

# A survey of the number of coastal fishing vessels in Fiji<sup>1</sup>

Robert Gillett<sup>2</sup>



A variety of small coastal fishing vessels in Lautoka Port, Fiji. (Image: R.E. Gillett)

## The importance of knowing fishing vessel numbers

Estimating the number of vessels that are involved in coastal fishing in a country such as Fiji is important for several reasons. For fisheries management purposes, it is generally agreed that an intimate knowledge of a fishery is an important prerequisite for management to be effective – and the number of vessels is an important aspect of that knowledge. In addition, fishing effort is often key to determining when and where management measures should be applied. In many Pacific Island, however, where it is difficult to quantify fishing effort (e.g. person-days), the number of vessels involved in a fishery could serve as a crude proxy for effort. The reality is that it is much easier counting boats than counting fishing days or even fishers. At various times in the past, Fiji's Ministry of Fisheries has subsidised small fishing vessels or given vessels away for free. In the future, before increasing the number of fishing vessels further, it would be sensible to know the current number of vessels and their geographic distribution. Other reasons for knowing vessel numbers include:

- The distribution of vessels is also quite useful for targeting non-vessel initiatives of the Ministry of Fisheries, such as the establishment of fisheries centres, promotion of fisher associations, and provision of fish warden training.

- In assessing the impacts of natural disasters and the subsequent rehabilitation efforts, much attention is given to fishing vessels, but there is considerable uncertainty in determining how many were actually lost due to the inability to establish pre-disaster numbers.
- In some respects, fisheries surveillance and enforcement efforts could be made more effective by focusing operations where there is a high density of vessels.

There is considerable uncertainty as to the number of coastal fishing vessels in Fiji. Although there is a requirement that fishing vessels be registered with the Ministry of Fisheries, that requirement is only for commercial vessels (i.e. does not include vessels used for subsistence fishing). Further complicating the situation is that an unknown but probably large proportion of coastal commercial fishing vessels in Fiji are not registered.

## This study

This short study was sponsored by the Packard Foundation and was carried out as a desk exercise in late May and early June 2020. The purpose of the study was to obtain a crude estimate of the number of small fishing vessels in the country. Secondly, it was to explore mechanisms for obtaining better estimates in the future.

<sup>1</sup> The full report of the study is available from the author at [gillett@connect.com.fj](mailto:gillett@connect.com.fj)

<sup>2</sup> Director of Gillett, Preston and Associates.

Some definitions were established for this study:

- “Coastal fisheries” are equivalent to “inshore fisheries”, and are the fishing activities that occur on reefs, in lagoons, and up to 10 km offshore.
- “Small fishing vessels” are generally those craft that are smaller than 10 metres in length. In practice, it includes almost all vessels used for marine fishing in Fiji except those involved in longlining and the larger boats involved in deep slope bottom fishing.

## Previous documentation on the number of vessels

The Ministry of Fisheries registers commercial vessels, and information on the number of registered fishing vessels has appeared in some of its annual reports. The last time information for all four of Fiji’s geographic divisions was published was in 2008, when the annual report indicated 1276 registered fishing vessels. According to several sources, the actual number of small fishing vessels (including non-registered commercial boats and boats used for subsistence fishing) is probably much greater.

Other estimates of small fishing vessels in Fiji (and some comments in italics) are:

- A Food and Agriculture Organization sea safety survey in 1991 (McCoy 1991) estimated that there were about 1600 motorised fishing vessels under 10 m in length, including 450 inboard-powered vessels, plus 400 non-motorised vessels. *Because this survey operated in Fiji for only a few days and was primarily concerned with sea safety legislation, the numbers of vessels are likely to have been based on estimates by staff of the Fisheries Division, but not on the Division’s vessel registration system due to the large number of unmotorised vessels included in McCoy’s estimate.*
- The Asian Development Bank Fisheries Sector Review (Hand et al. 2005) stated: “There is currently an estimated 895 boats operating in the country’s small-scale fisheries, most of which are small 15 foot skiffs, although there are also a small number of small-scale tuna boats and deepwater snapper boats in operation (around 6–10). *Although I participated in this review, I have no idea where Tony Hand got this number of vessels. Tony had only limited experience in Fiji and certainly did not survey vessels himself. The Fisheries Department annual report for 2005 showed many more vessels than the 895 mentioned by the review.*”
- A Pacific Community project to establish a small-scale vessel registration system (Welch 2016) estimated “more than 1,500 vessels less than 15 m”. *Welch did not enumerate vessels on his short stay in Fiji, so the number is likely to have come from the Ministry of Fisheries. The report mentions canoes as a small-scale vessel type, but canoes are not a common fishing craft in Fiji.*

- In a World Wildlife Fund study of fish markets in the Western Division, Takali (2018) states there are about 666 registered fishing boats in Ba Province. *Data from the Ministry of Fisheries Western Division office show 490 registered fishing vessels in 2018 in the entire Western Division (which includes Ba Province and two other provinces). This suggests that the difference between the number of registered fishing vessels and the actual number is quite large.*

The above information does not appear especially useful in estimating the current number of small fishing vessels in Fiji, but it does reinforce the idea that estimating vessel numbers in the country is difficult.

## Alternative ways to estimate vessel numbers

During the study, several ways for obtaining an idea of vessel numbers were explored, and included: 1) the use of Google Earth images, 2) satellite-based long-wave radar, 3) aircraft-based light detection and ranging (LIDAR), 4) estimates of the number of non-registered vessels by the staff of the Ministry of Fisheries, 5) knowledge of boatbuilders, 6) my personal experience with Fijian coastal villages, and 7) the use of cyclone assessment data.

Google Earth maps the Earth by superimposing satellite images, aerial photography, and geographic information system data onto a 3-D globe, allowing users to see cities, landscapes and various objects (Fig. 1). At the beginning of this study, Google Earth appeared to have considerable potential for counting fishing vessels, and so exercises were carried out to test this potential by ground truthing. After this work, it was concluded that there are several difficulties with using Google Earth for a census of small fishing boats, with the most serious being the inability to count vessels that are being stored under trees.

Other forms of aerial technology that could conceivably be used to count coastal vessels were examined in this study: spaceborne systems (i.e. longwave radar) and airborne systems such as LIDAR. It was concluded that various forms of aerial technology hold considerable promise for censusing coastal fishing vessels, but none appear to be ready for use at the present time by the staff of the Ministry of Fisheries.

The other approaches used by this study for estimating vessel numbers showed more promise (Table 1). There appears to be some convergence in vessel numbers in the above four approaches. Selectively using the information Table 1, the number of small fishing vessels in Fiji can be crudely estimated to be about 3800.

This estimate could be very inaccurate due to weaknesses in the approaches used. Especially troublesome are combining data (and guesses) from different years, the issue of inactive vessels, and non-fishery vessels (transport, tourism).

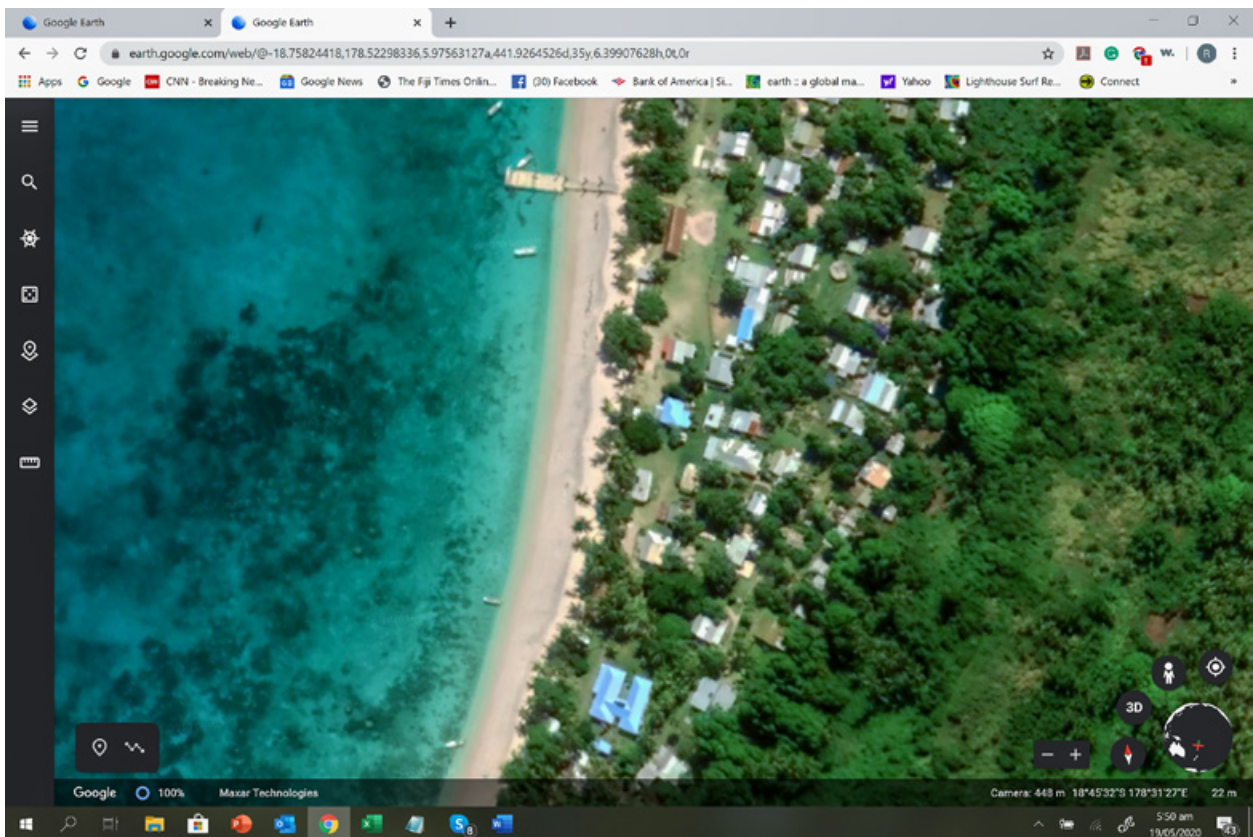


Figure 1. Google Earth image showing five boats anchored off Dravuni, Kadavu, Fiji.

Table 1. Other methods used to estimate the number of coastal fishing vessels in Fiji.

Approach	Estimate of vessel number	Comment
The experience of senior officers of the Ministry of Fisheries in the geographic divisions indicate that the actual number of fishing vessels operating is two to three times the number of registered vessels	2552 to 3828 vessels in 2008	The last time the number of registered vessels was given in an annual report was in 2008 (1276 registered vessels in all four divisions).
Estimates from Fiji boatbuilders of boat production combined with boat longevity	About 3000 fibreglass boats plus several hundred non-fibreglass boats	Estimates of vessels produced by “backyard boatyards” and vessels imported are really semi-educated guesses.
My experience at observing the number of vessels on the beach or moored near coastal villages in most parts of Fiji	3400 vessels	An average of about 4 vessels per coastal village; 850 coastal villages in Fiji.
Estimate of pre-cyclone number of vessels in a post-cyclone survey	4250 vessels	The survey showed 774 boats in 154 villages (average of 5 boats/village). That average is multiplied by Fiji’s 850 coastal villages. The average number of boats per village could be distorted by the high number in Ba Province.

Nevertheless, it is the only estimate available in recent years, and 4.7 times greater than the number of small fishing vessels estimated by a 2005 fisheries sector study (Hand et al. 2005).

## For the future

For the future the study concluded that the least expensive and most practical options for improving vessel estimates would be to include questions on vessel numbers in each population census and/or agriculture census – as done by several other Pacific Island countries, such as Cook Islands and Vanuatu. In order for this to happen, fisheries officers need to be proactive and attend census planning meetings at the national statistics agencies to ensure those surveys collect the desired information.

## References

- Gillett R. 2020. Estimating the number of coastal fishing vessels in Fiji. Gillett, Preston and Associates for Fiji's Ministry of Fisheries. 20 p.
- Hand T., Davis D. and Gillett R. 2005. Republic of the Fiji Islands: Fisheries sector review. Manila, Philippines: Asian Development Bank. 95 p.
- McCoy M. 1991. Safety at sea in Pacific Island fisheries. Suva: Food and Agriculture Organization/United Nations Development Programme Regional Fisheries Support Programme. 75 p.
- Takali E. 2018. Western Division market field data collection [Tavua – Nadi] marine fish movement within the Province of Ba. Suva: World Wildlife Fund – Pacific. 12 p.
- Welch D. 2016. A small-scale vessel registration system for Pacific Island countries and territories. Noumea, New Caledonia: Pacific Community. 14 p.