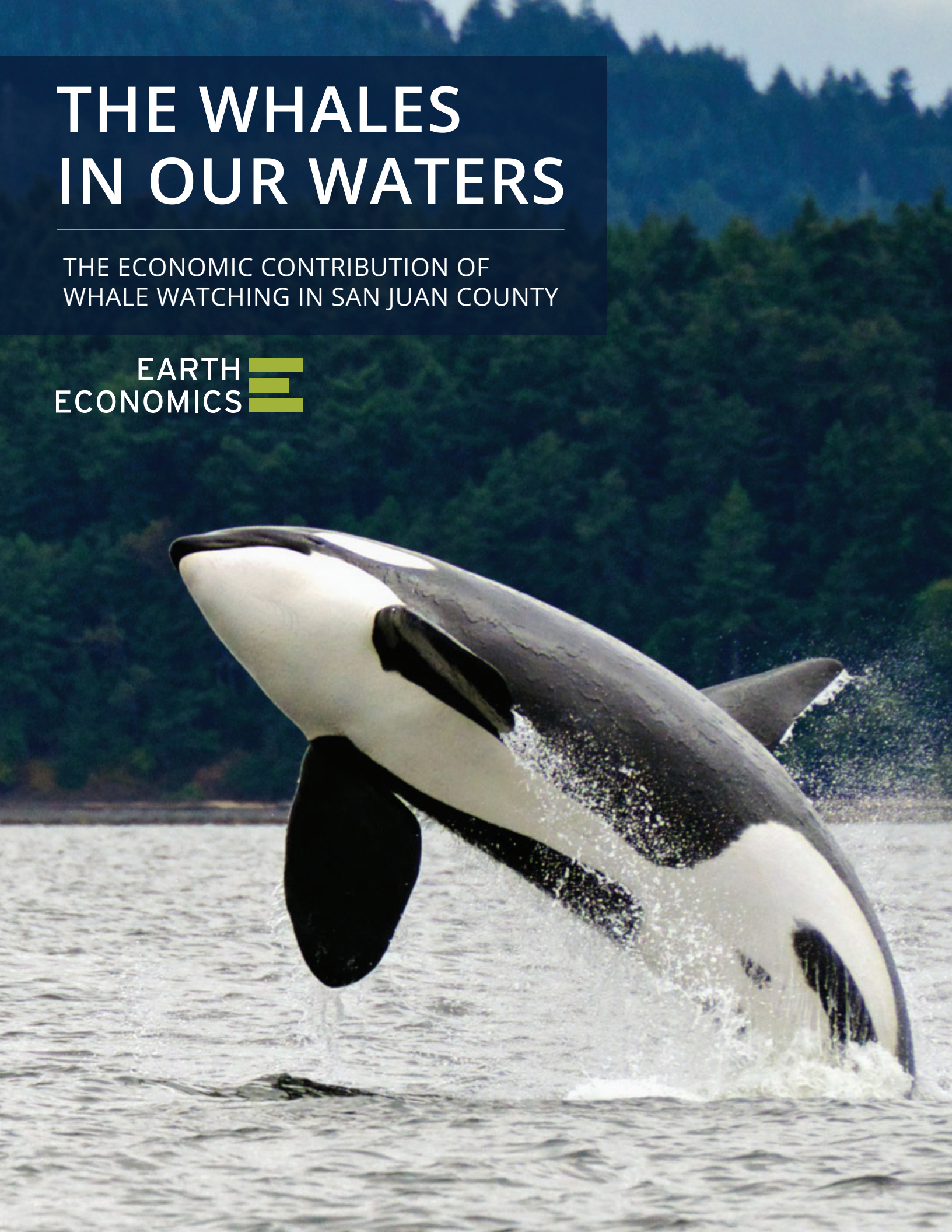
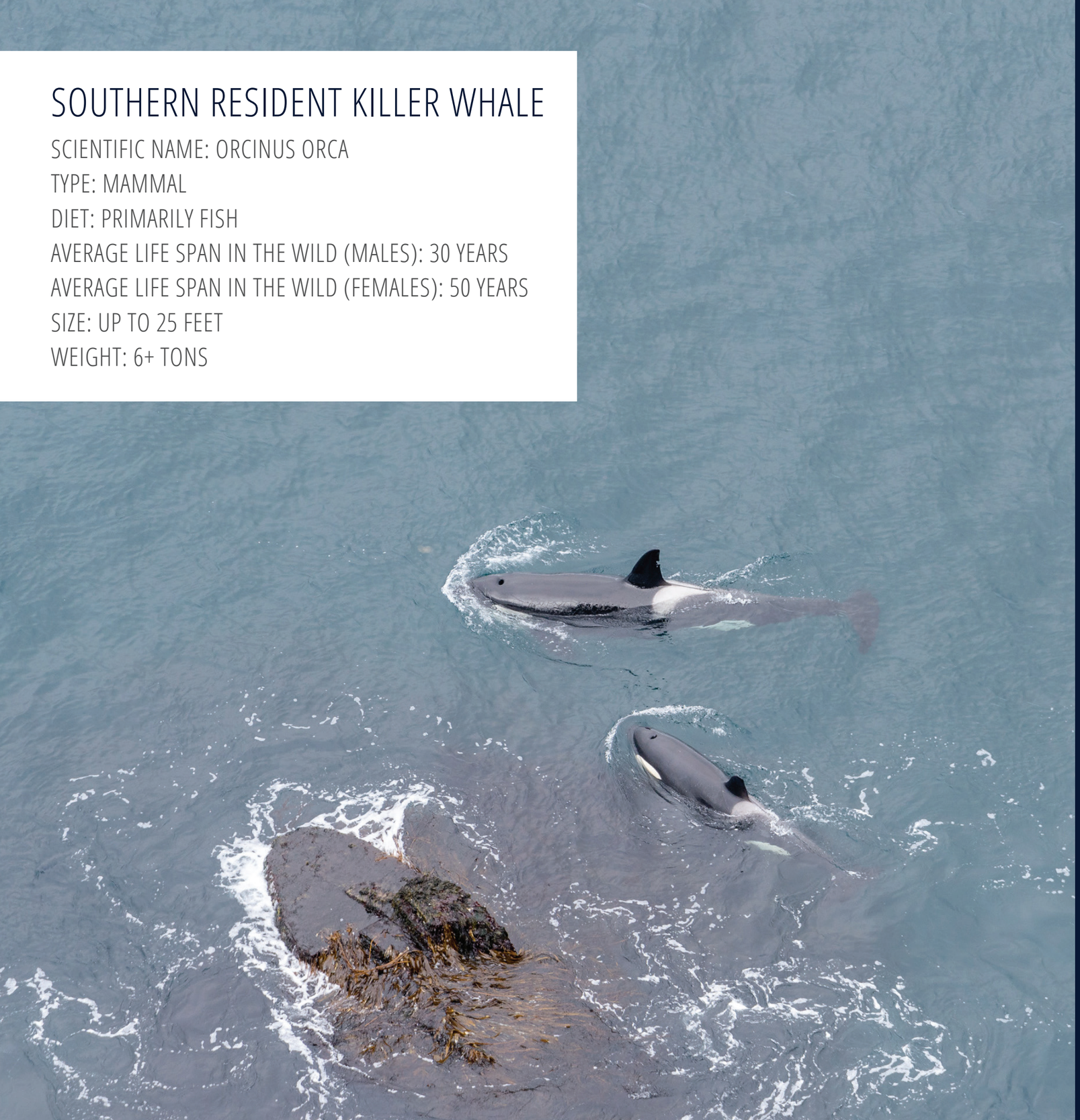
# THE WHALES IN OUR WATERS

## THE ECONOMIC CONTRIBUTION OF WHALE WATCHING IN SAN JUAN COUNTY

EARTH ECONOMICS





## SOUTHERN RESIDENT KILLER WHALE

SCIENTIFIC NAME: ORCINUS ORCA
TYPE: MAMMAL
DIET: PRIMARILY FISH
AVERAGE LIFE SPAN IN THE WILD (MALES): 30 YEARS
AVERAGE LIFE SPAN IN THE WILD (FEMALES): 50 YEARS
SIZE: UP TO 25 FEET
WEIGHT: 6+ TONS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The authors are responsible for the content of this report.




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Earth Economics is a leader in ecological economics and has provided innovative analysis and recommendations to governments, tribes, organizations, private firms, and communities around the world.

EARTH ECONOMICS

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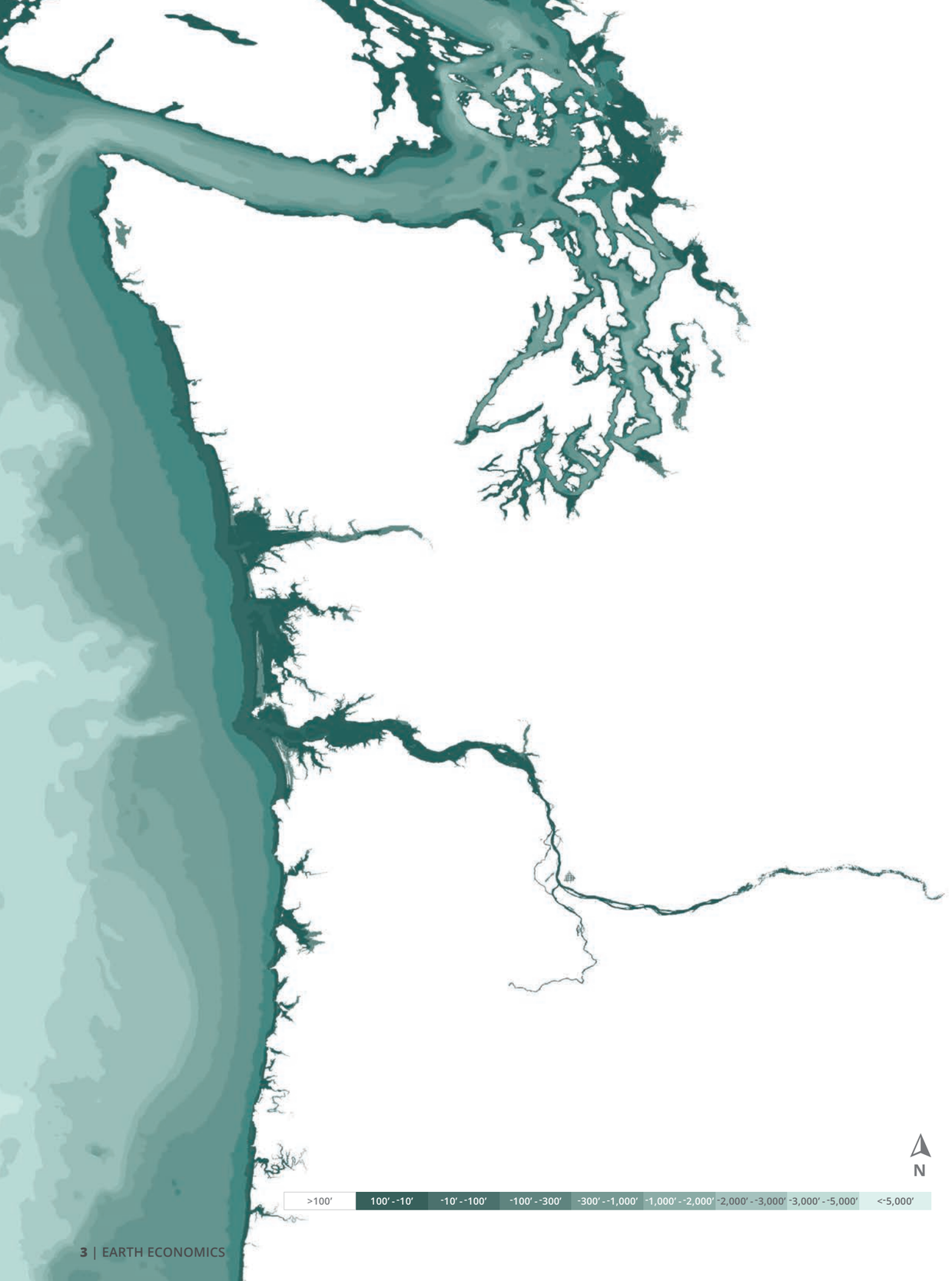
## LIST OF ABBREVIATIONS

| | |
|---|---|
| **ESA** | ENDANGERED SPECIES ACT |
| **IO** | INPUT-OUTPUT |
| **PWWA** | PACIFIC WHALE WATCH ASSOCIATION |
| **NRKW** | NORTHERN RESIDENT KILLER WHALES |
| **SRKW** | SOUTHERN RESIDENT KILLER WHALES |



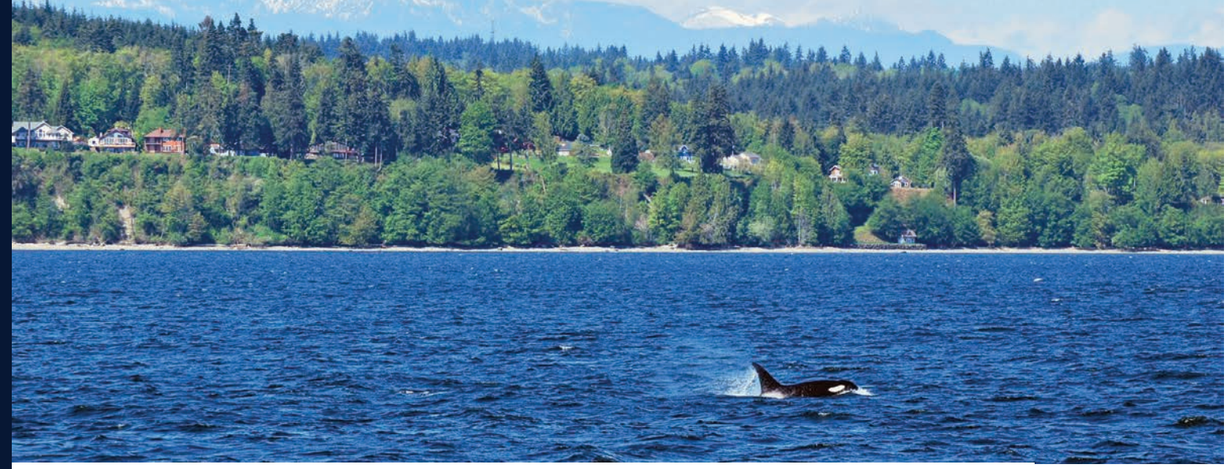



# EXECUTIVE SUMMARY

The Southern Resident Killer Whale (SRKW) is a flagship species, a cultural icon, and an economic driver for Washington State. However, depleted Chinook salmon stocks, vessel-related noise and disturbance, and increasingly polluted waters put the orca population at risk of extinction. Efforts are underway to aid and support orca recovery, but these efforts are time consuming and expensive.

To better understand the economic incentives to invest in SRKW recovery, Earth Economics conducted an economic contribution analysis to estimate the value of whale watching in San Juan County. Our analysis focuses on boat- and land-based whale watching in San Juan County, the heart of Washington's whale watching economy, but calculates the benefits to the entire Puget Sound Region. This study utilizes the existing estimates on the number of individuals that participate in whale watching in San Juan County each year and contributes critical new data to the conversation via the results of a survey designed and conducted by Earth Economics during the summer of 2018. Together, these sources present a more comprehensive picture of the economic impacts of whale watching in our region. The results show that whale watching participants who whale watch from boat-based tours or from terrestrial viewing points in San Juan County support over $216 million worth of economic activity in the Puget Sound Region every year. This activity generates more than $12 million in state and local tax revenue annually and supports over 1,800 jobs.

In addition to valuing San Juan County's whale watching economy as a whole, our survey design allows us to estimate the economic damages that would occur if the SRKW population were to collapse. Using sightings data to predict the decrease in whale sighting days near the San Juan Islands, we asked survey respondents to predict their behavior, should their chances of seeing an orca decrease by the proportion that is expected if the SRKWs become extinct. In this alternative scenario, 33% of non-local, boat-based whale watching participants said they would no longer choose to visit the Puget Sound Region, equating to an annual loss of $34 million in economic activity, $2.2 million in state and local tax revenue, and 330 jobs. While these results are significant, they are also likely an underestimate of Washington's whale watching economy and the economic losses that would occur in the face of SRKW extinction, because our analysis focused explicitly on whale watching occurring in San Juan County, and we know that the industry extends far beyond that border.



# INTRODUCTION

The Southern Resident Killer Whales (SRKWs) are an endangered population native to the Pacific Northwest with significant cultural, spiritual, environmental, and economic importance for the region. The SRKW population consists of three pods, known as the J, K, and L pods, which travel from Southeast Alaska to central California, but spend the majority of the year in the Salish Sea and Washington's coastal waters.

As an icon for the Pacific Northwest, SRKWs attract tourists from around the globe. From humble beginnings, Washington's whale watching economy grew from a single operator on San Juan Island to more than 30 operators facilitating boat-based whale watching tours throughout Puget Sound and the Salish Sea. Moreover, the region has experienced significant increases in land-based whale watching, with tourists flocking to waterfront parks to catch a glimpse of the orcas. Today, whale watching comprises a significant part of Washington's economy and serves as a foundational block of the larger tourism industry. While various whale species can been seen in the region – including humpbacks, gray whales, and several ecological types of killer whales – the SRKWs, which have captured the attention and fascination of Puget Sound residents for centuries and the Coast Salish people for thousands of years, remain the main attraction for whale watchers visiting Washington State.

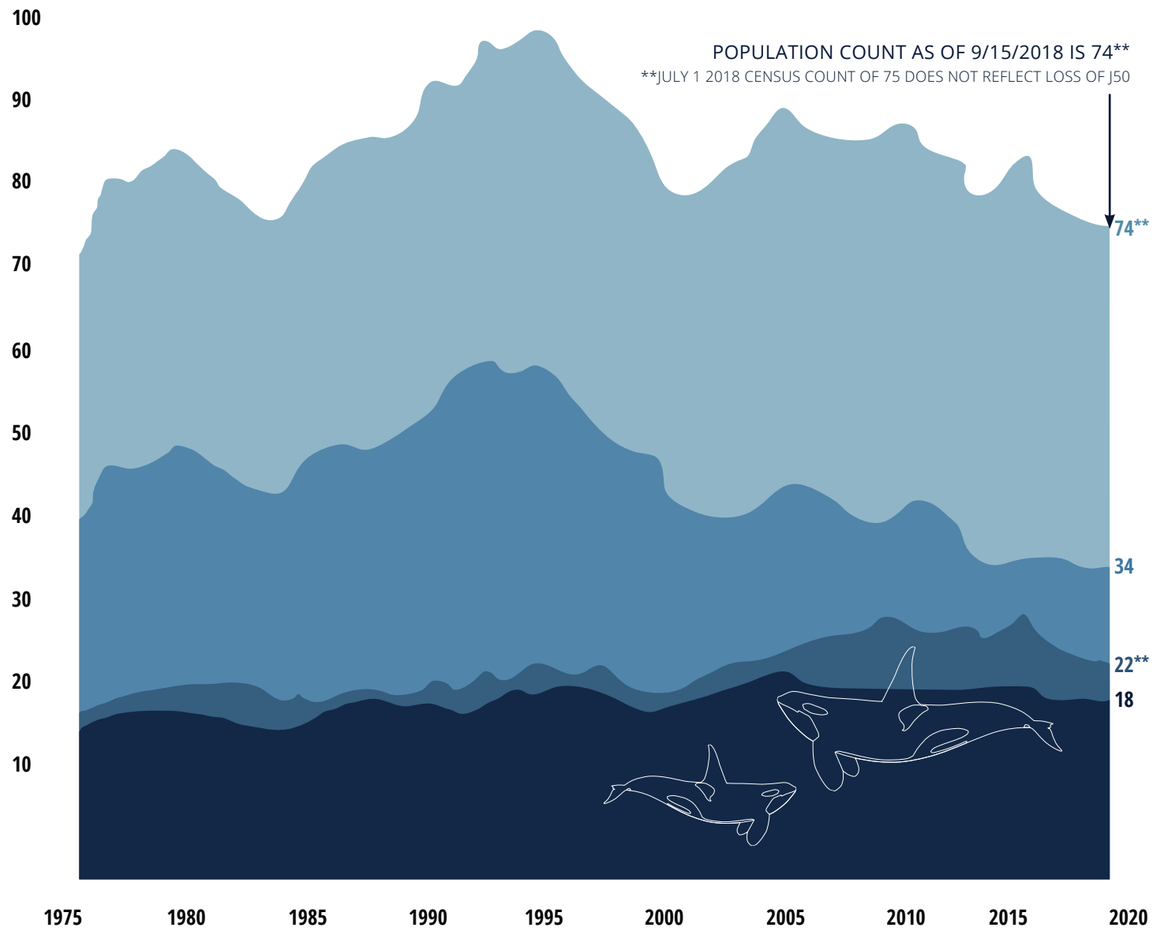
Over the past several decades, the SRKW population has experienced periods of both growth and decline. SRKWs were listed as endangered under the U.S. Endangered Species Act (ESA) in the early 2000s, after their population declined to just 78 whales.[1] Despite many recovery efforts, ongoing challenges in prey availability (i.e., depleted Chinook salmon stocks), increasingly polluted waters, and vessel-related disturbance continue to plague the population. In September of 2018, the Center for Whale Research placed the total SRKW population at just 74 whales.[2] Additional barriers to the population's recovery include changing age demographics and gender ratios within the small population, further threatening the vitality of one of Washington's greatest cultural, spiritual, and environmental assets, and an economic driver for the region.



**FIGURE 1** SOUTHERN RESIDENT KILLER WHALE POPULATION[3]

J, K, and L Pod Census as of July 1 Each Year. Populations Count as of 9/15/2018 is 74.*
**July 1 2018 census count of 75 does not reflect loss of J50.*

- **J** POPULATION (CWR)
- **K** POPULATION (CWR)
- **L** POPULATION (CWR)
- **JKL** POPULATION (CWR)




Primary Sources: Center for Whale Research Orca Survey July 1, 2018 + 2018/2019 Population Updates.
Data reproduced with permission of Center for Whale Research, Friday Harbor, WA. Design interpretation attributed to Earth Economics.

In 2018, Washington Governor Jay Inslee announced the creation of the Orca Task Force, a team of experts representing members of the Legislature, the Government of Canada, tribal, federal, local and other state governments, and the private and non-profit sectors. The Task Force is supported by the Puget Sound Partnership and the Washington State Department of Fish and Wildlife, and has been called upon to develop longer-term recommendations for SRKW recovery. This move builds on ongoing local, state, and federal recovery efforts, as well as the advocacy and research conducted by local non-profits, research groups, and academic institutions. While specific recovery methods and goals are being debated, there exists an underlying fact that any efforts to support SRKW population recovery will require significant investment. That investment seeks to protect a cultural, spiritual, and environmental icon, but also a resource that, if managed wisely, can support a sustainable whale watching economy in Washington for generations to come.

To understand the depth and extent to which the SRKWs contribute to the Puget Sound's regional economy, Earth Economics estimates the travel expenditures of local and non-local boat- and land-based whale watching participants who whale watch in San Juan County. Local participants are defined as individuals who live in the San Juan County or Puget Sound Region (Map 1). Non-Local participants are defined as participants who live elsewhere. The estimate is informed by an expenditure survey, conducted by Earth Economics in the summer of 2018, designed to capture the range of expenditures made in San Juan County and the Puget Sound Region by boat- and land-based whale watching participants. While earlier studies have focused explicitly on the economic impacts of expenditures made solely on guided, boat-based, whale watching tours, our survey offers additional insights by (1) including land-based participants' spending, and (2) estimating the total economic activity of visitors for whom whale watching played a primary role in their spending decisions, even if it was not the sole reason for visiting the area. This more holistic accounting of the diverse expenditures and spending behaviors attributable to whale watching offers a more comprehensive estimation of the value of whale watching in San Juan County.

## A NOTE ON THE ECOLOGICAL IMPACTS OF WHALE-WATCHING

The ecological impacts of boat-based whale watching are among the primary considerations of the Governor's Orca Task Force and are at the forefront of global conversations about whale watching as an increasingly popular form of ecotourism. In recent years, the long-term effects of short-term responses to the ecological disturbances caused by whale watching vessels and other marine traffic, including container ships and ferry boats, has become better understood. In response to this, the Pacific Whale Watch Association (PWWA), an association representing 32, dedicated, whale-watching and ecotourism businesses in Washington and British Columbia, has actively worked to reduce the ecological disturbances caused by whale watching vessels and other marine traffic in the Salish Sea. In addition to the association's participation in restoration and research activities, the PWWA has played a significant role in efforts to develop local whale and wildlife viewing guidelines that include viewing buffers and "slow-go" zones. However, the impacts of marine traffic in the region continue to threaten the vitality of the SRKWs. These impacts include hearing impairment and communication interference, habitat abandonment, feeding disruption, and decreased reproductive rates.

It is not the intent of this report to ignore such impacts. Nor is it within the purview of Earth Economics' practice to make recommendations for a sustainable whale watching industry. The intent of this report is to determine the economic value that whale watching contributes to the Puget Sound Region and its coastal and island communities. This economic valuation supports the idea that it is in everyone's interest to invest in the protection and stewardship of the SRKWs.


# SAN JUAN COUNTY'S WHALE WATCHING ECONOMY

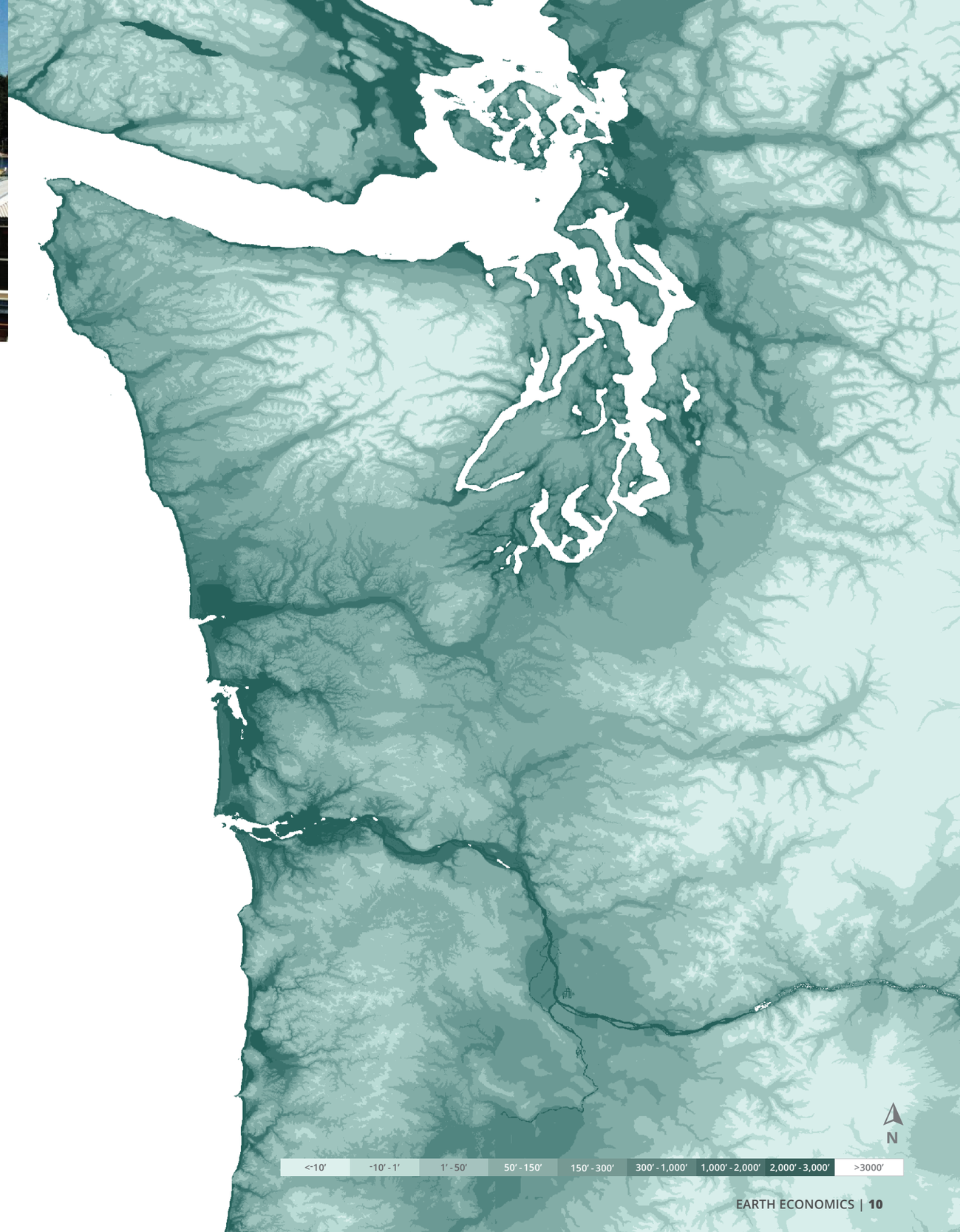
## WHALE WATCHING PARTICIPANTS

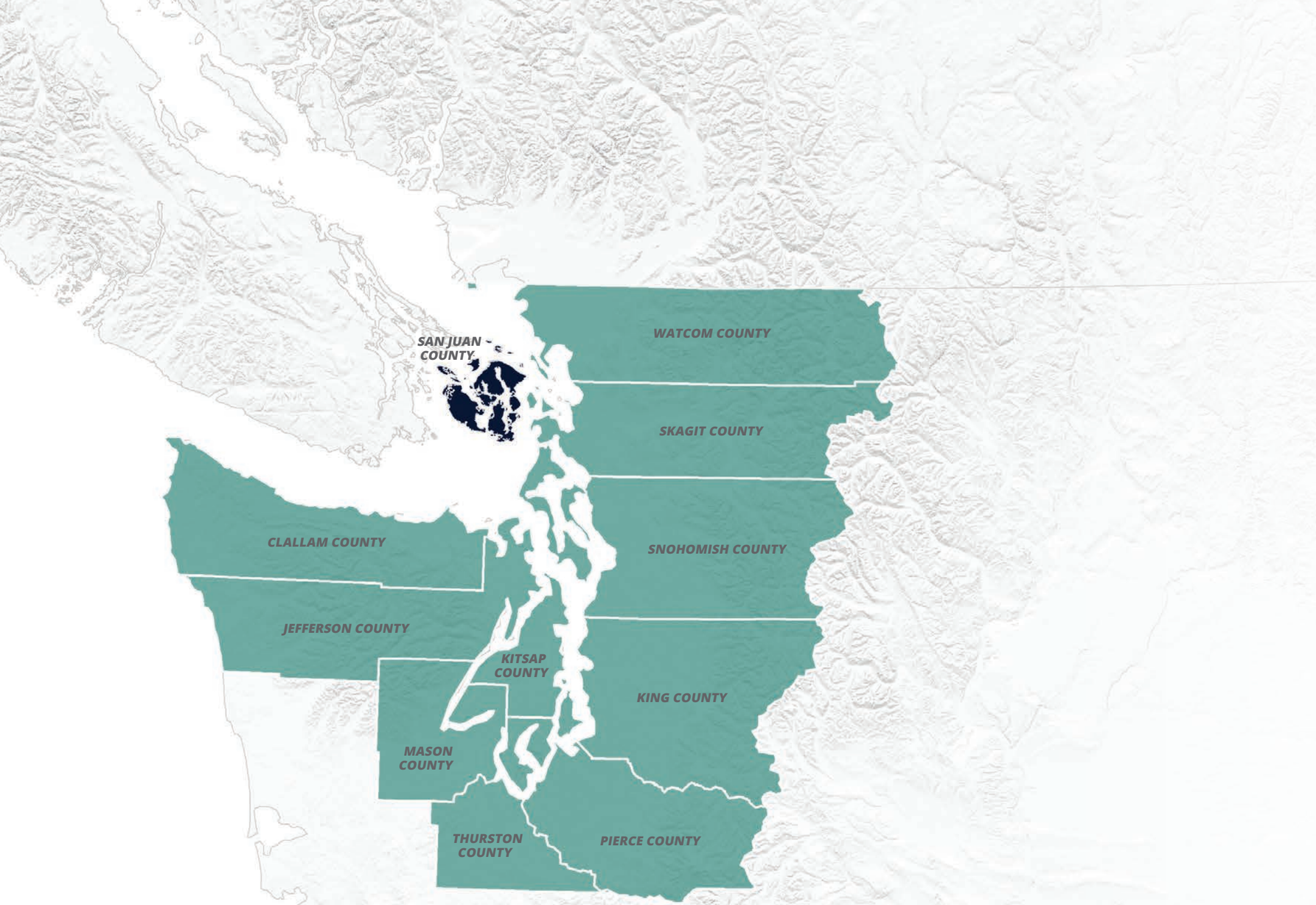
Previous studies have cited a range of estimates for the annual number of participants in boat- and land-based whale watching within San Juan County. Because no single, authoritative source regarding the number of annual whale watching participants exists, this study assumes an average of previous estimates (See Figure 2).[i] Estimates for the annual number of boat-based whale watching participants in San Juan County come from a 2015 memo to the National Marine Fisheries Service, prepared by Industrial Economics, Incorporated.[3] Estimates for the average number of local and non-local, land-based whale watching participants originate from a report produced by the International Fund for Animal Welfare, written in 2001.[4] These estimates were tied to the annual national population growth rate, provided by the World Bank, to arrive at an estimate for boat- and land-based whale watching participants in 2017.

[i] *The full range of estimates for annual whale watching participation rates in San Juan County are presented in Appendix A.*

**FIGURE 2** WHALE WATCHING PARTICIPANTS IN SAN JUAN COUNTY

Each figure represents 10,000 people.




**MAP 1**

Survey Expenditure Geography

- **SAN JUAN COUNTY**
- **PUGET SOUND REGION**



## WHALE WATCHING EXPENDITURES

Expenditure data for whale watching participants in Washington is limited. Previous studies estimate a range of expenditures per participant. However, these estimates often focus exclusively on the expenditures associated with a boat-based whale watching tour, rather than all expenditures associated with a destination trip to San Juan County for which whale watching is either the primary or one of the principal reasons for the trip. Past estimates also fail to account for expenditures associated with whale watchers who view whales from land.

### SURVEY METHODOLOGY

To gather the necessary data to conduct an economic contribution analysis of whale watching in San Juan County, Earth Economics developed a survey to administer to boat- and land-based whale watching participants. Surveys included questions to capture consumer expenditures by category within San Juan County and the greater Puget Sound Region (Map 1), as well as supplemental questions to capture the respondents' mode of whale watching, reasons for their trip (i.e., was the primary purpose of their trip whale watching, or was whale watching one of several reasons?), and demographic information. Surveys also asked respondents to predict how their behavior would change if their chances of seeing an orca were significantly reduced, an inevitable impact that would occur should the SRKW population collapse (See Section "Survey Results – Alternative Scenario").

Ideally, data would have been gathered throughout the year, because consumer spending likely differs seasonally. However, due to time constraints and the natural seasonality of whale watching, surveys were collected during the peak whale watching season, from July to September 2018. For a complete explanation of survey challenges please see Appendix D. Surveys were collected through in-person interviews (the intercept method) in San Juan County and supplemented with an online survey sent to email addresses collected via sign-up sheets. To capture the expenditures of land-based whale watchers, sign-up sheets were distributed throughout San Juan County at various coffee shops, outdoor equipment rental facilities, and the Friends of Lime Kiln Society Lighthouse and Interpretive Center. To capture the expenditures of boat-based whale watchers, sign-up sheets were posted in the offices of several whale watching tour operators. Respondents over the age of 18 who voluntarily signed up for the survey would receive a link to the online platform by email.

## SURVEY RESULTS - EXPENDITURES

The results of the survey provide some initial insights into the distribution of local and non-local participants among boat- and land-based whale watching participant groups (Figure 3). Local participants are defined as survey respondents who live in San Juan County or the Puget Sound Region (Map 1). Non-local participants are defined as whale watching participants who currently live elsewhere in Washington State, other states within the United States, or abroad. Earth Economics only received one survey response from an international visitor. As expected, non-locals comprise the majority – roughly two-thirds (68%) – of boat-based whale watching participants. In contrast, locals comprise the majority – roughly two thirds (67%) – of land-based whale watching participants.

**FIGURE 3** DISTRIBUTION OF LOCAL AND NON-LOCAL WHALE WATCHING PARTICIPANTS

**BOAT-BASED**

LOCAL 32%
NON-LOCAL 68%

**LAND-BASED**

LOCAL 67%
NON-LOCAL 33%

Survey results also provide meaningful insights on the average trip expenditures per person, across various spending categories (e.g., whale watching tours, airfare, car rental, hotel, groceries). The average total expenditures per person, and for all local and non-local, boat- and land-based whale watching participants are presented in Table 1. As expected, non-local, boat-based participants spend the most per person on their whale watching trips with average per-person expenditures totaling more than $1,500 and the average trip lasting 4 days. Alternatively, local, boat-based participants spend just over $300 per person on their trips, which last, on average, only 2 days. Local and non-local, land-based whale watching participants spend more than $370 and $440 per person on their trips, respectively. However, local, land-based participants opted for longer trips, lasting 6 days on average, with non-local, land-based participants taking trips that lasted an average of 2 days each. In total, individuals who participated in whale-watching in San Juan County spend over $171 million in San Juan County and the Puget Sound Region every year.

**TABLE 1** WHALE WATCHING TRIP LENGTH AND EXPENDITURES

| PRIMARY MODE OF WHALE WATCHING | LOCAL/ NON-LOCAL | TRIP LENGTH (AVERAGE DAYS) | EXPENDITURES | | | ANNUAL PARTICIPANTS | TOTAL EXPENDITURES |
|---|---|---|---|---|---|---|---|
| | | | SAN JUAN COUNTY | PUGET SOUND REGION | TOTAL | | |
| BOAT-BASED | LOCAL | 2 | $220 | $92 | $312 | 22,560 | $7,044,109 |
| | NON-LOCAL | 4 | $1,074 | $453 | $1,526 | 47,940 | $73,178,328 |
| LAND-BASED | LOCAL | 6 | $352 | $20 | $372 | 154,100 | $57,378,707 |
| | NON-LOCAL | 2 | $147 | $297 | $443 | 75,900 | $33,649,000 |
| | | | | | | *TOTAL ANNUAL EXPENDITURES* | *$171,250,145* |

While average trip expenditures provide meaningful information on total trip costs per-person, survey data on per-person spending also illustrates how spending supports a range of industries within San Juan County and the Puget Sound Region. The distribution of expenditures by spending category for all boat- and land-based whale watching in San Juan County is presented in Appendix B.



WHALE WATCHING PARTICIPANTS
SPEND OVER $171 MILLION ANNUALLY
IN SAN JUAN COUNTY AND THE PUGET SOUND REGION.

# A DECREASE IN ORCA SIGHTINGS WOULD RESULT IN FEWER TOURISTS VISITING

## SAN JUAN COUNTY AND THE PUGET SOUND REGION.


**MAP 2**

Orca Sighting Geography

**SAN JUAN COUNTY**

**PUGET SOUND REGION**



## SURVEY RESULTS - ALTERNATIVE SCENARIO

In addition to understanding how much whale watching participants spend in San Juan County and the Puget Sound Region, as well as the sectors that are supported by those expenditures, Earth Economics' survey sought to understand how spending would change should the SRKW population collapse. To accomplish this goal, Earth Economics asked survey participants to predict how their behavior would change if their chances of seeing an orca were reduced, an inevitable impact of SRKW population collapse.

Orca sighting records recorded in the Orca Master Data Set and provided by The Whale Museum were used to determine the percentage of whale sightings days in which SRKWs were the only ecological type of orcas seen in the immediate area surrounding the San Juan Islands from 2012 to 2016.[ii] While the Orca Master Data Set contains sightings data for the greater Salish Sea and Puget Sound, our analysis was limited to the geographic area where the majority of boat- and land-based whale watching occurs (Map 2). Each sighting within the Orca Master Data Set is coded to a specific geographic quadrant within the Salish Sea and Puget Sound, allowing for this type of analysis.

Table 2 reports the total number of days an orca sighting was reported near the San Juan Islands between 2012 and 2016, and the percentage of sighting days in which the SRKWs were the only type seen. On average, SRKWs are the only orca type sighted on 48% of orca sighting days. In other words, if the SRKW population were to collapse, the number of days in which an orca could be expected to be seen in the area would roughly be cut in half.[iii]

Survey respondents were asked whether they would still visit San Juan County and the Puget Sound Region if their chances of seeing an orca were reduced by 50%. The results of this question are presented in Table 3.[iv] In general, boat-based whale watching participants were the most sensitive to decreases in the chances of seeing an orca on their whale watching trips. Nearly half of non-local, boat-based whale watching participants said they would not visit San Juan County in this alternative scenario, and one third said they would not visit Puget Sound at all.

*[ii] Orca sighting records that comprise the Orca Master Data Set are based on information from whale watching vessels, Five Star Charters, Whale Watch pager data, Otis data from Lime Kiln State Park, SPOT data from various vessels, information from hydrophone arrays, and the sighting archives at The Whale Museum.*

*[iii] While there is a range of anecdotal estimates on the number of SRKW sightings, the use of the Orca Master Data Set represents the most objective way to estimate the decrease in whale sighting days that would result from the loss of the SRKW.*

*[iv] In reality, the collapse of the SRKW population would be gradual, and the chances of seeing an orca would decrease over time.*

**TABLE 2** ORCA SIGHTINGS NEAR THE SAN JUAN ISLANDS, 2012-2016

| | SRKW UNIQUE SIGHTING DAYS | TOTAL ORCA SIGHTING DAYS *(SRKW, NRKW, AND TRANSIENTS)* | % SIGHTING DAYS THAT ONLY SRKW WERE SEEN |
|---|---|---|---|
| **2012** | 104 | 197 | 53% |
| **2013** | 74 | 179 | 41% |
| **2014** | 93 | 213 | 44% |
| **2015** | 128 | 238 | 54% |
| **2016** | 92 | 199 | 46% |

**TABLE 3** REDUCTION IN WHALE WATCHING PARTICIPATION UNDER ALTERNATIVE SCENARIO

| PRIMARY MODE OF WHALE WATCHING | LOCAL/ NON-LOCAL | % OF RESPONDENTS WHO WOULD NOT VISIT... | |
|---|---|---|---|
| | | SAN JUAN COUNTY | PUGET SOUND REGION |
| **BOAT-BASED** | LOCAL | 78% | N/A |
| | NON-LOCAL | 47% | 33% |
| **LAND-BASED** | LOCAL | 67% | N/A |
| | NON-LOCAL | 33% | 0% |

It is unsurprising that land-based whale watchers are less sensitive to decreases in their chances of seeing an orca, given that land-based whale watching has a lower probability of an orca sighting to begin with, when compared to boat-based tours. Land-based whale watchers were also more likely to have several principal reasons for visiting San Juan County and the Puget Sound Region, one of which being whale watching, while boat-based whale watching participants were more likely to visit the area for the primary purpose of whale watching. The surveys suggest that land-based whale watching participants would not change their behavior at all if their chances of seeing an orca were reduced. However, this may be the effect of a small sample size as opposed to the true percentage of non-local whale watchers that would visit the Puget Sound Region.



WHALE WATCHING CONTRIBUTES

## SIGNIFICANT ECONOMIC VALUE TO THE PUGET SOUND REGION

AND ITS COASTAL AND ISLAND COMMUNITIES.

WHALE WATCHING PARTICIPANTS SUPPORT

## OVER 13% OF TOTAL EMPLOYMENT IN SAN JUAN COUNTY



# ECONOMIC CONTRIBUTION OF WHALE WATCHING

## ECONOMIC CONTRIBUTION METHODOLOGY

An economic contribution analysis demonstrates the contribution of a given industry to the surrounding economy, at current levels of production. A contribution analysis can estimate the economic output of an industry, the number of jobs and labor income supported by an industry, the industry's contribution to the gross regional product, and taxes supported by the industry. Contribution analyses can demonstrate the relative size of an industry within the larger economy.

This analysis measures how consumer spending on whale watching trips contributes to the regional economy. To measure these effects, we use input-output (IO) modelling, which characterizes the financial linkages between industries within a regional economy. Simply put, it shows how spending in one industry ripples throughout the economy. This analysis uses an industry standard IO modelling software called IMPLAN V3.1.

We estimated economic contribution values for both land-based and boat-based whale watching. Total economic contribution is broken out into direct effects and secondary effects, and secondary effects are further broken out into indirect and induced effects. Direct effects measure the economic activity of industries directly supported by consumer spending. This includes contributions from businesses such as hotels, whale watching companies, and ferries. Secondary effects are those that stem from direct effects, and they are further categorized as either indirect or induced effects. Indirect effects are the effects of the supporting industries that supply the direct industries. For example, ranchers supply beef and growers supply produce to local restaurants that are patronized by whale watching participants, and thus the agricultural industry is indirectly impacted by the whale watching industry. Induced effects arise from employee spending, such as the money a whale watching tour guide spends within the regional economy on things like rent, gas, and groceries. Depending on the connectivity of the regional economy, these economic effects can circulate throughout the economy numerous times before leaving the region.

## ECONOMIC CONTRIBUTION RESULTS

Whale watchers come from around the globe to experience the natural beauty of the region, and, for those lucky enough, to experience a whale sighting. During their time in the Puget Sound, they spend money on everything from ferry tickets to ice cream cones to bed and breakfasts and gourmet dinners, and this spending stimulates the local economy.

Whale watching tourism in San Juan County provides significant economic benefits both within the county and throughout the Puget Sound Region. The $171 million spent on whale watching trips in San Juan County every year yields a total economic output of $216 million.[vi] This means that for every $1 spent on whale watching, $1.26 in economic activity is generated in the regional economy. In terms of GDP, whale watching contributes $113 million to the Puget Sound's GDP, $75 million of which is generated in San Juan County. Although land-based whale watching accounts for 77% of all whale watching trips, boat-based trips account for about half of the economic contributions. This is largely due to the high expenditure profiles associated with boat-based whale watching, as well as the high-expenditure profiles of non-local participants.

This economic activity supports nearly 2,000 jobs (full- and part-time) and $67 million in wages in the Puget Sound Region, 1,400 of which are in San Juan County. The entire San Juan County economy is estimated to support 11,000 full- and part-time jobs. That means whale watching is responsible for 13% of total employment in the country.[v] Many of the direct jobs are service-related jobs in restaurants, bars, coffee shops, hotels, inns, etc. We estimate that almost a third of all food service jobs and lodging jobs are dependent on whale watching tourism, and the food service industry is among the greatest job providers in San Juan County. Secondary employment effects are experienced in maintenance, real estate, and medicine.

Finally, whale watching trips contribute significantly to local, state, and federal taxes. Taxes on production and imports are by far the largest contributors to local and state taxes (largely from sales tax), while employee wages contribute significantly to federal taxes. As seen at right, whale watching contributes more than $12 million in local and state taxes and $14.6 million in federal taxes.

[v] *Calculated in terms of "job years," or the total number of full- and part-time jobs annualized over the course of the year (e.g., one employee working twelve months or two employees working six months each equal one job year). Wages includes wages and benefits.*

[vi] *As consumers inject money into industries related to whale watching, businesses and employees then re-spend this income on goods and services. The proportion of this income that is re-spent within the region is determined by each industries Regional Purchase Coefficients (RPCs), representing the proportion of local demand for a commodity that is supplied from within the region. Industries associated with boat-based whale watching have higher RPCs than industries associated with land-based whale watching, resulting in a greater economic output per dollar spent.*



# INPUT-OUTPUT **DATA**

BOAT-BASED
LAND-BASED

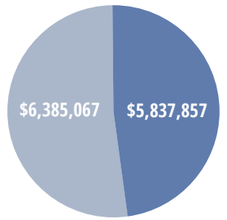
Input-output analysis allows us to see how expenditures in one industry ripple throughout the regional economy. In this case, we are able to understand how expenditures made by whale watching participants contribute to Puget Sound's economy.

**PARTICIPANTS**
TOTAL: 300,500

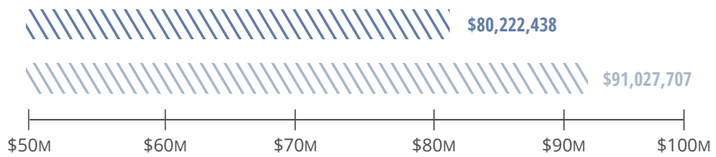
70,500 **BOAT-BASED** PARTICIPANTS

230,000 **LAND-BASED** PARTICIPANTS

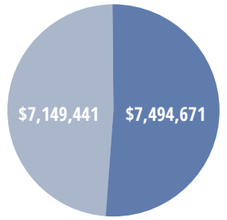
**STATE & LOCAL TAX**
TOTAL: $12,222,924



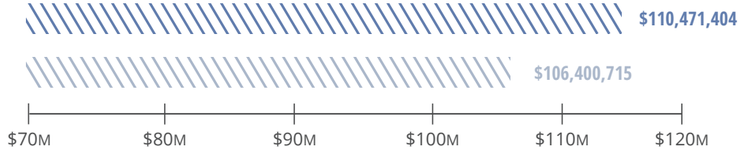

**EXPENDITURES**
TOTAL: $171,250,145



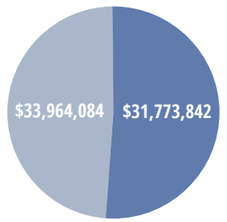

**FEDERAL TAX**
TOTAL: $14,644,112




**TOTAL ECONOMIC CONTRIBUTION**
TOTAL: $216,872,119




**LABOR INCOME**
TOTAL: $66,727,926




**JOB YEARS**
TOTAL: 1870

**900** JOB YEARS

**970** JOB YEARS

# ECONOMIC IMPACT OF SRKW EXTINCTION

## ECONOMIC IMPACT METHODOLOGY

To understand what the loss of the Southern Resident Killer Whale population means for the Puget Sound's economy, we conducted an economic impact analysis. An economic impact analysis differs from an economic contribution analysis in that an economic impact analysis measures the net change in a region's economic base as a result of an event, while an economic contribution analysis estimates the economic effects that can be linked to an industry. In this case, we seek to measure the economic loss to the region as a result of the loss of the SRKWs.

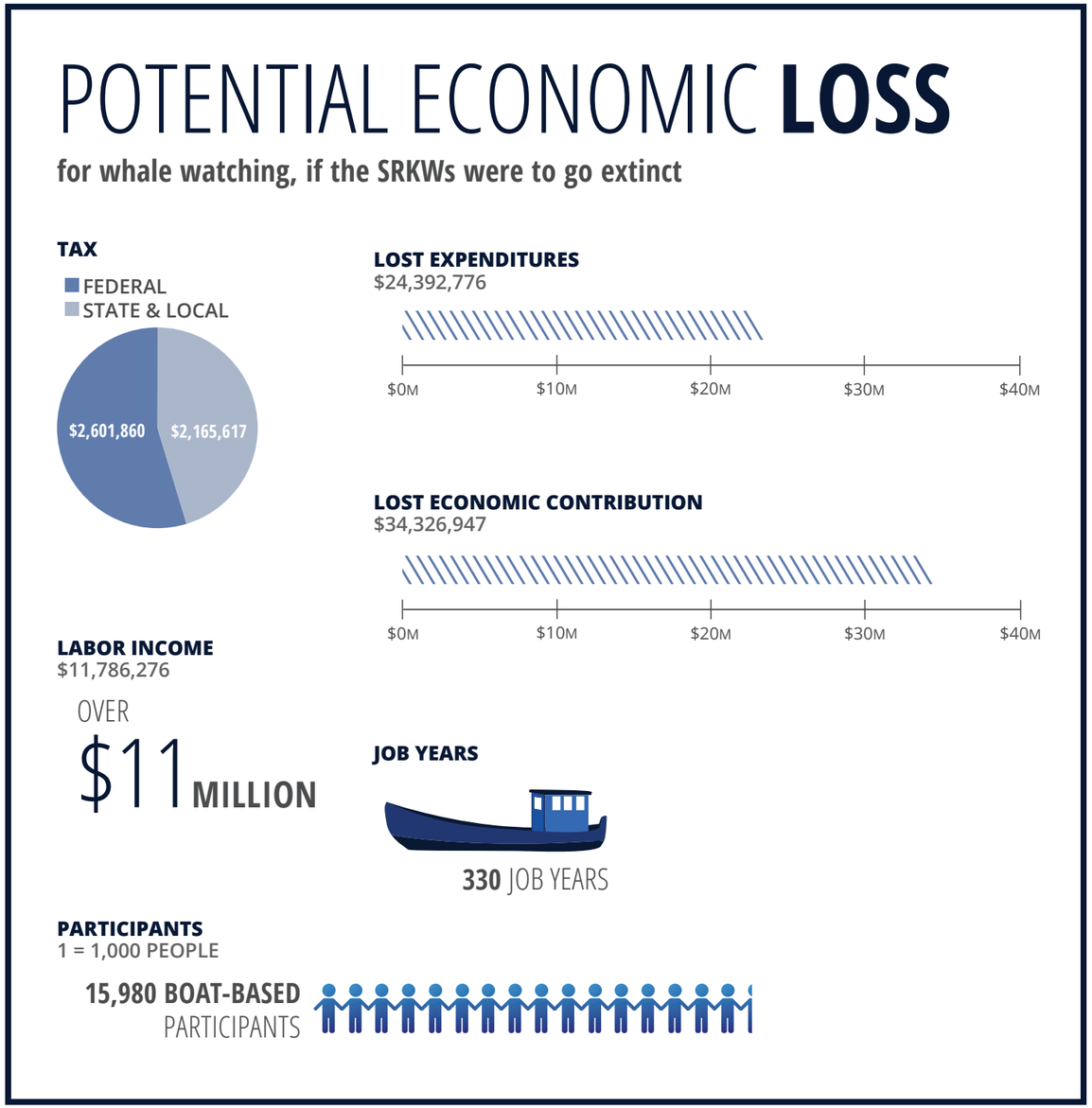
To measure this, our survey inquired whether participants would still visit the Puget Sound Region if their chances of seeing an orca were reduced by 50%. Looking only at survey respondents that were from outside the Puget Sound Region, 33% of boat-based whale watchers stated they would not visit the region, while zero land-based whale watchers stated that their behavior would change (100% answered either "yes" or "don't know" to whether they would still visit the region) (Table 3). Therefore, our analysis assumes that 33% of boat-based whale watching participants would no longer visit the region, and their economic contribution lost. For non-local land-based whale watching participants, and the segment of non-local boat-based whale watching participants that would still visit the region, we assume that their expenditures would not be lost if the SRKW population were to collapse.

For local survey respondents, 78% of boat-based and 67% of land-based respondents stated they would not visit San Juan County. Although they will no longer take their whale watching trip, we assume that they would substitute their expenditures with spending on another amenity within the region, as we did not ask where they would have made expenditures had they not taken their whale watching trip. Therefore, these expenditures are assumed to remain in the Puget Sound Region.



## ECONOMIC IMPACT RESULTS

Understanding that the demise of the SRKW population will result in a measurable loss of visitors to the region, we can estimate the economic impacts to the Puget Sound Region. With 33% of non-local, boat-based whale watching participants no longer visiting the region, $24.4 million in annual consumer spending will not occur, and the impacts of this will ripple throughout the region's economy. These non-local visitors and the revenue they bring to the region are important contributors of jobs, income, and taxes. This spending supports 330 jobs and nearly $12 million in wages each year. Additionally, $2.2 million in local and state taxes will be lost.



# CONCLUSION

This report provides evidence that whale watching contributes significant economic value to the Puget Sound Region and its coastal and island communities. Our analysis shows that whale watching participants who whale watch from boat-based tours and from terrestrial viewing points in San Juan County support over $216 million worth of economic activity, more than 1,800 jobs, and more than $12 million in state and local tax revenue in Washington each year. However, the threats to the SRKW population recovery put these economic benefits at risk, with estimated projected losses of $34 million in economic activity, $2.2 million in state and local tax revenue, and 330 jobs if the population were to collapse.

While these results are significant, they are also likely an underestimate of the true value of Washington's whale watching economy and the economic losses that would occur, because our analysis focused explicitly on whale watching occurring in San Juan County. In reality, the whale watching industry for both boat- and land-based whale watching extends throughout Washington's waters and coastal areas and into British Columbia. In addition, our results in no way capture the immeasurable, cultural and spiritual losses that would be experienced as a result of SRKW extinction, and this further underscores the fact that the results of this analysis are still underestimates of total value. Even so, they make clear the immediate need to invest in the protection and stewardship of this immensely valuable natural asset.



THREATS TO THE RECOVERY OF THE SRKW POPULATION PRESENT AN

**ECONOMIC RISK OF $34 MILLION IN ANNUAL ECONOMIC ACTIVITY,**

$2.2 MILLION IN STATE AND LOCAL TAX REVENUE, AND 330 JOBS.

# APPENDIX A:

## LOW AND HIGH ESTIMATES OF THE ECONOMIC CONTRIBUTION OF WHALE WATCHING IN SAN JUAN COUNTY

The low and high estimates for whale watching participation rates and expenditures are by no means meant to represent low and high bounds. Rather, these values represent a range of reasonable estimates for the average number of whale watching participants in San Juan and their expenditures both within San Juan County and throughout the greater Puget Sound Region. Table 4 presents a range of estimates for whale watching participation in San Juan County. Tables 5-8 show the low and high estimates for per-person expenditures for boat- and land-based whale watching trips. Table 5 estimates the economic contribution of whale watching in San Juan County using the low participation and low expenditure estimates, average participation and average expenditure estimates, and high participation and high expenditure estimate. The results show that reasonable estimates of the economic benefit of whale watching in San Juan County can range from $135 to $334 million annually.

**TABLE 4** WHALE WATCHING PARTICIPATION IN SAN JUAN COUNTY

| | BOAT-BASED TOUR PARTICIPANTS | LAND-BASED TOUR PARTICIPANTS |
|---|---|---|
| LOW ESTIMATE | 49,000 | 161,000 |
| AVERAGE ESTIMATE | 70,500 | 230,000 |
| HIGH ESTIMATE | 92,000 | 299,000 |

**TABLE 5** WHALE WATCHING PARTICIPANT EXPENDITURES - LOW ESTIMATE

| PRIMARY MODE OF WHALE WATCHING | LOCAL/ NON-LOCAL | LOW ESTIMATE (85% OF AVG.) | | |
|---|---|---|---|---|
| | | SAN JUAN COUNTY | PUGET SOUND REGION | *TOTAL* |
| BOAT-BASED | LOCAL | $187 | $78 | ***$265*** |
| | NON-LOCAL | $913 | $387 | ***$1,298*** |
| LAND-BASED | LOCAL | $299 | $17 | ***$316*** |
| | NON-LOCAL | $125 | $252 | ***$377*** |

**TABLE 6** WHALE WATCHING PARTICIPANT EXPENDITURES - AVERAGE ESTIMATE

| PRIMARY MODE OF WHALE WATCHING | LOCAL/ NON-LOCAL | AVERAGE ESTIMATE | | |
|---|---|---|---|---|
| | | SAN JUAN COUNTY | PUGET SOUND REGION | *TOTAL* |
| BOAT-BASED | LOCAL | $220 | $92 | ***$312*** |
| | NON-LOCAL | $1,074 | $453 | ***$1,527*** |
| LAND-BASED | LOCAL | $352 | $20 | ***$372*** |
| | NON-LOCAL | $147 | $297 | ***$443*** |

**TABLE 7** WHALE WATCHING PARTICIPANT EXPENDITURES - HIGH ESTIMATE

| PRIMARY MODE OF WHALE WATCHING | LOCAL/ NON-LOCAL | HIGH ESTIMATE (115% OF AVG.) | | |
|---|---|---|---|---|
| | | SAN JUAN COUNTY | PUGET SOUND REGION | *TOTAL* |
| BOAT-BASED | LOCAL | $253 | $106 | ***$359*** |
| | NON-LOCAL | $1,235 | $520 | ***$1,755*** |
| LAND-BASED | LOCAL | $405 | $23 | ***$428*** |
| | NON-LOCAL | $169 | $341 | ***$510*** |



**TABLE 8** LOW AND HIGH ESTIMATES OF THE ECONOMIC CONTRIBUTION OF WHALE WATCHING IN SAN JUAN COUNTY

| PRIMARY MODE OF WHALE WATCHING | PARTICIPANTS | EXPENDITURES | ECONOMIC CONTRIBUTION | JOB YEARS | LABOR INCOME | LOCAL AND STATE TAX | FEDERAL TAX |
|---|---|---|---|---|---|---|---|
| LOW | | | | | | | |
| BOAT-BASED | 49,000 | $47,393,823 | $68,522,423 | 582.3 | $21,392,223 | $3,749,233 | $4,715,990 |
| LAND-BASED | 161,000 | $54,161,486 | $66,912,007 | 579.0 | $19,707,145 | $3,825,269 | $4,309,385 |
| *TOTAL* | ***210,000*** | ***$101,555,309*** | ***$135,434,430*** | ***1,161.3*** | ***$41,009,368*** | ***$7,574,502*** | ***$9,025,375*** |
| MEDIUM | | | | | | | |
| BOAT-BASED | 70,500 | $80,222,438 | $110,471,404 | 900.0 | $33,964,084 | $5,837,857 | $7,494,671 |
| LAND-BASED | 230,000 | $91,027,707 | $106,400,715 | 969.5 | $32,773,842 | $6,385,067 | $7,149,441 |
| *TOTAL* | ***300,500*** | ***$171,250,145*** | ***$216,872,119*** | ***1,869.5*** | ***$66,737,926*** | ***$12,222,924*** | ***$14,644,112*** |
| HIGH | | | | | | | |
| BOAT-BASED | 92,000 | $120,390,552 | $165,785,454 | 1,350.7 | $50,970,214 | $8,760,929 | $11,247,325 |
| LAND-BASED | 299,000 | $136,086,422 | $168,123,444 | 1,454.7 | $49,516,270 | $9,611,388 | $10,827,781 |
| *TOTAL* | ***391,000*** | ***$256,476,974*** | ***$333,908,898*** | ***2,805.4*** | ***$100,486,484*** | ***$18,372,317*** | ***$22,075,106*** |

# APPENDIX B:
## ANNUAL EXPENDITURES BY CATEGORY

**TABLE 9** ANNUAL EXPENDITURES FOR BOAT-BASED AND LAND-BASED WHALE WATCHING PARTICIPANTS, IN SAN JUAN COUNTY AND THE PUGET SOUND REGION

| SPENDING CATEGORY | SAN JUAN COUNTY | | PUGET SOUND REGION | |
|---|---|---|---|---|
| | BOAT-BASED | LAND-BASED | BOAT-BASED | LAND-BASED |
| WHALE-WATCHING TOURS | $11,029,250.45 | $- | $- | $- |
| AIRFARE | $3,150,818.68 | $843,445.00 | $- | $- |
| CAR RENTAL | $2,889,080.33 | $2,969,437.00 | $2,889,080.33 | $2,376,909.00 |
| GASOLINE/OIL | $876,139.03 | $2,235,130.00 | $5,923,898.53 | $5,182.234.00 |
| PARKING/FERRY | $2,897,969.86 | $8,631,252 | $257,971.28 | $- |
| HOTELS/MOTELS | $12,484,498.85 | $12,969,238.00 | $3,320,514.21 | $3,327,673.00 |
| AIR B&B/VRBO/SHARED HOUSING | $7,138,316.10 | $2,987,329.00 | $3,456,973.69 | $- |
| CAMPING | $436,087,60 | $3,688,153.00 | $272,918.98 | $- |
| EQUIPMENT RENTALS *(KAYAK, CANOE, ETC.)* | $959,392.71 | $2,699,025.00 | $- | $- |
| GOVERNMENT FEES *(PARK FEES, PARKING TICKETS, PARKING, ETC.)* | $488,435.27 | $741,209.00 | $45,486.50 | $- |
| GROCERIES | $2,006,617.22 | $7,000,597.00 | $1,738.841.16 | $7,202,893.00 |
| MISCELLANEOUS RETAIL *(SOUVENIRS, BOOKS, ETC.)* | $4,334,869.50 | $5,744,372.00 | $1,364,594.88 | $1,652,095.00 |
| RESTAURANTS/CAFES/DRINKING LOCATIONS | $7,757,578.81 | $13,876,714.00 | $4,035,280.70 | $5,900,003.00 |
| ***TOTAL*** | *$56,449,054.39* | *$65,385,901.00* | *$23,773,383.33* | *$25,641,806.00* |

# APPENDIX C:
## INPUT OUTPUT TABLES

Input-output analysis was conducted for expenditures made in San Juan County and expenditures made during travel to San Juan County (within the Puget Sound Region). The stemming economic effects are detailed below:

**TABLE 10** SAN JUAN COUNTY INPUT-OUTPUT RESULTS

| PRIMARY MODE OF WHALE WATCHING | PARTICIPANTS | EXPENDITURES | DIRECT OUTPUT | INDIRECT OUTPUT | INDUCED OUTPUT | TOTAL OUTPUT | JOB YEARS | LABOR INCOME | LOCAL AND STATE TAX | FEDERAL TAX |
|---|---|---|---|---|---|---|---|---|---|---|
| **LOW** | | | | | | | | | | |
| BOAT-BASED | 49,000 | $33,348,980 | $31,688,096 | $7,482,972 | $5,076,273 | $44,247,341 | 432.8 | $14,355,224 | $2,612,041 | $3,149,788 |
| LAND-BASED | 161,000 | $38,904,611 | $32,386,721 | $8,177,863 | $4,542,816 | $45,107,400 | 431.2 | $12,870,520 | $2,694,052 | $2,1813,800 |
| *TOTAL* | *210,000* | *$72,253,592* | *$64,074,817* | *$15,660,835* | *$9,619,089* | *$89,354,741* | *864* | *$27,225,744* | *$5,306,093* | *$5,963,588* |
| **MEDIUM** | | | | | | | | | | |
| BOAT-BASED | 70,500 | $56,449,054 | $49,808,127 | $12,004,953 | $7,828,460 | $69,641,539 | 647.9 | $22,127,653 | $3,923,140 | $4,860,333 |
| LAND-BASED | 230,000 | $65,385,901 | $54,431,463 | $13,744,307 | $7,634,985 | $75,810,754 | 724.7 | $21,631,125 | $4,527,818 | $4,729,076 |
| *TOTAL* | *300,500* | *$121,834,956* | *$104,239,590* | *$25,749,260* | *$15,463,445* | *$145,452,295* | *1,372.6* | *$43,758,778* | *$8,450,958* | *$9,589,409* |
| **HIGH** | | | | | | | | | | |
| BOAT-BASED | 92,000 | $84,713,616 | $74,747,516 | $18,015,943 | $11,748,242 | $104,511,701 | 972.4 | $33,207,173 | $5,887,493 | $7,293,948 |
| LAND-BASED | 299,000 | $182,465,539 | $81,375,037 | $20,547,739 | $11,414,302 | $113,337,078 | 1,083.4 | $32,338,532 | $6,769,088 | $7,069,968 |
| *TOTAL* | *391,000* | *$182,465,539* | *$156,122,553* | *$38,563,682* | *$23,162,544* | *$217,848,779* | *2,055.8* | *$65,545,705* | *$12,656,581* | *$14,363,916* |

**TABLE 11** PUGET SOUND INPUT-OUTPUT RESULTS (INCLUDING SECONDARY EFFECTS FROM SPENDING IN SJC)

| PRIMARY MODE OF WHALE WATCHING | PARTICIPANTS | EXPENDITURES | DIRECT OUTPUT | INDIRECT OUTPUT | INDUCED OUTPUT | TOTAL OUTPUT | JOB YEARS | LABOR INCOME | LOCAL AND STATE TAX | FEDERAL TAX |
|---|---|---|---|---|---|---|---|---|---|---|
| **LOW** | | | | | | | | | | |
| BOAT-BASED | 49,000 | $14,044,843 | $13,134,443 | $6,687,049 | $4,453,591 | $150 | 149.5 | $7,036,999 | $1,137,192 | $1,566,202 |
| LAND-BASED | 161,000 | $15,256,874 | $11,622,304 | $5,876,660 | $4,305,643 | $21,804,607 | 147.8 | $6,836,625 | $1,131,217 | $1,495,585 |
| *TOTAL* | *210,000* | *$19,301,717* | *$24,756,747* | *$12,563,709* | *$8,759,234* | *$46,079,690* | *297.3* | *$13,873,624* | *$2,268,409* | *$3,061,787* |
| **MEDIUM** | | | | | | | | | | |
| BOAT-BASED | 70,500 | $23,773,383 | $22,232,371 | $11,141,365 | $7,456,129 | $40,829,865 | 252.1 | $11,836,431 | $1,914,717 | $2,634,338 |
| LAND-BASED | 230,000 | $25,641,806 | $14,390,345 | $9,171,119 | $7,028,497 | $30,589,961 | 244.8 | $11,142,717 | $1,857,249 | $2,420,365 |
| *TOTAL* | *300,500* | *$36,622,716* | *$36,622,716* | *$20,312,484* | *$14,484,626* | *$71,419,826* | *297.3* | *$22,979,148* | *$3,771,966* | *$5,054,703* |
| **HIGH** | | | | | | | | | | |
| BOAT-BASED | 92,000 | $35,676,936 | $33,364,323 | $16,719,948 | $11,189,482 | $61,273,753 | 378.3 | $17,763,041 | $2,873,436 | $3,953,377 |
| LAND-BASED | 299,000 | $38,334,499 | $29,202,261 | $14,765,724 | $10,818,382 | $54,786,366 | 371.3 | $17,177,738 | $2,842,300 | $3,757,813 |
| *TOTAL* | *391,000* | *$74,011,435* | *$62,566,584* | *$31,485,672* | *$22,007,864* | *$116,060,120* | *749.6* | *$34,940,779* | *$5,715,736* | *$7,711,190* |

**TABLE 12** TOTAL INPUT-OUTPUT RESULTS

| PRIMARY MODE OF WHALE WATCHING | PARTICIPANTS | EXPENDITURES | DIRECT OUTPUT | INDIRECT OUTPUT | INDUCED OUTPUT | TOTAL OUTPUT | JOB YEARS | LABOR INCOME | LOCAL AND STATE TAX | FEDERAL TAX |
|---|---|---|---|---|---|---|---|---|---|---|
| **LOW** | | | | | | | | | | |
| BOAT-BASED | 49,000 | $47,393,823 | $44,822,539 | $14,170,021 | $9,529,864 | $44,347,491 | 582.3 | $21,392,223 | $3,749,233 | $4,715,990 |
| LAND-BASED | 161,000 | $54,161,486 | $44,009,025 | $14,054,523 | $8,848,459 | $66,912,007 | 579 | $19,707,145 | $3,825,269 | $4,309,385 |
| *TOTAL* | *210,000* | *$101,55,309* | *$88,831,564* | *$28,224,544* | *$18,378,323* | *$135,434,431* | *1,161.3* | *$41,099,368* | *$7,574,502* | *$9,025,375* |
| **MEDIUM** | | | | | | | | | | |
| BOAT-BASED | 70,500 | $80,222,438 | $72,040,498 | $23,146,318 | $15,284,589 | $110,471,404 | 900 | $33,964,084 | $5,837,857 | $7,494,671 |
| LAND-BASED | 230,000 | $91,027,707 | $68,821,808 | $22,915,426 | $14,663,482 | $106,400,715 | 969.5 | $32,773,842 | $6,385,067 | $7,149,441 |
| *TOTAL* | *300,500* | *$171,250,145* | *$140,862,306* | *$46,061,744* | *$29,948,071* | *$216,872,121* | *1,869.5* | *$66,737,926* | *$12,222,924* | *$14,644,112* |
| **HIGH** | | | | | | | | | | |
| BOAT-BASED | 92,000 | $120,390,552 | $108,111,839 | $34,735,891 | $22,937,724 | $165,785,454 | 1,350.7 | $50,970,214 | $8,760,929 | $11,247,325 |
| LAND-BASED | 299,000 | $136,086,422 | $110,577,298 | $35,313,463 | $22,232,684 | $168,123,444 | 1,454.7 | $49,516,270 | $9,611,388 | $10,827,781 |
| *TOTAL* | *391,000* | *$256,476,974* | *$218,689,137* | *$70,049,354* | *$45,170,408* | *$333,908,899* | *2,805.4* | *$100,486,484* | *$18,372,317* | *$22,075,106* |

# APPENDIX D:
## SURVEY CHALLENGES

Collecting survey data is often the largest challenge for studies that include primary data collection. Through five days of in-person survey collection, and the distribution of an online survey, Earth Economics received a total of 37 usable surveys, 28 of which were completed by boat-based whale watching participants, and 9 were completed by land-based whale watching participants. On average, Earth Economics' survey work had a 20% response rate which is in line with other surveys that offered no incentives to survey respondents.[5]

While Earth Economics' response rate was in-line with similar studies, efforts to increase the total number of surveys used in our analysis were hindered by the highly publicized deaths of several SRKWs and the growing public concern for the population, both of which contributed to a general skepticism of the survey and this report. Working with local businesses in Friday Harbor, as well as with the Friends of Lime Kiln Society, Earth Economics was able to post survey sign-up sheets in various locations. However, whale watching participants were reluctant to sign up, or participate in in-person surveys. Skepticism on the part of whale watching participants was met equally with skepticism from the whale watching tour operators themselves. For example, Earth Economics attempted to conduct an additional, tailored survey of whale watching operators specifically, in order to better understand how expenditures that go directly to operators ripple throughout the economy. The PWWA supported the distribution of the survey. However, of the 16 surveys sent out, only three were returned. In lieu of their responses, Earth Economics' economic contribution analysis assumes an expenditure profile consistent with "tours and sightseeing" in San Juan County, as defined by the software used for this analysis (See section "Economic Contribution Methodology" for more information on this software and methodology.)

Given the small sample of whale watching participant surveys received, we bolstered our analysis by including values from additional sources. Our analysis examined a range of per-person expenditures that were informed by 1.) our own primary data, via the survey results; 2.) whale watching participation rates provided by the International Fund for Animal Welfare; and 3.) a 2015 memo to the National Marine Fisheries Service, prepared by Industrial Economics, Incorporated. The survey results presented in this report, and those used in the economic contribution and economic impact analysis, are based on the average estimates of per-person expenditures, provided by Earth Economics' survey data, and participation rates, provided by the external sources listed above. Results based on the low and high estimates of per-person expenditures and participation rates are presented in Appendix A. By modeling a range of estimated impacts, Earth Economics is able to account for the uncertainty inherent within survey data collection while making the most of some of the first whale watching participant expenditure data in Washington.



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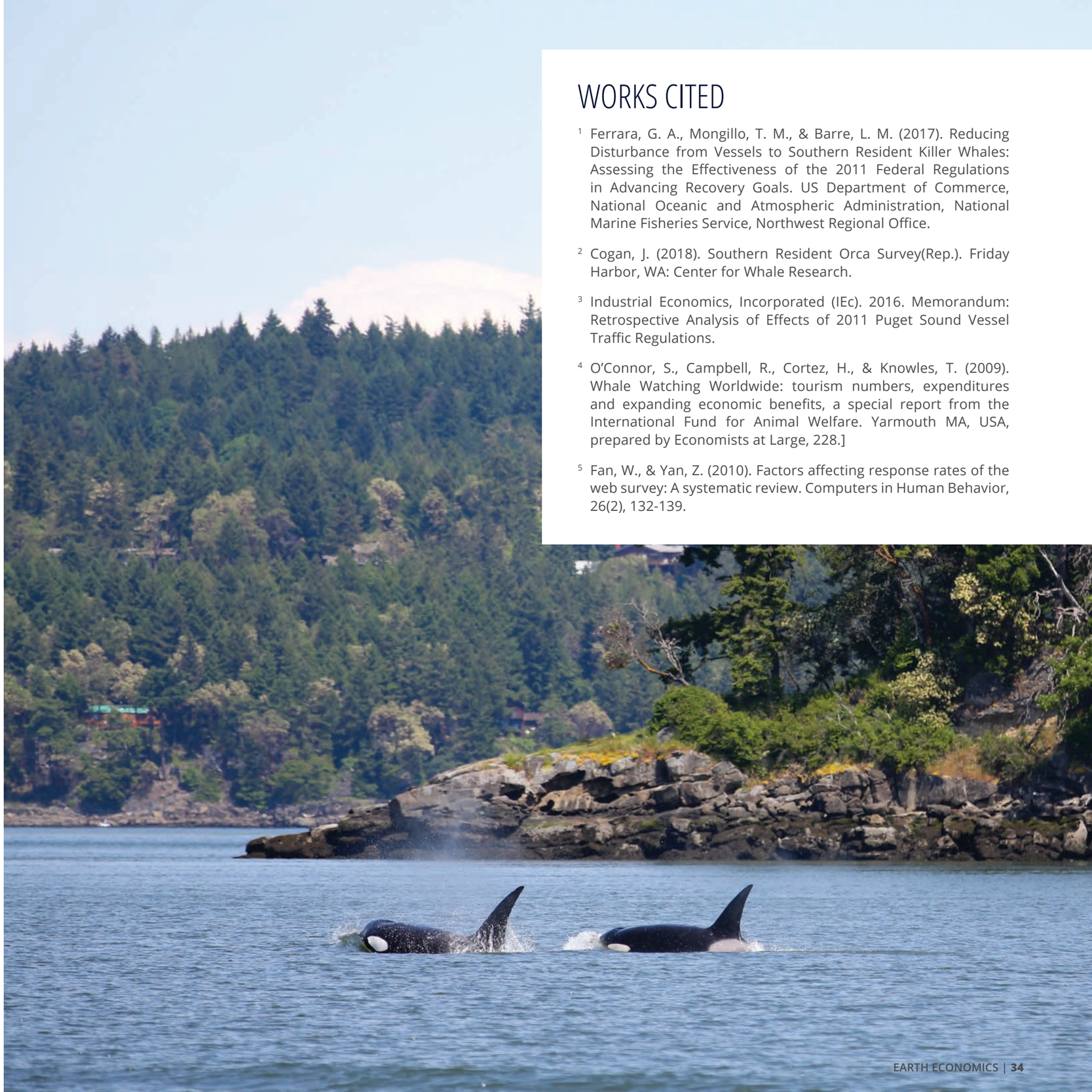

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