

ECONOMIC ANALYSIS OF THE LAKE CHELAN GOLF COURSE

CITY OF CHELAN, WA | 2021





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EXECUTIVE SUMMARY

The Lake Chelan Golf Course (LCGC) has a substantial and positive impact on the Chelan Valley economy, through both its operations and the golf tourism spending that the course drives. The increase in golf participation during 2020's pandemic provided an unexpected economic boost, there was a downturn in overall tourism. Total rounds played at the LCGC increased from 18,131 in 2019 to 21,389 in 2020, an 18 percent increase.

LCGC operations and golf tourism spending in the Chelan Valley supported \$16.9 million in direct and secondary spending, and supported 148 jobs and \$4.5 million in wages in 2020. We estimated that 60 of those jobs (44 percent) were within the City of Chelan, and that the LCGC generates \$146,000 in city tax revenues, between course operations and direct and secondary spending associated with golf tourism. These local tax revenues offset the \$40,000 annual subsidy to the course many times over.

This analysis reveals a 49-percent increase in golf-tourism days in 2020 over the prior year—not only are there more tourists golfing, but they also stay in the region for longer periods. This led to an additional \$4.2 million in tourism dollars entering the study area. The LCGC attracts visitors from around the world, but most visitors arrive from the state's most populous region, the Seattle-Tacoma-Olympia corridor. The average LCGC visitor spent an estimated \$326 each day of their trip, though overnight visitors spent significantly more, \$357 for each overnight stay, compared to \$61 for each day visit.

This study also observed changes in golf tourist movement, using anonymized cell phone data. Most notable was a decrease in the number of unique devices in full-service restaurants, and an increase in grocery stores and limited-service restaurants. The analysis also notes that while business in some sectors saw fewer unique devices in 2020, there was an overall increase in golf-tourism, which led to increased spending across all sectors.

REPORT STRUCTURE

This report estimates the economic impact of the Lake Chelan Golf Course. The report is structured as follows:

CHAPTER 1 provides a background on the Chelan Valley study area

CHAPTER 2 reviews the study methodology

CHAPTER 3 estimates the economic impact of the Lake Chelan Golf Course, detailing the jobs, wages, and tax revenues associated with golf course operations and golf-related tourism.

CHAPTER 4 evaluates how consumer behavior changed due to COVID-19

CHAPTER 5 summarizes the report findings and identifies areas for future research.

LAKE CHELAN GOLF COURSE (LCGC) ECONOMIC IMPACT

2020

\$16.9 MILLION
in economic activity in the Chelan Valley supported by LCGC tourism spending.

148 JOBS
supported by LCGC tourism, including 60 jobs within the City of Chelan.

\$4.5 MILLION
in labor income in Chelan Valley supported by LCGC tourism.

21,389 ROUNDS OF GOLF
played at the LCGC in 2020—a single-season record; 53% were played by tourists.

\$146 THOUSAND
in municipal tax revenue generated.

\$12 MILLION
spent by tourists on non-golf expenditures, with 46% spent on lodging.



INTRODUCTION

There are two major industries at the heart of the Lake Chelan Valley (the Valley) economy—agriculture and tourism. These include apple growers, wineries (at the intersection of the agriculture and tourism industries), golf, and natural amenities, such as Lake Chelan and the Columbia River. The Valley has approximately 4,000 year-round residents, but as many as 25,000 stay in the area during the summer months. Tourism attracts over 2 million visitors annually, and it is estimated that visitors spend \$417 million per year, supporting about 5,000 jobs.ⁱ The Valley's five golf courses—Lake Chelan, Gamble Sands, Bear Mountain Ranch, Rock Island, and Alta Lake—attract tourists from around the world, contributing to the larger tourism economy.

The City of Chelan owns and operates the Lake Chelan Golf Course (LCGC), an 18-hole municipal golf course where approximately 21,000 rounds are played each year. Of the five golf courses in the Valley, the LCGC offers the best price and value, and is nearest to the Chelan city center. The City of Chelan commissioned Earth Economics to perform this study on the economic impact of the Lake Chelan Golf Course, to better understand how the course contributes to the regional economy.

The purpose of this study is to determine the economic impact of the LCGC in terms of business operations (from direct spending on the course itself) and related tourism spending throughout the Valley. To estimate economic impacts, Earth Economics applied an economic impact analysis—also known as a contribution analysis. Economic impact analysis reveals how spending in one industry contributes to other sectors, detailing the total spending, employment, average wages, and tax generation associated with the initial, direct expenditures. For this case study, only spending by tourists (i.e., those whose permanent residence is outside of the study area) has been considered.

In 2020, over 101 million people over the age of six enjoyed golf in some form (e.g., playing, watching) in the United States. Of these, roughly 36.9 million people played the sport, 3 million of whom were new to golf.ⁱⁱ The most recent data for Washington state is from 2015, where direct spending on golf reached \$1.2 billion, and the total economic effects approached \$1.6 billion (both 2015 dollars). The golf industry in Washington State supports over 22,000 jobs and \$499 million in wages.ⁱⁱⁱ



CONCEPTS & METHODS

The economic effects of the LCGC fall into two categories: golf course operations and golf tourist spending effects, considered economic contributions and economic impacts, respectively. Economic contributions represent spending within an existing economy, while economic impacts represent spending entering the local economy from outside the region. The economic contribution of golf course operations measures how the LCGC contributes to the local economy as a business enterprise. The economic impact of golf tourism studies how spending supports the economy more broadly, through direct spending at local businesses which purchase goods and services to maintain their business (indirect spending), and employ staff, who then purchase goods and services to support themselves and their families (induced spending). The ratio of direct spending to the combined direct, indirect, and induced spending resulting from those initial expenditures is known as the “multiplier effect.”

GOLF COURSE OPERATIONS IMPACT

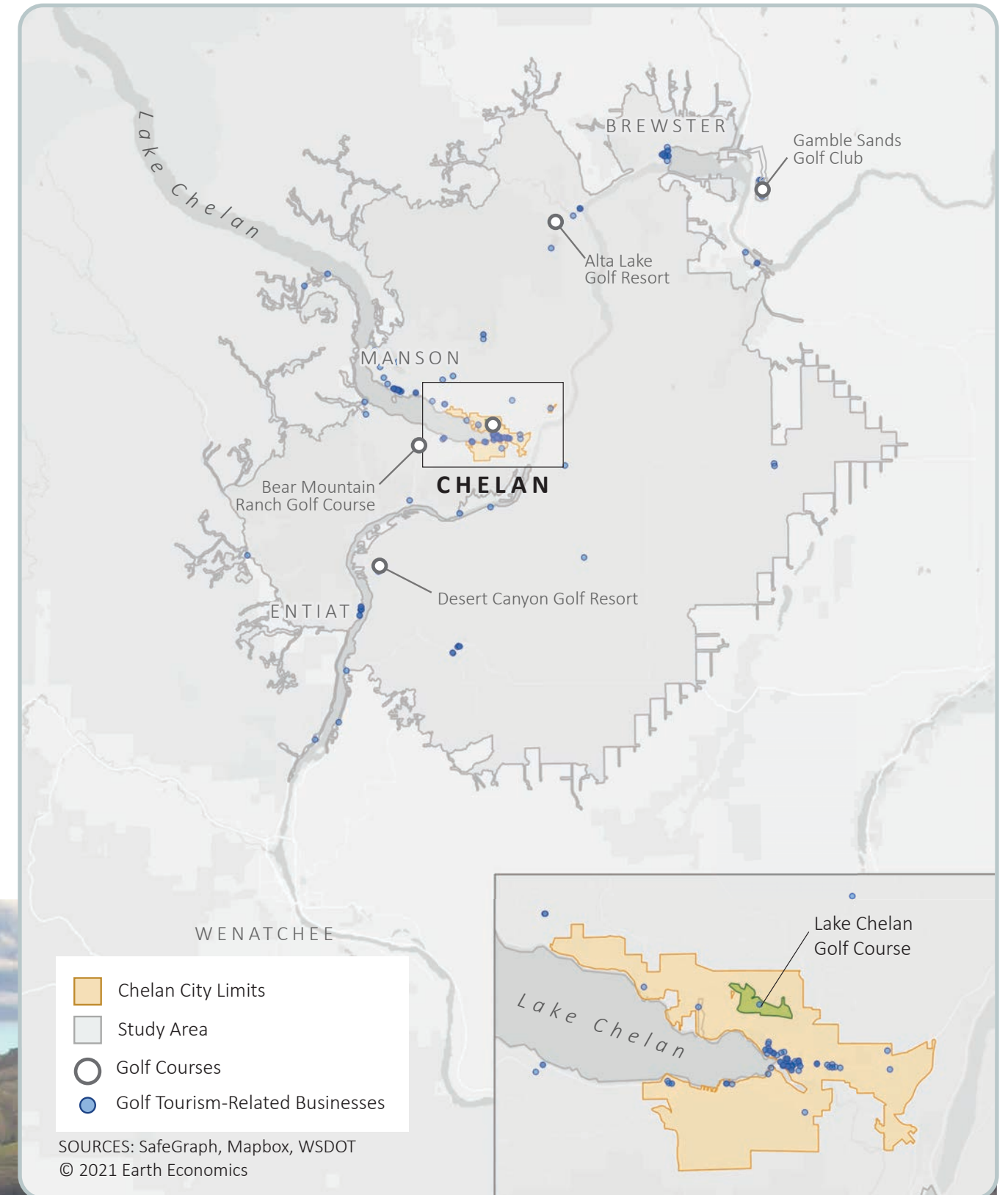
The LCGC employs staff at the course (e.g., pro shop employees, instructors, greenskeepers), but also buys goods and services from other businesses to maintain and operate the course. These employees—both LCGC staff and of supporting businesses—spend money in the community to support themselves and their families. Though owned and operated by the City, the Lake Chelan Golf Course is a business that supports jobs.

Our analysis categorized business revenues for the Lake Chelan Golf Course and estimated the economic effects associated with them.

GOLF TOURISM IMPACT

Golfing in the Chelan Valley is a key tourist attraction. The LCGC—and LCGC tournaments—are a primary draw for some golf tourists. Others may be attracted to the Valley’s wineries, lake and river amenities, and the availability of multiple nearby golf courses. Though playing a round at the LCGC may not be the primary reason for these visitors, the course provided another recreational opportunity and added to their overall enjoyment while visiting Chelan. For both primary and non-primary LCGC golf tourists, the course is a key attraction, drawing visitors from around the world to the Valley. This study estimates the economic impacts for all day and overnight tourists who played at least one round of golf at the Lake Chelan Golf Course during the 2019 and 2020 seasons.

FIGURE 1. LAKE CHELAN VALLEY STUDY AREA



Lake Chelan Golf Course is one of five golf courses within the study area. Many golf tourists visit the area to play at more than one course over the course of their trip.

Tourism impact analyses can help us understand how a region benefits from tourism: the total amount of tourist spending, the sectors benefitting from that spending, jobs supported by those dollars, and the associated state and local tax revenues. These spending estimates—organized by industry—are added to a complex model of the interlinkages between regional businesses to determine the degree to which dollars are re-spent, the number of persons employed by that spending (and their wages), as well as the degree to which income from tourism remains local (i.e., transactions between locally owned companies). Again, the models also calculate state and local tax revenues stemming from the initial spending. Accordingly, such impact analyses often shed light on the return on investment in tourism assets within a region.

Golf tourists are defined as nonlocal visitors who visited the LCGC at least one day of their trip. For the purposes of this study, the local area was defined as all locations reachable by road within 33 miles of the LCGC clubhouse (Study Area, Figure 1). The distance of 33 miles was chosen to include overnight stays within the Chelan Valley, but to exclude overnight stays in Wenatchee, Leavenworth, or the Okanogan Valley. Isolating local spending impacts from larger regional and statewide impacts allows us to identify the spending, employment, and taxes that spending by nonlocals generates within the local economy, where decisions to invest in tourism amenities are made.

Tourist days are defined as one person spending one day within the local spending area—each day of a multiday overnight trip is counted separately. Because tourist expenditure patterns vary depending on the length of stay (e.g., day visitors do not pay for local lodging), separate spending profiles—by industry—were developed for day trips and overnight trips, based on a review of the literature¹ on golf spending:

DAY TOURISTS are nonlocals (those travelling 33 or more miles to the LCGC) who did not stay overnight within the local area;

OVERNIGHT TOURISTS are nonlocals who stayed overnight within the local area.

Determining the number of nonlocal golfers who played at the LCGC was challenging, because the course does not track golfers' home locations (nor do they know the duration of trips by nonlocals, or how much they spend during their visit). **To address this, we acquired anonymized cell phone data, which geolocates each device based on data (voluntarily) shared by user apps.** Detailed information about each user has been replaced with unique, anonymized identifiers, as well as the ZIP code of the common evening location for each device. By reviewing the home ZIP codes of the unique devices appearing on the LCGC links, we were able to identify the proportion of local and nonlocal golfers, which we then scaled by the total number of rounds played each year, as recorded in the LCGC reservation system. The pattern of device locations throughout each 24-hour period allowed us to then estimate the number of day and overnight tourists within each golfing season. A full description of the cell phone analysis is found in Appendix C.

FIGURE 2. GOLF COURSE VISITOR SPENDING

SECTOR	Tourist Type	
	DAY	OVERNIGHT
Car and gas	\$10.17	\$17.17
Groceries	\$8.71	\$18.90
Equipment	\$5.67	\$18.33
Retail	\$5.67	\$18.33
Entertainment	\$16.38	\$12.10
Lodging	\$0.00	\$169.34
Full-Service Restaurants	\$8.82	\$61.97
Limited-Service Restaurants	\$3.26	\$22.92
Snack and Nonalcoholic Beverage Bars	\$2.55	\$17.88
Total	\$61.24	\$356.94



The total expenditures associated with LCGC golf tourism were calculated as the sum of the total estimated tourist days (by type—day and overnight) and the spending profile associated with each type. The total expenditures by industry were then used as inputs for an economic contribution analysis, which models market patterns between regional businesses, based on the specific goods and services (as both producers and consumers) associated with each sector. In this way, spending in one sector (e.g., hotels) generates a different pattern of economic activity than others (e.g., gas stations). By modeling spending, employment and wages, and tax revenues across multiple sectors, economic contribution analysis allow us to compare the economic activity spurred by tourism with that of other industries (e.g., agriculture).

To conduct economic contribution analyses, Earth Economics uses the industry-standard input-output (IO) modeling software IMPLAN, which calculates the ripple effects of spending on several economic categories (Box 1).

With the exception of tax revenues, each category of the IMPLAN model is broken into direct and secondary economic effects. Direct effects measure the economic activity of industries where tourists directly spend their

money, such as hotels, retail stores, recreation services, and restaurants. Secondary economic effects is the economic activity that follows from that tourist initial spending, and are further categorized as either indirect or induced effects.

Indirect effects are the impacts on the industries providing goods and services to those directly serving tourists. For example, tourists spend money in restaurants, who purchase their ingredients from wholesalers, farmers, and ranchers. Increased tourist spending in restaurant generates additional purchases from wholesalers, farmers, and ranchers, indirectly benefitting the agricultural industry.

Induced effects measure the effects of employee spending. Those working in industries directly and indirectly affected by tourism dollars purchase goods and services for themselves and their families. For instance, a marina employee spends her paycheck on rent and groceries, benefiting local businesses and the regional economy—to the extent that such spending remains local. Depending on the internal connectivity of a regional economy, induced effects can recirculate multiple times, generating substantially more economic activity than the initial (direct) spending itself.

BOX 1. ECONOMIC CATEGORIES

ECONOMIC OUTPUT

The value of all sales in industries directly and indirectly supported by golf tourism is known as total economic output. This is useful for understanding the scale of one sector relative to others within the regional economy. Comparing direct tourist spending against total economic output reveals how each dollar spent by tourists generates even more economic activity—the multiplier effect.

VALUE ADDED TO GDP

The value added to GDP identifies the value added to the GDP of the local spending area. It is calculated by subtracting the value of intermediate inputs (e.g., raw materials, semi-finished goods, and business-to-business services) from total economic activity. It represents the additional value created by each industry—related to initial tourist spending—within the study area.

JOB

Tourists directly support Chelan Valley jobs in restaurants, coffee shops, hotels, and other businesses, who must hire full- and part-time workers to serve them. Tourist spending also indirectly supports employment in supporting industries, such as maintenance, government services, real estate, and medicine, which provide services to those who work in industries paid directly by tourists.

LABOR INCOME

Employees of the recreation, retail, and hospitality sectors receive wages for their labor, and the same is true for industries which serve those who work in those directly impacted sectors, as those working in tourism-related sectors purchase goods and services for themselves and their families.

TAX REVENUE

Tourist spending also generates revenue for state and local governments, through taxes on production and imports (typically via sales or property taxes).

¹ The methodology used to develop these spending profiles is provided in Appendix B.

ECONOMIC IMPACT

OF THE LAKE CHELAN GOLF COURSE

For this analysis, we categorized economic effects in two ways: business operations of the LCGC (considered economic contributions), and tourism impacts throughout the local spending area (considered economic impacts). LCGC operation contributions include spending effects from local and nonlocal golfers and captures all sales at the golf course, while the tourism impact analysis captures spending by nonlocal golfers to highlight the impacts from dollars entering from outside the region. Finally, while we focused on the 2020 economic effects, we also investigated how the economic impacts associated with tourist spending changed between 2019 and 2020.

Combined, LCGC direct sales and golf tourism supported \$16.9 million in direct and indirect spending in 2020, and supported 148 jobs (\$4.5 million in wages) throughout the Chelan Valley.

Within the City of Chelan, we estimated that the LCGC supports 65 jobs and generates \$146,000 in municipal taxes, including both golf course operations and tourist spending within the city.

ECONOMIC CONTRIBUTION OF GOLF COURSE OPERATIONS

In 2020, 21,389 rounds were played at the LCGC—a single-season record. Between green fees, cart and club rentals, driving range balls, pro shop merchandise, and lessons, the LCGC generated just over \$1 million in sales. Greens fees, range balls, rentals, and lessons account for 92 percent of this; while merchandise is an important offering for customers, it only accounts for 8 percent of all sales.

We allocated golf course sales across three key industries in the IMPLAN model: “Other Amusement and Recreation Industries” (92 percent), “Wholesale—Other Durable Goods Merchant Wholesalers” (4 percent), and “Wholesale—Other Nondurable Goods Merchant Wholesalers” (4 percent). Each industry is connected to the local, national, and global economy in different ways. For instance, spending in “Other Amusement and Recreation Industries” sector recirculates within the local economy at a higher rate than wholesale industries, which are often larger in geographical scope—in other words, it has a higher multiplier effect.

The 2020 LCGC sales of \$1.06 million supported an estimated 10.8 jobs in the Chelan Valley. Most were generated in the “Other Amusement and Recreation Industries” sector, which includes golf course employees. **We estimated the total direct and indirect spending associated with LCGC operations to be \$1.5 million, which multiplied the initial direct spending (sales) 1.49 times.**



ECONOMIC IMPACT OF GOLF TOURISM

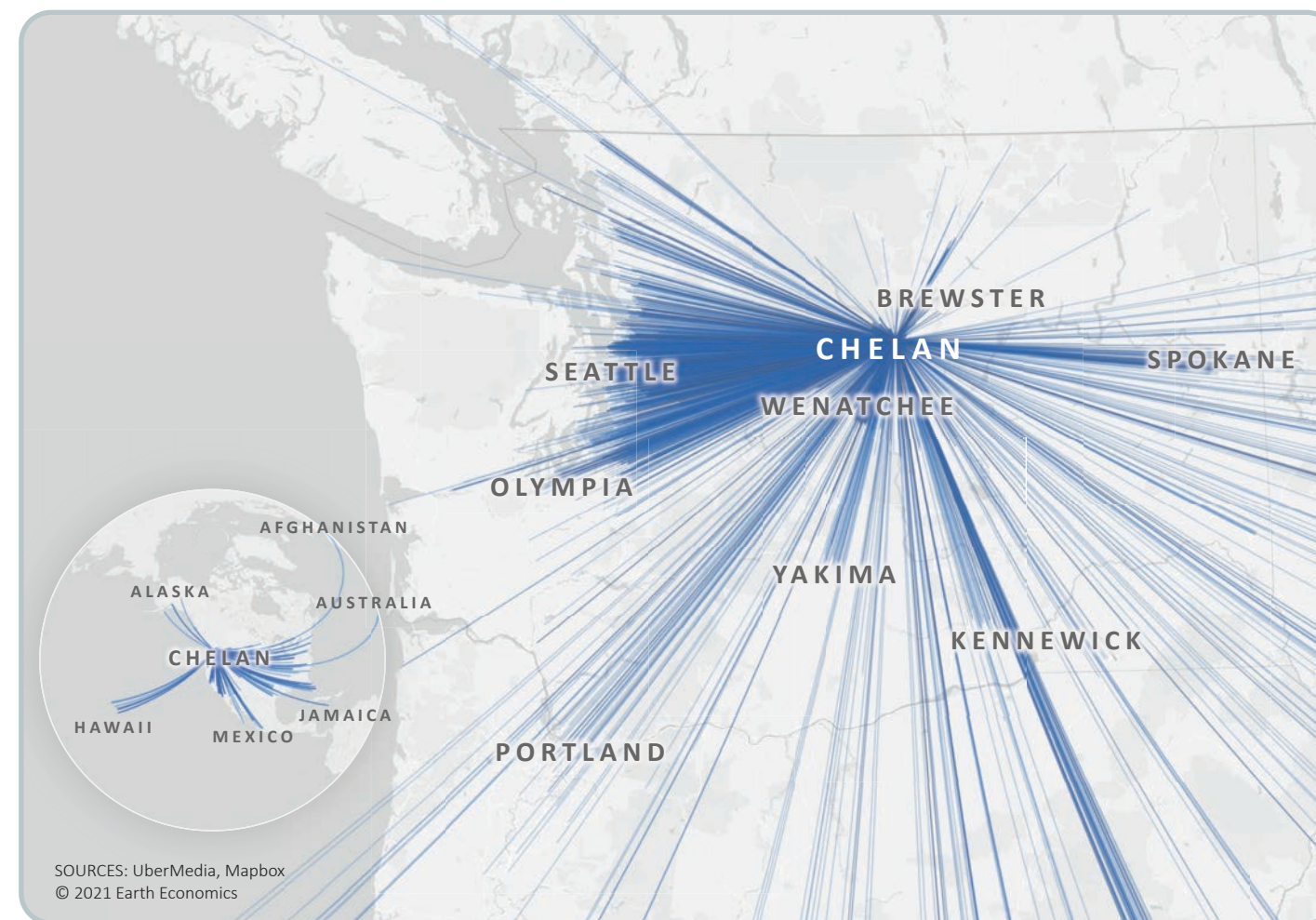
Of the more than 21,000 rounds played at the LCGC in 2020, analysis of the cell phone data estimated that 11,233 (53 percent) were played by golf tourists—those whose home residence is more than 33 miles from the LCGC. Local golfers played the remaining 10,156 rounds. Course records show an 18-percent increase over 2019, when 18,131 rounds were played. We also observed a marginal increase in the proportion of rounds played by tourists, from 50 percent in 2019, to 53 percent in 2020. These changes reflect a 25-percent increase in the number of rounds played by tourists in 2020.

The home zip codes of LCGC tourists (provided in the anonymized cell phone data) reveals that 27 percent of visitors were from Seattle—the largest share. Most

LCGC tourists originated from the Puget Sound cities: Seattle, Tacoma, Olympia, and Everett. Figure 3 shows origins of all LCGC golf tourists in 2019 and 2020.

Again, golf tourists who visit the LCGC spend money outside of the course itself. Spending across on food, lodging, retail, gasoline, and other forms of entertainment totaled \$7.8 million in 2019 and \$12 million in 2020. On average, golf tourists spent \$326 per day in 2020, a slight increase from the 2019 average of \$315 per day. **Again, overnight visitors spent an average of \$357 per day, significantly more than day visitors, who spent an average of \$61 per day.** Note that these daily estimates do not include spending at the LCGC for greens fees, rentals, etc.

FIGURE 3. ORIGINS OF GOLF COURSE TOURISTS



Tourism spending models categorize expenditures across nine industries. Overall, the largest share of tourist dollars—over 46 percent—is spent at hotels and other temporary accommodations. Restaurants (including full services, limited service, and specialty food stores) receive for over 28 percent of direct tourist spending. Total golf tourism spending by industry in 2020 is shown in Figure 5. This figure does not include including economic activity generated by direct and secondary spending at the LCGC, as it was not possible to separate local and nonlocal expenditures in the course’s point of sale records.

Again, the nearly \$12 million spent by tourists during the 2020 golf season generates significant economic activity across the Chelan Valley—industries directly and indirectly supported by those expenditures produce goods and services worth a total of \$15.4 million. This means that for every \$1.00 spent by golf tourists, \$1.29 in economic activity is generated throughout the local economy.

In 2020, golf tourist spending and the economic activity it generates support 137 full- and part-time jobs in the Chelan Valley, paying \$4 million in wages. Employment directly related to tourist spending are primarily in service-related sectors, such as restaurants, bars, coffee shops, and hotels or other forms of short-term lodging. Secondary employment effects are experienced in industries such as maintenance, government services, real estate, and medicine.

Finally, spending by golf tourists is a significant contribution to local and state tax revenues. Taxes on production and imports are by far the largest contributors, which is essentially made up of what we know as “sales tax.” Visitor spending generated more than \$1.8 million in local and state tax revenue.

FIGURE 4. GOLF DAYS AND TOURISM SPENDING

Year	Golfer Type*	Rounds of Golf	Tourist Days	Tourism Spending (2020\$)
2019	LOCAL GOLFERS			
	LC Valley Residents	9,144	-	-
	TOURIST GOLFERS			
	Day Tourists	2,470	3,471	\$212,590
	Overnight Tourists	6,517	21,142	\$7,546,589
	Tourists	8,987	24,614	\$7,759,179
	TOTAL			
	All Golfers	18,131	24,614	\$7,759,179
2020	LOCAL GOLFERS			
	LC Valley Residents	10,156	-	-
	TOURIST GOLFERS			
	Day Tourists	2,014	3,835	\$234,875
	Overnight Tourists	9,218	32,886	\$11,738,290
	Tourists	11,233	36,721	\$11,973,164
	TOTAL			
	All Golfers	21,389	36,721	\$11,973,164

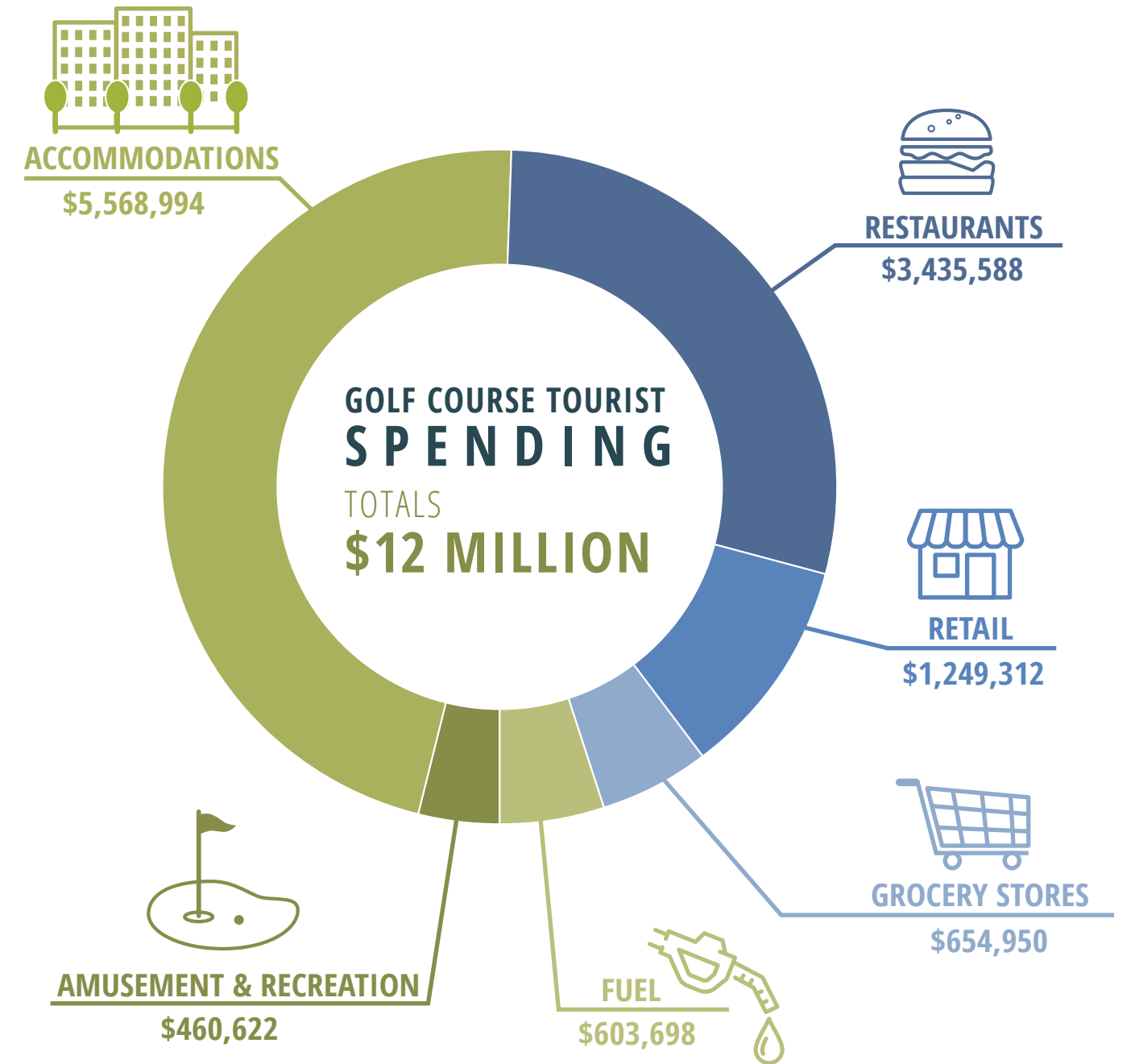
* **Day Tourists:** nonlocals (travelling 33 or more miles to the LCGC) who did not stay overnight within the local area; **Overnight Tourists:** nonlocals who stayed overnight within the local area.

CITY OF CHELAN IMPACTS

Though golf tourist visitors spend money throughout the Chelan Valley, we wanted to take a closer look at impacts that occur within Chelan’s city limits. Although tourism spending data were not available at the city-level for this project—which would require data outside the scope of this project—we were able to use business location data to estimate economic impacts at the city-level.

Using this approach, we estimated 43 percent of all 2020 direct and secondary spending within Chelan city limits totaled \$6.7 million, supporting 60 jobs, and \$1.8 million in wages. Estimating city-level tax revenues was a bit more challenging. The City of Chelan imposes a 0.085 percent local sales tax in addition to the state sales tax rate of 6.5 percent. Combined with county, transit, and other local taxes, total sales taxes within the Chelan city limits are 8.3 percent. In 2020, golf tourism generated local and state tax revenues of \$1.8 million within the study area. Based on the proportion of local to all tax revenues (0.085 percent of 8.3 percent), we estimated that 2020 golf tourism approximately \$135,000 tax revenues for the City of Chelan. This translates to 8 percent of Chelan’s estimated \$1,790,042 in local sales tax that year.

FIGURE 5. LAKE CHELAN GOLF COURSE TOURIST SPENDING, 2020



COVID-19 IMPACT

Chelan's job market is seasonal—more people are employed in the summer than in winter months. The Covid-19 pandemic began to emerge in the early Spring of 2020, just as unemployment would typically begin to fade, increasing unemployment from April through November of that year. In April of 2020, unemployment spiked from 6.3 percent to 16.5 percent and then gradually declined over the course of summer. The combination of shutdowns and reduced tourism shrunk the labor force; it is estimated that between November 2019 and November 2020, the number of jobs in the Chelan Valley decreased by 2,439.^{iv}

Even as the pandemic had serious impacts on the local labor market, many workplaces around the state shifted to remote work arrangements with more flexible schedules. This offered more opportunities for people to golf, including learning the sport. Additionally, many people cancelled distant vacations for recreational opportunities they could drive to. Golf offered a balance of outdoor recreation and socially distanced socialization—a plausible explanation of the observed 18 percent increase in rounds played at the LCGC during 2020. Anecdotal reports show that many of these rounds were played by new golfers, or those returning to the sport after some time.

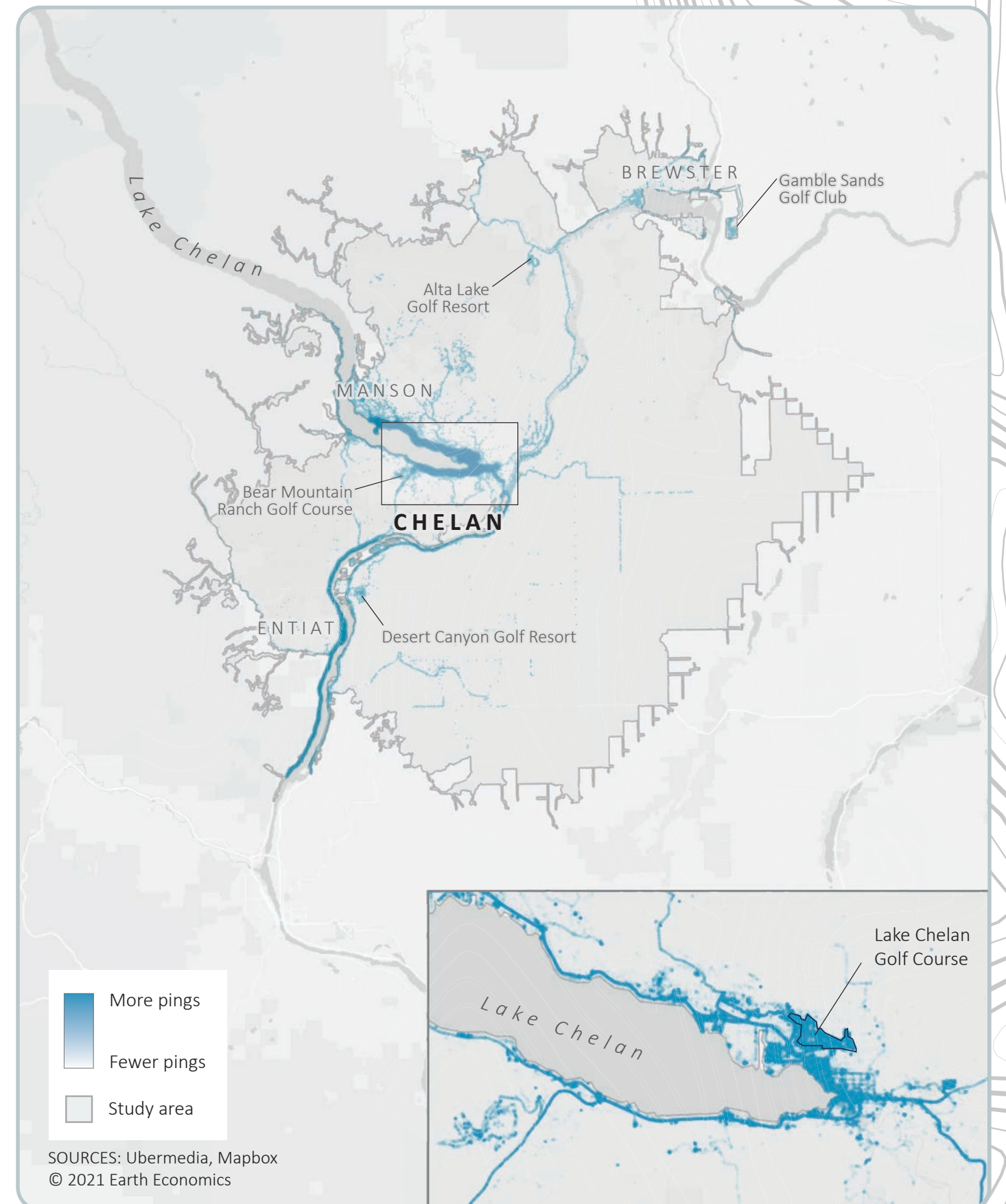
The LCGC was completely closed between March 13th and May 5th of 2020, a time when the golf season is picking up. On May 6th, the course opened at 50-percent capacity. Ten days later, Washington State relaxed COVID-19 restrictions for golf. Even with the shortened season, the LCGC was able to accommodate an 18 percent increase in total rounds played over 2019. As noted previously, **this resulted in a significant increase in golf tourism spending in the Chelan Valley, from \$7.8 million in 2019 to nearly \$12 million in 2020 (greater than 50-percent growth, year-over-year).**

While total golf tourism spending in 2020 increased, there is still the question of whether tourist movement within the study area changed during the pandemic—did visitors frequent fewer businesses of one sector or another? Reviewing the anonymized cell phone data of nonlocals over both 2019 and 2020 golf seasons, we were able to determine the percentage of unique devices visiting businesses of each sector, each season. Insights from this process include a decrease in the number of devices seen in hotels, which may indicate a (temporary or permanent) switch to vacation rental homes. Full-service restaurants also saw a significant decrease in share of devices, while visits to grocery stores and limited-service restaurants increased. Again, it should be noted that while there may have been shifts in the likelihood that tourists would visit certain business types, the overall increase in golf-tourism led to increased spending in all tourism-related sectors.

FIGURE 6. COVID-19 CONSUMER BEHAVIOR CHANGES

BUSINESS SECTOR	Visit Probability		
	2019	2020	CHANGE
Hotels and motels, including casino hotels	12.9%	10.9%	-15.1%
Full-service restaurants	21.4%	18.1%	-15.0%
Limited-service restaurants	5.5%	7.4%	33.9%
Snack and Nonalcoholic Beverage Bars	6.4%	5.2%	-19.5%
Retail - Food and beverage stores	13.2%	17.3%	30.9%
Retail - Gasoline stores	7.6%	11.6%	52.2%
Retail - Miscellaneous store retailers	1.5%	2.4%	59.6%
Retail - Sporting goods and hobby stores	2.2%	2.4%	8.2%
Other amusement and recreation industries	29.3%	24.7%	-15.7%

FIGURE 7. MOVEMENT OF LCGC TOURISTS, 2019 & 2020 SEASONS



CONCLUSION

Golfers at the Lake Chelan Golf Course generate significant local spending through both business operations and golf-tourist spending. This analysis finds that the LCGC supported \$16.9 million in direct and indirect spending, supporting 148 jobs and \$4.5 million in wages throughout the Chelan Valley. It is estimated that 44 percent of these jobs are supported within the Chelan city limits. **It is also estimated that the LCGC generates \$146,000 in municipal taxes for Chelan, across both golf course operations and golf tourism.**

Spending by non-local golf tourists was the largest driver of this economic activity, bringing dollars from other regions into the Chelan Valley. The average LCGC visitor spent an estimated \$326 per day, with overnight visitors spending significantly more than day visitors—\$357 per overnight stay, compared to \$61 for each day visitor.

The LCGC currently operates at a slight loss; the course's annual expenses are approximately \$40,000 more than the revenue captured by the course itself—not uncommon for municipal golf courses. This analysis demonstrates the broader return-on-investment in the LCGC, via the tax revenues associated with nonlocal golf spending. **The \$146,000 of annual tax revenues Chelan collects from golf tourism are more than three and a half times the annual subsidy to the LCGC.**

The conclusions of this analysis are subject to the accuracy of the source data. Because the share of golf rounds by tourists were calculated using the proportion of nonlocal cell phones located on the LCGC links, these results may underestimate total tourism spending, if the actual rounds played were found to skew more towards nonlocals. Anecdotal observations by course staff suggest that just 30 percent of golfers are local, while 70 percent are tourists. Under this scenario, 14,972 of 2020's 21,389 rounds would have been nonlocal, producing \$16 million in direct golf tourist spending (up from \$12 million). A survey of golfers could be conducted (or zip codes could be collected when booking tee times) to clarify this issue.

Finally, this analysis does not investigate broader community benefits of the LCGC, such as consumer surplus, the health benefits of outdoor recreation, increases in real estate values (and associated changes in property tax revenues), or the attraction of the LCGC for those looking to relocate or purchase a second home. It should also be noted that this analysis does not look at land-use alternatives for the course (e.g., conversion to residential property might increase property tax revenues, but may also lower the appeal of the Chelan to nonlocals and those considering relocation).

APPENDIX A

DATA SOURCES

Parcel boundary data (used to identify visitors to the Lake Chelan Golf Course, as well as parcels zoned for residential use—including short-term lodging) were acquired from Washington Geoservices.

Current Parcels, 2021. Washington Geoservices. URL <https://geo.wa.gov/datasets/current-parcels/explore?location=47.269133,-120.770191,7.82>.

To identify the local spending area, we used ESRI's ArcGIS Online road network service area analysis, which draws upon ESRI's proprietary World/Traffic Layer.

ESRI, 2021. Consuming the traffic service using ArcMap. ArcGIS Desktop Extensions, Network Analyst, ArcGIS Online Services. URL <https://pro.arcgis.com/en/pro-app/latest/help/analysis/networks/service-area-analysis-layer.htm>.

We used SafeGraph business data to identify locations and footprints of the following sectors: grocers; gas stations; sporting goods stores; miscellaneous retailers; rental goods; amusement and recreation; travel lodgings; and restaurants and other eating places.

SafeGraph, 2021. SafeGraph Places: Points of Interest Datasets. URL www.safegraph.com/places.

We acquired 2019 and 2020 cellular device data within the Chelan Valley from UberMedia, an aggregator of locational data generated by mobile device applications. All users have consented to share such data, but those records have been further aggregated and anonymized to fully protect user privacy. UberMedia follows GDPR and CCPA guidance, and is certified by Verasafe, an independent third-party privacy compliance auditor.

UberMedia, 2021. A world of insights for tourism. UberMedia. URL <https://um.co/tourism>.

The Input-Output analysis was developed using IMPLAN software (IMPLAN.com).

IMPLAN, 2019. IMPLAN Data. URL <https://implan.com/data>.

Proprietary data on the annual rounds played and Pro Shop sales were provided by Lake Chelan Golf Course management.



APPENDIX B

INPUT-OUTPUT ANALYSIS

The central goal of this project was to analyze the economic effects linked to the consumer spending of golf course users, including: total economic output, jobs, income, taxes, and associated economic multipliers. These effects are estimated based on input-output (I-O) models of the economic connections between industries in regional economies. We used the industry-standard IMPLAN software—which draws on data from the U.S. Department of Commerce, the U.S. Bureau of Labor Statistics, and other agencies—to estimate the direct, and secondary economic effects driven by golf tourist expenditures, reported as economic output, employment, wages, and taxes.

Because local estimates on the daily spending by day and overnight golf tourists were not available, we conducted a literature review on consumer spending on golf. As we found no literature for comparable courses (i.e., 18-hole municipal golf courses in the inland northwest), we began with national-level estimates of golf tourism in reported by Golf 20/20 and TEconomy Partners (2016), which included total daily spending by day and overnight tourists for 2011 and 2016. After adjusting both values to 2020 dollars, we used the averages as our estimates of total daily spending for each visitor type.

We based the distribution of spending across sectors (e.g., food, lodging, transportation) on a 2018 study by Rbouvier Consulting, which identified the proportion of daily spending by golf tourists in the Cape Cod region across economic sectors. After applying these proportions to the average daily spending provided by TEconomy Partners, we adjusted restaurant spending downward according to federal per diem rates for Hyannis, MA and Chelan, based on the observation that Cape Code offered more high-end dining than Chelan. We similarly adjusted transportation spending, based on the likelihood that most golf tourists in Chelan would use their own vehicles, rather than rentals.

After testing various approaches to identifying a local spending area, we chose a driving distance of 33 miles from the Chelan city center. This distance was chosen to exclude the city of Wenatchee (39 miles), but also include all golf courses within the Chelan Valley. We made one manual adjustment to this road network, including the Gamble Sands Golf Course, located just outside the network.

The spending profiles include daily expenditure estimates for seven sectors: car and gas; groceries; equipment; retail; entertainment; lodging; and restaurants. We used SafeGraph data to identify the location of the relevant businesses within each county of the spending network, as not every sector was present in every county. Also, since sectors can generate higher revenues per square foot from county to county, we calculated those ratios for each county and sector. We then multiplied these ratios by the footprint of each sector of each county in the spending network to distribute tourist expenditures.

The underlying rationale of this approach was to get as close to ground-truth as was possible—looking only at local businesses that visitors could reach within 33 miles of driving, and distributing their expenditures based on the availability of spending opportunities (by sector) within that road network, weighted by the revenues each industry generates per square foot, by county.

SOURCES:

- Golf 20/20, TEconomy Partners, 2016. The 2016 US Golf Economy Report. The National Golf Foundation, Jupiter, FL.
- Rbouvier Consulting, 2018. The Economic Contribution of The Golf Industry to Cape Cod. Golf Course Superintendents Association of Cape Cod, North Scituate, RI.

APPENDIX C

CELLULAR DEVICE ANALYSIS

To determine the scale of golf tourists within the Chelan Valley in 2019 and 2020, we acquired cellular device locational data for the area defined by 33 miles of driving distance from Chelan's city center. The resulting 119,107,776 data points (referred to as "pings") record the time and location (within 2 meters) an application on each mobile device connects to a nearby cellular tower. This initial data recorded 263,473 unique devices (anonymized to protect user privacy) that generated an average of 425 pings over the two year period. To eliminate devices on aircraft and vehicles that merely pass through the study area, we used Google BigQuery to remove records that do not move slower than 25 meters per second (55 mph) on a given day, as well as those which pinged a single time over the two-year period. This reduced the dataset to 95,259,579 pings from 189,421 devices. Finally, because the intention was to focus on golfers who visited the Lake Chelan Golf Course (LCGC), we limited the dataset to only those devices with pings recorded within the boundary of the links (i.e., excluding the parking lot and club house, which often hosts non-golfers). This produced a final dataset of 11,481,157 pings from 1,170 unique devices.

UberMedia records also identify the ZIP code of the Common Evening Location (CEL) of each device for each month, which we used to identify local and nonlocal devices. Because cellular device data represents a subset of all local (394 unique devices with 1,987 golf days) and nonlocal (801 unique devices with 1,176 golf days) golfers, these ratios were scaled to LCGC data on annual rounds-played for both 2019 and 2020.

To identify day and overnight visits within the nonlocal cellular data, we first converted the 11.5 million pings to records of each unique device recorded within each 24-hour period (beginning at midnight), identifying contiguous days for unique devices as device-trips. To these device-trip records, we summarized the following:

- the total length (in days) of the device-trip;
- the total number of pings recorded each day;
- the timestamp of the first and last pings each day;
- the ping count each day for the following periods: 12:01am to 6:00am (overnight), 6:01am to noon (morning), 12:00pm to 6pm (afternoon), and 6:01pm to midnight (evening);
- the ping count each day within parcels zoned for residential use (including hotels and resorts, campgrounds); and
- the straight-line distance between first and last location each day, as well as last location and first location of the following day.

We classified device trips lasting a single day as day trips, along with device-days where the first ping of the day occurred after 6am, the last ping of the day occurred in the afternoon (noon to 6pm), and the first ping of the following day (where relevant) also occurred after 9am. Overnight stays were identified as device-days where there were pings in residential parcels between 9pm and 9am of the following day, or where the straight-line distances between the first and last pings of a trip day, or the last ping of a trip day and the first of the following day were relatively small (i.e., less than 100 meters).

Because there was no external record against which we could validate these classifications, we coded the entirety of the device-days data three times—two times for comparison, and a third to resolve disagreements between the first two rounds of classification. The subsequent classifications were tested for intercoder agreement using the tidycomm package in R, to assess the degree to which two or more reviewers assign the same classification to each data point. These tests showed an 91-percent Holsti pair-wise agreement, and an 86-percent simple agreement across all three classification passes.

Scaling the cellular device data to LCGC data on rounds-played, we estimated a total of 24,614 golf tourist days (of which 21,142 were overnight stays) in 2019, and 36,721 in 2020 (of which 32,886 were overnight). Again, these are trip days by nonlocal visitors which visited the LCGC at least once during their stay.

Finally, we identified proportions of nonlocal day and overnight device trip-day pings in parcels associated with the three restaurant subindustries (full service, fast food and takeout, and coffee and other beverages) to determine whether tourist spending patterns shifted during the first year of COVID.

SOURCES:

Allen, M. 2017. Intercoder Reliability Techniques: Holsti Method, in: The SAGE Encyclopedia of Communication Research Methods. SAGE Publications, Thousand Oaks CA. <https://doi.org/10.4135/9781483381411.n258>

Brennan, R.L., Prediger, D.J., 1981. Coefficient Kappa: Some Uses, Misuses, and Alternatives. Educational and Psychological Measurement 41, 687-699. <https://doi.org/10.1177/001316448104100307>.

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APPENDIX D

STUDY LIMITATIONS

As with any research efforts, this analysis was limited by the available data and supporting literature, which inevitably force compromises. Our goal throughout was to minimize the substantive impact of those concessions while developing practical means of maximizing the real-world validity of our analyses. Where such compromises were inevitable, we chose more conservative approaches (i.e., those less likely to increase visitation and spending projections).

Time and budget limits meant that primary (field, survey) research was not possible. Accordingly, we developed spending profiles based on national and destination golf tourism, with adjustments for the economic and industry conditions of the Chelan Valley.

The use of cellular data can be challenging—even for a relatively small region as the Lake Chelan Valley. While it is possible to review the locational (ping) data of a single anonymized device, this is not tractable at-scale. Accordingly, we summarized the temporal and spatial patterns of each device to a daily level. This may fail to capture subtle nuances in the movement of all individual devices, which includes our efforts to distinguish between day and overnight visits. Because we queried cellular data only within the local spending area, it was impossible to identify visitors which may have stayed overnight at locations just outside of the local spending area (e.g., Wenatchee). While the expenditures of such visitors would be more similar to overnight visitors (with the exception of spending on lodging outside of the local spending area), we chose to treat visitors matching such patterns as day visitors.

For this analysis, we included all days of device-trips where nonlocals visited the LCGC at least one time during their trip. This means that we treated a week-long trip where a visitor played a single round of golf on one day as a week of overnight stays. Over both years, the average number of golf-days per nonlocal trip was 1.38 days. We were also unable to include expenditures associated with non-golfers who visited the Chelan Valley with those who golfed, such as non-golfing partners, children, and friends.

Similarly, there is no external record to which we could validate our classification of day or overnight visitors. While tests for intercoder agreement showed relatively high consistency across classification passes, the precise number of day and overnight visitors is unknown. Given the likelihood that golf-related trips included at least some non-golfers, we likely underestimated both day and overnight visits and related expenditures.

Finally, between 2019 and 2020, the LCGC switched point-of-sale and reservation systems. The new recordkeeping increased the ability to record all rounds-played; accordingly, the 2019 rounds-played and visitor estimates (visitation and spending) are likely to be undercounts.



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- ⁱⁱⁱ SRI International, 2017. The Washington Golf Economy. Available at: <http://golfallianceofwashington.org/wp-content/uploads/2017/04/EIS-WA-Golf-Full-Report.pdf>.
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