workingpaper

Evaluating the Fisheries and Aquaculture Dataset

March 2011

Sustainable Future Institute Working Paper 2011/6

Authors	Resource Project Team
Prepared by	The Sustainable Future Institute, as part of *Project 2058*
Working Paper to support	Report 10: *The State of New Zealand's Resources*

Published

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ISBN 978-1-877473-61-6 (PDF).

About the Resource Project Team

The Resource Project Team comprises of Jessica Prendergast, Nicola Bradshaw, Chris Aitken, Lisa Bazalo, Jean-Charles Perquin, and Steph Versteeg. Each team member has placed a significant amount of time and effort into each Working Paper and the corresponding datasets.

Acknowledgements

The authors would like to thank Fanny Toorenburg for her invaluable help in the preparation of this Working Paper. Of great assistance were the expert reviewers who lent their expertise in externally reviewing this paper. We are also grateful to the Ministry of Fisheries for providing comprehensive data on New Zealand's fisheries and aquaculture on its website, and for advising the Institute during the preparation of this Working Paper. Naturally any errors or matters of opinion remain the responsibility of the authors

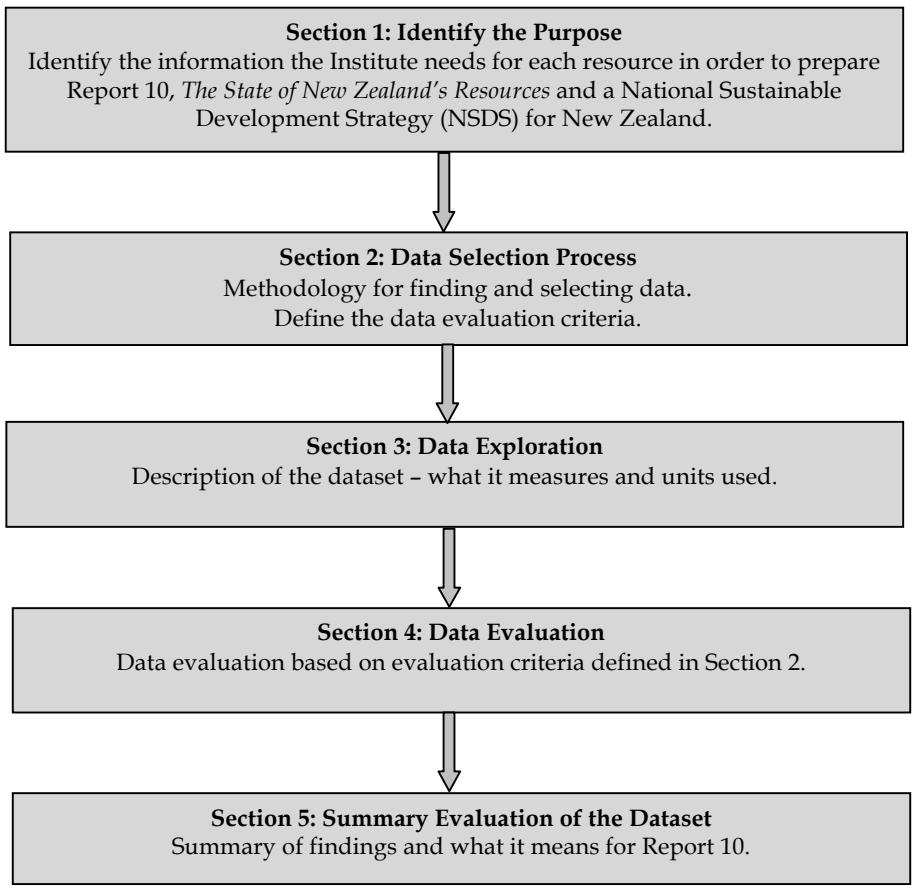
1. Purpose

This Working Paper is one of a series of 11 papers prepared as background to the Sustainable Future Institute's Report 10, *The State of New Zealand's Resources* (SFI, in press). Report 10 aims to provide an overview of available data and information covering a range of resources, and to discuss the use, availability and appropriateness of the data in the preparation of a National Sustainable Development Strategy (NSDS).

The purpose of this Working Paper is to describe the process by which the Institute collected, collated and presented a selection of data on fish capture, aquaculture, fish exports and imports, and fish stock assessment. The datasets are summarised and evaluated for completeness, accuracy, relevance, appropriateness of sources and public availability. This paper also discusses the purpose for which the data was collected by its custodians, and why the Institute has selected this data for its reporting. The content of the dataset is not interpreted or analysed; rather, our purpose is to evaluate the usefulness of this dataset for the purposes of Report 10.

Following this evaluation any gaps and resulting limitations in using the selected data are assessed, as well as its relevance and reliability in relation to the Institute's purpose of using the comprehensive series of datasets to inform the development of an NSDS for New Zealand.

Figure 1 The Five-step Process for Evaluating the Institute's Datasets



1.1 The Sustainable Future Institute

The Institute is an independently funded think tank based in Wellington, New Zealand. Earlier work by the Institute has indicated that New Zealand is well behind other developed countries on its international obligations to develop and implement a National Sustainable Development Strategy (NSDS) (SFI, 2007). It is hoped that *Project 2058* will help inform ministers, policy analysts and members of the public about key events and trends in New Zealand's past, and alternative strategies for the future. With this in mind, this Working Paper is a step towards Sustainable Future's goal of preparing an NSDS for New Zealand in 2011.

1.2 Project 2058

The strategic aim of *Project 2058* is to promote integrated long-term thinking, leadership and capacity building so that Aotearoa/New Zealand can effectively seek and create opportunities, and explore and manage risks, over the next 50 years. In order to achieve this aim, the *Project 2058* team is working to:

1. Develop a detailed understanding of the current national planning landscape, and in particular the government's ability to deliver long-term strategic sustainability thinking;
2. Develop a good working relationship with all parties that are working for and thinking about the 'long-term view';
3. Recognise the goals of iwi and hap□, and acknowledge te Tiriti o Waitangi;
4. Assess key aspects of New Zealand's society, asset base and economy in order to understand how they may shape the country's long-term future, such as government-funded science, natural and human-generated resources, the state sector and infrastructure;
5. Develop a set of four scenarios to explore and map possible futures for New Zealand;
6. Identify and analyse both New Zealand's future strengths and weaknesses, and potential international opportunities and threats;
7. Develop and describe a desirable sustainable future in detail, and
8. Prepare a *Project 2058* National Sustainable Development Strategy. (SFI, 2009: 3)

The culmination of *Project 2058*, the creation of a National Sustainable Development Strategy (NSDS), depends on having an accurate assessment of key aspects of New Zealand society. Earlier reports have dealt in particular with points 1, 3, 5 and 6 above,[1] and this Working Paper is designed to help progress the fourth point: 'Assess key aspects of New Zealand's society, asset base and economy in order to understand how they may shape the country's long-term future …'

1.3 Fisheries and Aquaculture Resources within an NSDS

Below we ask six strategic questions that drive this research. These are then expanded upon to discuss the use, availability and appropriateness of the data in the preparation of an NSDS. Without accurate, comprehensive, relevant and accessible data to answer the following questions, it will be difficult to develop and execute an informed NSDS for New Zealand.

[1] For a detailed list of published and upcoming reports, see *Project 2058 Methodology: Version 3* (SFI, 2009: 7).

- **What** are the issues facing fisheries and aquaculture in New Zealand? Are New Zealanders clear on exactly what these issues are? Does New Zealand have quality data and information to enable us to understand these issues as fully as possible? Are New Zealanders able to establish an informed understanding of the priorities?

- **Why** does New Zealand need to confront issues affecting our fisheries and aquaculture? Are there improvements that can be achieved; or practices that need to change? Are current indicators relevant and meaningful to benchmark changes over-time? What is the purpose and the benefit in taking action?

- **When** should New Zealand start to address issues which impact on New Zealand's fisheries and aquaculture? Is now the right time? Are current economic, social and environmental conditions conducive? Would it be beneficial to wait and monitor events as they evolve? Are current measures and indicators appropriate to monitor developments? Is there a risk of rushing into short-term action when a long-term approach is needed?

- **Where** do New Zealanders most need to concentrate their efforts to address New Zealand's fisheries and aquaculture issues? Which aspects of the issue should be focused on first? Where should New Zealanders begin to ensure the most beneficial and sustainable outcome? Does New Zealand have sufficient knowledge, based on accurate and appropriate data, to assess outcomes?

- **Who** must be engaged to effectively address issues facing fisheries and aquaculture in New Zealand? Who needs to be involved if New Zealand is going to successfully tackle these issues? Is data on fisheries and aquaculture in New Zealand accessible and transparent to allow those interested to be accurately informed? Are data ownership issues affecting public involvement?

- **How** should New Zealand ensure we have effective management of our fisheries and aquaculture? What is the best approach? What skills or techniques are needed? Does New Zealand have comprehensive and accurate information to enable effective management? How can New Zealand learn from international experience to assist in maximising effective and sustainable fisheries and aquaculture?

This working paper does not attempt to answer the above overarching questions. These overarching questions do however inform our purpose for Report 10 and in progressing an NSDS. Data collected for inclusion within this dataset has enabled us to understand the level of accuracy, relevance, comprehensiveness and issues of ownership that exist surrounding publicly available data in New Zealand. The above questions function as a bridge between the dataset, this Working Paper and Report 10; specific questions pertaining to how the selected Institute's dataset will inform the development of an NSDS are outlined in Table 1.

2. Data Selection Process

2.1 Methodology

Report 10a, *Designing a Framework to Monitor New Zealand's Resources* (SFI, 2010a) outlined the process through which the Institute developed the framework for collecting and presenting the data. With this framework in place, the steps towards the completion of Report 10 are: (i) building the datasets for the 11 resource types studied; (ii) evaluating the selected datasets, and (iii) reporting on the findings in relation to the Institute's aim of defining an NSDS for New Zealand. The datasets developed in Step (i) are available on our website.[2] This Working Paper is one of 11 that form Step (ii), the data evaluation. Step (iii) will be published in Report 10.

The source data for the Institute's Fisheries and Aquaculture Datasets was reproduced from a variety of static tables, extracted from the Food and Agriculture Organization of the United Nations (FAO) Fisheries and Aquaculture Department fisheries and aquaculture country profile section on their website and Statistics New Zealand's reports '*Measuring New Zealand's progress using a Sustainable Development Approach*'. The tables used are listed on the Institute's website under Project 2058 Publications and State of New Zealand's Resources (SFI, 2010b). The Institute has taken the original data and reformatted it in an Excel spreadsheet to facilitate use and analysis. The original data values have been preserved.

2.2 Sources of Data

The Institute supports the free availability of data relating to environmental statistics. With this in mind, we deliberately used only openly accessible data so that we were able to report on its availability and identify potential gaps. This enables us to report on the implications of using only freely available data, and to evaluate the information that can be extracted from these data sources.

We acknowledge that many sources of information exist on New Zealand's fisheries and aquaculture that may or may not be publicly available or easily discoverable. Crown Research Institutes (CRIs), universities, national and local government, and other private and public organisations also collect and hold data on fisheries and aquaculture.

For various reasons including privacy, commercial sensitivity, cost of dissemination or commercial sale price of the data, there are many datasets on New Zealand's resources that are inaccessible to the public. Without extensive research, funding or expertise to assist in the interpretation of the data, many others remain unavailable. The Institute has focused on open data; therefore no efforts have been made to retrieve the other datasets. This is a limitation of this project as gaps identified by the Institute could potentially be filled by these other data sources.

For example, an extensive amount of work is being carried out by the Ministry of Fisheries (MFish) with regards to updating the National Aquatic Biodiversity Information System

[2] www.sustainablefuture.info

(NABIS). NABIS is an interactive web-based mapping tool using Geographic Information System (GIS) technology to enable users to map and display New Zealand's marine biodiversity information. With NABIS, users can map information about New Zealand's marine environment, species distributions and fisheries management. NABIS is provided by the Ministry of Fisheries as part of the New Zealand Biodiversity Strategy (MFish, 2010a).

Other data on fish stocks is available from national agencies such as Statistics New Zealand, the Ministry of Fisheries, the Ministry for the Environment, the National Institute of Water and Atmosphere (NIWA) and the New Zealand Seafood Industry Council. The later holds very useful statistics on New Zealand fisheries which are also used by international organisations such as the Food and Agriculture Organization of the United Nations (FAO). Unfortunately, the data is only available on a subscription basis for a fee.

The Institute searched for and compiled its dataset in 2009. What we have selected for inclusion in this dataset and for discussion within this Working Paper reflects data which fits our purpose and was available within the environmental data landscape at the time of research.

As data availability increases rapidly on an ongoing basis, it would not be practical to include within this Working Paper all datasets relevant to fisheries and aquaculture in New Zealand. Report 10 investigates the past, present and future of the environmental data landscape in New Zealand. It also provides a list of alternative sources of information pertaining to New Zealand resources. When appropriate, we have mentioned complimentary data sources in this Working Paper.

Data on New Zealand resources is often produced and targeted to industry experts. This makes a thorough analysis and evaluation of datasets a complex task for the uninitiated. We have referred to the original source documents to support our evaluation of the datasets.

2.3 Fisheries and Aquaculture Dataset Evaluation Criteria

The Institute has developed a series of criteria to support the effective evaluation of its datasets and to consider the data in the context of our wider work programme. Each criterion is supplemented with questions to direct attention to relevant areas for consideration. The aim is to structure the analysis of each dataset in a way that is consistent and replicable across the 11 datasets. In this Working Paper, these criteria are applied to the Fisheries and Aquaculture Dataset as a whole and to the different indicators and sources that comprise the dataset.

The criteria and guiding questions are outlined in Table 1, below.

Table 1 Criteria for Evaluating the Institute's Datasets
Source: SFI, 2010

Criteria for evaluation	Guiding questions
Comprehensive time series	For how long has the data been collected? Are there gaps in the records? Are data/indicators consistent and comparable over time?
Quality data	What is the scope and range of indicators; are there any gaps? Is data comprehensive and detailed? How is data classified/categorised? Is the data local/regional/national? Is the data internationally comparable and valid? Is the data accurate – is there any sampling bias? Are error bars calculated? Is the data relevant and able to be interpreted with meaning?
Appropriate sources	How many sources are drawn on, and what are they? Who owns the data? Why, how and where is data collected/measured? Is the data original, self-reported/obtained by survey? Is the data collection and analysis informed by sound assumptions? Is data reliable, independent, verifiable and/or of international standard? Is the data subject to (external) review?
Publicly available	Is the data easy to access? Is the data located online, in publicly available reports or databases, or within an institution? Is the data freely available?

2.4 Selected Sources

In order to find possible sources of data to establish a baseline portrait of fisheries and aquaculture in New Zealand, the websites of agencies and organisations with relevant links to the fisheries and aquaculture industry were reviewed for publications that provided information and data on New Zealand's fisheries and aquaculture, including imports and exports. A search was undertaken to find online datasets and statistics, documentation on the data collection and its uses, and specific publications on fisheries and aquaculture as well as general publications such as annual reports.

The New Zealand organisations whose websites were searched included, but were not limited to, the Ministry of Fisheries (MFish), Ministry for the Environment (MfE), and Statistics New Zealand. International organisations which correlate data on New Zealand's fisheries and aquaculture were also searched.

The data for fish capture, aquaculture, fish exports and fish imports was obtained from the FAO Fisheries and Aquaculture Department, within its fisheries and aquaculture country profile sections (FAO, 2004–2010). Data compiled by the FAO is in a consistent format that enables comparative analysis between countries. It was the most complete and comprehensive source of online statistics at the time of research. Data from FAO was originally sourced from Statistics New Zealand and the New Zealand Seafood Industry Council, with the exception of FAO export and import data, where the source is not specified.

Data on fish stock assessment was obtained from Statistics New Zealand under the Measuring New Zealand's Progress programme, which collected data to create a benchmark of national resource accounts.

2.5 Purpose for which the Data was Initially Collected

Statistics on fisheries and aquaculture production and consumption are collected by producers and suppliers for their own purposes and to fulfil statutory requirements. The Ministry of Fisheries collates these statistics for policy and for fisheries and aquaculture planning purposes, including reporting under the QMS. Each stock is managed independently to help ensure the sustainable utilisation of that fishery (MFish, 2010b). Both Statistics New Zealand and the Ministry of Fisheries provide information concerning the sources of their data.

Information for fish stock assessment date was obtained from *Measuring New Zealand's Progress Using a Sustainable Development Approach: 2008* (Stats NZ, 2008), which aims to:

> … provide information about whether we are meeting our current needs, how our resources are distributed, how efficiently we are using our resources, and what impact our actions may have on the stock of resources that will be available in the future.

New Zealand has 97 species groups, within which fall 629 stocks, all subject to the New Zealand Quota Management System (QMS). Fish stocks are required to be monitored under New Zealand's Quota Management System. The QMS controls the total commercial catch from all the main fish stocks found within New Zealand's 200 nautical mile EEZ (MFish, 2010b). The QMS was introduced in 1986 to (i) prevent overfishing, which had reached dangerous levels in some inshore fisheries, and with certain species such as snapper, and (ii) improve the economic efficiency of the fishing industry (MFish, 2010c).

Data from 193 member countries is collected by the FAO to provide a global database of fisheries data for monitoring and the assessment of their state (FAO, 2007). The FAO believes that international collaboration is necessary for the effective management of fisheries (FAO, 2011a). The Fisheries and Aquaculture Department of FAO states its mission as to 'facilitate and secure the long-term sustainable development and utilization of the world's fisheries and aquaculture' (FAO, 2011b).

The Department promotes policies and strategies aimed at the sustainable and responsible development of fisheries and aquaculture in inland and marine waters. For this purpose:

- It collects, analyzes and disseminates information on the sector operations (catch, production, value, prices, fleets, farming systems, employment).
- It develops methodology, assesses and monitors the state of wild resources and elaborates resources management advice.
- It monitors and advises on the development and management of aquaculture.
- It provides socio-economic analysis of fisheries and aquaculture and assists in the elaboration of development and management polices and strategies and institutions.
- It supports and assists a network of regional fishery commissions and promotes aquaculture networks.
- It monitors and advises on technology development, fish processing, food safety and trade

(FAO, 2011b)

2.6 Additional sources

The Institute's 11 working papers, prepared as background papers to Report 10, *The State of New Zealand's Resources*, are selective in their use of specific information and data from within a broader pool of information. The boundaries set for these working papers were tightly focused on openly accessible online data available as at February 2009, the original time of data collection for the Institute's accompanying datasets. For further reading and comparisons which fall outside of our collection strategies we suggest the following additional sources. Please note that the findings of the following reports have not been included within this working paper due to the reasons outlined above, but that references to these additional sources are included in the reference list at the back of this paper:

Ministry of Fisheries (MFish), their website contains a great deal of information including: *Stock Status: Sustainability* (MFish, n.d.[a]) and *Stock Status: Catch* (MFish, n.d.[b]). These reports include sustainability information such as stock status and allowable and reported catch data. Foreign trade earnings and volumes by species 2002 to 2009 are reported in *NZ Exports: Foreign Trade – All Species* (MFish, n.d.[c]). The fishery stock assessment plenary, *The Plenary Report* (MFish, n.d.[d]), report summarises biological, fishery, stock assessment and stock status information for 80 species or species groups, each of which is split into 1-10 stocks. *The Plenary Report* takes into account the most recent data and analyses available to Fisheries Assessment Working Groups (FAWGs) and the Fisheries Assessment Plenary and also incorporates relevant analyses undertaken in previous years. The Ministry of Fisheries website enables you to search through all plenary reports since 2006.

FishServe, FishServe is the trading name of a privately owned company called Commercial Fisheries Services (CFS). CFS is a wholly owned subsidiary of SeaFIC (Seafood Industry Council). Established in 1999, FishServe provides administrative services to the New Zealand commercial fishing industry to support the 1996 Fisheries Act, information is available on

their website (FishServe, n.d.).

Statistics New Zealand, in addition to *Measuring New Zealand's Progress using a Sustainable Development Approach 2008* Statistics New Zealand also publishes the *Fish monetary stock account 1996–2009,* an annual account which presents a time series asset value of New Zealand's commercial fish resource from 1996 to 2009 (Statistics New Zealand, 2010). Asset values in this report are derived from the quota and annual catch entitlement (ACE) values of the commercial fish resource as managed under the QMS. The time series show trends in the total asset value of New Zealand's commercial fish resource and trends in the asset values of selected species, which can be utilised for analysis by government and the wider community. Also shown in this time series are exports of the highest value species.

Aquaculture NZ, this aquaculture industry body has published a selection of aquaculture farm facts for 2008 (Aquaculture New Zealand, 2010).

Seafood Industry Council (SeaFiC), the New Zealand Seafood Industry Council Ltd is owned by and works on behalf of the New Zealand seafood industry. The industry is made up of about 2,500 participating enterprises, including fishermen and aquaculturalists; and family-owned, publicly listed and joint venture seafood companies; fisheries management organisations and retailers. Its main areas of focus are in shaping policies and the industry's regulatory framework, lobbying for surety of access to fisheries, reducing tariffs, working co-operatively on fisheries management and environmental issues, and providing an avenue for funding for scientific research and value-added innovation. See their website and the *Seafood Industry Factfile* for information on the Seafood industry (SeaFiC, n.d.).

Further, although the Aquaculture Unit within the Ministry of Fisheries is the lead for aquaculture in New Zealand, aquaculture is a whole-of-government initiative which encompasses many agencies. This is because sustainable aquaculture involves a range of considerations, e.g. coastal planning, customary rights and environmental management.

3. Data Exploration

A comprehensive understanding of the state of New Zealand's fisheries and aquaculture, and any trends, is vital for future planning. In order to gain this understanding the fisheries and aquaculture dataset is divided into four categories: (i) fish capture, (ii) aquaculture, (iii) fish exports and imports, and (iv) fish stock assessment.

Table 2 Fisheries and Aquaculture Dataset Summary Table

Dataset Category	Data Custodian	Data presented	Dates	Measures	Data Reporting Frequency
Fish capture	Statistics New Zealand and New Zealand Seafood Industry Council	Fish capture quantity	1950–2007	Tonnes (t)	Annual
Aquaculture	Statistics New	Aquaculture production	1950–2007	Tonnes (t)	Annual

	Zealand and New Zealand Seafood Industry Council	quantity Aquaculture production trade value		$US000	
Fish exports and imports	Unknown - No sources indicated in FAO data	Fish exports and imports quantity Fish exports and imports trade value	1976–2006	Tonnes $US000	Annual
Fish stock assessment	Statistics New Zealand	Fish stock assessment	2006–2008	%	Annual

Fish capture

The fish capture dataset provides information on the capture quantity of fish, crustaceans, aquatic plants, miscellaneous aquatic animals, molluscs, and aquatic mammals within New Zealand's marine environment. Capture quantity is classified primarily according to these parameters, and then by specific genus. The range of dates for which the data is provided is from 1950 to 2007. The units of measurement are tonnes (t). An excerpt from the fish capture dataset is provided in Figure 2 to give an indication of the content and layout of the dataset. Data from 1952 to 2005 has been excluded for representational purposes.

Figure 2 Excerpt from the Fish Capture Dataset
Source: SFI, 2010b

Dataset	Indicator	Attribute		1950	1951	2006	2007	Data source table #
5. Fisheries & Aquaculture	5.1 Fish capture quantity	Aquatic plants	Brown seaweeds	0.00	0.00	12.00	6.00	5a
			Red seaweeds	200.00	200.00	213.00	186.00	
			Total	**200.00**	**200.00**	**225.00**	**192.00**	
		Crustaceans	Crabs, sea-spiders	0.00	0.00	307.00	247.00	
			Lobsters, spiny-rock lobsters	2,700.00	2,900.00	3,382.00	3,366.00	
			Shrimps, prawns	0.00	0.00	2.00	3.00	
			Total	**2,700.00**	**2,900.00**	**3,691.00**	**3,616.00**	

Aquaculture

The aquaculture dataset provides data on production and trade values from New Zealand's aquaculture resources. Data on production quantities extends back to 1950, and trade value has been recorded since 1984 at the earliest. Data is provided up to 2007. The data is measured in tonnes (t) and in thousands of US dollars ($US000). An excerpt from the aquaculture dataset is provided below in Figure 3, with entries from 1952 to 2005 omitted for representation purposes.

Figure 3 Excerpt from the Aquaculture Dataset
Source: SFI, 2010b

Dataset	Indicator	Attribute			1950	1951	2006	2007	Data source table #
5. Fisheries & Aquaculture	5.2 Aquaculture production quantity & trade value	Freshwater diadromous fish	Salmons, trouts, smelts	tonnes	0.00	0.00	0.00	0.00	5b
				$US000	0.00	0.00	0.00	0.00	
		Marine diadromous fish	Salmons, trouts, smelts	tonnes	0.00	0.00	7,721.00	9,400.00	
				$US000	0.00	0.00	61,681,910.85	67,742.49	
			Total fish	**tonnes**	**0.00**	**0.00**	**7,721.00**	**9,400.00**	
				$US000	**0.00**	**0.00**	**61,681,910.85**	**67,742.49**	

Fish exports and imports

In this section of the dataset, the data is first divided into exports and imports, and then by quantity and trade value. Data is measured in tonnes (t) and in thousands of US dollars ($US000). Data is provided from 1976 to 2006. An excerpt from the fish exports and imports dataset is shown in Figure 4, with entries from 1978 to 2004 omitted for representation purposes.

Figure 4 Excerpt from the Fish Exports and Imports Dataset
Source: SFI, 2010b

Dataset	Indicator	Attribute			1976	1977	2005	2006	Data source table #
5. Fisheries & Aquaculture	5.3 Fish exports quantity & trade value	Crustaceans	Crustaceans, frozen	tonnes	1,765.00	1,811.00	893.00	983.00	5c
				$US000	18,093.00	21,922.00	19,084.00	19,476.00	
			Crustaceans, not frozen	tonnes	0.00	0.00	2,229.00	2,271.00	
				$US000	0.00	0.00	75,665.00	78,843.00	
			Crustaceans, prepared or preserved	tonnes	164.00	172.00	21.00	9.00	
				$US000	910.00	1,066.00	102.00	173.00	

Fish stock assessment
The Fish stock assessment dataset provides information on the proportions of assessed fish stocks by assessment category, which relate to performance in relation to target levels set by the Ministry of Fisheries. Data is provided for 2006, 2007 and 2008. Target levels are assessed by percentages. An excerpt from the fish stock assessment dataset is provided in Figure 5.

Figure 5 Excerpt from the Fish Stock Assessment Dataset
Source: SFI, 2010b

Dataset	Indicator	Attribute			Data 2006	Data 2007	Data 2008	Data source table #
5. Fisheries & Aquaculture	5.5 Fish stock assessment	proportions of assessed fish stocks by assessment category	near or above target levels	%	51.50	44.70	35.60	5d
			probably near or above target levels		23.20	25.90	21.80	
			possibly near or above target levels		10.10	14.10	13.90	
			below target levels		15.20	15.30	28.70	

4. Data Evaluation

In this section we evaluate the data presented in the Fisheries and Aquaculture Dataset based on the evaluation criteria set in Table 1.

4.1 Comprehensive Time Series

Comprehensive data on fish capture and aquaculture from 1976
Data on fish capture and aquaculture production for many genera have been collected since 1950 and are publicly available; similarly data on exports and imports is available from 1976.

Recent data on fish stock assessment: data only available from 2006
The fish stock assessment dataset is based on a recent sustainable development reporting initiative from Statistics New Zealand (Stats NZ, 2008: 25), with data available for the years 2006, 2007 and 2008. It is encouraging to see that new data is being gathered as needs arise.

4.2 Quality Data

Scope of indicators appropriate for establishing a baseline profile of the fisheries and aquaculture industries but may need to be supported by other reports

All data reported upon is obtained from within New Zealand's 200 nautical mile Exclusive Economic Zone (EEZ), which covers an area of 4 million km^2. Thorough records of production, capture, exports and imports of New Zealand's fisheries resources are necessary for government, industry and those concerned with sustainable fisheries practices.

Accurate fish stock statistics are difficult to obtain: fish stock assessment data is based on estimates

Statistics and data on fisheries and aquaculture stocks are challenging to gather. No model to date has been capable of measuring accurately fish and aquaculture stocks in their entirety. Currently, the sole indicator relied upon is the quantity of fish captured each year. These figures are put into complex computer models based on scenarios and a wide range of variables to estimate New Zealand's underwater fish stocks.

Comparable and user-friendly indicators

Data is classified according to species and genus, and measured in tonnes, $US000 or as a percentage against target levels. The Institute believes these categorisations and measures are sufficient, due to their comparability and simplicity. Data on three datasets (excluding fish stock assessment) is provided in an internationally comparable format as it has been obtained from FAO which reports on various nations using the same indicators. This increases both its relevance and its ability to be interpreted meaningfully.

The Institute has assessed the datasets as being without obvious gaps, and with data over a large scope and range of indicators.

The Institute notes that the Ministry of Fisheries does not publish fisheries statistics online, but many use the data that it holds in the Ministry's reports. It would therefore be useful to have access to other reports to help establish a baseline portrait of the fisheries and aquaculture industries.

4.3 Appropriate Sources

Internationally comparable FAO statistics

The FAO provides country profiles that summarise its assessment of activities and trends in the fisheries for each nation profiled. The data provides an overview of the fisheries sector including economic and demographic information, development prospects, sector management, industry structure and status, and trends.

The FAO database provides an internationally coordinated alternative to the data available from national agencies. Categories are grouped under species and taxonomic groups for ease of data analysis and interpretation. FAO classifications for fish capture, aquaculture, fish export and fish import data are consistent throughout the categories, meaning the datasets are easy to navigate. At the time our research was conducted the FAO provided statistics on New Zealand fisheries and aquaculture for the period 1950 to 2007.

Since the statistics provided by the FAO are based on consistent measures across nations, it is possible to make an assessment on global status and trends in the aquaculture sector. National Aquatic Sector Overviews (NASO) and National Aquatic Legislation Overviews (NALO) are compiled by the FAO as a way of distributing information.

Data presented to meet FAO's own reporting interests

The FAO has not provided any publically available information as to whether the same guidelines for reporting are used internationally. FAO presents data fitting its specific criteria/spreadsheet layouts to meet its own reporting interests. The level to which original data provided by national agencies has been transformed to fit FAO reporting criteria is not reported.

Official statistics from Statistics New Zealand

Statistics New Zealand is the country's major source of official statistics, with the mandate of administering the Statistics Act 1975. Data specific to the fish stock assessment dataset was compiled by Statistics New Zealand for inclusion in *Measuring New Zealand's Progress Using a Sustainable Development Approach*. This data presented by Statistics New Zealand is sourced from the Ministry of Fisheries. Administrative and survey data was used in the Statistics New Zealand report, with information on specific indicators, including that on data and the source, available at the end of each topic within the report. All data used to produce graphs is available in Excel format.

4.4 Public Availability

All data publicly available

It is the aim of this project to assess publicly available data, i.e. data that is able to be accessed by parties independent of those who collect or present it. Both FAO's and Statistics New Zealand's reports fit this criterion; the reports are freely available to the public via each agency's website.

Lack of access to the official source of data for all indicators

Unfortunately, all sources cited and used in the Institute's dataset were derived from third party information provided by the Ministry of Fisheries and the New Zealand Seafood Industry Council. This means that it is not possible to know whether the original data has been modified to meet the needs of the FAO, or to access the details on data collection methodologies or models used in calculating estimates. This is a major limitation of this dataset as it does not contain original data from authoritative sources.

Additionally, it is disappointing that the Ministry of Fisheries and New Zealand Seafood Industry Council did not provide detailed data on their website at the time of this research. When the Institute was compiling the Fisheries dataset in early 2009, the New Zealand Seafood Industry Council provided other statistics but on a fee basis, hence these were not considered for inclusion within this Working Paper.

5. Summary Evaluation of the Dataset

The Institute chose data from the FAO and Statistics New Zealand to inform its upcoming Report 10 and an NSDS as they were the only freely available sources of fisheries and aquaculture data at the time of research. It is a serious limitation that source data and statistics from the Ministry of Fisheries and New Zealand Seafood Industry Council were not able to be accessed. It also impedes on our ability to comment on the methodologies, data collection and modelling methods used to produce the statistics presented. Table 3 below summarises the Institute's evaluation of the dataset.

Table 3 Summary of Fisheries and Aquaculture Data Evaluation

	Strengths	Weaknesses
Comprehensive time series	▪ Comprehensive data on fish capture and aquaculture from 1976	▪ No data pre-1950 for all indicators ▪ Recent data on fish stock assessment: data only available from 2006
Quality Data	▪ Scope of indicators are appropriate for establishing a baseline profile of the fisheries and aquaculture industries but may need to be supported by other reports ▪ Comparable and user-friendly indicators	▪ Accurate fish stocks statistics are difficult to obtain: data on fish stocks are estimates
Appropriate Sources	▪ Internationally comparable statistics (FAO) ▪ Official statistics from Statistics New Zealand	▪ Data presented to meet FAO's own reporting interests
Publicly available	▪ All data used is publically available	▪ Lack of access to the official source of data for all indicators ▪ Data presented was all that was publicly available at the time of research

The Institute acknowledges that other sources will need to be consulted in order to gain a complete and comprehensive overview of the fisheries and aquaculture industries in New Zealand. The Institute's dataset presented does not answer the questions outlined in Section 1.3, but can provide background statistics to support analysis, reporting and argumentation. If source data cannot be accessed when producing Report 10, additional reports may need to be consulted in order to support the Institute's research on fisheries and aquaculture.

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