

CRSUS, Volume 2

Supplemental information

Global economic impact of scuba dive tourism

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Atlas Aquatica: Recognizing the Economic Benefits of the Global Dive Industry, August 2021

Atlas Aquatica: Mapping the Distribution and Global Value of the Diving Industry

Dear Participant:

Thank you so much for participating in this survey! We are a group of researchers at UC San Diego and the University of British Columbia working to understand the benefits of scuba diving and snorkeling to the global economy and ocean conservation. Because of your experience in the industry, we are inviting you to participate by completing the following survey, which will take about 30 minutes.


All individual responses are confidential and we will not ask your name and will remove any personal identifiers. There is no compensation for responding nor are there any known risks of doing so.

If you agree to participate, the survey will take place electronically. Participation in research is entirely voluntary and you may choose to withdraw at any time until the data are published. By completing this questionnaire you are giving consent to participate in this research, please answer all questions as honestly as possible. The results of this survey will be aggregated, anonymized and published in a scientific journal. Summaries of the survey results will be made publicly available at the level of country or US state.

This online survey company is hosted by a web survey company located in the USA. The security and privacy policy for the web survey company can be found at the following link: <https://www.surveymonkey.com/mp/data-security-and-compliance/>

We would be happy to answer any questions about this research, please email: atlasaquatica@gmail.com or a_cisneros@sfu.ca.

In addition, if you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at 604-822-8598 or if long distance e-mail RSIL@ors.ubc.ca or call toll free 1-877-822-8598. Survey is certified as exempt by the University of California San Diego IRB (210112XX) and approved by the UBC Ethics (H21-00687).

If you are interested as to why we are asking a question, you can find more information by clicking on the  at the end of each question.

* 1. Do you wish to continue? [🔗](#)

Yes

No



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Business Operations

Please answer all questions for 2019 or earlier (pre-COVID).

If you are interested as to why we are asking a question, you can find more information by clicking on the [i](#) at the end of each question.

* 2. General Company Information [i](#)

Company name

City

* 3. What country is your business located in? [i](#)

4. If your business has more than one location, please add details. [i](#)

* 5. What currency does your business use for its accounting records? Please answer all financial-related questions in this survey in the indicated currency. [i](#)

6. What year did you begin your business? [i](#)

7. On average, what percent of your **total annual revenue** is due to **snorkeling and diving** activities? [📄](#)

(Activities include tours, equipment rental/sales, and certifications.)

0% 100%

8. On average, what percent of your total annual revenue comes specifically from **dive and snorkel equipment sales**? [📄](#)

0% 100%

9. Which other activities does your business offer? [📄](#)

- | | |
|---|--|
| <input type="checkbox"/> Scuba certification | <input type="checkbox"/> Nature tours |
| <input type="checkbox"/> Freediving training and/or certification | <input type="checkbox"/> Kayaking/paddleboard tours or rentals |
| <input type="checkbox"/> Recreational or sport fishing | |
| <input type="checkbox"/> Other (please specify) | |

10. If you offer SCUBA certifications, on average... [📄](#)

how many certifications per year?

how many new divers do you certify per year?

11. On average, what is the price per certification? Please use the currency indicated above. [📄](#)

price

12. What are the most important natural attractions for divers at your location? [🔗](#)

	Rating
Turtles	<input type="text"/>
Sea lions/seals	<input type="text"/>
Sharks	<input type="text"/>
Whales and dolphins	<input type="text"/>
Coral reefs	<input type="text"/>
Billfish	<input type="text"/>
Groupers and snappers	<input type="text"/>
Rays (mantas/eagle rays/sting rays etc.)	<input type="text"/>
Reef fish	<input type="text"/>
Pelagic fish (jacks, tunas, etc.)	<input type="text"/>
Artificial reefs/shipwrecks	<input type="text"/>
Kelp forests	<input type="text"/>
Ice	<input type="text"/>

Other (please specify)

13. On average; how many employees work at your business during...[🔗](#)

high season?

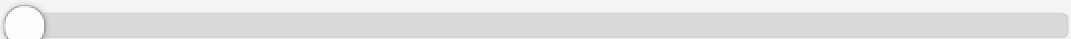
low season?

14. What percentage of your employees are **local nationals** (from the country you operate in)? [🔗](#)

0% 100%

15. On average, what **percentage** of your annual expenses is for employee salaries? [📄](#)

0% 100%

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16. On average, what **percentage** of your annual expenses is for marketing and advertising? [📄](#)

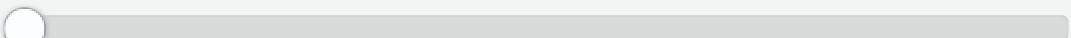
0% 100%

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17. On average, what **percentage** of your annual running expenses are for maintaining boats and equipment? [📄](#)

(This includes costs of repairs, general maintenance, new parts, fuel, etc., but does NOT include the cost of purchasing new vessels or property.)

0% 100%

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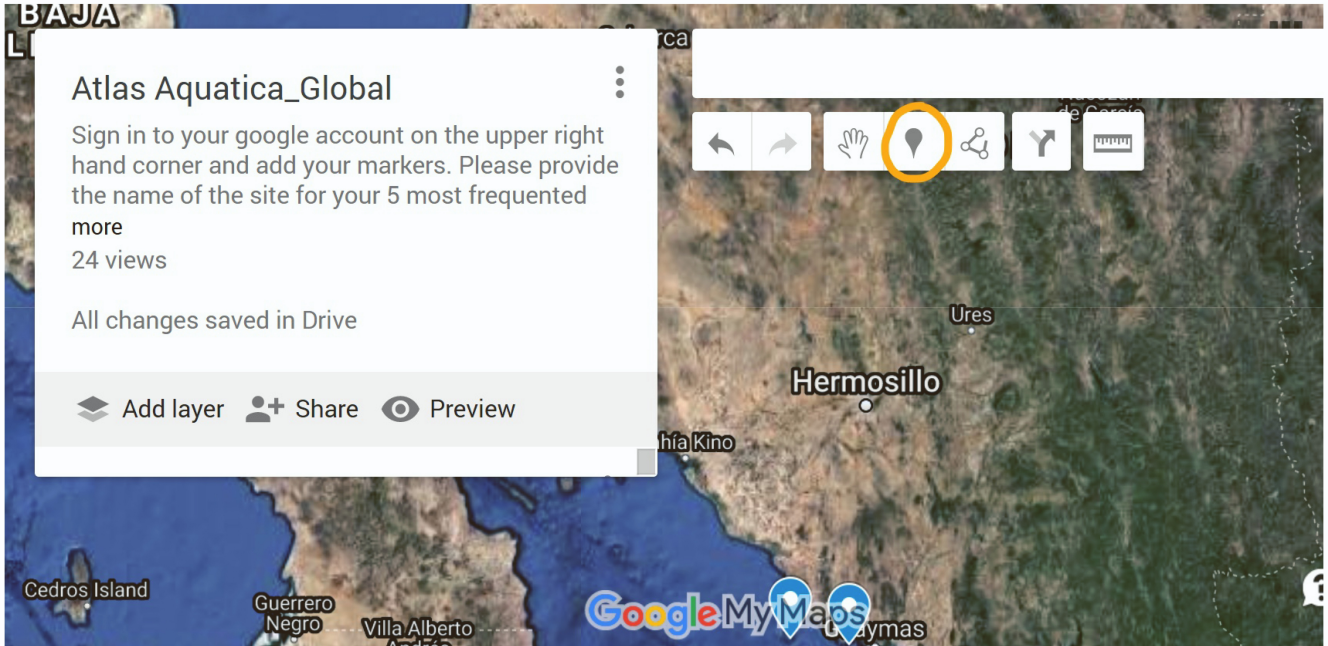
18. How many boats of different capacity does your business operate? [📄](#)

(Capacity is the maximum number of clients on the boat, NOT including staff).

1-5 Clients	<input type="text"/>
6-10 Clients	<input type="text"/>
11-20 Clients	<input type="text"/>
21-50 Clients	<input type="text"/>
51-75 Clients	<input type="text"/>
76-100 Clients	<input type="text"/>
101+ Clients	<input type="text"/>

19. What are the **most visited dive sites** in your dive business? [📌](#)

Please navigate to this [link](#). Sign in to your google account on the upper right hand corner and add your markers. Please provide the name of the site. Even if there is an existing pin, please add yours. Your answers are automatically saved.



If you don't have a Google account, please enter the site names below.

20. Do you offer liveaboard tours? [📌](#)

(These are overnight tours lasting more than one day.)

Yes

No



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Liveaboard Trips

These are overnight tours lasting more than one day.

21. What is the average length of a single liveaboard trip? [🔗](#)

1 days 30

22. How many liveaboard trips do you carry out each year? [🔗](#)

23. On average, how many clients do you usually host per trip? [🔗](#)

24. On average, what is the price of one **trip** per person? (Excluding gear rental.) [🔗](#)

Average price

25. On average, what percentage of your clients rent gear? [🔗](#)

SCUBA %

Snorkel %

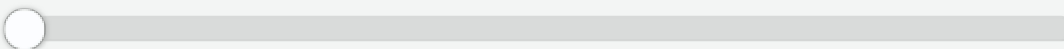
26. On average, what is the price of equipment rental per day? (Please use the above indicated currency.) [📄](#)

SCUBA average price

Snorkel average price

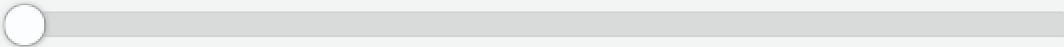
27. On average, how many total scuba dives does one client make during a liveaboard trip? [📄](#)

0 100

A horizontal slider control with a circular knob on the left and a rectangular box on the right. The slider bar is filled with a light gray color. The number '0' is positioned at the left end of the slider, and '100' is positioned at the right end. The slider is currently set to approximately 80% of the range.

28. On average, how many total snorkeling excursions does one client make during a liveaboard trip? [📄](#)

0 100

A horizontal slider control with a circular knob on the left and a rectangular box on the right. The slider bar is filled with a light gray color. The number '0' is positioned at the left end of the slider, and '100' is positioned at the right end. The slider is currently set to approximately 80% of the range.

29. In addition to liveaboard trips, does your business also offer scuba diving/snorkeling day trips? [📄](#)

Yes

N
o



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Day Trips

These are diving and snorkeling tours lasting less than 24 hours, including single or half-day trips, night dives, shore dives, etc.

30. For scuba and snorkel day trips, what are your **busiest, medium-busy, and least busy** months in the year?

	Busiest	Medium Busy	Least Busy
January	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
February	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
March	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
April	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
May	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
June	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
July	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
August	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
September	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
October	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
November	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
December	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

31. Approximately, **how many clients** per month do you serve during your **busiest and least busy** months? (Including all locations where you operate in.) [📄](#)

	Busiest	Medium Busy	Least Busy
SCUBA DIVING	<input type="text"/>	<input type="text"/>	<input type="text"/>
SNORKELING	<input type="text"/>	<input type="text"/>	<input type="text"/>

32. On average, what is the price of one **dive** day trip per person (excluding gear)? [📄](#)

Average price

33. On average, what is the price of one **snorkel** day trip per person (excluding gear)? [📄](#)

Average price

34. Does that price include food and beverages? [📄](#)

	Yes	No
SCUBA	<input type="radio"/>	<input type="radio"/>
Snorkeling	<input type="radio"/>	<input type="radio"/>

35. On average, what percentage of your clients rent gear? [📄](#)

SCUBA %

Snorkel %

36. On average, what is the price of equipment rental per day? [📄](#)

SCUBA average price

Snorkel average price



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Conservation Interest

37. On a scale from 1 to 10, please rate **how the conditions of the diving sites where you work have changed** from 10 years ago. If you were not in the area 10 years ago, please compare the current conditions to your first year of operation. [\[?\]](#)

1 - Heavily Degraded 5 - No Change 10 - Greatly Improved

38. Please describe any changes that you have seen over that time (i.e. water quality, number of species, size of organisms, pollution). [\[?\]](#)

39. Is your dive operation involved in the protection and conservation of the dive sites and/or region? [\[?\]](#)

1 - Not involved 5 - Somewhat involved 10 - Extremely involved

43. Please rate your support of the following activities/regulations if they were enforced and established in your diving area. [↗](#)

	Very resistant	Somewhat resistant	Neutral	Somewhat supportive	Very supportive
Incentives for hiring local staff for tourism operations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Limit access e.g., numbers of boats on the water (including for tourism)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seasonal fishing closures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regulate or prohibit coastline constructions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Prohibit mining activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Establish marine protected area: no commercial fishing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Establish marine protected area: no fishing of any kind	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Establish marine protected areas: no activities of any kind	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

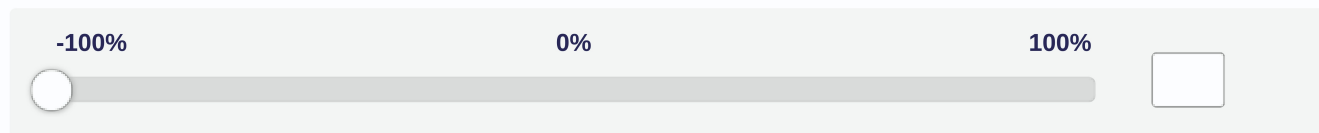
Other (please specify)

44. Please rate in a scale from 1 to 10, how interested would you be in joining groups of dive operators to help promote the conservation of the dive sites in your region, with 1 Extremely unlikely and 10 Extremely likely. [↗](#)

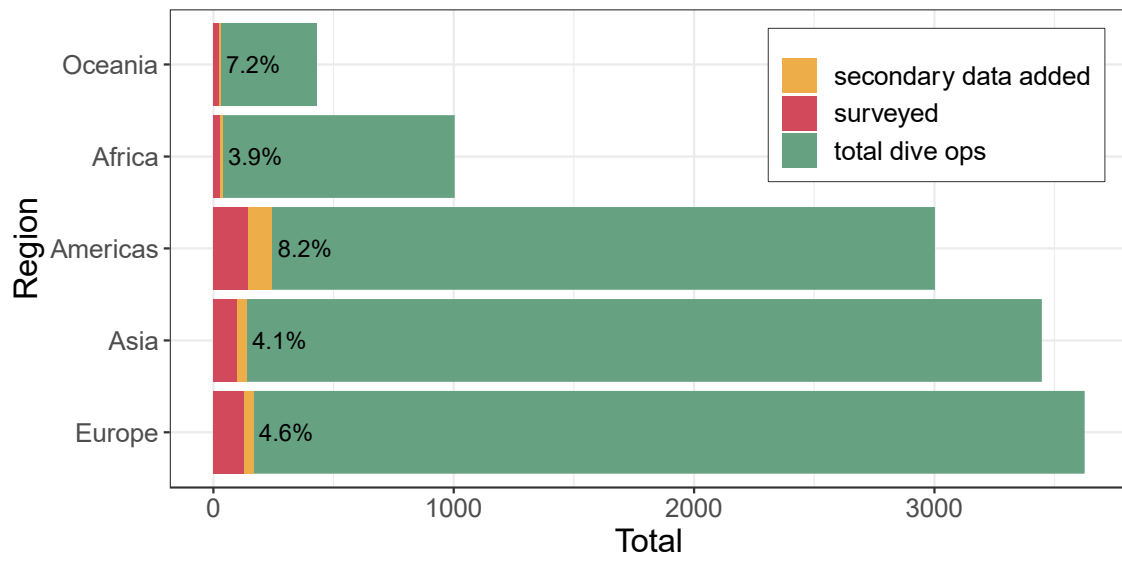
	City	Regional	National	International
Scale of Association	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please provide your reasoning.

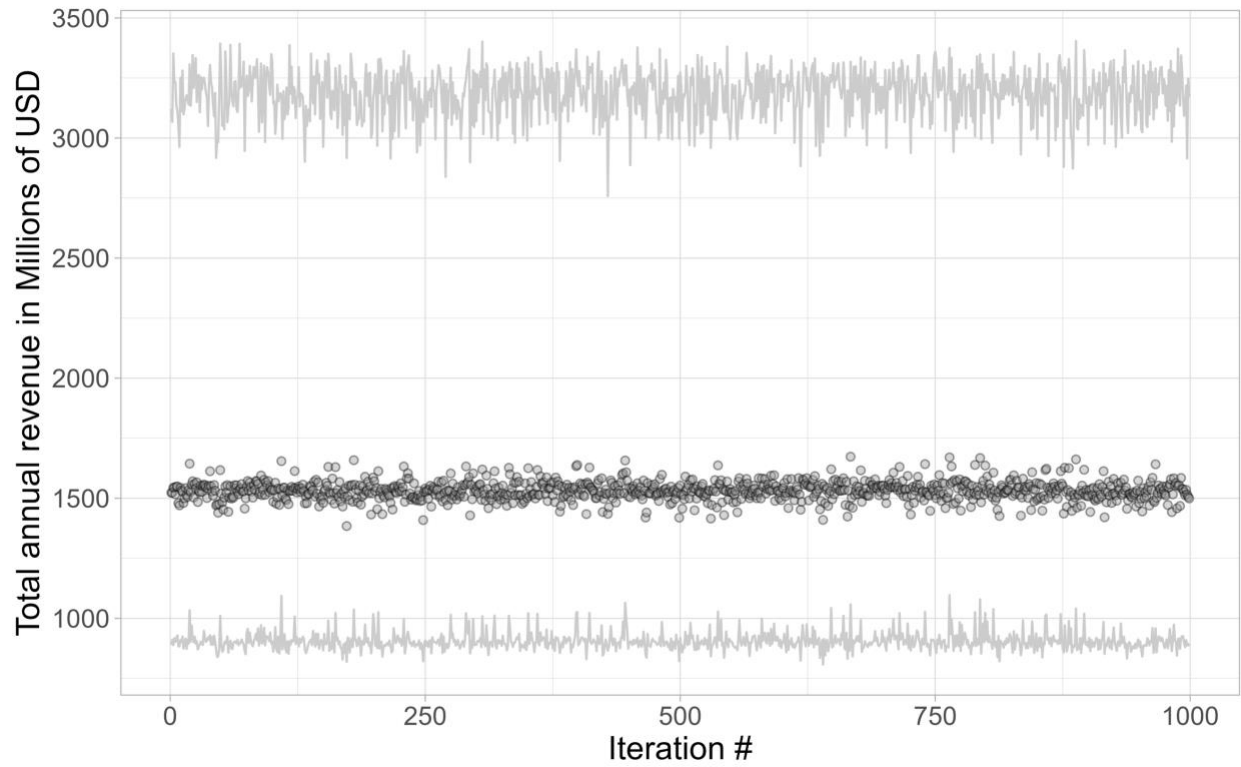
45. Because we are aware that the COVID-19 pandemic has upended many businesses, by what percentage did your company revenue **change** due to COVID-19 in 2020? [↕](#)



46. If you have any other comments, please feel free to provide them in the textbox below. All comments and information entered in this survey will be strictly anonymous. You can also contact us atlasaquatica@gmail.com

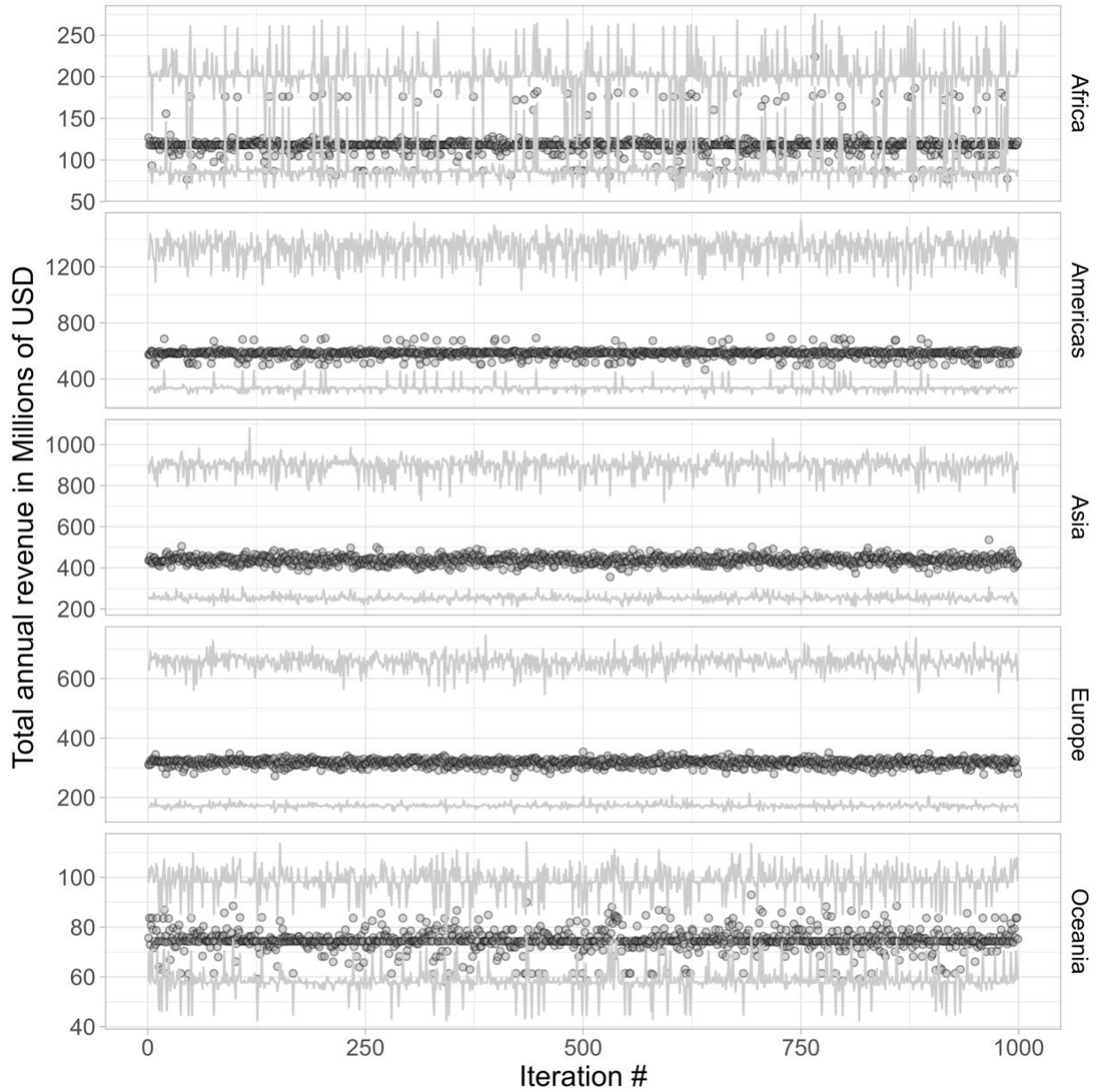


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7 Figure S1: Total number of dive operators per region the percentage indicates the total dive operators
8 sampled (including surveys and secondary sources).
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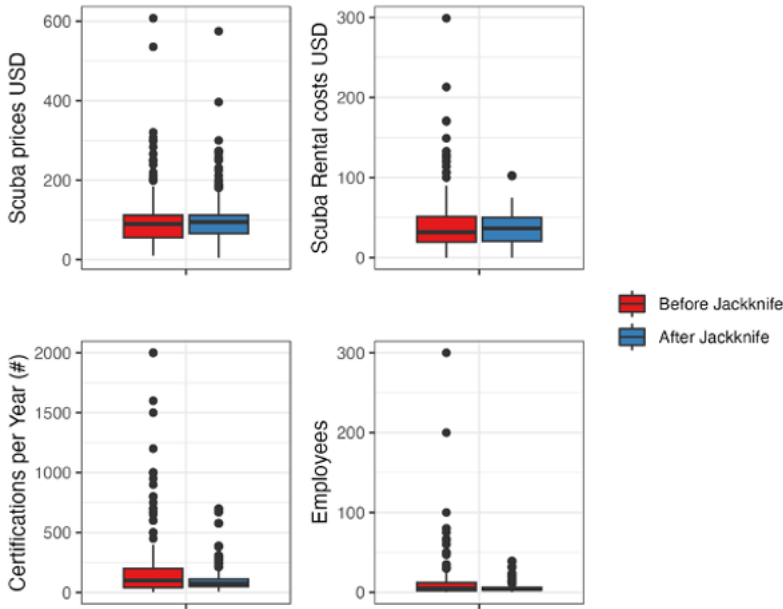
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13 Figure S2: Total global annual revenue over each jackknife iteration number capturing lower quantiles
14 (Q1), median and upper quantiles (Q3). Results were presented after 999 iterations; 5% of original data
15 points were omitted for each iteration.

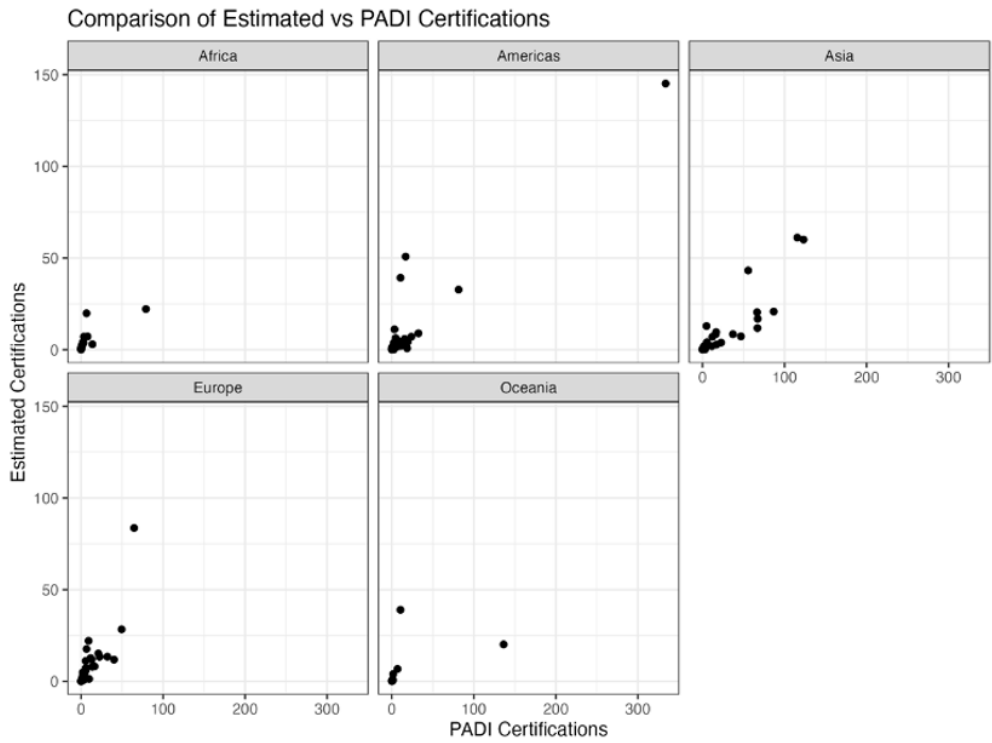


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18 Figure S3: Total annual revenue over each jackknife iteration number capturing lower quantiles (Q1),
19 median, and upper quantile (Q3) presented for each major geographic region. Results were presented after
20 999 iterations; 5% of original data points were omitted for each iteration.



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 22 Figure S4: Shows the metrics from the survey questions before and after the Jackknife to limit outlier
 23 influence on the extrapolations.
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 26 Figure S5: Scatter plot displaying the relationship between estimated and actual PADI certification totals
 27 per year. Correlations are all significant and results are available in Table S3

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29 Table S1: Presenting all global and regional estimates for all identified scuba dive operators. All ranges
30 refer to quantile 1 - quantile 3 from the final jackknife results.

Region	Number in millions of SCUBA clients (tourists)	Expenditure (Total Revenue) in million USD			Employment (FTEs) in Thousands	
		Diving trips	Gear rental	Certification	Low season	High season
Africa	0.6 -1.1	48 - 104	12 -40	25 - 46	4 - 11	6 - 12
Americas	2.9 -4.2	105 - 652	40 -174	86 - 493	8 - 21	12 - 31
Asia	3.0 - 4.6	162 - 502	17 - 87	72 - 297	9 - 29	13 - 59
Europe	2.0 -3.3	85 - 364	19 - 95	67 - 186	5 - 8	9 - 17
Oceania	0.3 - 0.3	31 - 55	4 - 11	23 - 31	3 - 4	3 - 6
Global	8.9 - 13.6	532 - 1,677	91 - 406	273 - 1,053	28 - 73	42 - 124

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34 Table S2: Mean tourist expenditure per day in 2020 USD by country found in the literature.

Year	Author	Title	Location	Country	Mean Expenditure by Trip (USD)
2020	Mustika, PLK et al.	The Economic Value of Shark and Ray Tourism in Indonesia and Its Role in Delivering Conservation Outcomes	Indonesia	Indonesia	906
2006	Pendleton, Linwood H	Understanding the Potential Economic Impact of SCUBA Diving and Snorkeling: California	California	United States	203
2014	Dicken, MI	Socio-economic aspects of the Sodwana Bay SCUBA diving industry, with a specific focus on sharks	Sodwana Bay	South Africa	1747
2008	Tapsuwan and Asafu-Adjaye	Estimating the Economic Benefit of SCUBA Diving in the Similan Islands, Thailand	Similan Islands	Thailand	Domestic: 190 Foreign: 1570
2017	Huveneers, C et al.	The economic value of shark-diving tourism in Australia	Port Lincoln	Australia	256
2017	Haas et al	The contemporary economic value of elasmobranchs in The Bahamas: Reaping the rewards of 25 years of stewardship and conservation	Bahamas	Bahamas, The	3546
2012	Vianna et al.	Socio-economic value and community benefits from shark-diving tourism in Palau: A sustainable use of reef shark populations	Palau	Palau	2081
2016	Northern Economics, Inc.	Economic Impact of Washington State Resident Scuba Divers	Washington State	United States	533
2009	Dicken and Hosking	Socio-economic aspects of the tiger shark diving industry within the Aliwal Shoal Marine Protected Area, South Africa	Aliwal Shoal Marine Protected Area	South Africa	2514
2017	Saayman and Saayman	Are there economic benefits from marine protected areas? An analysis of scuba diver expenditure	Portofino	Italy	393
2017	Fedler, Anthony	The Economic Impact of Shark Diving in Florida	Florida	United States	115-209
2017	Wayan et al.	The Impact of Direct Expenditures of Diving Tourism Towards The Economy of Coastal Balinese	Bali	Indonesia	951
2017	De Brauwier et al.	The economic contribution of the muck dive industry to tourism in Southeast Asia		Indonesia	2134
2015	Beaver and Keily	The scuba dive industry in Australia: Towards estimate of economic size and impact	Australia	Australia	2321-5324
2019	Zimmerhackel et al.	Evidence of increased economic benefits from shark-diving tourism in the Maldives	Maldives	Maldives	4712
2017	Trujillo et al.	Valuing Coral Reef Preservation in a Caribbean Marine Protected Area. Economic Impact of Scuba Diving in Corals of Rosario and San Bernardo National Natural Park, Colombia	San Bernardo National Park	Colombia	Domestic: 417 Foreign: 1905
2017	Torres et al.	Dead or alive: The growing importance of shark diving in the Mid-Atlantic region	Azores	Portugal	4018
2016	Pires et al.	The economic role of sharks in a major ecotourism archipelago in the western South Atlantic	Fernando de Noronha	Brazil	1259

2010	Catlin et al.	Consolidation in a Wildlife Tourism Industry: The Changing Impact of Whale Shark Tourist Expenditure in the Ningaloo Coast Region	Ningaloo Marine Park	Australia	655
2021	Wallmo et al.	Economic Impact Analysis of Recreational Fishing, SCUBA Diving, and Snorkeling on Florida's Coral Reefs	SE Florida	United States	243
2015	Wei et al.	A Comparison Study Between Domestic and International Rural Tourist Profile and Travel Expenditures in Semporna, Sabah	Semporna, Sabah	Malaysia	381-559
2021	Drakakis et al	Multipliers and impacts of active sport tourism in the Greek region of Messinia	Messinia	Greece	482

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Table S3: Pearson’s correlation table between PADI certifications and our estimated certifications number.

Region	Correlation	<i>p</i> value
Africa	0.974	6.22e-19
Americas	0.835	1.89e-12
Asia	0.816	2.18e-8
Europe	0.875	3.51e-14
Oceania	0.738	3.99e-3

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