA. 2021b. "Outdoor Recreation Satellite Account, U.S. and States, 2019." <https://www.bea.gov/news/2021/outdoor-recreation-satellite-account-us-and-states-2020>. Accessed Nov. 2021.
- U.S. BEA. 2021c. "Outdoor Recreation." <https://www.bea.gov/data/special-topics/outdoor-recreation>. Accessed Nov. 2021.
- U.S. Bureau of Land Management (BLM). <https://www.blm.gov/about/what-we-manage/idaho>. Accessed Nov. 2021.
- U.S. Department of Agriculture (USDA). 2017. "Intermountain Region National Forests in Idaho." [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprd3852339.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3852339.pdf). Accessed Nov. 2021.

- U.S. Environmental Protection Agency (EPA). 2016. "What Climate Change Means for Arizona." EPA 430-F-16-005. <https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-az.pdf>. Accessed Nov. 2021.
- Verbos, R. I., B. Altschuler, M. T. J. Brownlee. 2017. "Weather Studies in Outdoor Recreation and Nature-Based Tourism: A Research Synthesis and Gap Analysis." *Leisure Sciences* 40(6), 533-556. <https://doi.org/10.1080/01490400.2017.1325794>
- Vitters, J., R. Chipeniuk, M. Skår, O. I. Vistad. 2004. "Recreational Conflict Is Affective: The Case of Cross-Country Skiers and Snowmobiles." *Leisure Sciences* 26(3), 227-243. <https://doi.org/10.1080/01490400490461378>
- Warren, R. "How to Hunt an Old Burn." Western Hunter, <https://westernhunter.net/tactics/how-to-hunt-an-old-burn/>. Accessed Nov. 2021.
- Weiler, S. and A. Seidl. 2004. "What's in a Name? Extracting Econometric Drivers to Assess the Impact of National Park Designation." *Journal of Regional Science*. 44(2), 245-262. <https://doi.org/10.1111/j.0022-4146.2004.00336.x>
- White, M., I. Alcock, J. Grellier, B. W. Wheeler, T. Hartig, S. L. Warber, A. Bone, M. H. Depledge, L. E. Fleming. 2019. "Spending at least 120 minutes a week in nature is associated with good health and wellbeing." *Scientific Reports* 9, 7730. <https://doi.org/10.1038/s41598-019-44097-3>
- Wobus, C., E. E. Small, H. Hosterman, D. Mills, J. Stein, M. Rissing, R. Jones, M. Duckworth, R. Hall, M. Kolian, J. Creason, J. Martinich. 2017. "Projected climate change impacts on skiing and snowmobiling: A case study of the United States." *Global Environmental Change* 45, 1-14. <https://doi.org/10.1016/j.gloenvcha.2017.04.006>
- Wood, L., P. Hooper, S. Foster, F. Bull. 2017. "Public green spaces and positive mental health – investigating the relationship between access, quantity and types of parks and mental wellbeing." *Health & Place* 48, 63-71. <https://doi.org/10.1016/j.healthplace.2017.09.002>
- Zajchowski, C. A. B., M. T. J. Brownlee, J. Rose. 2019. "Air quality and the visitor experience in parks and protected areas." *Tourism Geographies* 21(4), 613-634. <https://doi.org/10.1080/14616688.2018.1522546>
- Zajchowski, C. A. B., F. South, J. Rose, E. Crofford. 2021. "The Role of Temperature and Air Quality in Outdoor Recreation Behavior: A Social-Ecological Systems Approach." *Geographical Review*. <https://doi.org/10.1080/00167428.2021.1897811>
- Zeng, X., P. Broxton, N. Dawson. 2018. "Snowpack Change From 1982 to 2016 Over Conterminous United States." *Geophysical Research Letters* 45(23), 12940-12947. <https://doi.org/10.1029/2018GL079621>