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SUPPORTING INFORMATION

Authors: Early-Capistrán, Michelle-María¹, Sáenz-Arroyo, Andrea^{2*}, Cardoso-Mohedano José-Gilberto³, Garibay-Melo, Gerardo⁴, Peckham, Hoyt⁵, Koch, Volker^{6,7}

¹ Instituto de Ciencias del Mar y Limnología, Posgrado en Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México, Circuito Exterior S/N, Ciudad Universitaria, 04510, Ciudad de México, Mexico.

^{2*} Corresponding author: Departamento de Conservación de la Biodiversidad. El Colegio de la Frontera Sur (ECOSUR), Periférico Sur s/n, María Auxiliadora, 29290 San Cristóbal de Las Casas, Chiapas, Mexico. E-mail: andrea.saenzarroyo@gmail.com Fax: +52 (967) 674 9021

³ CONACyT- Estación El Carmen, Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México, Carretera Carmen-Puerto Real km. 9.5, 24157 Ciudad del Carmen, Campeche, Mexico

⁴ Maestría en Manejo de Ecosistemas de Zonas Áridas. Universidad Autónoma de Baja California (UABC), Carretera Tijuana-Ensenada 3917, Playitas, 22860 Ensenada, B.C., Mexico.

⁵ Center for Ocean Solutions, Stanford University. Pacific Grove, CA, USA.

⁶ Departamento de Ecología Marina, Centro de Investigación Científica y Educación Superior de Ensenada, Ensenada, B.C., Mexico

⁷ Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Dag Hammarskjöldweg 1-5, Eschborn, Germany

Materials and Methods

As this approach uses new methodological approaches and data sources, we describe them in detail here.

1. Ethnography

1.1. Field journal entries

Field journal entries were indexed and coded for future reference and classification (Table S1). The date and study site are noted, as well as the approximate time of day and location, along with a cryptic indicator of the collaborator. The symbol “#” is used to tag and index specific themes in the text. Observations are separated from analysis using the “&” symbol. Analyses are enumerated and often cross-referenced between journal entries.

1.2. Electronic data capture

Interviews were recorded when possible with the contributor’s informed verbal consent. All interviews were transcribed, indexed, and coded.

1.3. Recurring questions

In the context of semi-structured and in-depth interviews, we used recurring questions based on (Sáenz-Arroyo *et al.* 2005) to assess changes in sea turtle captures and morphometrics (Table S2). In this study,

rather than use surveys, we used open-ended questions that were adapted to each fishers' knowledge or expertise, allowing each contributor to extend on topics they considered most interesting or important.

2. Historical data

We visited the Biblioteca Nacional and Hemeroteca Nacional in Mexico City; the special collections of the Instituto de Investigaciones Bibliotecológicas y de la Información and Instituto de Geografía, and the libraries at the Instituto de Investigaciones Antropológicas, Instituto de Investigaciones Estéticas, Instituto de Investigaciones Filológicas, Instituto de Investigaciones Históricas, and the Biblioteca Conjunta de Ciencias de la Tierra of the Universidad Nacional Autónoma de México (UNAM). We also carried out systematic research in digital archives, including the digital collections of the Biodiversity Heritage Library, the California Digital Newspaper Collection, the Gale Digital Collections, the HathiTrust Digital Library, the Internet Archive, Instituto Nacional de la Pesca, the Smithsonian Collections Online, the Natural History Museum of Los Angeles, the University of Arizona, the Universidad Autónoma de Nuevo León, the University of California, L'Université de Lyon, the University of Michigan, the Universidad de Sevilla, and the University of Washington.

3. Consumption reconstruction

3.1. Parameter value calculations

3.1.1. Nutritional value and usable tissue

For all phases, we used mean nutritional values for muscle and adipose tissue of *C. Mydas* to calculate the contribution of sea turtles to local diets (864.3 kcal/kg) (González Olmedo *et al.* 2004). The percentage of tissue consumed (λ) was based on percentage values reported by Márquez *et al.* (1991),

which was reported by category: fillet meat (31%); stew meat (11%), defined as flippers, necks, calipee, and calipash; skin (5%); fats (14%); offal (15%), defined as liver, heart, and tripe; shells (16%); and waste, composed mostly of blood and bones (8%). Based on ethnographic data, we summed the percentages of categories consumed during different time periods. We assumed all fillet meat, stew meat, fats, and offal were consumed (71%) in coastal communities; for inland communities which consumed primarily dried meat and rendered oil, usable tissue was limited to fillet meat, fats and oils (45%).

3.1.2. Parameter values for Pre-Hispanic and mission phase

We quantified approximate annual per capita sea turtle consumption (c) in the early 18th to early 19th centuries using paleonutritional data based on stable isotope analysis for two Cochimí populations (Bahía de los Ángeles and Sierra de San Francisco) (King 1997), in conjunction with archaeological and ethnohistoric data on Pre-Hispanic diet in the central desert (Aschmann 1959), which register proportional consumption of different food groups (marine vertebrates, marine invertebrates, terrestrial fauna, legumes, etc.) and other edible taxa, including sea turtles. These data were correlated with dietary data compiled from hunter-gatherers worldwide (Cordain *et al.* 2000) in order to obtain approximate calculations of dietary patterns by developing the following equation:

$$q_w = (ab_w) / k_w \quad (S1)$$

Where q_w is the approximate annual consumption of a given food group w ($kg \text{ person}^{-1} \text{ y}^{-1}$), a represents annual caloric intake by the Cochimí population ($kcal \text{ person}^{-1} \text{ y}^{-1}$), b_w represents the percentage of calories obtained from food group w (no units), and k_w represents the food group's mean caloric density ($kcal \text{ kg}^{-1}$). Mean caloric density of *C. mydas* muscle tissue was obtained from nutritional analysis data (González Olmedo *et al.* 2004).

Approximate consumption values by weight for main sources of animal protein (marine vertebrates, marine invertebrates, and terrestrial animals) were calculated and summed to obtain approximate annual meat consumption for coastal ($Q=500 \text{ kg person}^{-1} \text{ y}^{-1}$) and inland ($Q=192 \text{ Kg person}^{-1} \text{ year}^{-1}$). We used interpolated weight and nutritional density values reported by King (1997) and Aschmann (1959) for the percentage of annual meat consumption from sea turtles (γ). We adjusted for

varying paleonutritional patterns among inland and coastal populations using values of $\gamma=14\%$ and $\gamma=3.5\%$ for coastal and inland Cochimí populations, respectively, and interpolating demographic data to calculate variations in population levels (*see Section 3.2.1*). Both Q and γ values were corroborated with ethnographic descriptions of the Comcáac/Seri diet in the 19th century (McGee 1898). We assumed that the bulk of sea turtle catches corresponded to *C. mydas*, given the importance of both sites as feeding areas for the species. Due to the adverse conditions for agriculture, it was assumed that dietary composition remained similar throughout the Pre-Hispanic and mission phases (Crosby 1994; Rodríguez Tomp 2002), and that all parts of the turtle except for entrails, shells, bones, and skins were consumed ($\lambda = 71\%$).

3.1.3. Parameter values for secular phase and ethnographic present

Annual per capita meat consumption was calculated using mean values for the Baja California peninsula reported by ONU-FAO (2003) of $48.2 \text{ kg person}^{-1} \text{ y}^{-1}$ assuming a $2,000 \text{ Kcal day}^{-1}$ caloric intake. These values were adjusted for increased food consumption by miners, who made up most of the regional population, with a $4,030 \text{ Kcal day}^{-1}$ caloric intake (Garry *et al.* 1952), such that $Q=97 \text{ Kg person}^{-1} \text{ year}^{-1}$.

The percentage of consumed meat obtained from sea turtles (γ) was estimated based on mean values of frequency of sea turtle consumption obtained through ethnographic research. In coastal communities, sea turtles were a staple protein source consumed up to three times per week ($\gamma=43\%$), and an important source of dried meat in inland communities ($\gamma=7\%$). Given the extreme geographic isolation and confirmation from collaborators that technological conditions and means of communication had changed little between the 1950s and the previous two generations, we assumed

that these data could be used as parameter values as far back as the mid-19th century. At inland sites, sea turtle was consumed predominantly as jerky or oil, λ values were limited to steak and stew meat, as well as oils and adipose tissue ($\lambda = 45\%$); at coastal sites only shells and bones were discarded ($\lambda = 71\%$). Change in weight due to processing ($\delta=80\%$), primarily by drying meat for jerky in inland communities, was calculated from ethnographic data on food conservation methods and food processing reports for dried meats (ONU-FAO 1990).

3.2. Demographic calculations

3.2.1. Pre-Hispanic and mission phase

Demographic data for late Pre-Hispanic occupation was inferred from archaeological studies of population density, using a base value of 3 people Km^{-2} (Ritter 2012). For the mission phase, detailed baptismal records at the missions of San Borja and Santa Gertrudis, along with administrative logs, census reports, travel logs, and historical scientific reports, were used to obtain demographic data (Duflot de Mofras 1844; Aschmann 1959; Piñera Ramírez 1991; Rodríguez Tomp 2002; Romero Gil *et al.* 2003). Population change outside mission settlements was calculated by interpolating late Pre-Hispanic population density with mission records using this equation from Early-Capistrán (2014):

$$n_t = z_{(t-1)} \left\{ 1 - \left[\frac{m_{(t-1)}}{m_{(t)}} \right] + m_t \right\} \quad (S2)$$

Where z represents the coastal population (n humans), and m_t represents the population at the nearest mission (humans) at year t . Total population is the sum of mission and coastal populations.

Interpolations were carried out for coastal populations at Laguna Ojo de Liebre using demographic data from Santa Gertrudis mission, and at Bahía de los Ángeles using records from San Borja mission. Both were summed to obtain an approximate regional population (see Tables S7 and S8).

3.2.2. Secular phase and ethnographic present

Demographic data for coastal and inland communities were obtained from mining and prospecting reports (Goldbaum 1971; Nelson 1922; Ramoscas 1886; Southworth 1899), historical scientific reports (Duflot de Mofras 1844; Diguét 1898; Goldbaum 1918), census data (Dirección General de Estadística, 1900; Instituto Nacional de Estadística, Geografía e Informática 2015; 2017a, 2017b; Secretaría de Agricultura y Fomento, 1918; Secretaría de Desarrollo Social, 2010a, 2010b), and secondary sources which compiled commercial and demographic data from the period (Romero Gil *et al.* 2003; Romero Castillo 2008; Vernon 2009). At a local level, census data was used from 1940-1990 in Bahía de los Ángeles, and 1960-1990 at Laguna Ojo de Liebre (Instituto Nacional de Estadística, Geografía e Informática 2017a,b). At a Territory/State level, census data were used from 1895-1990 (Secretaría de Agricultura y Fomento 1918; Instituto Nacional de Estadística, Geografía e Informática 2015). Additional demographic data was compiled through ethnography for coastal and inland communities between 1930 and 1990 (see Tables S7, S8, and S9).

4. Catch reconstruction from whaling vessels

Data on sea turtle captures by whalers in Laguna Ojo de Liebre were compiled from published whaling logbooks and shipping reports (Daily Alta California 1860, 1871; Scammon 1970; Henderson 1972).

For two years, captures were reported as turtles day⁻¹ (1859 and 1860). Daily catches summed to obtain an approximate catch per ship per season using the equation:

$$W = \sum d \quad (\text{S3})$$

Where W is the approximate annual catch by a whaling ship (turtles ship⁻¹ y⁻¹) and d represents turtles catches reported in the ship's log over the course season in Ojo de Liebre lagoon (turtles ship⁻¹ y⁻¹). Given that whaling seasons lasted between fall and spring and thus covered two calendar years, we used the latest year as the reference. In two cases, whaling ships reported sea turtles from Ojo de Liebre lagoon unloaded at the San Francisco (1860) and San Diego customs offices (1871) (Daily Alta California 1860, 1871). Both figures were used directly as values for W . Mean W values were used for μ_w (Eq. 3, main text).

5. Commercial records

For some years during the Secular phase, official landing data for sea turtles imported to California from Mexico, almost exclusively from Baja California, are available (Karmelich 1935; True 1887). Given the market preference for green turtles, we assumed that all landings corresponded to *C. Mydas* (Karmelich 1935). With the exception of the record for 1887 which reported number of individuals, landings were reported in pounds and standardized to turtles y⁻¹ by converting to kilograms and dividing by p . During the early twentieth century, sea turtles were captured for export to the United States at Bahía Magdalena and Bahía Tortugas as well as Laguna Ojo de Liebre. For 1887-1918, we assumed that an equal proportion of sea turtles came from each site, and divided landings records by

three to obtain approximate landings from the study site. Qualitative sources suggest that from 1919 onward, the fishery shifted heavily towards Laguna Ojo de Liebre (Averett 1920; Nelson 1922), and landings for this 1919-1935 were assumed to correspond to the site.

Official landing records are also available for the late-20th century commercial fishery at Bahía de los Ángeles (Márquez in Seminoff *et al.* 2008). Landings were reported in metric tonnes, which we converted to kilograms and divided by the mean weight of individuals caught by fishermen at Bahía de los Ángeles (50 Kg) to obtain n turtles year⁻¹. It should be noted that the 0 reported in 1972 corresponds to a temporary ban (Márquez 1996).

6. Commercial reconstruction

No official landing data are available for the late-twentieth century commercial fishery in Laguna Ojo de Liebre. For this phase, we reconstructed the annual number of turtles shipped from the community through in-depth interviews with sea turtle fishers and merchants using the equations adapted from Early-Capistrán (2014). First, we calculated approximate number of shipments made annually to urban markets:

$$V_t = v_{ft} + v_{it} \quad (S4)$$

Where V_t is the approximate number of annual shipments (shipments y⁻¹) during year t , v_{ft} is the number of shipments made during the dry season (summer-autumn) during year t (n shipments 0.5 y⁻¹), v_{it} is the approximate number of trips made during the rainy season (winter-spring) during year t (n shipments 0.5 y⁻¹). Seasonal variables were used to adjust for seasonality in captures and for changes

in transport times due to changes in infrastructure, primarily the opening of the Transpeninsular Highway which shortened trip times from 2 weeks to 1-2 days.

Values for v_{fi} and v_{it} were reconstructed from interviews, choosing key dates as reference points: the founding of the Luis Gómez Z Cooperative in 1968 (the first organized effort for large-scale sea turtle commerce in the community); 1975 as a date after the opening of the Transpeninsular Highway; and 1985 date after the official ban on *C. mydas* which has scarcely applied in the region, but recognized by most fishers as the approximate date of fisheries collapse; and the total ban on sea turtle products in 1990 as the definitive end of commercial captures (Secretaría de Medio Ambiente y Recursos Naturales 2010). Grouped seasonality (rainy/dry) was assumed to correspond to six months, and shipment numbers were adjusted for trip time and variations of seasonal captures based on ethnographic data, using mean values of monthly shipments reported by turtle fishers and merchants during the years used as reference points, such that:

$$v_i = 6j \quad (S5)$$

Where v_{gt} is the number of shipments during season g in year t (shipments season⁻¹), and j is the number of monthly shipments (shipments merchant⁻¹ month⁻¹).

Based on shipping frequency, we calculated approximate number of turtles shipped annually to urban markets using the following equation:

$$M_t = V_t K \quad (S6)$$

Where M_t is the number of turtles shipped annually (turtles y^{-1}), and K is the carrying capacity of the vehicles (turtles shipment⁻¹). K was a constant of 60 turtles, and is the mode reported by sea turtle merchants and fishers. Given the market preference and regional abundance, we assumed all captures corresponded to *C. mydas*. A detailed breakdown of parameter values and calculations is in Table S7.

TABLES

Table S1: Translated and abbreviated field journal entry

20-02-13. Guerrero Negro.
18:00-19:30. CS's house.

We interviewed C.S. in his living room, after he returned from an abalone trip. This was the third time we had stopped by looking for him. On the other two occasions, his sons (both 25-30 years old) told us to return another day, as there had been good tides for abalone diving. \&1

C.S. is around 65, and his house is spacious, with a large leather couch, large flat-screen TV and sound system #socioeconomicIndicators. He seems to make a steady living in abalone diving, although the work is seasonal. He grew up in Isla de Cedros and moved to Guerrero Negro as a young man, working continually as a fisher and diver in the local coop. #LifeHistory

C.S. worked as a turtle fisher in the coop. in the late '60s and early '70s. He says that when he was a turtle fisherman, there were turtles all year, and they would work with harpoons during spring tides \&1. However, there were more turtles around during hot months #seasonality \&2. Every part of the turtle was put to use: "we weren't going to throw anything out just because there was a lot". They would get oil from the carapace and eat the cracklings, and in the ranches, they would make flour tortillas with sea turtle oil instead of lard. The oil is "very medicinal" for bronchial ailments. Blood was also eaten cooked, like "moronga", or drunk directly as a remedy for anemia. #medicinaluses #recipes

\&1 Several of the younger (under 65) fishers keep working as abalone divers in spite of the risks.

\&2 Several older fishermen emphasize tides and weather as restrictions on the fishery before the introduction of large outboard motors.

\&2 While C.S. says there were more turtles in hot months, other attribute lower catches in winter to reduced activity/dormancy.

Table S2: Recurring questions

Age ____

How long have you lived in this community? _____

How many generations have your family lived in the region? _____

Where your parents or grandparents fishers? _____

How long have you been a fisher? _____

During which years did you work in the commercial sea turtle fishery? _____

What type of gear did you use (harpoon or net)? _____

What type of vessel did you use (wood or fiberglass)? _____

Did you have a motor? _____ How many horsepower? _____

Which were the fishing sites you visited most? _____ How long did it take to get there? _____

How many days did it take, on average, to fill a cargo of sea turtles? _____

During years X-X, how many turtles would you catch on an average night? _____

What was the largest number of turtles you ever caught? _____

What year was this? _____ If it happened more than once, how many times? _____

How much did most turtles weigh? _____

How much did the largest turtle you ever caught weigh? _____

What year was this? _____ If it happened more than once, how many times? _____

Do you think there are now more, less, or about the same number of turtles as when you captured them commercially? _____

If “More”: much more, or somewhat more? _____

If “less”: much less, or somewhat less? _____

Table S3: Values used for consumption reconstruction (Eq. 1, 2) (Bahía de los Ángeles)

Period	Population	Values used for consumption reconstruction (Eq. 1, 2)					
		Q (kg person ⁻¹ y ⁻¹)	γ *	λ †	δ ‡	p (kg turtle ⁻¹)	c_t (turtles person ⁻¹ y ⁻¹)
Pre-Hispanic (1700-1750)	Coastal	500	14%	71%	0	50	1.97
	Inland	192	3.5%	71%	0	50	0.19
Mission (1750-1850)	Coastal	500	14%	71%	0	50	1.97
	Inland	192	3.5%	71%	0	50	0.19
Secular (1850-1945)	Coastal	97	43.00%	71.00%	0	50	1.18
	Inland	--	--	--	--	--	--
Modern Fisheries (1945-1990)	Coastal	97	43.00%	71.00%	0	50	1.18
	Inland	--	--	--	--	--	--
Data source		A, E, H, S	A, C, H, S	E, H, S	E, C	E, M	A, E, H

Note: -- indicates not applicable

* Percentage of annual meat consumption from sea turtles

† Percentage of sea turtle tissue consumed

‡ Percentage of change in weight due to processing

A: Published archaeological research

E: Ethnographic data

H: Historical/ethnohistorical sources

C: Published nutritional and commercial reports

Table S4: Values used for consumption reconstruction (Eq. 1, 2) (Laguna Ojo de Liebre)

Period	Population	Values used for consumption reconstruction (Eq. 1, 2)					
		Q (kg person ⁻¹ y ⁻¹)	γ *	λ †	δ ‡	ρ (kg turtle ⁻¹)	c_t (turtles person ⁻¹ y ⁻¹)
Pre-Hispanic (1700-1750)	Coastal	500	14%	71%	0	43	2.29
	Inland	192	3.5%	71%	0	43	0.22
Mission (1750-1850)	Coastal	500	14%	71%	0	43	2.29
	Inland	192	3.5%	71%	0	43	0.22
Secular (1850-1945)	Coastal	--	--	--	--	--	--
	Inland	97.123	7.00%	47.00%	80%	43	1.7
Modern Fisheries (1945-1990)	Coastal	97.123	7.00%	71.00%	0	50	0.22
	Inland	97.123	7.00%	47.00%	80%	43	1.7
Data source		A, E, H, S	A, C, H, S	E, H, S	E, C	E, M	A, E, H

Note: -- indicates not applicable

* Percentage of annual meat consumption from sea turtles

† Percentage of sea turtle tissue consumed

‡ Percentage of change in weight due to processing

A: Published archaeological research

C: Published nutritional and commercial reports

E: Ethnographic data

M: Scientific monitoring data

H: Historical/ethnohistorical sources

S: Published scientific research

Table S5: Sources used for parameter calculations (Parameters: Q, γ, λ, p)

Period	Source type			
	Archaeological*	Historical†	Ethnographic‡	Scientific data
Pre-Hispanic (1700-1750) / Mission (1750-1850)	Human ecology, paleonutrition, stable isotope analysis,	Historical scientific literature, letters, mission logs, and travel logs	--	Nutritional analysis, Scientific monitoring data
Secular (1850-1945)/ Modern Fisheries (1945-1990)	--	Historical scientific literature, mining and prospecting reports	Dietary patterns, ethnobiology, fishing, food preparation, food preservation and storage	Nutritional analysis, Scientific monitoring data

Note: -- indicates not applicable

* Topic areas

† Source types

‡ Categories based on (Murdock *et al.* 2008)

A: Published archaeological research

C: Published nutritional and commercial reports

E: Ethnographic data

M: Scientific monitoring data

H: Historical/ethnohistorical sources

S: Published scientific research

Table S6: Sources used for parameter calculations (cont.) (Parameter: n_i)

Period	Source type		
	Archaeological*	Historical†	Ethnographic‡
Pre-Hispanic (1700-1750) / Mission (1750-1850)	Human ecology	baptismal statistics, commercial records, historical scientific literature, mining and prospection records, mission census records	--
Secular (1850-1945) / Modern Fisheries (1945-1990)	--	Commercial records, historical census records, historical scientific literature, mining and prospection records	Demography, external migration internal migration, population,

Note: -- indicates not applicable

* Topic areas

† Source types

‡ Categories based on (Murdock *et al.* 2008)

Table S7: Estimated human population values for Bahía de los Ángeles, 1700-1960

Year	Coastal subpopulation	Inland subpopulation	Total population
1700	88	1912	1,950
1730	88	1912	2,000
1750	88	1912	2,000
1762	78	1712	2,000
1768	47	1045	1,791
1773	19	657	1,092
1782	15	539	676
1794	12	443	554
1798	11	400	455
1800	9	359	411
1802	9	359	368
1804	6	270	368
1806	4	192	276
1808	0	61	196
1823	0	40	61
1836	0	71	40
1844	0	3	71
1857	50	0	3
1870	60	0	50
1880	65	0	60
1889	600	0	65
1893	492	0	600
1896	60	0	492
1910	35	0	60
1918	35	0	35
1930	126	0	35
1935	162	0	126
1940	100	0	100
1950	57	0	57
1960	170	0	170
1970	526	0	526
1980	307	0	307
1990	443	0	443

Note: Sources for population estimates in Tables S7 and S8 in text, sec. 3.2.2

Table S8: Estimated human population values for Laguna Ojo de Liebre, 1700-1970

Year	Coastal subpopulation	Inland subpopulation	Total population
1700	150	1800	1950
1730	150	1800	1950
1740	150	1800	1950
1755	150	1586	1738
1762	164	1730	1894
1768	129	1360	1489
1773	76	808	884
1782	30	317	347
1794	22	234	256
1796	21	224	245
1798	21	226	247
1800	19	203	222
1802	19	198	217
1804	19	198	217
1806	13	137	150
1808	13	137	150
1823	4	44	48
1836	4	40	44
1841	5	53	58
1857	0	4	4
1882	0	300	300
1883	0	300	300
1884	0	320	320
1889	0	56	56
1890	0	100	100
1899	0	300	300
1905	0	50	50
1910	0	562	562
1912	0	300	300
1918	0	101	101
1921	0	135	135
1925	0	1000	1000
1940	0	270	270
1960	991	50	1041
1970	1259	50	1309
1980	4687	0	4687
1990	7231	0	7231

Table S9: Population values for the Territory of Baja

California Norte/State of Baja California

Year	Population
1895	42245
1900	47624
1910	52272
1921	23500
1930	48300
1940	78900
1950	227000
1960	520200
1970	870400
1980	1179000
1990	1660900

Sources: Secretaría de Agricultura y Fomento, & Dirección de Estadística (1918) for years 1895-1919, Instituto Nacional de Estadística, Geografía e Informática (2015) for years 1921-1990.

Table S10: Values used for commercial reconstruction

Year	V_{ft} (shipments 0.5 y ⁻¹)	V_{it} (shipments 0.5 y ⁻¹)	V_t (shipments y ⁻¹)	M_t (turtles y ⁻¹)
1968	72	24	96	5760
1975	120	33	153	9180
1985	60	18	78	4680
1990	6	6	12	720

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