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**A comprehensive approach to assessing and monitoring marine recreational fisheries**

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Starting in 2009, New Zealand set out to develop a comprehensive and robust method of assessing and monitoring the harvest by marine amateur fishers around its long and complex coastline. After a long design and test phase, a systems-based approach was adopted wherein several complementary sampling methods are combined. In 2011/12, an offsite national panel survey including about 7000 panellists was conducted in parallel with two onsite direct observation methods for popular fisheries in the north-east of the country. The harvest estimates from these methods were very similar, giving us confidence that robust harvest estimates can be generated. A second, similarly corroborated, national panel survey is planned for 2017/18 and repeat surveys are envisaged every 5 or 6 years. In the years between these expensive surveys, fishing effort at key access points is monitored using web cameras. Based on assumptions about the distribution of effort, this information can be used to estimate and monitor marine recreational harvest in a number of key fisheries year on year. A machine learning method of reading web camera images is being developed to automate parts of the monitoring programme. New Zealand's integrated approach has shown that recreational harvest can be a significant proportion of total removals in some stocks and that harvest can vary dramatically between years. These are both important findings for management of stocks popular with recreational fishers.

**Keywords:** recreational fisher, amateur fisher, harvest estimation, catch monitoring, systems approach, machine learning tool

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