Addressing gaps in management approach and protection of the world's rarest marine dolphin, *Cephalorhynchus hectori maui*

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ABSTRACT

Maui's dolphins (*Cephalorhynchus hectori maui*) are one of the smallest and rarest cetaceans in the world. Listed as critically endangered by the International Union for Conservation of Nature (IUCN), there are an estimated 55 individuals over the age of one year (95% confidence interval range of 48-69) residing only in the waters off the west coast of the North Island (WCNI), New Zealand. Entanglement in set nets and capture by inshore trawl fisheries are the leading human-induced causes of their decline.

In November 2013, the final decision regarding the Maui's Threat Management Plan (TMP) was announced by the New Zealand government, which resulted in the official implementation of two extensions to set net restrictions at the southern end of the dolphins' range. In addition, a progressive increase in extensive monitoring coverage of the trawl fishery was initiated, commercial ring netting was permitted within the set net ban of the Manukau harbour (with restrictions), a plan to improve information on the use of the WCNI harbours by Maui's dolphins and set netters, and a research advisory group was established to lead on the prioritisation and funding of future research priorities. This paper provides a summary of progress, identifies gaps, and proposes recommendations for improvement to the current conservation management approach.

Maui's dolphins are on the brink of extinction and effective management action and a precautionary approach are required to ensure all necessary steps are in place to avoid extinction whilst providing opportunity for population recovery.

KEYWORDS: Maui's distribution, residual risk, observer coverage, bycatch estimate, alternative gear, transitional support, eco-labelling.

INTRODUCTION

Cephalorhynchus hectori is a small and culturally significant dolphin, endemic to the inshore waters of New Zealand. In 2002, the North Island population of Maui's dolphins (*Cephalorhynchus hectori maui*) were formally described as a separate subspecies from the South Island populations of Hector's dolphins (*Cephalorhynchus hectori hectori*; Baker et al., 2002). As a result, we discovered how truly serious the situation had become, and it was finally acknowledged by the New Zealand government that a formal intervention was necessary in order to attempt to safe-guard the future of these dolphins. In 2003, the first management measures (consisting of set net and trawling bans) were implemented in part of the west coast of the North Island (WCNI) – across an area believed by officials to sufficiently cover the entire remaining range of the subspecies.

Historically, Maui's dolphins are believed to have ranged along the full extent of the North Island west coast (Russell, 1999) with numbers close to 2000 individuals as recently as 1970 (Slooten, 2007; Slooten and Dawson, 2010). The latest abundance estimate, based on biopsy and autopsy samples, indicates that only 55 individuals over the age of 1 year remain (95% Confidence Interval 48-69; Hamner et al., 2012). The current severely depleted population is estimated at less than 10% of the 1970s levels, and Maui's are classified as critically endangered (IUCN, 2000). In comparison, the South Island populations of Hector's dolphins have also experienced a rapid and significant decline (about 70%) from an estimated 21,000-29,000 individuals in the 1970s to just 7,270 today (Slooten, 2007; Davies et al., 2008), and are classified as endangered (IUCN, 2000).

Maui's dolphins have not only declined significantly in abundance, but have also contracted markedly in range and suffered a loss of diversity (Martien et al., 1999; Russell, 1999; Pichler and Baker, 2000; Dawson et al.,

2001). Similar to the Vaquita porpoise (*Phoecoena sinus*) in the Gulf of California, they have only one remaining maternal lineage (Rosel and Rojas-Bracho, 1999; Dawson et al., 2001). Like many other cetaceans, fecundity is low and their numbers are but a fraction of historical levels due largely to human-induced mortality.

Hector's and Maui's dolphins are particularly vulnerable to decline from human-induced threats because they frequent shallow coastal waters less than 100 metres deep, their lifespan is relatively short–estimated at just 22-30 years (Gormley et al., 2012) and they are relatively late and slow breeders. Females mature at approximately 7-9 years of age and have one calf every 2-3 years (Slooten, 1991). This equates to about 4 calves total in the average life of a female dolphin, or a maximum population growth rate of 1.8-4.9% (Slooten and Lad, 1991). An assessment of the latest abundance estimate suggests that Maui's can only sustain one human-induced mortality every 10 to 23 years, known as Potential Biological Removal (PBR), without impacting on the ability of the population to rebuild to or maintain its optimum sustainable size (Wade et al., 2012).

Entanglement in set nets and capture by inshore trawl fisheries have been identified as the leading threat to their survival –estimated to be responsible for 95.5% of total Maui's dolphin mortalities (Currey et al., 2012), and genetic evidence suggests a demographic bottleneck has occurred within the past few generations (Hamner et al., 2012). As protection measures still do not fully extend across their entire known range, both dangerous fishing methods (set netting and trawling) currently occur within Maui's dolphin habitat.

This paper provides a summary of progress on Maui's dolphin management since the last IWC Scientific Committee (SC) meeting, identifies gaps in current protection measures, and proposes recommendations for improvement of New Zealand's conservation strategy. In particular we address our concerns over the inconsistent acknowledgment of reliable Maui's dolphin sightings data, residual risk from net fishing, the prioritisation of resources, and the inadequate consideration of transitional support for the industry.

PROGRESS TOWARDS CURRENT PROTECTION (SINCE IWC SC65A)

At the end of November 2013, after a lengthy period of multiple public consultations and deliberation, Conservation Minister Nick Smith and Primary Industries Minister Nathan Guy announced their final decision on the draft Maui's Threat Management Plan (TMP; DOC and MPI, 2012) options and additional proposals for the protection of Maui's dolphins. In summary (Table 1), the Ministers decided to keep the existing fisheries management along the west coast of the North Island, including the interim measures implemented earlier in the year, and add an additional 350 sq. km set net restriction south of Pariokariwa Point where four public sightings of Maui's dolphins were considered reliable (shaded grey area in Fig. 1). In addition, the New Zealand government will put in place extensive monitoring on commercial trawl vessels between 2-7 nautical miles (nm) – starting with 25% in the first year, attempt to improve information on Maui's dolphin distribution and set net activity in harbours (particularly Manukau harbour) while permitting commercial ring netting to occur within the set net ban of Manukau harbour (with restrictions on the length and height of ring nets, time and duration of deployment), and establish a Maui's Dolphin Multi-stakeholder Advisory Group to lead on the prioritisation and funding of future research priorities.

Current activity restrictions inside the Maui's habitat consist of a trawl ban out to 2 and 4 nm, a set net ban out to 7 nm (including harbour entrances), and a marine mammal sanctuary out to 12 nm with limits on certain types of mining and seismic activities (Fig. 1)—which includes a mineral mining exclusion zone out to 2-4 nm not shown on the map. Additional legislation and statutory requirements (Marine Mammal Protection Act 1978; Conservation Act 1987) attempt to reduce the number of deaths and other impacts from activities such as vessel collision, harassment, and deliberate injury, but do not adequately prevent the negative effects from marine mining within their habitat (Thompson, 2012). Instead, an improved code of conduct has been developed and made mandatory in New Zealand waters in an effort to minimise disturbance to marine mammals from seismic survey operations (DOC, 2012).

Table 1. Summary of the Maui's Threat Management Plan (TMP) decision. Source: Ministry for Primary Industries.

Measure	Purpose
Commercial and Amateur Set Netting (off the WCNI - Taranaki): Keep existing management, including the interim measures to: • retain the commercial and amateur set net prohibition between zero and two nautical miles offshore from Pariokariwa Point to Hawera; • prohibit the use of commercial set nets between two and seven nautical miles offshore from Pariokariwa Point to Hawera without an observer onboard. The interim measures would be reviewed in 2015-2016 to inform management going forward.	Managing the risk to Maui's dolphins in the inshore area (out to two nautical miles) where the January 2012 mortality occurred, and the alongshore range based on the maximum travel distance recorded for Maui's dolphins. Gathering more information on dolphin presence in the area. One-hundred percent observer coverage between two and seven nautical mile areas offshore will provide independent monitoring and reporting of fishing interactions with, or sightings of Hector's and/or Maui's dolphins beyond two nautical miles.
Commercial and Amateur Set Netting (WCNI Harbours): • Keep existing commercial and amateur set net restrictions • Amend the regulations to allow commercial ring netting in the Manukau Harbour where the set net ban applies, with restrictions on the length and height of ring nets, time and duration of deployment. • Improve information on Maui's dolphin distribution and set net activity in the west coast North Island harbours, with a focus in the Manukau Harbour.	Allowing for commercial ring netting (which is considered a lower risk activity) in the area where set net activity is currently prohibited in the Manukau Harbour. Improving information in two areas: • Maui's dolphin use of the WCNI harbours, with a focus in the Manukau Harbour; • where commercial and amateur set net activity is occurring in the harbours.
Commercial Trawling: • Keep existing management for trawl, and • Put in place extensive monitoring coverage in the commercial trawl fishery between two and seven nautical miles offshore from Maunganui Bluff to Pariokariwa Point.	Increasing the level of monitoring coverage in the inshore trawl fishery to: • reduce the uncertainty in the risk trawling poses to Maui dolphins while enabling trawling to continue, and • provide robust information to inform assessment of the level of interaction between trawl activity and the Maui's dolphin population.
Seismic Survey: Regulate seismic surveying by incorporation of the Seismic Surveying Code of Conduct 2012 by reference under section 28 of the Marine Mammals Protection Act (MMPA) as a mandatory standard. This would apply in Territorial waters, EEZ and within the Marine Mammal Sanctuaries.	Management of risk to Maui's dolphins from seismic surveys by making the Code of Conduct - developed with input from stakeholders – mandatory in all New Zealand fisheries waters.
Inshore Boat Racing (WCNI): Develop Code of Conduct for inshore boat racing off the west coast of the North Island. As a part of the Code, investigate seasonal or area specific restrictions on racing in sensitive areas.	Management of risk to Maui's dolphins from inshore boat racing by use of a voluntary Code of Conduct to be developed with input from all relevant stakeholders.
Maui's Dolphin Multi-stakeholder Advisory Group: Develop and implement a strategic, collaborative advisory group for engaging interested parties (National and local government, industry, ENGO's, tangata whenua and science providers) in prioritisation and funding of future conservation research on Maui's dolphins.	To manage the recovery of Maui's dolphins via: An annual strategic planning process with central and local government, industry, Treaty Partners and stakeholders to ensure a strategic, integrated approach to mitigating the impacts of human activities on Maui's dolphins; An annual research planning process to direct research priorities where they will provide the most benefit for Maui's dolphins; An engagement strategy to support implementation of outcomes from the planning processes, focused initially on options developed during consultation. This should also include development of a domestic and international communications strategy, to convey messaging about the government response.

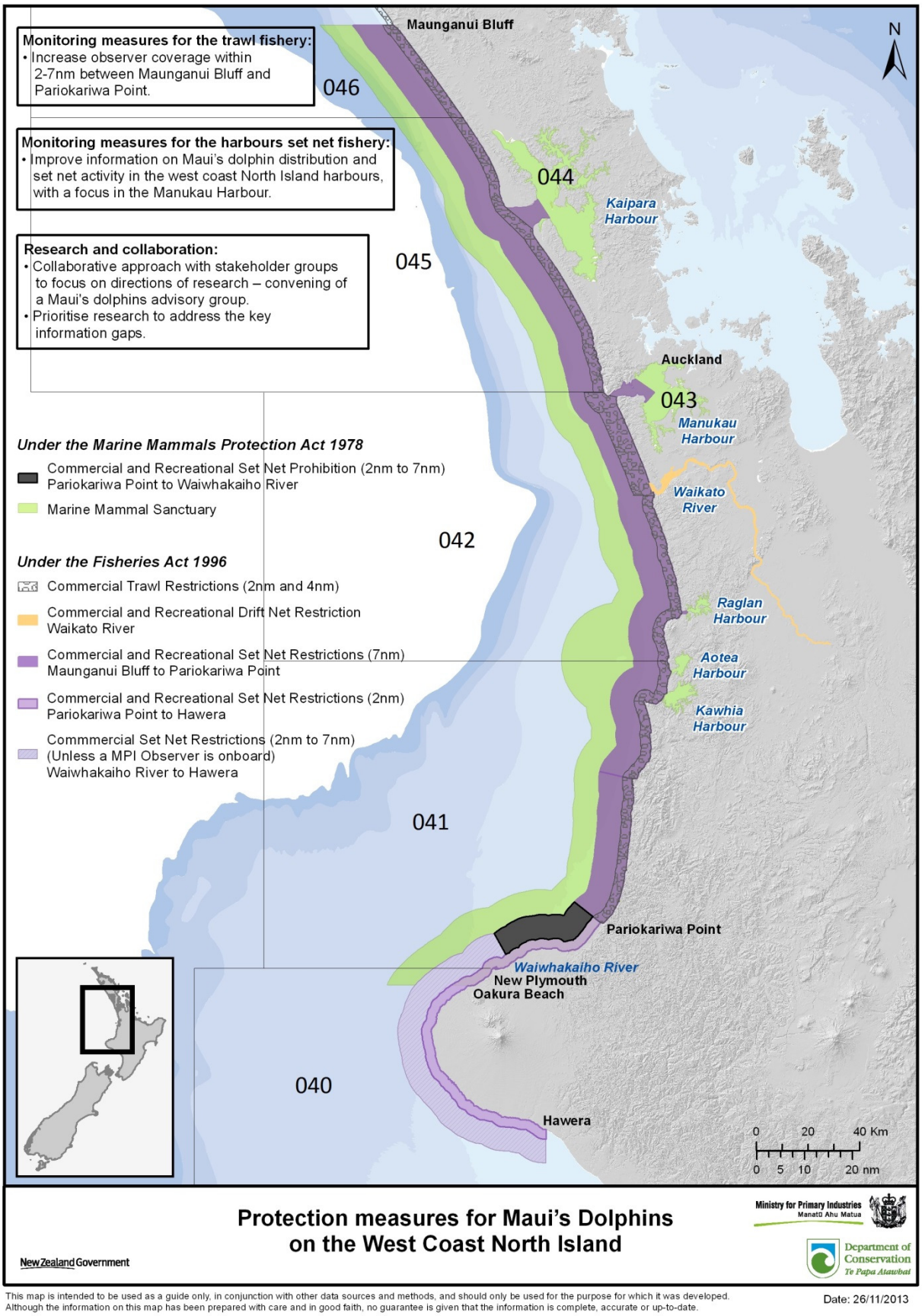

Figure 1. Current activity restrictions within the Maui's dolphin habitat. These consist of a set net ban out to 7 nm (including harbour entrances), a trawl ban out to 2 and 4 nautical miles (nm), and a marine mammal sanctuary out to 12 nm with limits on certain types of mining and seismic activities. An additional set net ban out to 2 nm (with 100% observer coverage on all remaining vessels out to 7 nm) has been recently added in part of their southern range. The statistical reporting areas, 40-46, are depicted as they occur on the west coast of the North Island of New Zealand. Source: Adapted from Ministry for Primary Industries.

Although the government's decision is a step in the right direction and we commend them on their progress towards improved protection, these additional measures fall short of what is needed to save Maui's dolphins from extinction. Much more commitment and work is needed to adequately address the fundamental issues of fisheries bycatch (and risk from other human-induced threats) leading to an unsustainable decline of New Zealand's most threatened marine mammal, and there are no grounds for hesitancy or complacency. The current measures offer protection to Maui's where they are most abundant, but fail to secure their entire known range from all known threats. A more precautionary and appropriate approach would be to extend the boundaries of protection (including net fishing restrictions) from Maunganui Bluff in the north to the Whangnaui river mouth in the south (including all harbours), and out to the 100 m depth contour (Fig. 2A), or at a minimum to the 12 nm 'territorial sea' (Fig. 2B). These areas would represent 19,826.5 km^2 and 15,351.5 km^2 respectively.

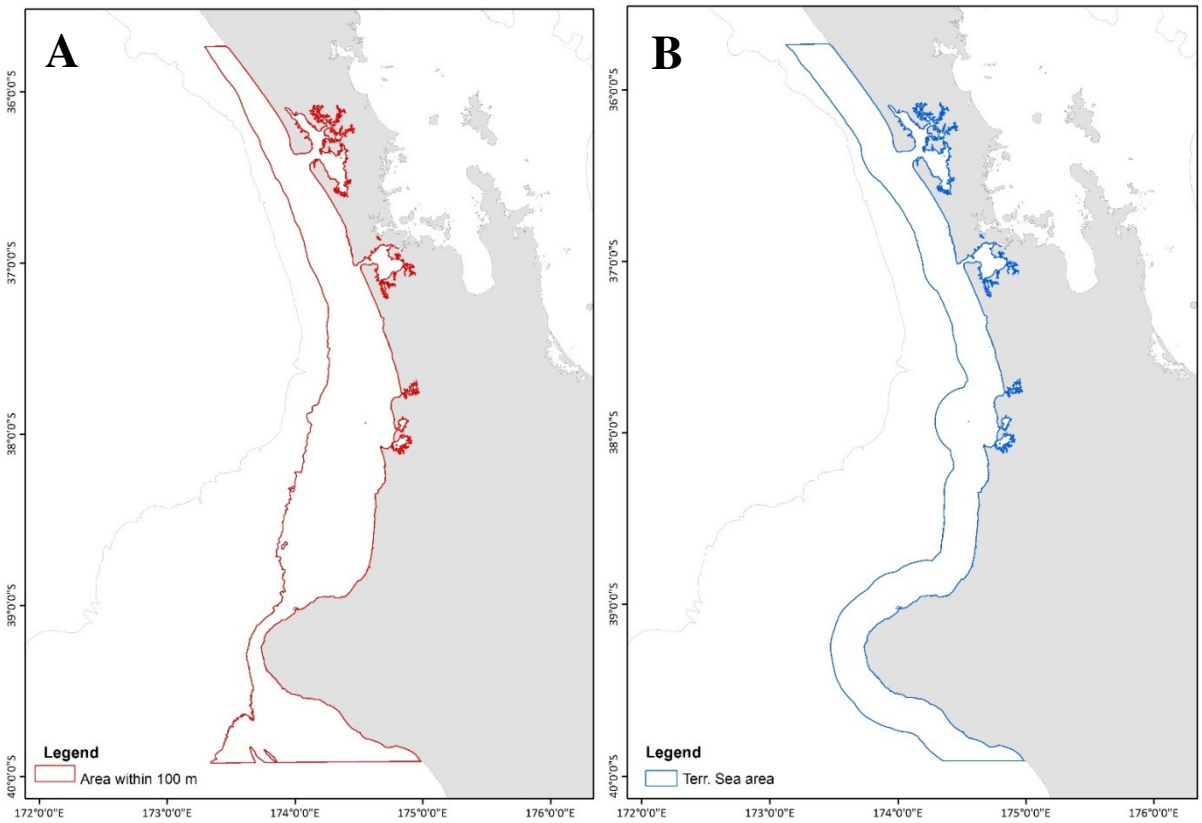

Figure 2. A graphical depiction of two alternative scenarios of improved protection for Maui's dolphins , between Maunganui Bluff (north) to the Whanganui river mouth (south), and out to either the 100 m depth contour (map A) or 12 nautical miles (map B). Traditional set netting and trawling, as well as other dangerous activities (eg. new mineral/oil/gas exploration and extraction) would be prohibited throughout the sanctuary boundaries. Source: Maps created and supplied by NIWA.

At present, the existing set net ban covers only about 39.3% of option A (water less than 100 m deep) and 50.7% of option B (the 12 nm 'territorial sea'), while trawling is only restricted from approximately 8.5% or 11.1% of the respective scenario area. The current WCNI Marine Mammal Sanctuary boundaries are most representative of the ideal, with between ~60.5%-78.2% of the areas above protected.

With an estimated 5.27 Maui's dolphins dying in set net and trawl fisheries each year, a level which is 75.5 times PBR or what the population can withstand (Currey et al., 2012), it is imperative that time-bound and ambitious goals to remove dangerous fishing activities (or replace them with dolphin-friendly methods) from within boundaries that are more reflective of their true range.

DISCUSSION POINTS and KEY QUESTIONS

Maui's distribution

Earlier this century, sighting and stranding records of Maui's and Hector's dolphins were distributed around most of the North Island (Russell, 1999), but in recent years their range appears to have contracted with very few recent sightings in the southern west coast. More recent aerial and boat surveys have revealed that the dolphins continue to range from Manganui Bluff in the north to Wanganui (river mouth) in the south, including harbours and out beyond 12 nm (Currey et al., 2012; Slooten et al., 2005; Slooten et al., 2006; Rayment et al., 2011; Russell, 1999). Most summer sightings (75%) during aerial surveys occurred within 1 nm of shore, compared to 33.3% in the winter (Slooten et al., 2005). Continued scientific research has also strengthened evidence that harbours are part of the Maui's dolphin range (Russell, 1999; Rayment et al., 2011).

The World Wide Fund for Nature (WWF) and the government's Department of Conservation (DOC) have also maintained independent databases of verified Maui's dolphin sightings. DOC's database includes staff, research and public sightings (Fig. 3) from 1970-2013, as well as documented moralities (Fig. 4) from 1921-2012, and has been supplemented by WWF public sightings since 2003). Both the WWF and DOC validation system now use a 5-point scale that consolidates categories from the initial 7-point WWF scale, making previous 2006-2012 WWF-scaled validations directly transferrable to the new scale. The reports are also currently assessed (with an interview) and assigned the category number by an independent marine mammal scientist. Validation categories 1-3 are considered most reliable and categories 4 and 5 are the least reliable (see Appendix 1 for complete list of category descriptions). In addition to sightings with a category 1-5, there are sightings with a category 0 ("null validations") where no score is assigned. Rather than representing sightings of an unreliable nature, they represent either historical sightings or sightings where the validation process is pending.

All sightings which appear to occur beyond the current boundaries of protection have been highlighted and identified (where possible) on the maps below. Any additional sightings which appear to have been missed from the maps in Fig. 3-4, and may also be missing from the DOC Maui's dolphin sightings database, have been circled in Fig.5 (Du Fresne, 2010). As is evident from the maps, Maui's dolphins have been reported inside harbours, past 12 nm, and south of Hawera, and there is on-going concern that they continue to be exposed to known threats outside the fisheries restrictions on the west coast.

Of the 18 tagged sightings between Kaipara harbour and Whanganui (main map of Fig. 3), 4 are reliable public, 3 are unreliable public (1 of which is from a DOC staff member), 6 are considered null, and 5 are research sightings (1 of which is an acoustic detection). Between the Manuwatu river and south of Wellington harbour (insert map of Fig. 3) 16 sightings are tagged, 12 of which are reliable (including two from DOC staff) and 4 are null. There have also been 6 recorded mortalities of Maui's or Hector's dolphins and 2 DNA-confirmed Maui's dolphins outside the current protection boundaries from 1921-2000 (Fig. 4). These consist of 1 from the far north, 1 each from Manukau, Raglan, and Kawhia (DNA) harbours, 2 from Whanganui (1 DNA), 1 from Wellington harbour, and 1 from Palliser bay. The remaining map of GPS-marked opportunistic public sightings (Fig. 5) depict 6 records, 1 from the Manukau harbour and 5 offshore between 7- 14nm (Du Fresne, 2010). The total breakdown of the 48 sightings across all three maps, include 11 from inside harbours between Maunganui Bluff and Pariokariwa Point, 15 offshore beyond 7 nm (5-6 of which are beyond 12 nm), 4 alongshore from the far north to Whanganui river, and 18 beyond Whanganui. A summary table and more detailed information about the sightings, including descriptions and score notes from the databases, are listed in Appendix 1.

In September 2013, the Minister of Conservation announced a proposed variation to the WCNI Marine Mammal Sanctuary (to ban set netting from 2-7 nm between Pariokariwa Point and the Waiwhakaiho River) based on the presence of 5 relatively recent (2006-2013) public sightings of Maui's dolphins (within the black rectangle on Fig. 3). More than 45,000 submissions were received, all but 17 in favour of the proposal. The Minister reviewed the available information associated with these sightings (as a result of recent back-validation), and decided that 4 out of the 5 provided sufficient "clear evidence" of Maui's presence to warrant a fisheries closure to set nets. A similar approach would be a valuable exercise for assessing the validity of the remaining 48 sightings listed above, in addition to any which may have been reported more recently).

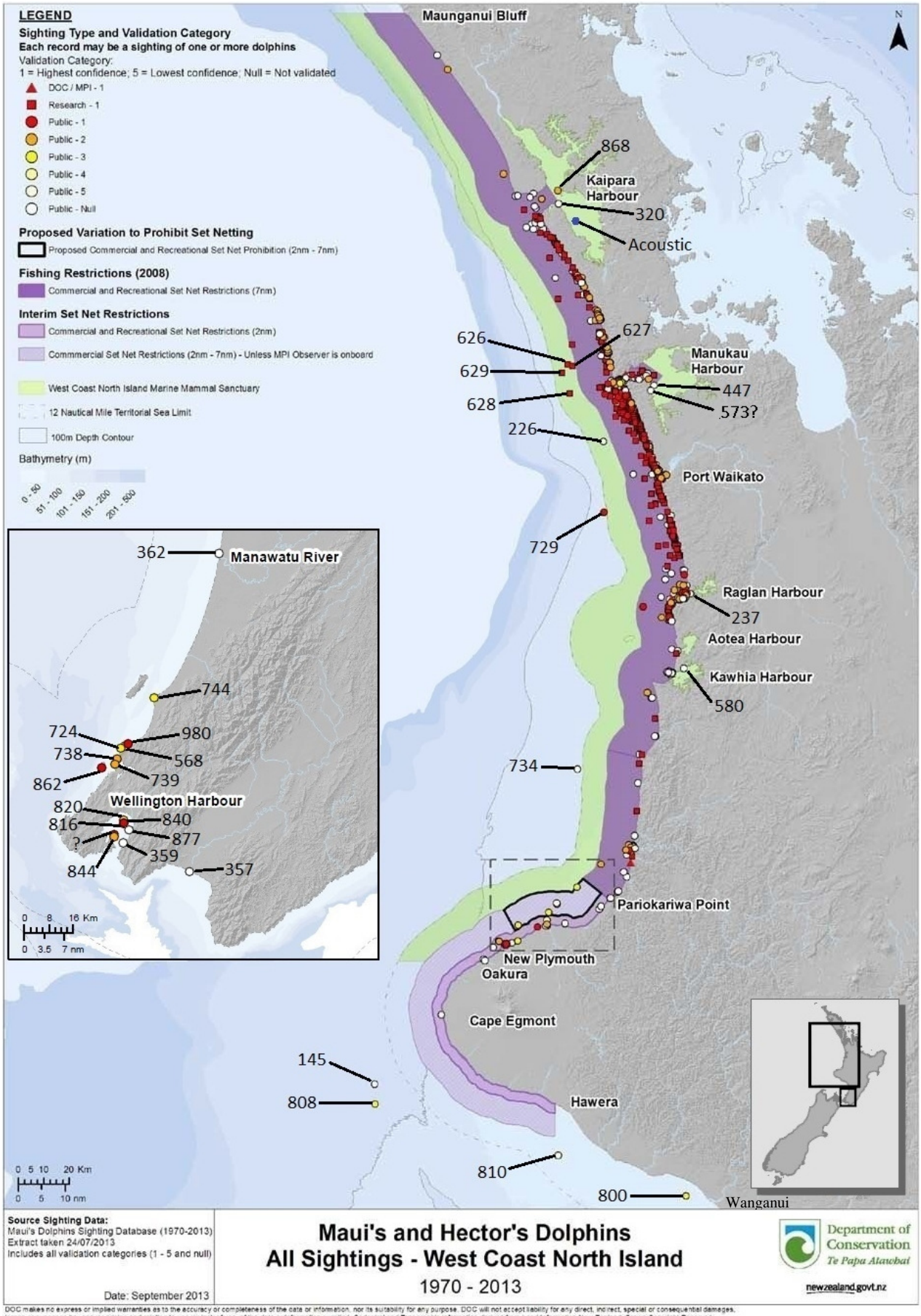

Figure 3. Maui's dolphin sightings (1970-2013), map extracted on 24/07/2013. Includes all validation categories (1-5 and null = 0) from all sighting sources. Each record may be a sighting of one or more dolphins. For public sightings, a validation process is undertaken to ensure that publicly reported sightings are verified. Validations which were reported prior to the formal validation process or the validation is still pending are defined as "null". Source: Adapted from Department of Conservation.

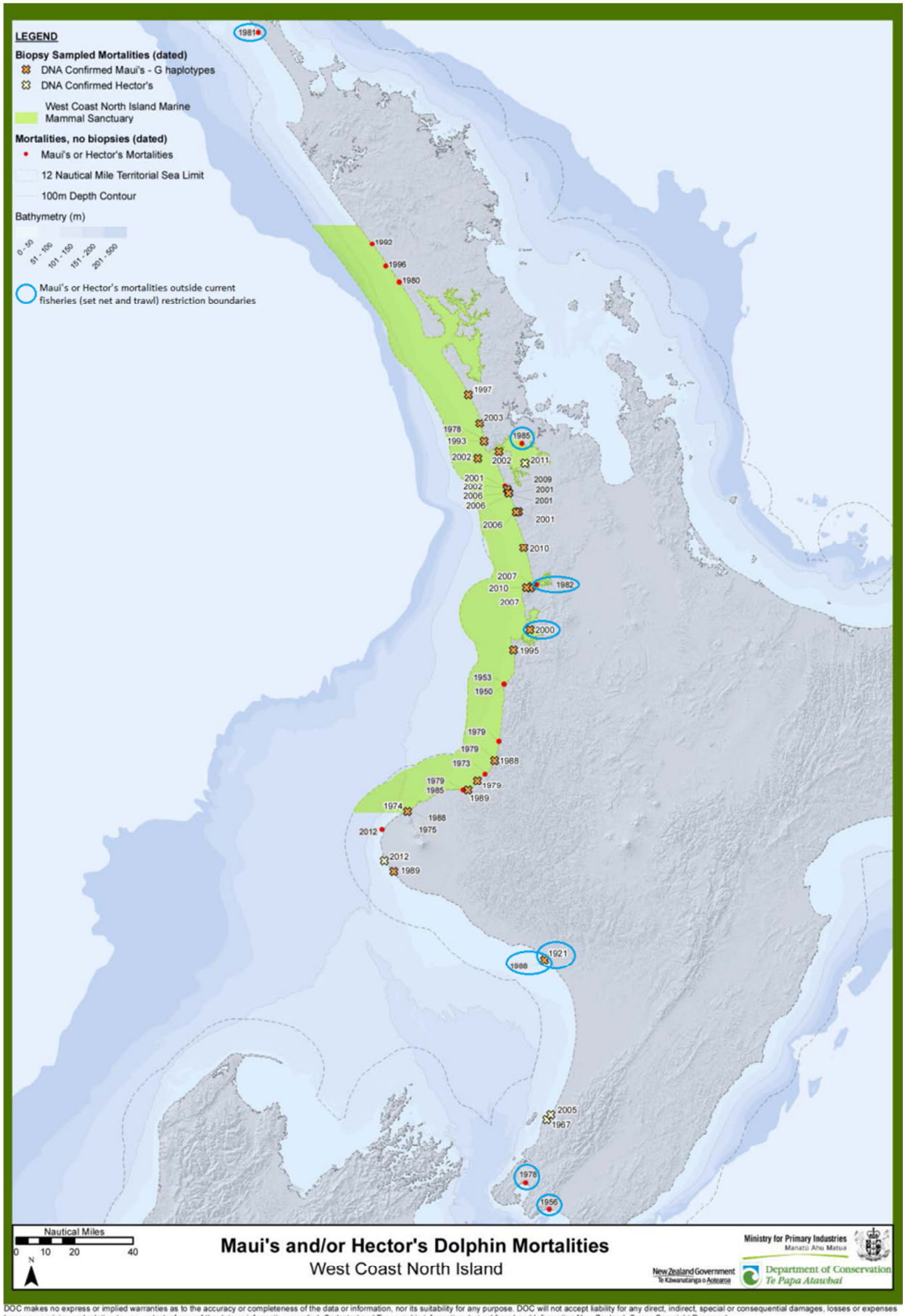

Figure 4. Locations of Maui's and Hector's dolphin mortalities (either DNA-confirmed or not-biopsied) between 1921-2012. Those circled in blue highlight mortalities recorded outside current fisheries (set net and trawl) restriction boundaries.

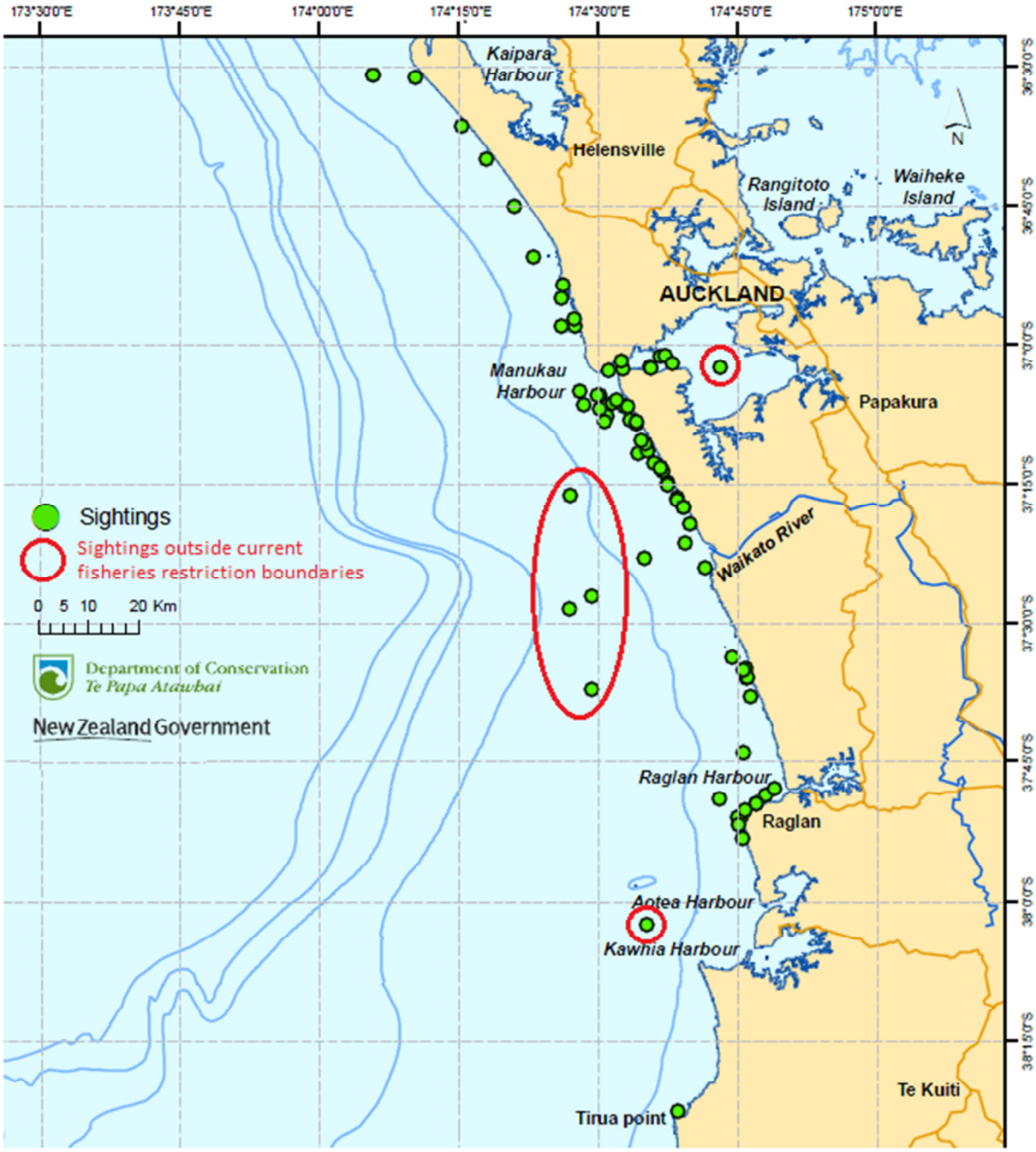

Figure 5. GPS-marked opportunistic (public) sightings of Maui's or Hector's dolphins (2000-2009). Those circled in red highlight sightings made outside current fisheries (set net and trawl) restriction boundaries, and which do not appear to be included in the map sourced from the Department of Conservation's database (Fig. 3). Each record may be a sighting of one or more dolphins. Source: Adapted from Du Fresne (2010).

The 100 m depth contour is the best proxy we have from the results of decades of research on Hector's dolphins. However, in the presence of doubt, the next best available evidence should be examined while exercising the precautionary principle. Protection (from both set netting and trawling) should be urgently extended to at least the 12 nm limit, especially in the area immediately offshore from Manukau harbour and down to Raglan harbour where Maui's dolphins are most abundant. It is particularly irresponsible to allow trawling, estimated to kill at least 1 critically endangered Maui's dolphin per year (Currey et al., 2012) to continue in an area undisputed as Maui's dolphin habitat (2/4 - 7 nm).

Similarly, the Whanganui river should become the southern fisheries restriction boundary for several reasons. There is a DNA-confirmed Maui's which stranded at Castlecliff Whanganui in 1921 (Fig. 4), and there is also a reliable public just north of the river from 2012 (Fig. 3). At least 95% of the dolphins biopsied north of Hawera have been Maui's dolphins - which leads experts to believe that Maui's ranging down to Whanganui isn't

unreasonable. Most of the scientists at the risk assessment workshop also agreed that the southern extent of their range is most likely Whanganui. Appendix 2 of the government's risk assessment report (Currey et al. 2012) reads: "The final decision to extend the distribution south was based on decisions made by the expert panel members. A linear ramp from Port Waikato to Whanganui was defined, with a linear decrease alongshore, reaching zero at Whanganui."

Fisheries effort, bycatch estimates, and monitoring coverage

The WCNI set net fishery is comprised of approximately 106 fishers operating 133 vessels since 2006/07, while the trawl fishery in this area consists of approximately 28 fishers operating 39 vessels since 2006/07 (MPI and DOC 2012). Fisheries effort varies by statistical reporting areas 40-46 (Fig. 1) for both set netting (Fig. 6) and trawling (Fig.7), with Manukau and Kaipara harbours (44 and 43) and the southern end of the Maui's range (41 and 40) being the busiest areas respectively. Additionally, recreational set netting occurs in Kaipara, Manukau, Kawhia, Raglan, and Aotea harbours between Pariokariwa Point and Cape Egmont, and is carried out year round with higher frequency in summer.

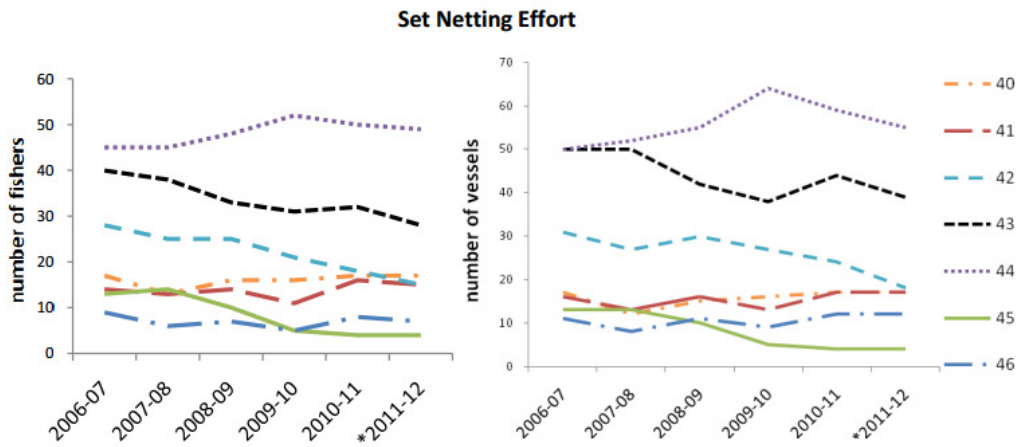

Figure 6. Number of commercial set net fishers and vessels operating in each of statistical reporting areas 40-46 since 2006/07. Note: numbers not additive as a single fisher or vessel may operate across more than one statistical reporting area. Source: Adapted from MPI and DOC 2012.

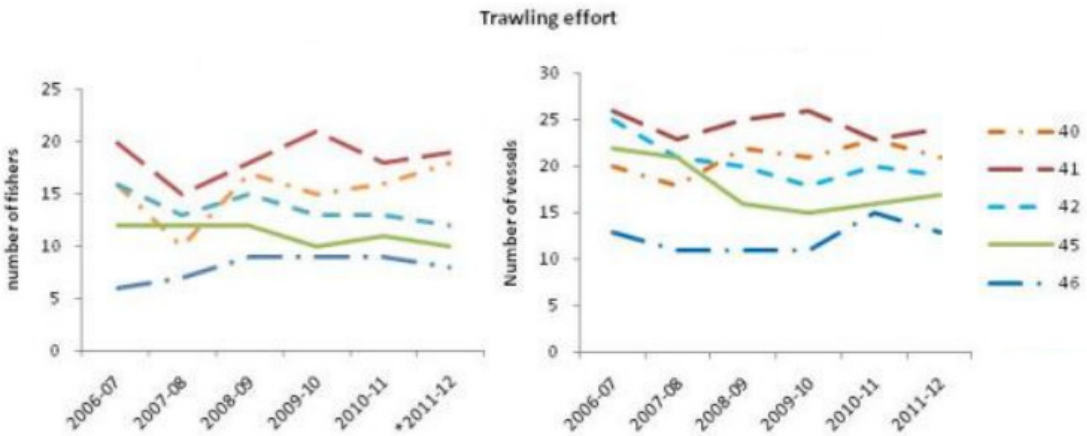

Figure 7. Number of commercial trawling fishers and vessels operating in each of statistical reporting areas 40-42, 45, and 46 since 2006/07. Note: numbers not additive as a single fisher or vessel may operate across more than one statistical reporting area. Source: Adapted from MPI and DOC 2012.

The main species targeted by set netters on the WCNI between 2007/08 and 2010/11 (Table 2) included flatfish, grey mullet, yellow-eyed mullet, rig, kahawai, trevally, school shark, warehou, and other mixed species. For trawlers (bottom and mid-level), the main target was gurnard, snapper, trevally, baracoutta, terakihi, and other mixed species over the same period of time.

Table 2. Target inshore commercial fisheries on the WCNI (2007/08-2010/11). Source: Adapted from MPI and DOC 2012.

Species	Method	% reporting by position	Avg. annual no. vessels	Avg. annual no. fishers	Avg. annual fished days
Flatfish	Set net	8	91.3	75.8	4195.0
Grey mullet	Set net	2	63.8	54.0	1288.3
Yellow-eyed mullet	Set net	0	9.0	9.0	51.0
Rig	Set net	61	61.8	56.3	573.5
Mixed sp.	Set net	57	71.3	65.3	388.0
Kahawai	Set net	13	45.3	40.0	311.8
Trevally	Set net	39	36.8	33.0	176.5
School shark	Set net	99	17.8	17.5	164.0
Warehou	Set net	100	4.8	5.0	152.3
Species	**Method**	**% reporting by position**	**Avg. annual no. vessels**	**Avg. annual no. fishers**	**Avg. annual fished days**
Mixed sp.	Bottom trawl (55%)	99	31.3	7.5	306.8
Gurnard	Bottom trawl (89%)	93	18.8	22.3	188.5
Snapper	Bottom trawl (88%)	97	20.5	16.3	171.5
Trevally	Bottom trawl (77%)	99	14.3	10.8	140.3
Barracouta	Mid trawl (84%)	100	22.8	14.8	126.0
Tarakihi	Bottom trawl (90%)	98	14.3	10.5	103.5

The total per year estimated landings (tonnes) and mean values (averaged across 2008/09, 2009/10, and 2010/11) for commercial set netting were 0t - $0K (area 40), 11.3t - $34K (area 41), 120.5t - $296.2K (area 42), 258.7t - $744.8K (area 43), 459.6t - $1335.9K (area 44), <4t - $negligible (area 45), and 0t - $0K (area 46); with a total mean annual gross value of about NZ$2.41 million (MPI and DOC, 2012).

The total per year estimated landings (tonnes) and mean values (averaged across 2008/09, 2009/10, and 2010/11) for commercial trawling were 162t - $489.5K (area 40), 950.8t - $3285K (area 41), 613.4t - $2057.7K (area 42), n/a (area 43), n/a (area 44), 901t - $3059.2K (area 45), and 458.4t - $1773.8K (area 46); with a total mean annual gross value of about NZ$10.6 million (MPI and DOC, 2012).

Despite these figures, the Ministry for Primary Industries (MPI) estimates that "the primary costs associated with a set net and trawl ban out to the 100m depth contour (including harbours) are the economic impact of the fishing industry and the wider economy, estimated to be $27.8 million (for the coastal and harbour set net fisheries) and $75 million (for the trawl fishery)" (MPI and DOC, 2012). This does not account for the ability of the fishers to move to another area, switch species, or transition to alternative fishing gear. It also does not consider that profit margins are typically only 5% of the gross value (G. Simmons – Auckland University, pers. comm.).

There are currently no direct estimates of bycatch (through a credited observer program) available for the North Island population and the apparent lack of voluntary reporting is of concern. Commercial set net fishing effort is relatively high directly north and south of Taranaki and in the harbours on the upper west coast (Figure 8a; Martien et al., 1999; Burkhart and Slooten, 2003). The very high level of fishing effort (both commercial and recreational) in west coast harbours, compared to the open coast, suggests that even infrequent use of the harbours by Maui's dolphins poses a very high entanglement risk (Slooten et al., 2005; Rayment et al., 2011). There is also very limited information on the level of fishing effort for recreational set netters or catch rate (per trawl) for the very high level of effort in the inshore trawling fishery (Figure 8b) for this area. To date, quantitative bycatch estimates only exist for the east coast South Island population based on observed captures. Hector's dolphins in South Island waters are known to be caught in set nets (both commercial and amateur) and trawling operations (Dawson, 1991; Baird and Bradford, 2000; MPI and DOC, 2012).

A 2008 risk analysis, by the National Institute for Water and Atmospheric Research, estimated the total death rate at 110-150 Hector's and Maui's dolphins nationally every year (Davies et al., 2008). The DOC Hector's dolphin incident database reports cause of death for a total of 41 known Maui's deaths in 1921-2008, of which 5 are identified as entanglement and an additional 2 as human-interaction. Recent data between 2008-2012 lists 3

Maui's dolphin mortalities, of which 1 is confirmed as set netting bycatch (January 2012). Assessing the effects of the current protection measures is difficult, given the very small population size of Maui's dolphins. Scientifically robust bycatch data are available for Hector's dolphins living on the east coast of the South Island. From 2000-2006, an estimated 35-46 dolphins were caught (Davies et al., 2008). From May 2009-2010, an estimated 23 individuals were caught based on fisheries observer data (Slooten and Davies 2011). The Expert Panel convened by the New Zealand government in 2012 reviewed all of the available catch rate data, and the continued level of overlap between Maui's dolphins and fisheries known to cause dolphin mortality. On the basis of these data, the Panel estimated that around 5 Maui's dolphins are likely to be caught each year in set net and trawl fisheries, which is 75.5 times PBR or what the population can withstand (Currey et al., 2012).

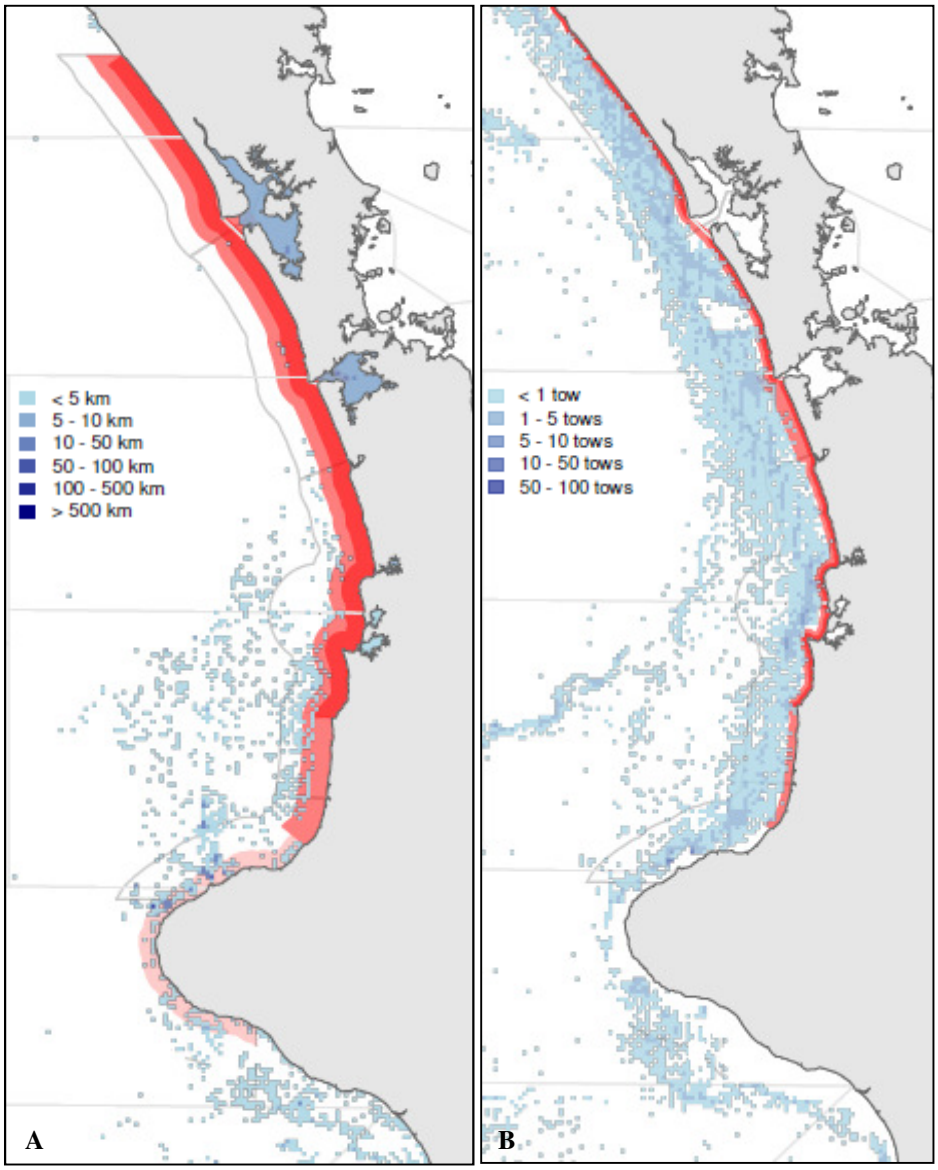

Figure 8. Set net effort, measured in kilometres of net set per year, per 1 square nautical mile, for the years 2008 to 2011 (A), and trawl effort from vessels less than 43m long, measured in tows per year, per square nautical mile, for the years 2006-2011 (B). The various existing and proposed areas closed to set net fishing (A) and the various existing areas closed to trawl fishing (B) are indicated in red. The grey outline marks the extent of the Marine Mammal Sanctuary. Adapted from Currey et al. 2012.

There have been several reports of Maui's dolphin captures by trawlers off the west coast of the North Island, in interviews with fishermen conducted by the Ministry of Fisheries. In addition, there are many reports of incidental catches of Common dolphins off the North Island west coast (e.g. Thompson et al. 2013; MPI and

DOC, 2012). Other dolphins, including Hector's, are also regularly caught in trawl fisheries, including on the east coast of the South Island (e.g. Baird and Bradford, 2000) and in Taranaki (Nordon and Fairfax, 2004). Additionally, the depletion of prey species through increased fishing effort has likely had an indirect effect on both the abundance and distribution of Maui's dolphins.

Because historic observer coverage has been too low (<1%) and under-reporting of bycatch is considered problematic, there has been little reliable information on the number of the dolphins killed in these fisheries to date. However, the best area to allocate monitoring coverage resources (independent observers and/or electronic surveillance) would be the west coast of the South Island, where set netting and trawling is intensive and the population of Hector's dolphins is believed to be the largest. This new estimate would not only be applicable to Maui's dolphins (to assess and remove residual risk), but would also help inform the government's pending review the Hector's dolphin component of the TMP.

Although the implementation of an extensive monitoring program in the WCNI trawl fishery, with the ultimate goal of reaching 100% observer coverage within 2 years, will document any potential incidences of bycatch, it will not sufficiently "reduce the uncertainty in the risk trawling poses to Maui's dolphins". While this measure has the potential to trigger a fisheries closure if an accidental capture occurs, it fails to prevent a Maui's dolphin mortality, does not allow for an accurate bycatch estimate in the area, and does not provide any guarantees that the dolphins are safe should a bycatch incident not be witnessed.

A precautionary approach would remove all known dangerous fishing gear from the habitat of a critically endangered dolphin, and work towards a solution of how to re-introduce dolphin-safe methods. If it is not possible to extend the trawling ban to at least 7 nm, then only 100% observer coverage will guarantee that a bycatch incident is not over-looked. The Government needs to increase the current 25% observer coverage to 100% immediately and commit to an automatic fisheries closure should a bycatch incident occur.

Transitional support for fishermen and eco-labelling

The situation for the remaining Maui's dolphin population has become so desperate, that there is very little to no room for mistakes or second guessing. However, when dealing with the livelihoods of established communities, the Ministers are given the difficult task of trying to balance the economy with the survival of a species. This has led to a stalemate argument over the presence versus absence of an extremely rare and very small animal across a substantial stretch of coastline. But rather than focusing on the near-impossible task of finding irrefutable evidence that every Maui's-like dolphin beyond the boundaries of protection is indeed a Maui's, there needs to be a shift in the mind-set of the New Zealand government towards pursing a truly sustainable fisheries sector with technology-driven strategies. The following two international examples provide context and an opportunity to adopt similar approaches within our own waters.

Australian gummy shark fishery:

After commercial gillnet fishery for gummy sharks (part of a AU$2.3 million per annum sector, with approximately 79 fishing concessions) was identified as a significant cause for a lack of recovery in populations of threatened Australian sea lions (ASL) in South Australia, the Australian Fisheries Management Authority (AFMA) developed a management strategy that included significant closures around known ASL colonies (totalling 18,500 km^2), the allowance to use hooks within the closed areas, 100% monitoring in adjacent waters, and refined triggers for additional fishery-closures (AFMA, 2013). The strategy is considered a success since no ASL interactions have been reported since March 2012.

The initial sector declined by approximately 50% in value, yet only 2 of the initial 15 gillnet boats ceased fishing operations or moved-to other areas. Of the remaining 13 boats, 3 switched to hook fishing, 5 continued fishing outside the closures, and 5 started fishing outside waters of Southern Australia. For boats switching fishing gear systems to hooks, the costs can vary between AU$50-200K (depending on the size of the boat and gear configuration), but increased costs associated with additional crew requirements and bait were also expected. Conversions may have taken some weeks, and this would have depended on the availability of equipment and location. Hook fishing may be less efficient and more expensive than gillnet fishing, however hook-caught sharks can attract a small price premium based on freshness and condition (ARMA, 2013).

Currently, a research project investigating issues with the change to hook fishing methods from gillnets is being finalised and due to be released shortly (ARMA, 2013).

Gulf of California shrimp fishery:

Gillnets are the most widespread gear used by artisanal 'panga' fishers targeting blue shrimp (worth US$10.1 million per year) and a variety of finfish (worth US$5.7 million per year) in the Gulf of California. Unfortunately, incidental bycatch in these fisheries is recognised as the primary cause of the Vaquita porpoise's mortality and population decline, with now less than 200 individuals estimated remaining (Afflerbach et al. 2013).

In an effort to reduce bycatch for this species to zero, the Mexican government, NGOs and the international community worked together in developing technology-based strategies in combination with spatial gillnet ban, which resulted in the development of several varieties of Vaquita-safe trawls. The cost of the new gear and complementary equipment is approximately US$4400 and US$2400 respectively, with additional expenses on more salaries/gasoline/consumption and costs of training/monitoring compliance estimated at US$6600 and US$320000 respectively – a total of US$332840 per year per vessel (E. Sanjurjo – WWF Mexico, pers. comm.).

As part of a program to test the light trawl effectiveness, fishermen were economically compensated and trained to develop field trials. These recent experimental trials with light trawls capable of being pulled by modified pangas have shown that the shrimp catch rates can equal 1:1 with gillnet rates, but overall annual costs were approximately 24% higher primarily due to increased gasoline expenses (Afflerbach et al. 2013).

In June 2013, the government of Mexico announced the 'Official Norm law', a new regulation that guarantees that all shrimp gillnets will be phased into Vaquita-safe trawls (eg. Red Selectiva-INP, Scorpion, and Box trawls) within the next 3 years. Research aimed at finding vaquita-safe methods for catching finfish continues and an improved buy-out program is now also in operation.

Recommendations (with applications to Maui's dolphins) from Afflerback et al., 2013:

Alternative gear - alleviates the potential economic impact that would arise from a policy that includes an expanded fisheries-exclusion zone. In addition, certain types of alternative gear have the added benefit of incentivising fishermen to comply with gillnet closures because the two methods may not be able to effectively operate in the same fishing grounds. This area should be prioritised, with particular effort should concentrate on experimentally confirming there is in fact zero species bycatch associated with the new method.

Buyout programs – A certain level of buyout can have an important role to play in decreasing incidental bycatch, but needs to have correctly-set parameters (eg. whether the program is voluntary, the level of compensation, and stipulations on what money can be spent on).

Value-added seafood products – Analysis of economic impact often largely ignores the very real possibility of fishermen using alternative gear, capturing alternative fisheries product values, or moving into other forms of employment to make up the loss from a given fisheries policy. Market research into fisheries value chains and identifying potential areas for value-added processing or markets has further potential to generate distinct revenue. Success has been seen in value-added production through certification programs, which conceivably serve as the basis for marketing dolphin-safe seafood.

The media has long pinned the environmental community against fisherman, but it doesn't have to be a jobs-versus-dolphins argument A successful approach to managing the recovery of a critically endangered population will encompass the following policy principles: a closure of fisheries central to preventing extinction, a shift to alternative gear and revenue streams, a significantly large protected area, and achieving compliance close to 100% will be essential. Alternative methods do exist, and could allow fishermen to access more valuable markets by producing a product that is fresher and better quality. For trawling this includes the promising new 'Precision Seafood Harvesting' gear (precisionseafoodharvesting.co.nz) which could replace the traditional vessels currently operating within Maui's habitat. Set netters could also be transitioned to other methods such as long-lining and trapping. However, in order to establish a comprehensive package of solutions that works for both Maui's and the affected fishermen, several key issues need to be addressed. At the moment, it isn't feasible for many fishermen off the WCNI coast to long-line for their target species because their efforts would result in a greater catch of snapper (which most don't hold quota for). Alternative gear (which helps avoid snapper) could be developed and trialled, however this initiative needs the support of Government, both through financial aid and through granting of specific exemption permits (to allow catch of non-target and non-quota held species).

Additionally, eco-labelling targets industry and consumer stakeholders in an effort to increase social responsibility and awareness, and has the potential to establish a simple way for consumers to support Maui's and Hector's dolphin-safe "fish-n'chips" through simply altering consumer behaviour. This certification process would enable consumers to make a difference without having to do anything other then purchase a seafood product with a label.

"Transitional support" can take many forms. The Government needs to take a more active role in helping fisherman find viable solutions, as this would be a more practical and effective use of resources compared to more research on the precise distribution of an elusive and extremely rare marine mammal.

PRIORITISING MANAGEMENT MEASURES TO ENSURE THE DOLPHINS' RECOVERY

In the previous papers (2012 and 2013) we presented to IWC SC64 and 65a, we concluded that strong conservation action was necessary, particularly the immediate reduction of all fisheries-related mortality to zero. Delaying this precautionary management will very likely lead to the extinction of the Maui's dolphin.

The areas with the highest bycatch risk continue to be the harbours (primarily set netting), the southern area of their range, and offshore past restriction boundaries, particularly for trawling. In addition, there is a continuing risk from illegal fishing activities within the protected area, as policing and monitoring have been minimal. The top of the South Island and interisland corridor continue to have no protection at all. This is a serious risk for Maui's dolphins as there is evidence that Hector's travel north and could potentially help the Maui's dolphin population persist. Protecting Hector's and Maui's dolphins so that they can recover to 1970s numbers means preventing further fragmentation by developing one coherent and comprehensive protection package that matches the dolphins' distribution, current and former. Strong evidence suggests that if a marine mammal protected area is made large enough, this species is capable of reversing its decline (Slooten, 2013).

The following recommendations were addressed throughout the paper, and have been summarized as concluding thoughts below:

- extend set net ban to the 100 m depth contour (or at least 12 nm) and down to the Whanganui river (to encompass all research and public sightings)
- remove trawling from the same area (or at a minimum extent protection 4-7nm directly offshore between Manukau and Raglan harbours = greatest residual risk), otherwise only 100% observer coverage will detect a capture (not prevent it) and this must trigger an immediate fisheries closure
- implement a sufficient observer program (independent observers and/or electronic surveillance) around the South island (in areas of highest dolphin density versus fishing effort – both trawling and set netting) to acquire more accurate estimates of bycatch in these fisheries
- offer affected fisherman transitional support to alternative dolphin-friendly gear, including support for technology-led research and appropriate permitting
- explore a certification process for Maui's and Hector's dolphin-safe fish'n'chip and other seafood products

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APPENDIX 1

Table i. Categories for publish sightings reported to DOC or WWF.
Source: Department of Conservation.

Category	Description
1	i. Report from a source of known reliability; or ii. High quality photo with landmark; or iii. High quality photo with no landmark but detailed description of location; or iv. Report from someone who has previously provided category 1, 2 or 3 reports (under the old system).
2	Description provided that is consistent with Maui's dolphin, detailed location description and/or GPS position.
3	Description provided that is consistent with Maui's dolphin, but the location is outside the known current range of the species.
4	Description is inconsistent with Maui's dolphin.
5	i. The report is for a South Island location (Hector's dolphin); or ii. The report is incomplete. The interview does not enable the report to be scored in any of the previous categories; or iii. The interview was not able to be conducted; or iv. The report is another dolphin species.

Table ii. Sightings (not DNA-confirmed, including research) and mortalities (some DNA-confirmed as Maui's) of Maui's/Hector's dolphins beyond the boundaries of current protections, listed from North to South. DNA-confirmed Hector's dolphins were not included.

Data ID	**Validation category**	**Year**	**Location**	**# seen**	**Reference**	**Fig.**
?	Mortality	1981	North of Ahipara Bay, Northland	1	DOC	4
868	Public - 2	2010	Kaipara Harbour, off Te Poura (Big Sand Island)	10	Reported to WWF (ID 584)	3
320	Public - 0	2007	South Kaipara light	1	DOC	3
n/a	Acoustic (research)	2006	Kaipara harbour, >10 km beyond protection	1	Rayment et al. 2011	3
?	Mortality	1985	Inner Manukau Harbour	1	DOC	4
626	Research - 1	2006	Offshore from Piha coast, beyond 7 nm (aerial survey offshore winter)	1	DOC (Breen 2006); Du Fresne 2010 (Scali 2006 – Otago university)	3
627	Research - 1	2006	Offshore from Piha coast, beyond 7 nm (aerial survey offshore winter)	1	DOC (Breen 2006); Du Fresne 2010 (Scali 2006 – Otago university)	3
629	Research - 1	2006	Offshore from Piha coast, beyond 7 nm (aerial survey offshore winter)	1	DOC (Breen 2006); Du Fresne 2010 (Scali 2006 – Otago university)	3
628	Research - 1	2006	North of Manukau Harbour, beyond 7 nm (aerial survey offshore winter)	1	DOC (Breen 2006); Du Fresne 2010 (Scali 2006 – Otago university)	3

?	Public	?	Manukau harbour	?	Du Fresne 2010	5
447	Public - 0	1993	Manukau Harbour, half way between Grahams Beach and Awhitu	1	DOC/Otago university	3
573?	Public - 0	2010	Hamilton's gap, 50 m north of stream (*inside Manukau Harbour?*)	3	DOC	3
226	Public - 0	2002	GPS is 9.5 nm off Kariotahi coast (*may be a duplicate of one of 4 below*)	4	DOC	3
?	Public	2002	Offshore between Manukau and Raglan Harbours, between 8.75-14 nm	?	Du Fresne 2010	5
?	Public	2002	Offshore between Manukau and Raglan Harbours, between 8.75-14 nm	?	Du Fresne 2010	5
?	Public	2002	Offshore between Manukau and Raglan Harbours, between 8.75-14 nm	?	Du Fresne 2010	5
?	Public	2002	Offshore between Manukau and Raglan Harbours, between 8.75-14 nm	?	Du Fresne 2010	5
729	Public - 1	2011	Just north of Papanui Point (Ruapuke Beach), offshore beyond 7 nm	1	DOC	3
?	Mortality	1982	Raglan Harbour	1	DOC	4
237	DOC/MPI staff - 5	1997	Raglan Harbour, Deep water on northern side of harbour directly out from main wharf, would be able to mark spot on a map	3	DOC	3
?	Public	?	Offshore between Aotea and Kawhia harbours, near 7 nm boundary	?	Du Fresne 2010	5
?	Mortality - DNA	2000	Kawhia Harbour (DNA-confirmed Maui's)	1	DOC	4
580	Public - 0	2010	Kawhia Harbour	3	DOC	3
734	Public - 5	2011	Mohakatino, offshore beyond 12 nm	1	DOC	3
145	Public - 0	2001	80 km SW from New Plymouth (Maui A platform, 160 feet deep), offshore beyond 12 nm	1	DOC (Russel - University of Auckland)	3
808	Public - 3	2012	Maui A oil platform, offshore beyond 12 nm	1	DOC	3
810	Public - 5	2012	Patea (South Taranaki), offshore beyond 7 nm	4	DOC	3
800	Public - 3	2012	Between Kai Iwi beach and Whanganui Bar	4	DOC	3
?	Mortality - DNA	1921	Whanganui river mouth (DNA-confirmed Maui's)	1	DOC	4
?	Mortality	1988	Whanganui	1	DOC	4
362	Public - 0	1970	Manawatu beaches	5	DOC (Cawthron)	3
744	Public - 3	2011	Just off the boat club in Paraparaumu	1	DOC	3
980	Public - 1	2010	Pukerua Bay/Plimmerton	1	Reported to WWF (ID 617)	3
568	Public – 3	2010	Immediately south of Wairaka Point, Pukerua Bay	1	DOC	3
724	Public – 3	2011	Big Bay, just south of Pukerua Bay	1	DOC	3
738	Public - 2	2011	Pa Point, Plimmerton	1	DOC	3
739	Public - 2	2011	1-2 nautical miles east of Mana Island	1	DOC	3
862	Public - 1	2010	South of Mana Island (2-300m offshore)	1	Reported to WWF (ID 577)	3
?	Mortality	1978	Wellington Harbour	1	DOC	4
820	DOC/MPI staff - 3	2009	Matiu/Somes Is. wharf (NE of island), Wellington Harbour	1	DOC	3

840	Public - 1	2009	Wellington Harbour, out by Somes Island	1	Reported to WWF (ID 555)	3
816	DOC/MPI staff - 3	2009	50 m offshore from the southern tip of Matiu/Somes Island	1	DOC	3
877	Public - 0	2004	In Wellington Harbour, between Somes Island and Days Bay.	5	Reported to WWF (ID 228)	3
?	Public - 1	2004-2012	Wellington Harbour (may be a duplicate of the one above)		DOC	3
844	Public - 2	2009	off Scorching Bay, Wellington Harbour	1	Reported to WWF (ID 559)	3
359	Public - 0	1977	Wellington Heads, eastern side, a few miles north of the harbour entrance	4	DOC (Cawthron)	3
357	Public - 0	1988	Palliser Bay, east of Wellington Harbour	1	DOC (Cawthron)	3
?	Mortality	1956	Palliser Bay	1	DOC	4

Descriptions of sighting (and score notes):

145 (=0) – (None)

226 (=0) – "*Not contacted until Feb 2008, Observer was confident at the time they were hectors dolphins, had seen them several times before from his boat and on posters and had talked with DOC staff.*" (None)

237 (=0) – "Three *dolphins, saw on two separate occasions. Phone interviewed observer 17 March 2008. Observer (DOC staff) certain they were Hector's and had seen them many times previously on South Island. When queried on id, cited coloration and round dorsal.*" (Incomplete information, consulted with DOC staff from the Area and could not confirm the sighting.)

320 (=0) – "*Family who live above the South Kaipara light, used to see Maui's dolphins around the light but haven't in recent years.*" (None)

357 (=0) – "*Hector's dolphin is observed frequently in Palliser Bay, east of Wellington Harbour, by fishermen.*" (None)

359 (=0) – "*4 dolphins. Although unusual in Wellington Harbour, recent incidental sightings have been reported on the eastern side a few miles north of the Harbour entrance.*" (None)

362 (=0) – "5 *dolphins.*" (None)

447 (=0) – (None)

568 (=3) – "*The dolphin surfaced 20m or so from boat as we prepared to enter water to scuba dive. Sighting lasted less than 1 min, but was clearly either a Maui or Hector.*" (None)

573 (=0) – "P*layful, coming in close and catching a few waves*" (None)

580 (=0) – None

626 (=1) – "*Aerial Survey offshore winter 2006*" (Pre-validation system, but research sighting not public.)

627 (=1) – "*Aerial Survey offshore winter 2006*" (Pre-validation system, but research sighting not public.)

628 (=1) – "*Aerial Survey offshore winter 2006*" (Pre-validation system, but research sighting not public.)

629 (=1) – "*Aerial Survey offshore winter 2006*" (Pre-validation system, but research sighting not public.)

724 (=3) – "*Interacting with boaties and coming up to boat for about an hour.*" (Images - need to check on, but outside of current range, if photos then should be a 1.)

729 (=1) – (Ex DOC, within current range, has reported sightings before.)

734 (=5) – "*Jumped twice 10m from boat (seen for 20 sec over all) not a common dolphin but not enough conclusive evidence to say that it was a Maui's dolphin*" (Not possible to determine if Hector's/Maui's.)

738 (=2) – "*Heading in to harbour, interacting with boat, rolling under it and looking at passengers.*" (None)

739 (=2) – "*Following boat/playing around bow for approx. an hour.*" (None)

744 (=3) – "*Dolphin would stay under-water for lengthy time and then surface briefly which gave the impression that it was feeding, it was not heading in a particular direction but just moving around in the vicinity. There were lots of boats coming and going in the area and it didn't seem to mind. Also a gill net in the area.*" (None)

800 (=3) – "*Boat travelling at 25kn, rough seas one dolphin jumped out of water 10m from boat, all of dolphin out of water, got good look at dolphin. 3 other dolphins inside 20-30m of boat in wave one was clearly smaller than the others .*" (Description of colour and dorsal fin is consistent with Hector's/Maui's, but not considered

within CURRENT range of either species) -- Observer's family owned 'Dolphin Watch Marlborough. He skippered the boat for 2/5 years. Has sighted a lot of Hector's dolphins and swum with Hector's.

808 (=3) – "*Crane boom was out over water, with hook just above water. Every now and then the swell/wave would pass over hook. Maui's dolphin was sighted in wave passing over hook. By the time he got his phone out to take photo it was gone.*" (fits the description of Hector's/Maui's but outside of current range)

810 (=5) – "*Boat anchored, fishing. Dolphins swam around boat.*" (Description of dorsal fin is possibly consistent with Hector's/Maui's, but given the location, group size, and lack of other information considered not possible to confidently score)

816 (=3) – "*Lone Hector's dolphin continually approaching an anchored recreational fishing boat, often within 1-2 metres. The 2 people on board seemed oblivious to it, and sooned hauled the anchor and moved another 200 m south. Up until then, the dolphin remained near the surface (we were looking down on it from the circuit track through 8x binoculars) so that its pale body was continuously visible within 10 m of the boat. Whenever it surfaced, the small size, black convex dorsal fin and absence of a beak were easily seen. After the boat moved south, the dolphin started diving deeper (out of sight when not surfacing) and moved north, and we soon lost sight of it. Lone Hector's dolphin continually approaching an anchored recreational fishing boat, often within 1-2 metres. The 2 people on board seemed oblivious to it, and sooned hauled the anchor and moved another 200 m south. Up until then, the dolphin remained near the surface (we were looking down on it from the circuit track through 8x binoculars) so that its pale body was continuously visible within 10 m of the boat. Whenever it surfaced, the small size, black convex dorsal fin and absence of a beak were easily seen. After the boat moved south, the dolphin started diving deeper (out of sight when not surfacing) and moved north, and we soon lost sight of it. Lone Hector's dolphin continually approaching an anchored recreational fishing boat, often within 1-2 metres. The 2 people on board seemed oblivious to it, and sooned hauled the anchor and moved another 200 m south. Up until then, the dolphin remained near the surface (we were looking down on it from the circuit track through 8x binoculars) so that its pale body was continuously visible within 10 m of the boat. Whenever it surfaced, the small size, black convex dorsal fin and absence of a beak were easily seen. After the boat moved south, the dolphin started diving deeper (out of sight when not surfacing) and moved north, and we soon lost sight of it.*" (ex-Doc so confident Hector's or Maui's, however, outside current range)

820 (=3) – "*It followed the East by west ferry into the island wharf from the Days Bay direction and surfaced behind the vessel several times. It played in the vessels prop wash whilst the ferry was tied up.*" (DOC staff on Matiu Somes Island, so confident hector's or Maui's, but outside current range.)

840 (=1) – (From WWF database = ID 555, scored a 1 or 2 on the old system which translates to a 1 under the new system.)

844 (=2) – (From WWF database = ID 559, scored a 3 on the old system which translates to a 2 under the new system.)

862 (=1) – (From WWF database = ID 577, scored a 1 or 2 on the old system which translates to a 1 under the new system.)

877 (=0) – "I saw a group of about 5 or 6 dolphins that I think were Hector's Dolphins. I remember that they were smaller and rounder than other dolphins I have seen and I could see that they had distinctive white backs." (From WWF database = ID 228)

868 (=2) – "*10 dolphins observed from boat.*" (From WWF database = ID 584, scored a 3 on the old system which translates to a 2 under the new system.)

980 (=1) – *"Dove in Pukerua Bay for 3 years but only saw Maui's dolphin once however another resident said he'd seen same dolphins a few times."* (From WWF database = ID 617, Images definitely a Hector's or Maui's, land in background, appears to be off of the Plimmerton/Pukerua Bay headland. Photos saved to DM - 1245374)