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Towards Evaluating the Socio-economic Impacts of Changes to Queensland's Inshore Fishery Management

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Australian Government
Fisheries Research and Development Corporation

F&F

JAMES COOK UNIVERSITY
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Towards Evaluating the Socio-economic Impacts of Changes to Queensland's Inshore Fishery Management.

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List of Acronyms used in report

CRFF ……. Coral Reef Finfish Fishery

DEWHA ……. Department of Environment Water, Heritage and the Arts

DPI&F …….. Department of Primary Industries and Fisheries

ECIFF ……. East Coast Inshore Finfish Fishery

EPA …….. Environmental Protection Agency

ESD …….. Ecologically Sustainable Development

FFRC ……. Fishing and Fisheries Research Centre

FRDC …….. Fisheries Research and Development Corporation

JCU …….. James Cook University

GBRCMP……. Great Barrier Reef Coastal Marine Park

GBRMPA ……. Great Barrier Reef Marine Park Authority

MTSRF…….. Marine and Tropical Sciences Research Facility

PMS ……. Performance Measurement System

QBFP …….. Queensland Boating and Fisheries Patrol

QSIA ……. Queensland Seafood Industry Association

QSMA …….. Queensland Seafood Marketers Association

RAP …….. Representative Areas Program

Non-Technical Summary

2007/048	**Towards evaluating the socio-economic impacts of changes to Queensland's inshore fishery management.**

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OBJECTIVES:

1. Develop a set of socio-economic indicators that are appropriate to monitor over time for Queensland's east coast inshore fisheries stakeholders (i.e. recreational, charter and commercial fishers and seafood consumers).
2. Collect baseline socio-economic data for Queensland's east coast inshore fisheries stakeholders (i.e. recreational, charter and commercial fishers and seafood consumers).
3. Develop, in cooperation with fishers and managers, a practical and cost-effective socio-economic indicators monitoring system that can be used to measure and assess change in the socio-economic status of the inshore fisheries on Queensland's east coast.

NON TECHNICAL SUMMARY:

OUTCOMES ACHIEVED TO DATE

The outputs of this project include a detailed socio-economic baseline for commercial, charter and recreational fishers and seafood consumers within the Queensland East Coast Inshore Finfish Fishery (ECIFF, the 'Inshore Fishery'), prior to management change for the fishery. This baseline will contribute to an assessment of the impacts of management change on the fishery stakeholders (a Fisheries Queensland priority), and assessment of the performance of the ECIFF Management Plan (a DEWHA requirement).

The project, and this report specifically, also provides a suite of the most important and useable socio-economic indicators for use in long-term monitoring of Inshore Fishery stakeholders. The indicators will be incorporated within the Performance Measurement System (PMS) for the fishery, adding to the ecological indicators and hence more completely fulfilling the goals of Ecologically Sustainable Development (ESD). The socio-economic indicators selected in this project are fishery and sector specific; however the project adjusted and tested a process for selecting indicators, which can be applied to other case studies.

This research directly benefits Fisheries Queensland by providing a detailed baseline and a clear set of indicators selected by transparent methods by all stakeholders in the fishery. This will allow managers to implement a long-term socio-economic monitoring system, explore impacts and outcomes from management change, and more clearly integrate socio-economic factors into management decisions. This in turn benefits Inshore Fishery stakeholders by ensuring their needs are considered and integrated into management, reducing impacts of management change, and improving trust and relationships between stakeholders and managers. Greater understanding and consideration of socio-economic factors will improve socio-ecological resilience within the whole fishery.

Fishery managers and the stakeholders involved in the project were very supportive of the process and outcomes. Fisheries Queensland has provided a commitment to include socio-economic indicators in the PMS for the Inshore Fishery. This commitment ensures adoption of the indicators into their existing monitoring system, with this report providing essential guidance for the review of the PMS framework in 2010/11. Stakeholder groups are also being encouraged to contribute to indicator data collection where possible.

Previous changes in fisheries management have had significant socio-economic impacts on associated fishery stakeholders. At the start of this project, management changes were planned for Queensland's East Coast Inshore Finfish Fishery (ECIFF, the 'Inshore Fishery') in the form of new ECIFF Management arrangements, which were implemented in 2009. Relevant fishery stakeholders (Queensland Seafood Industry Association (QSIA) and Sunfish) and managers (Fisheries Queensland) expressed the need to collect baseline data prior to management change and to develop and implement monitoring of socio-economic changes following these management changes. This monitoring program would require appropriate indicators of the socio-economic environment and the collection of baseline data outlining current socio-economic trends for the recreational, charter and commercial inshore fisheries. At the suggestion of FRDC, seafood consumers were also included as stakeholders in the Inshore Fishery, given the high proportion of inshore seafood consumed on the local market.

This project aimed to develop a long-term socio-economic monitoring system based on socio-economic indicators. These indicators would allow the examination of impacts of management change on Inshore Fishery stakeholders, and monitoring of the performance of the new Inshore Fishery Management Plan through the Performance Measurement System (PMS). Monitoring of the socio-economic status of the fishery will help to ensure continued socio-economic sustainability of fishery stakeholders, fulfilling the goal of Ecologically Sustainable Development (ESD) for this fishery. The specific objectives of this project are provided above.

This was a highly collaborative project. Fishery stakeholders and Fishery and Marine Park managers were engaged in an initial workshop to develop a list of socio-economic indicators for each sector in the fishery. Together these participants developed socio-economic goals for the Inshore Fishery and the monitoring program, on which to base an initial 'wish list' of indicators for consideration.

The initial list of indicators was then incorporated into surveys of commercial, charter and recreational fishers accessing the Inshore Fishery, and Queensland east coast seafood consumers in 2008, prior to implementation of the new management arrangements for the Inshore Fishery. The baseline surveys provided an opportunity to test many of the socio-economic indicators on the initial list. The surveys and associated collation of existing data also provided a detailed socio-economic baseline for the Inshore Fishery stakeholders with which to compare post-management change. Baseline data reports for each stakeholder group are being provided to relevant stakeholder representative bodies (QSIA, the Queensland Seafood Marketers Association (QSMA), and Sunfish) and Fishery and Marine Park managers (Fisheries Queensland and the Great Barrier Reef Marine Park Authority (GBRMPA)).

Following the collection of baseline data, the indicators were again revisited by stakeholders and managers. Using the lessons and information gained from the baseline surveys, the list of indicators was further refined and reduced, to result in a list of the most important and useable indicators associated with each of the socio-economic objectives for the fishery. To do this, we adopted and adjusted a process developed by Rice and Rochet (2005). This transparent process directed dialogue and involved full participation by stakeholders to ensure indicators selected were relevant. The final suite of indicators was selected according to how well each indicator met a set of screening criteria, and how important that indicator was to each of the objectives. Final indicator selection occurred by consensus. The final list of indicators (included in this report) is being provided to relevant stakeholder representative bodies (QSIA, QSMA, CapReef and Sunfish) and Fishery and Marine Park managers (Fisheries Queensland and the GBRMPA). Summary papers will be available for the stakeholder bodies, summarising information about the importance of indicator monitoring, the benefits it can provide, and the associated final list of indicators.

Now that the project is complete with a detailed baseline and a list of selected indicators, further surveys are needed to provide a time-line for the monitoring system and to explore the impacts of management change on the fishery stakeholders. There is a commitment from Fisheries Queensland to monitor socio-economic indicators within the PMS for the Inshore Fishery, at least for the fishing sectors (cf. seafood consumers). There is also scope for stakeholder organisations to contribute to indicator data collection.

Reference points are yet to be set for each indicator or suite of indicators. This will require some thought and discussion between managers and stakeholders, perhaps more in relation to the direction or trajectory of change, rather than specific reference points. Review of the chosen indicators is also essential after a monitoring system is initiated to make sure the indicators are providing the information they are intended to, and if the goals for the fishery change.

The process adopted here to select socio-economic indicators was previously used for selecting ecological indicators. While indicators are fishery and sector specific, this project provides a test of a process for selecting socio-economic indicators which can be applied to other fisheries and sectors. There are some further developments of the process required – for instance a more robust method of summarising the criteria scores for each indicator – but overall it proved very useful in this case study and very applicable to socio-economic indicators in any fishery.

KEY WORDS:

Inshore Fishery, Queensland east-coast, socio-economic, indicators, monitoring, demographics, fisheries management.

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Background

The Queensland East Coast Inshore Finfish Fishery

Queensland's East Coast Inshore Finfish Fishery (ECIFF) – from here termed the 'Inshore Fishery' – is important to recreational, charter and commercial fishers, plus seafood consumers. The Inshore Fishery is Queensland's largest fishery in terms of number of participants and operators. Most recreational fishing in Queensland occurs in estuarine and coastal areas, with an estimated 665 000 recreational fishers active in the Inshore Fishery on the east coast in 2000 (Williams 2002). In 2001, 9% of Queensland's recreational fishing effort was undertaken on charter vessels (Henry and Lyle 2003); though it is unknown how much of this was based in the inshore region. Regarding commercial fisheries, the inshore region includes various line, net and crab fisheries, from which 925 licensed vessels reported catch on the east coast in 2002. The combined harvest from commercial and recreational sectors was estimated to be about 10,600 t of crabs and finfish in the East Coast Inshore Fishery in 2000 (Williams 2002).

Fisheries Queensland (formerly Department of Primary Industries and Fisheries, DPI&F[1]) have been planning to implement a new Queensland ECIFF Management Plan (the 'Inshore Plan'), which is now implemented. The Inshore Plan has introduced significant changes to Queensland fisheries in the area most used by Queensland recreational, charter and commercial fishers. Fisheries in Queensland have already undergone major changes with the recent implementation of the Representative Areas Program (RAP), Great Barrier Reef Coastal Marine Park (GBRCMP) and the Coral Reef Finfish Fishery (CRFF) Management Plan. The RAP and GBRCMP altered access to fisheries resources within the inshore area through new "no-take" areas previously unseen in the inshore area. In addition, many fishers left the CRFF and it is possible some of this effort was transferred to the Inshore Fishery.

Socio-economics of fisheries

Any management changes will have socio-economic consequences for Queensland fishers. Most fishery stakeholders recognise this, and agree these impacts need to be measured, understood, and mitigated when possible. Measuring the socio-economic impacts of management changes to the Inshore Fishery is listed as a priority by Fisheries Queensland. In addition, Fisheries Queensland is required by the Australian Government's Department of Environment Water, Heritage and the Arts (DEWHA) to develop a Performance Measurement System (PMS) for the Inshore Fishery, which will include assessing the social and economic performance of the fishery. This provides an opportunity to understand the socio-economic status of the fishery, and determine how this can be monitored in the long-term. Socio-economic status may be considered in terms of the overall resilience of fishers and the fishery to change, be that environment or management related, and the ongoing viability of the fishery from a socio-economic sense.

The term 'socio-economics' as used in this report is consistent with the definition provided by Smith (2008) in that it includes both social and economic factors and the relationship between the two. There are practical difficulties in separating social and

[1] Fisheries Queensland was known as 'DPI&F' at the time of the study. In some cases, it is appropriate to retain the previous acronym.

economic factors: there are social impacts of economic activities and economic impacts of social activities (Smith 2008).

Reliable methods for evaluating social and economic factors for any fishery have not yet been developed. Measuring, documenting, and mitigating socio-economic impacts of fishery management change, or whether socio-economic management goals are being achieved, has been difficult due to a lack of longitudinal socio-economic data on recreational, charter and commercial fisheries (Lahn et al. 2007). Further, there is a lack of baseline socio-economic data for the Inshore Fishery specifically. Such baseline data prior to management change is essential to monitor any benefits or impacts that occur due to management implementation. Measurement of impacts resulting from management changes can assist in estimating, and thus reducing, costs of future management changes. Baseline data can also be used to initiate and test a long-term monitoring system based on socio-economic indicators.

Socio-economic indicators

Socio-economic indicators represent key aspects of a socio-economic system that may be monitored in order to provide a guide to the state of that system at any point in time (Lockie et al. 2002). Interest in socio-economic indicators has waxed and waned over the past 70 years, but there has been renewed interest in the past decade (Sawicki 2002; Dhakal and Imura 2003; Smith 2008). Social and economic indicators have been employed in other research contexts for some time, but are a relatively recent phenomenon in marine management contexts (Lahn et al. 2007). Most effort previously has been on developing indicators related to the ecological sustainability of fishery systems. Relatively little attention has been paid to the set of potential indicators that could be used to assess the social and economic aspects of fisheries (Sabatella and Franquesa 2004). Some suggest this paradigm persisted because both government and fishing interest groups agreed to work under the paradigm that “if the biology is taken care of management will succeed” (Brinson et al. 2006). It is now well accepted that increased recognition of stakeholder needs improves the effectiveness of fisheries management (Brinson et al. 2006; Lahn et al. 2007), and that economic or social imbalances can in turn cause sustainability issues and resource imbalances (Franquesa 2001). Ecological plus economic and social indicators are required to support any ecosystem approach to fisheries, consistent with political aspirations for achieving ecological, economic and social sustainability (Jennings 2005). Accordingly there has been a growing demand for social and economic indicators from policy makers as a result of the perceived imbalance and need (Sabatella and Franquesa 2004).

Socio-economic indicator based research seeks to condense and measure socio-economic dimensions largely by defining a set of variables by which to assess the state of, or changes in, a chosen attribute, called an indicator (Lahn et al. 2007). Many papers that explore social and economic indicators do so as a means to monitor human impacts on the resource (sustainability indicators) rather than impacts of resource or management changes on the fishers or the community within the socio-ecological system (e.g. see Azar et al. 1996; Michalos 1997; Bowen and Riley 2003; DEDUCE consortium 2007). However, there is a need to include socio-economic indicators to monitor the sustainability of user groups themselves.

Socio-economic indicators provide a practical and cost-effective method for gathering information for multiple purposes, such as monitoring changes in stakeholder groups

and identifying trends in human use of resources (e.g. participation rates, demographic trends, technology used, etc) (Bowen and Riley 2003; Sabatella and Franquesa 2004; Lahn et al. 2007). They can assess or predict effects of changes in management or resource status on resource users and whether management goals are being achieved (Sabatella and Franquesa 2004; Jennings 2005; Lahn et al. 2007), contributing greater objectivity and transparency to policy evaluation (DEDUCE consortium 2007). Socio-economic indicators can incorporate and monitor stakeholder group concerns and interests into the management process (Lahn et al. 2007). Indicators should improve awareness of management failure and, ultimately, promote more effective management (Garcia et al. 2000). Indicators may also be able to identify communities that may be vulnerable to management shifts or changing access to a resource (Larcombe et al. 2002). Moreover, when monitored on a regular basis, socio-economic indicators can provide the longitudinal perspective necessary to more fully integrate socio-economic information into decision-making, policy analysis and PMS frameworks (Garcia et al. 2000; Rice and Rochet 2005). Understanding socio-economic factors can assist in producing conflict-free management regimes (Lahn et al. 2007). The purpose of the indicators and associated monitoring must be established at the outset (Bowen and Riley 2003), which will assist in indicator selection (Garcia et al. 2000; Jennings 2005).

Socio-economic indicators may include basic demographic and use patterns, but also such things as satisfaction, expectations, or participation rates for recreational fishers; profit, or measures of social well-being or resilience for charter and commercial fishers; and demand for, or satisfaction with, availability of local seafood for consumers. When these indicators are monitored over time, a change in the level of the indicator would prompt investigation by fisheries managers or other stakeholders into the cause for change. It's important to note that indicators are meant to describe what is happening, not to explain why changes occur (Moscardo and Ormsby 2004). Causes for changes in indicator status may include such things as management impacts, changes in fish stocks or habitats, or conflict between user groups.

Appropriate indicators are currently unknown and are likely to be country, region and fishery specific (Garcia et al. 2000; Dhakal and Imura 2003; Lahn et al. 2007). Some studies have listed potential indicators, but each list is specific to the goals of the monitoring system and hence not appropriate for direct duplication. Studies that do list indicators provide very divergent lists (e.g. see Franquesa 2001; Bowen and Riley 2003; Sabatella and Franquesa 2004; EconSearch 2005; Brinson et al. 2006; DEDUCE consortium 2007). Given the relatively recent introduction of the use of socio-economic indicators for marine resource use, there is no consistent or standard process to follow to identify and create indicators (Lahn et al. 2007). There is little research designed to develop and test systematic measures of variables that could be used as indicators, and little research available on the reliability, validity and sensitivity of social indicator measures (Ormsby et al. 2004).

What is known is that any chosen indicators must be able to measure the socio-economic impact of changes in the resource or management, be clear enough to all stakeholders in such a way that they don't raise any doubt regarding their reliability, and allow an assessment of costs attached to any alternative management actions (Franquesa 2001). Indicators must be based on an understanding of the current socio-economic systems (Lahn et al. 2007), and clear management goals and objectives must be defined prior to determining which indicators are most appropriate (Garcia et al. 2000; Jennings 2005; Rice and Rochet 2005; Grafton et al. 2007; Lahn et al. 2007). Further,

indicators should be selected and developed in consultation with appropriate stakeholders so that indicators and their outcomes are relevant and understood (Garcia et al. 2000; Belfiore 2003; Fraser et al. 2006; Grafton et al. 2007). The process of engaging stakeholders to select key indicators provides a valuable opportunity for stakeholder empowerment and education (Fraser et al. 2006).

Characteristics of "good" indicators include: they can be measured regularly; they are cost effective and relatively easy to measure; they are comparable over time; they are reliable, accurate and sensitive to changes, and they are easy for stakeholders to understand and managers to use (Franquesa 2001; Lockie et al. 2002; Belfiore 2003; Moscardo and Ormsby 2004). They should be linked to the outcomes being monitored and incorporated into a sound and practical management process (Belfiore 2003). A successful indicator should reduce the number of measures which normally would be required for an exact presentation of a situation and simplify the process of communication to managers, stakeholders and communities (Bowen and Riley 2003). In reality, no indicator will have all of desired properties (Dhakal and Imura 2003; Hauge et al. 2005; Jennings 2005).

Some authors suggest indicators should be chosen based on data availability (Charles et al. 2002), however others stress that while it is essential to fully utilise existing data, that data exists does not de facto mean it should be used (Bowen and Riley 2003). Further, there will also be a need to collect new types of information not currently available (Garcia et al. 2000; Lockie et al. 2002), particularly given the current paucity of socio-economic data (Dhakal and Imura 2003; Jackson et al. 2004; Lahn et al. 2007).

Selecting the right number of indicators is difficult and requires a detailed understanding of the nature of user interactions with the resource and the factors most important to the stakeholders (Ormsby et al. 2004). The numbers, type and complexity of indicators will depend on the resources available for monitoring and data compilation (Jennings 2005). To keep any model manageable and cost-effective (while still fulfilling the needs of all users), limitations must be placed on the number of indicators. There is a need to find an equilibrium between what information is necessary and the effort required compiling any data (Franquesa 2001). Too few indicators will reduce the usefulness of the data while to many indicators will overburden users with non essential information (Rice and Rochet 2005; Lahn et al. 2007). Because each indicator implies monitoring, evaluation, and reporting costs, redundant indicators, at least, should be avoided (Rice and Rochet 2005). The challenge is to identify the suite that best meets the needs in each particular application, although it is obvious that no single suite of indicators is universally the best (Rice and Rochet 2005). Importantly, the suite of indicators need to reflect the management goals that are defined the prior to data collection (Ormsby et al. 2004; Rice and Rochet 2005), and the costs of collecting and using the information relative to the benefits of management need to be determined (Grafton et al. 2007).

Socio-economic indicators project

The goal of this project was to work closely with fisheries managers and fishers to develop an appropriate set of indicators to focus on for each sector in Queensland's Inshore Fishery. This report outlines the selection of indicators for all sectors of the Queensland East Coast Inshore Finfish Fishery – i.e. commercial, charter and recreational fishers plus seafood consumers. The report also suggests ways for Fisheries Queensland and major stakeholder bodies to collect priority indicators to

ensure long-term monitoring of indicators for this fishery. Much of the data to inform the indicators outlined here were collected via this project through baseline surveys of stakeholders. The baseline data are summarised here but outlined in detail in the baseline reports associated with this project (see Tobin et al. 2010b; a; Tobin et al. 2010c; Tobin et al. 2010d).

Need

Previous changes in fisheries management have had significant socio-economic impacts on recreational, charter and commercial fisheries. For example, the Representative Areas Program (RAP) and the associated Great Barrier Reef Coastal Marine Park implemented by the Great Barrier Reef Marine Park Authority (GBRMPA) and the Environmental Protection Agency (EPA) respectively in 2004 resulted in over $220 million compensation being paid to fishers and related businesses to date. A more accurate measure of the extent of socio-economic impacts of the rezoning is unavailable, due to the lack of established methodologies to monitor such changes, and lack of baseline socio-economic data prior to implementation of the RAP.

At the start of this project, management changes were planned (most of which were implemented in March 2009) for Queensland's East Coast Inshore Finfish Fishery (ECIFF, the 'Inshore Fishery') in the form of a new ECIFF Management Plan (the 'Inshore Plan'). Relevant fisheries stakeholders (Queensland Seafood Industry Association (QSIA) and Sunfish) and managers (Fisheries Queensland) expressed the need to collect baseline data prior to management change and to develop and implement methodologies that will allow monitoring of socio-economic changes following the implementation of these management initiatives. This methodology would involve selecting appropriate indicators of the socio-economic environment and the collection of baseline data outlining the current socio-economic trends for the recreational, charter and commercial inshore fisheries. At the suggestion of FRDC, seafood consumers were also included as stakeholders in the Inshore Fishery, given the high proportion of inshore seafood consumed on the local market.

The collection of baseline socio-economic data in 2008 provided the opportunity to explore and document the status of the fishery, in terms of resilience of the fishers within, the on-going viability of the fishery, and the expectations regarding local seafood from Queensland consumers. The baseline data presented through this project (see Tobin et al. 2010b; a; Tobin et al. 2010c; Tobin et al. 2010d) provides an understanding of the socio-economic status of fishery, and will allow changes to this status and the effects of changes in inshore fisheries management to be assessed in the future. A list of socio-economic indicators was developed at an initial project workshop in 2007, and the baseline surveys aimed to 'test' many of the indicators to help determine which are most appropriate and feasible to collect in the long-term.

This report outlines the process of indicator selection, the effectiveness or limitations of many of these indicators as revealed by the baseline surveys, and the final selection or prioritisation of indicators as chosen by key stakeholders. We also provide advice on how best to ensure continued collection of key indicators, to ensure monitoring of the socio-economic status of the fishery continues.

Objectives

1. Develop a set of socio-economic indicators that are appropriate to monitor over time for Queensland's east coast inshore fisheries stakeholders (i.e. recreational, charter and commercial fishers and seafood consumers).

2. Collect baseline socio-economic data for Queensland's east coast inshore fisheries stakeholders (i.e. recreational, charter and commercial fishers and seafood consumers).

3. Develop, in cooperation with fishers and managers, a practical and cost-effective socio-economic indicators monitoring system that can be used to measure and assess change in the socio-economic status of the inshore fisheries on Queensland's east coast.

This report focuses on objectives #1 and #3. Baseline socio-economic data (objective #2) are presented in previous reports (see Tobin et al. 2010b; a; Tobin et al. 2010c; Tobin et al. 2010d), though brief summaries are provided here (Results).

There have been no changes to the objectives from the original application. All objectives have been achieved, although the development of the monitoring *system* (objective #3) is being incorporated into the existing monitoring system of Fisheries Queensland.

Methods

Given the relatively recent introduction of the use of socio-economic indicators for marine resource use, there is no consistent or standard process to follow so far (Lahn et al. 2007). A few studies have constructed a framework, or steps to follow. Garcia et al. (2000) for instance listed five steps: 1) specify the scope of the reference system; 2) develop a framework to agree on components within the system; 3) specify criteria, objectives, potential indicators and reference values; 4) choose the set of indicators and reference values; and 5) specify the method of aggregation and visualisation.

Rice and Rochet (2005) proposed a detailed process for ecological indicator selection. Their work was predicated by the recognition that each indicator has monitoring, evaluation and reporting costs, and that a few indicators selected according to clear criteria were less likely to overload decision making systems than large numbers of relatively uninformative indicators (Jennings 2005). The difficulty is in selecting those few indicators by transparent process. They provided an eight step process to select ecological indicators, listing important issues to be addressed at each step. This eight step process, which was adopted for the selection of socio-economic indicators in this project, is as follows:

1) Identify user groups and their needs, and determine operational objectives (or management goals);

2) Develop a corresponding list of candidate indicators;

3) Assign weights to 9 screening criteria for candidate indicators (see Table 1);

4) Score the indicators against the criteria;

5) Summarise scoring results;

6) Decide how many indicators are needed;

7) Make the final selection of a complimentary suite of indicators;

8) Report on the suite of indicators.

Selection of candidate indicators

Step 1) and 2): For the first two steps, we held a workshop (in September 2007) with Inshore Fishery stakeholders, including recreational, charter and commercial fishing representatives, a seafood marketing representative, fisheries and marine park managers and other researchers with interest either in inshore fisheries or indicators (see Appendix 3 for a full list of attendees). Attendees were provided with background information (Appendix 4) to assist in preparing them for the workshop.

The first step at the workshop was to develop a list of socio-economic goals for the fishery and associated monitoring system for each sector (recreational, charter and commercial fishers, plus seafood consumers). Goals were initially suggested by Fisheries Queensland at the beginning of the workshop. This draft list was then discussed, refined and developed by all workshop participants.

A ‘wish list’ of candidate indicators was then developed for each sector based on the final list of goals. Attendees were instructed to list as many indicators as possible,

keeping in mind characteristics of 'good' indicators – i.e. they can be measured regularly; they are cost effective and relatively easy to measure; they are comparable over time; they are reliable, accurate and sensitive to changes, and they are easy for managers to understand and use, and are linked to the outcomes being monitored (Franquesa 2001; Lockie et al. 2002; Belfiore 2003; Moscardo and Ormsby 2004).

The reasons for indicator selection were documented to allow a review of indicators in the future and enhance consistency over time. The importance of each indicator may change over time, so retaining the discussion and reasons for selection of indicators allows choices to be adapted without repeating the entire exercise (Rice and Rochet 2005).

Following the workshop, the workshop attendees formed an e-mail working group to prioritise which indicators were most important and their potential information source, including what information needed to be sourced by direct stakeholder surveys.

Indicator testing and collection of baseline data

Collection of baseline socio-economic data was based on the chosen indicators. These quantitative baseline surveys provided an understanding of the Inshore Fishery as it was in 2008, prior to implementation of the Inshore Plan. The surveys also served as a 'test' for many of the socio-economic indicators, in order to further the development of a long-term socio-economic indicators monitoring system for the Inshore Fishery. The findings of the baseline surveys are outlined in detail in the baseline data reports (see Tobin et al. 2010b; a; Tobin et al. 2010c; Tobin et al. 2010d) and summarised in the Results.

Following the baseline data report completion, notes were added to the indicator 'wish lists' outlining any issues we found with each indicator included in the surveys. Given the limitation in length of surveys, not all indicators on the wish list were tested. The modified wish lists were then sent to the original e-mail working group in preparation for the final workshop.

Refining the indicator list

The aim of the final workshop, held in November 2009, was to reduce the number of indicators on the 'wish list'. There is a tendency for 'wish lists' to be exhaustive, and with a limit to resources and time available to collect and report data, indicators must be prioritised to ensure any monitoring system is manageable and cost-effective. However, care should be taken in selecting the final list of indicators to ensure the needs of all users and the goals of the program are fulfilled, and that there are sufficient indicators to ensure each monitored condition is adequately represented (Ormsby et al. 2004; Rice and Rochet 2005; Lahn et al. 2007).

Final indicator selection occurred by consensus and dialogue, however a formal screening process was adopted to structure the dialogue productively (Rice and Rochet 2005). To ensure we chose the most appropriate indicators, stakeholders (see Appendix 6 for attendee list) used what we learnt from the baseline surveys, plus their own expert opinion, within the formal screening process outlined in steps 3 to 5 of the 8 step indicator selection process:

3) Assign weights to 9 screening criteria for candidate indicators (see Table 1);

4) Score the indicators against the criteria;

5) Summarise scoring results

Step 3): To assign weights to the screening criteria, workshop attendees were asked to rank each of the 9 criteria on a 1-5 scale with 5 being the most important. It was expected that different stakeholders would consider different criteria as most or least important (Rice and Rochet 2005) (e.g. managers may be most concerned about cost, while fishers may be most concerned about stakeholder awareness). To make this process more visual, attendees were each provided with 9 cards (1 for each criterion), which they placed one of the 5 rings on a large circular target, with the centre ring reserved the most important criteria. More than one criterion was allowed on each ring. Part-way through this process, the attendees decided it was more appropriate to use a 3-point scale which was adopted. The criteria ranks were then discussed and decided by consensus. Although the ranks were reduced to three (low, medium, high), the original 1-5 scores were retained (1 = low importance, 3 = medium importance, 5 = high importance) to ensure sufficient influence of the criteria of greater importance.

Table 1 Screening criteria for candidate indicators.

Screening criteria	Definition
Concreteness	Indicators should be directly observable and measureable rather than reflecting abstract properties which can only estimated indirectly.
Theoretical basis	Indicators should reflect features of ecosystems and human impacts that are relevant to the achievement of objectives. They should be based on well defined and validated theoretical links.
Stakeholder* awareness	Public understanding of the indicator should be consistent with its technical meaning.
Cost	Indicators should be cost-effective.
Measurement	Indicators should be measurable in practice and theory. They should be measureable using existing instruments, monitoring programmes and analytical tools available in the regions, and on the time scales needed to support management. They should have minimum or known bias and signal should be distinguishable from noise.
Historical data	Indicators should be supported by an existing body or time-series of data to aid interpretation of trends and to allow a realistic setting of objectives.
Sensitivity	Trends in the indicator should be sensitive to changes in the state, pressure or response that the indicator is intended to measure.
Responsiveness	Indicators should be responsive to effective management action and provide rapid and reliable feedback on the consequences of management actions.
Specificity	Indicators should respond to the properties they are intended to measure rather than to other factors and/or it should be possible to disentangle the effects of other factors from the observed response.

Adjusted from: (Jennings 2005).

* Jennings (2005) listed this criteria as ‘public’ awareness. The stakeholders involved in the workshop suggested we changed this to ‘stakeholder’ awareness given the importance of the stakeholders’ understanding the indicators rather than the general public.

Table 2 Guidelines for scoring indicators against each screening criterion.

Criteria	5	4	3	2	1
Concreteness	Indicator is directly observable, not an abstract idea		Some aspects of the indicator are abstract ideas not easily observable		Indicator is an abstract idea that cannot be observed directly.
Theoretical basis	There is a clear theoretical link between the indicator and one or more fisheries goals		The theoretical link to fisheries goals is "fuzzy"		There is no theoretical link to any fisheries goals.
Stakeholder awareness	Stakeholder understanding of indicator is completely in line with technical meaning.		Stakeholder understanding not well aligned with technical meaning.		Stakeholder understanding is quite different from the technical meaning.
Cost	Measuring and monitoring of the indicator is cost-effective		Cost of measuring and monitoring is expensive, but not out of reach.		Cost of measuring and monitoring is out of reach.
Measurement	Indicator is easy to measure, with little bias and noise		Indicator somewhat difficult to measure, and/or has some bias and noise.		Indicator very difficult to measure, and/or has a lot of bias and noise.
Historical data	Historical data available for 5+ years		Historical data, but <5 years		No historical data available.
Sensitivity	Indicator responds to small changes in the fishery.		Indicator responds to moderate changes in the fishery.		Indicator only responds to large changes in the fishery.
Responsiveness	Indicator is likely to respond quickly to changes in the fishery.		Indicator is likely to respond at a moderate pace to changes in the fishery.		Indicator is likely to respond slowly to changes in the fishery.
Specificity	Indicator responds to the properties it is intended to measure rather than to other factors and/or it is possible to disentangle the effects of other factors from the observed response.		Indicator may respond to some other properties…		Indicator unable to respond to the properties they are intended to measure and/or unable to be disentangled from the effects of other factors.
Importance	It is extremely important for stakeholders to have the information provided by this indicator		It is moderately important for stakeholders to have the information provided by this indicator		It is not at all important for stakeholders to have the information provided by this indicator

Adjusted from criteria listed by Jennings (2005).

Step 4): Attendees were then divided into two groups, according to their interest and/or knowledge, with one group focusing on the charter and recreational fishing sectors, and the other focusing on the commercial fishing and seafood consumer sectors. Each group then went through the refined 'wish lists' of indicators for their respective sectors, scoring each indicator against each of the screening criteria – e.g. if an indicator was considered easily observable, it was given a high score (5) for 'concreteness', and so on (see Table 2 for the guide on how to score against each criterion). We also added a criterion of 'importance' in an attempt to ensure we didn't end up with a list of indicators that were reliable, easy and cheap to collect but not very relevant to the goals of the fishery or monitoring system.

Step 5): The screening criteria were assigned weights according to their given rank (Step 3: weight of 1 for low importance, 3 for medium importance and 5 for high importance), and weighted scores were calculated for each indicator:

Sum of (score for each criterion X criterion weight) = *Criteria weighted score*

This score was presented as a percentage of the *ideal indicator score* (ideal score being where all criterion are scored as '5')

Criteria weighted score / Ideal indicator score X 100 = *Criteria weighted score (%)*

This procedure provides unique scores that would facilitate subsequent crossing off the lower ranks (Rice and Rochet 2005). Those indicators with the highest scores were considered the most useable.

Rice and Rochet (2005) recommended against providing simple weighted scores to compare indicators, suggesting that the approach would tend to give similar scores to indicators with similar properties, fostering selection of redundant rather than complementary indicators. They made other suggestions for scoring the indicators such as using radar plots, however this method would be problematic for comparative evaluations among many indicators (as is the case here) because only very few competing indicators could be superimposed on a single set of axes. DEDUCE consortium (2007) similarly provide a graphical way of presenting scores against five criteria for indicators; again, however, this is not possible with nine criteria and an exhaustive list of indicators. Further, the final steps in the framework should be sufficiently consultative to diffuse any need for precision of inputs early in the process (Rice and Rochet 2005).

In an attempt to reduce the problems inherent with providing simplified scores, the indicators were further sorted according to their 'importance' rank, with a higher rank indicating higher importance (1-5 scale). This importance rank was added to ensure the final result was not a long list of indicators that are easy and cost efficient to collect but not very important for the given objectives. The criteria weighted scores were further weighted by importance:

Criteria weighted score (%) X Importance rank / 5* = *Final weighted score*

To summarise the results more clearly, those indicators with an importance rank of 4 or 5, and a final weighted score of 50% or higher, were listed against the specific goals of the monitoring system for each sector.

Steps 6 and 7 (determine how many indicators are needed; and make the final selection of a complimentary suite of indicators) were listed according to their final weight against each of the socio-economic objectives for each fishery sector.

The final suite of indicators was then presented to all users (Step 8). Rice and Rochet (2005) include this step as a presentation of the data associated with the indicators – this step was not completed here, but is provided for most indicators in the baseline data reports (see Tobin et al. 2010b; a; Tobin et al. 2010c; Tobin et al. 2010d). Instead this final step is considered an opportunity to ensure the indicators and information on their selection are provided to all relevant stakeholders.

Indicator Monitoring System

Potential methods for continued monitoring of socio-economic indicators were discussed at the first workshop, and refined in discussion with Fisheries Queensland and other stakeholders.

* i.e. the highest rank. If an indicator is ranked as '5' in importance, the final weighted score will be the same as the criteria weighted score. Meaning it is considered a useable and important indicator.

Results and Discussion

Results are discussed here in order of the eight steps outlined by Rice and Rochet (2005).

Step 1) Identify user groups and their needs, and determine operational objectives / management goals

The user groups relevant to the Inshore Fishery are the main users of the resource – i.e. commercial, recreational and charter fishers and local seafood consumers – plus Inshore Fishery managers and State and Federal Marine Park managers. All of these groups have a direct interest in socio-economic information and indicators related to this fishery.

Each of these user groups were present at the initial workshop in 2007, and each worked together to develop operational objectives of a socio-economic monitoring system, related strongly to the socio-economic objectives for the Inshore Fishery. The resulting goals for each sector are shown in Table 3.

Step 2) Develop a corresponding list of candidate indicators

Based on the goals for each sector, significant discussion ensued to develop a list of corresponding indicators. We considered the list as a 'wish list' given the large number of possibilities to consider, and the lack of data testing many of these indicators prior to the baseline data surveys. We also included potential information source, to determine which indicators needed to be collected by direct fisher surveys prior to management change. Discussions relating to the indicators are included in the minutes for the initial workshop (Appendix 5).

Prior to the collection of baseline data, we prioritised these indicators (both at the workshop and via the e-mail working group) in terms of those most important to collect prior to management change, those which had no other sources of information, and those which were possible to collect within a fisher survey considering time constraints.

Table 3 Operational objectives (related to management goals) for the socio-economic indicator monitoring system for the Inshore Fishery.

Sector	Main goal	Sub-goal
Commercial fishery	1) Understand the fishery	Understand the fishery as it is now
	2) Measure the performance of fishery management	2.1 Provide stability, certainty and security
		2.2 Minimise and simplify legislation
		2.3: Ensure fair access
		2.4: Encourage a diverse fishing fleet
		2.5: Acknowledge industry role in regions
		2.6: Ensure a profitable fishery now and in the future
		2.7: Ensure efficient use of the resource
		2.8: Minimise waste
		2.9: Encourage value-adding
		2.10: Acknowledge economic contribution to regions (including long-term viability of downstream industries)
		2.11: Ensure effective education/communication
		2.12: Ensure good governance
Charter fishery	1) Understand the fishery	Understand the fishery as it is now
	2) Measure the performance of fishery management	2.1: Provide stability certainty and security
		2.2: Minimise and simplify regulations
		2.3: Acknowledge role in regional tourism
		2.4: Monitor the value of industry
		2.5: Ensure confidence in consultation
		2.6: Ensure fair access
		2.7: Ensure long-term viability of downstream industries

Sector	Main goal	Sub-goal
Charter contd..	2) Measure the performance of fishery management contd..	2.8: Monitor contribution to communities
		2.9: Ensure effective education/communication
		2.10: Ensure good governance
Recreational fishery	1) Understand the fishery	Understand the fishery as it is now
	2) Measure the performance of fishery management	2.1: Simplify regulations
		2.2: Ensure continued ability for recreational fishers to catch a fish
		2.3: Ensure fair access
		2.4: Monitor confidence in sustainable management
		2.5: Ensure confidence in consultation process
		2.6: Ensure effective communication/education
		2.7: Ensure long-term viability of downstream industries (boat and tackle shops)
		2.8: Ensure fair Access for diverse economic brackets
		2.9: Monitor contribution to communities
Seafood consumers	1) Measure impacts of management changes	1.1 Understand Queensland Seafood consumers
	2) Measure the performance of the fishery management plan post implementation	2.1 Ensure local seafood is available
		2.2 Monitor perceptions regarding fisheries management
		2.3 Monitor perceptions of recreational and commercial fishing industry
		2.4 Ensure fair Access

Baseline data

Baseline socio-economic data were collected for the Inshore Fishery stakeholders via phone surveys. Information from other sources, where available, was also collated to give a more complete baseline of the fishery. Detailed results are available in Fishing and Fisheries Research Centre reports (see Tobin et al. 2010b; a; Tobin et al. 2010c; Tobin et al. 2010d). A brief summary of the data for each sector are provided here.

A) Inshore Commercial Fishery

Demographics

Of the 93 inshore commercial fishers that completed a survey about their inshore fishing, 95% were male. Respondents were dominated by the 50-59 year age group. Most (68%) fishers are married, most (42%) had two people in their household, and most (63%) fishers did not have any children under the age of 18 years in their household. Year 10 or equivalent was the highest level of academic education achieved by the largest proportion (39%) of fishers. However, almost half (46%) of the surveyed fishers had other training, which included trades (66%) in which they had an apprenticeship (41%) or worked (24%).

Fishing Dependence

Respondents had been in the fishing industry for 28 years on average, with only five fishers who had been fishing for 5 years or less. Most surveyed fishers (86%) were owner-operators. Sixty eight percent of respondents stated that fishing was the sole source of their individual income. The percentage of household income from fishing was somewhat lower: only 44% of fishers stated 100% of their household income was from fishing. However, a majority (55%) stated fishing provided over 75% of their household income. Most (36%) respondents had a household income over $100,000 in the previous financial year (2006/07) prior to the survey. Most (61%) respondents indicated they were satisfied with their current income category to support the style of life they prefer (i.e. their nominal income).

Patterns of use

In 2007 there were 507 net fishery symbols and 1648 line fishery symbols, from which 337 net boats and 331 line boats accessed the ECIFF (Queensland Department of Primary Industries and Fisheries 2008). Approximately 5400 t of finfish were retained by commercial fishers in 2007. Harvest was dominated mullet species (estuarine), followed by shark, sea mullet (beach caught), barramundi and threadfin.

Of the surveyed fishers, 31% of South-east Queensland (SEQ) fishers but only 7% of Great Barrier Reef (GBR) region fishers received all of their fishing income for their fishing business from inshore net fishing. Most fishers (46%) received income from two types of fishing, these two usually being net fishing and crabbing (38% of all fishers; 83% of fishers who utilise two types). Many fishers (37%) received most (>75%) of their income from net fishing.

Fishers were asked to list which three species of inshore finfish contributed most to the profit from their Inshore licence in the previous 12 months. The first species listed by respondents was dominated by mullet in SEQ (48% of SEQ respondents) and barramundi in the GBR region (45% of GBR respondents). Combining the three species listed by each fisher revealed a high dependence on whiting and bream in SEQ, and

threadfin in the GBR region, showing these species are of high importance as secondary species (they were listed 2nd and 3rd in many fishers' species list).

On average, fishers' common range was 55 km long, and their extreme range was 223 km, although GBR fishers had a smaller common range (33 km, c.f. 74 km for SEQ fishers), but a larger average extreme range (257 km, c.f. 192 km for SEQ fishers). The average of the maximum distance from home port was 73 km for their common fishing area, or 173 km for their extreme range.

Most fishers (56%) sold all of their inshore finfish on the local market (e.g. in their town), particularly in the GBR region (62% c.f. 51% in SEQ). Most fishers in both regions sold over 75% of their inshore finfish product in their local area. No fishers sold inshore finfish overseas directly.

Business structure

Most surveyed fishers (76%) owned only one licence. Fishers estimated their Inshore licence value as between $10,000 and $600,000, with an average of $90,862 (SEQ average = $73,125; GBR average = $104,464) and median of $65,000. A vast majority (91%) did not owe any money on their licence.

Most fishers (31%), particularly in the GBR region (42% cf. 22% SEQ) operated two vessels in the Inshore Fishery for their fishing business. Vessels ranged in age from 0-80 years old, with an average age of 15 years, and median of 10 years; and in length from 2.4 to 19.5 m (6.7 m average). Most fishers operated vessels less than 7 m in length. Despite the small length of vessels, most (73%) were operated as primary vessels rather than dories (27%). Holding capacity ranged from 100 kg to 10 tonne (for the one 19.5 m vessel), with an average of 1.4 t, and median of 1 t. Replacement cost ranged from $2000 to $1.5 million, with an average replacement cost of $77,000, and median of $26,500. Most fishers (90%) did not owe any money on their vessel.

Economics

Gross Value of Production (GVP) for the Inshore Fishery was approximately $24 million in 2007 (Queensland Department of Primary Industries and Fisheries 2008). For surveyed fishers, average revenue for the previous financial year before the survey (2006/07) for fishers' selected Inshore licence was $77,026 (n = 78), though the average in the GBR region was higher ($87,750) than the SEQ region ($69,292). Total fishing costs incurred for the 2006/07 financial year for fishers' selected Inshore licence ranged between $1,200 and $209,000, with an average of $43,410 and median of $35,000. Fixed costs contributed from 1-80% (average 22%) of the total costs, contributing up to 20% of the total costs for most fishers. Most fishers (91%) made at least some profit in the 2006/07 financial year for their selected Inshore licence. One fisher made zero profit, and six fishers made a loss of between $1000 and $80,000. Of those respondents that made a profit (n = 71), amounts ranged from $200 to $120,000, with an average of $39,595.

Resilience

When measured via a set of 'resilience statements' developed by Marshall and Marshall (2007), inshore commercial fishers on average had 'medium' resilience, although almost half (48%) fell into the 'low' resilience category. Level of education and presence of training outside of the fishing industry were found to be significant predictors of resilience.

When considering additional indicators, fishers' resilience *within* the fishery (socio-ecological resilience) appears high: Fishers harvest a diverse range of species and markets are available for byproduct species as well as the main target species, suggesting fishers should be able to easily adapt to environmental or managerial factors that impact the availability of one inshore species by shifting their effort to readily available substitutes. Most fishers reported holding symbols for, and being dependent on, more than one fishery, meaning they are able to shift effort to other fisheries if needed (although capacity to rely more heavily on offshore fisheries is somewhat limited by current vessel size). While profit within the fishery is low, return on invested capital (ROIC) estimates are relatively high and fishers hold little or no fishing related debt, suggesting an economically viable fishery despite low profits. Resilience *outside* of the fishery (social resilience) is low, however: fishers have a low ability or desire to exit the fishery, with most fishers being older (50-59) and with a high personal and household dependence on commercial fishing. Fishers' education level is low, and despite having other training, fishing is very important to them and they believe they will still be fishing in 3 years time.

On-going socio-economic viability of the fishery is questionable: While current fishers intend to remain in the industry, there appears very low recruitment of new fishers, which is particularly pertinent in a fishery dominated by older fishers. Fishers in the GBR region also hold a low level of satisfaction regarding many aspects of their fishing – an important factor for a socially viable fishery.

Perception of Management

Commercial inshore fishers were generally supportive of current (at the time of survey) commercial regulations for the Inshore Fishery, and believed they were sufficient to ensure long-term sustainability of inshore fish stocks. Fishers believed the reasons given for suggested changes to the Inshore Fishery management arrangements were transparent and clear but did not think they were being treated fairly compared to other groups in fisheries management decisions. Fishers also did not think stricter regulations were required for commercial fishers for some inshore species, were concerned about the negative impacts of management changes on their industry and were divided in their opinion regarding whether the changes suggested in the draft plan were in the best interest of the industry. Interestingly, fishers with a higher overall resilience level (according to the resilience statements) were less likely to be concerned about negative impacts of management changes on the commercial fishing industry.

Most inshore fishers reported being involved in consultation about the draft Inshore Fishery Management Plan by attending a public meeting or completing a questionnaire or submission, and most fishers reported they would get involved in this way again in the future. However, many did not feel that their concerns were adequately addressed by these processes, perhaps contributing to fishers' concern about the impacts of the management plan on their fishery.

B) Inshore Charter Fishery

Demographics

Of the 39 inshore charter fishers that completed a survey about their inshore fishing, 92% were male. Respondents were dominated by the 40-49 year age group. Most (72%) fishers were married, and most had 2 people (33%) or 4 people (26%) in their household. Approximately half (49%) of the fishers did not have any children under the age of 18 years in their household, followed by those who had 2 people under 18 years in their household. Most charter fishers had completed high school (36% completed year 12 or equivalent), and most (67%) also had other training or experience, which included trades (70%).

Fishing Dependence

Respondents had been in the fishing industry for 10 years on average, and 11 fishers had been fishing for 5 years or less. Most surveyed fishers (92%) were owner-operators. Most GBR fishers (58%) but fewer SEQ fishers (13%) stated that fishing was the sole source of their individual income. The percentage of household income from charter fishing was somewhat lower for GBR fishers: Only 23% of GBR fishers (and 14% (n = 1) of SEQ fishers) stated 100% of their household income was from fishing. Most (42%) respondents had a household income over $100,000 in the financial year (2006/07) previous to the survey. Most respondents (60%) indicated they were satisfied with their current household income.

Patterns of use

The number of charter fishing licences held in Queensland in 2007 was 389, with 233 vessels reporting catch of Inshore Fishery species. However, a Charter Fishing Licence is not required when exclusively used in waters less than 2m deep or a waterway (Mark Lightowler, QPIF, *pers. comm.*, 21/3/2009), but charter fishers must hold a licence for waters deeper than 2 m, so it is unclear exactly how many inshore charter operators are active.

For surveyed fishers, most SEQ fishers (75%) received all of their fishing income for their fishing business from inshore finfish fishing, but half of the GBR fishers received income from two types of fishing, these two being inshore finfish and ‘other’ fishing such as reef, Spanish mackerel, or billfish fishing. The percentage of overall fishing income provided by inshore fishing varied from 5% to 100%, with an average of 78%. Most fishers (68%) received most (>75%) of their income from inshore finfish fishing.

Fishers were asked to list which three species of inshore finfish that they targeted the most in the previous 12 months. The first species listed by respondents was dominated by bream and flathead in SEQ (25% of SEQ respondents each species group) and barramundi in the GBR region (69% of GBR respondents). Combining the three species listed by each fisher revealed a high dependence on whiting in SEQ, and mangrove jack and golden snapper (previously known as fingermark) in the GBR region, showing these species are of high importance as secondary species.

On average, fishers’ common range was 67 km long, and their extreme range was 275 km. The average of the maximum distance from home port was 82 km for their common fishing area, or 244 km for their extreme range. Linear regression revealed a positive relationship between extreme range and profit.

Most fishers (87%) stated none of their clients were from the local area or town. Only one fisher from each region stated all their clients were from the local area or town. For the SEQ region, most clients were from elsewhere in Queensland (intrastate), while for the GBR region most clients were from interstate.

Business structure
Most surveyed fishers (95%) operated only one charter operation. Fishers estimated their inshore charter operation to be worth between $0 (n=2) and $800,000, with an average of $166,343 and median of $90,000.

Most fishers (59%), particularly in the GBR region (65% cf. 38% SEQ) operate one vessel in the Inshore Fishery. Vessels ranged in age from 1 to 25 years old, with an average and median age of 9 years. All SEQ fishers and most GBR fishers (90%) operated vessels less than 7 m in length. Passenger capacity of vessels ranged from 2 to 14, with an average capacity of 6 passengers. Replacement cost ranged from $35,000 to $80,000 for SEQ fishers and $17,000 to $160,000 for GBR fishers. Average replacement cost was $100,000 overall ($55,000 for SEQ; $109,000 for GBR), but the median replacement cost was half of that value ($50,000). All SEQ fishers and most GBR fishers (66%) did not owe any money on their charter vessel.

Economics
Average revenue for the previous financial year before the survey (2006/07) for fishers' selected inshore charter operation was $107,875. Total fishing costs incurred ranged between $2,000 and $450,000, with an average of $78,870. Fishing related debt repayments for vessels for the previous financial year was zero for most fishers (62%). Most fishers (70%) made at least some profit in the 2006/07 financial year: 2 fishers made zero profit, and 24% of fishers made a loss of between $6,000 and $30,000. Of those respondents that made a profit (n = 23), amounts ranged from $2,000 to $120,000, with an average of $47,325 and median of $44,000. Most fishers' profit was 26-50% of their revenue.

Resilience
For inshore charter fishers the 'resilience statements' (developed by (Marshall and Marshall 2007) on their own did not give a reliable estimate of resilience level; Hence resilience was explored through a combination of demographic, patterns of use and economic indicators as well as the resilience statements. These indicators revealed that charter fishers' resilience *within* the Inshore Fishery specifically and charter fishing in general (socio-ecological resilience) is low: GBR fishers in particular had a high dependence on a single species (barramundi) and fished in a limited area. SEQ fishers had a slightly more diverse target species list, but also fished in a very restricted area. Most fishers (50 % of GBR fishers and 75% of SEQ fishers) were also dependent solely on the Inshore Fishery, suggesting limited capacity to diversify into other fisheries if needed. Further, current estimates of only 20% return on invested capital suggest economic viability is questionable. Resilience statements revealed fishers perceive their ability to adapt as low: most fishers did not believe they were competitive enough to survive in the industry much longer, and fishers from the GBR region in particular agreed that if there are any more changes they would not survive in the industry. It is likely that diversity and reliability of clients is important for the charter fishery in determining resilience: SEQ fishers had a diverse client base, while GBR fishers were more reliant on interstate clients (48%).

Resilience *outside* of the fishery (social resilience), on the other hand, is high: Fishers had been in the industry a relatively short time (10 years) and were spread between older and younger age groups. GBR fishers were younger than SEQ fishers and were less likely to agree they were too old to find work elsewhere. Most fishers were well educated and had other training, and felt they could get work of equivalent income outside of fishing if they needed to. Most SEQ fishers had a low personal and household dependence on charter fishing. GBR fishers had a high personal dependence on charter fishing, but less dependence at a household level. Most fishers in both regions had planned for their financial security. However, while fishers may be able to adapt outside of the industry, many may prefer not to, stating they intend to remain in the industry in the next three years.

On-going socio-economic viability of the fishery is likely given the high rate of recruitment, although there is high turnover of fishers as well. While this may further support the finding that social resilience is high, the high turnover needs investigating to determine why so many fishers are exiting the fishery and how well they are adapting once they exit (to confirm social resilience). High turnover could be related to satisfaction with various aspects of fishing. Aspects fishers weren't satisfied with include the number of other commercial fishers who fish in the same area, and their clients' ability to catch a fish and the size and number of fish caught. Fishers also stated fishing quality had decreased in recent years. Further investigation is needed into these aspects and whether they are affect fishers' decision to exit the fishery.

Perception of Management

Inshore charter fishers were generally supportive of current regulation concepts, but did not agree that current (at the time of the survey) regulations were sufficient to ensure long-term sustainability of inshore fish stocks. Consequently they believed there needed to be stricter regulations on both recreational and commercial fishing, although they were concerned about the negative impacts of management change on the charter industry.

There was a current lack of engagement and social networking with inshore charter fishers: While most charter fishers were aware a draft plan was being developed and open for comment at the time of the surveys, only half got involved in public consultation and many fishers disagreed or were unsure if the reasons given for the suggested management changes were transparent or clear. In addition, most charter fishers did not speak with QPIF or their charter fishing representatives about fisheries related issues at all in the previous 12 months.

C) Inshore Recreational Fishery

Demographics

Of the 808 recreational fishers that completed a survey about their saltwater fishing, 70% were male. Respondents were predominantly over 50 years old. The largest group of fishers (34%) had two people in their household, and more than half of the fishers surveyed did not have any children under the age of 18 years in their household. The majority of recreational fishers (71%) had attended or completed high school. Almost one third of recreational fishers reported a household income over $100,000 in the previous financial year (2006/07) prior to the survey.

Patterns of Use

Of the contacted households, 21% stated they recreationally fished in Queensland in the previous 12 months (17% in SEQ; 31% in GBR). Based on these results, it is estimated that there are 343,000 fishing households on Queensland's east-coast. The majority of these households (71%) stated that they had household members that recreationally fished in saltwater habitats on Queensland's east-coast. Based on the calculation of the number of fishing households, the proportion of those that saltwater fish, and the number of household members over 15 years of age who saltwater fished, the estimated number of people who have fished in saltwater on Queensland's east-coast in the past 12 months is 637,600.

The duration of recreational fishing experience reported by respondents ranged from less than 1 year to 65 years, for fishers in the SEQ region, and from 1 to 76 years in the GBR region. The fishery is dominated by experienced fishers, with the slightly largest group of fishers from both regions fishing for 21 to 30 years. Overall, mean fishing duration was 28 years. Only 2% of respondents had been fishing for 1 year or less, and approximately 8% had been fishing for 5 years or less.

Average number of days fished was 27 days per respondent in the previous 12 months. The largest group of respondents (40%) had only fished for a total of 1 to 10 days – i.e. less than once a month – in the 12 months prior to the survey. Saltwater fishing days accounted for the majority of respondents' total number of fishing days reported for the whole year prior to the survey (i.e. >75% of the total, for 74% of fishers). Respondents showed a preference for inshore, saltwater habitats (i.e. bays, beaches, estuaries or saltwater creeks), with approximately half the respondents spending between 1 and 10 days inshore fishing during the last 12 months. Inshore fishing accounted for more than 50% of total fishing days for the majority of fishers surveyed.

The majority of fishers in the GBR region (60%), and almost half (49%) of SEQ fishers did most (75% or more) of their inshore fishing from a boat, during the previous 12 months. Nevertheless, some respondents (26% in SEQ and 17% in GBR) reported that none of their inshore fishing was done from a boat. These results suggest that access to inshore habitats both via the shore and from a boat is important for many recreational fishers. Line fishing was the most commonly used technique (>95% of fishers), but a substantial proportion of fishers (43-53%) also crabbed.

Whiting were the species group most preferred by the largest proportion of SEQ fishers (22%), followed by bream (Sparidae), flathead and mud crab (all >10%). Whiting, bream and flathead were also the three highest ranked species groups as second most preferred by SEQ fishers. The suite of species listed by GBR fishers was quite different from the SEQ fishers. Coral trout were listed as most preferred by 20% of fishers, followed by barramundi and mud crab (each >10%). The highest ranked second most preferred species (each listed by about 9% of fishers) were again coral trout, barramundi, and mud crab but also mangrove jack. Three species groups – whiting, flathead and mud crab, were highly ranked (i.e. listed by >5% of fishers) in both regions.

Economics

The total amount fishers spent on different items for their fishing trips varied greatly, with standardised expenditure ranging from a total of $0 to $857, for SEQ fishers, and $0 to $1104, for GBR fishers. Average standardised total expenditures per trip were $50 for SEQ and $34 for GBR fishers (median $21 for both regions). Half of the fishers spent

$20 or less per person per 6 standard hour fishing trip. Average values were influenced by the high expenditure of just a few fishers. Expenditure was highest for travel, including fuel.

Each of the fishers who provided expenditure data were asked if they would hypothetically have still fished if the cost of their trip increased by a randomly chosen amount ($25, $50, $100, $200, or $400) (*willingness to pay)*. Most fishers agreed they would still fish if the cost of their trip increased by $25 (83% of fishers). Still the majority, but a lower proportion of fishers agreed they would still fish if costs increased by $50 (77% of fishers), or $100 (55% of fishers). Less than half of the fishers agreed they would still fish if their costs increased by $200 or $400.

Satisfaction

Fishers surveyed in this study reported being generally satisfied with most of the aspects of saltwater fishing they were questioned about, although a substantial proportion reported declining fishing quality and fishing satisfaction over the past 5 years. This decline was related to fishers' perceptions about access to resources, quality of fishing-related facilities, number of fish caught, and crowding in areas where they fish.

Most fishers considered fishing as within their three most important recreational activities, with 31% of SEQ fishers and 38% of GBR fishers stating it is their *most* important activity. Fishers were asked about the likelihood that they would continue to fish recreationally in saltwater in the next five years: almost all respondents (97%) stated they area likely to continue.

Consumption

Most recreational fishers surveyed indicated that of the fish they harvest, they keep these for their own consumption – the majority of respondents (>60%) stated they did not give away any of the fish, crabs or prawns they harvested during recreational fishing trips in the previous 12 months.

More than 20% of respondents from both regions stated they had eaten fresh seafood more than once per week during the last year. The majority of fishers (90%) had eaten fresh seafood at least once per month. Only 2% of respondents from each region reported that they had <u>not</u> eaten any fresh seafood during the past 12 months. The two most commonly reported sources of seafood were 'self caught' (for most GBR fishers) and local seafood stores (for most SEQ fishers).

Perception of Management

There was substantial support for recreational fisheries management among saltwater recreational fishers in Queensland. In general, most fishers believed that conservation of fish populations was a high priority for fisheries management, and most believed that strict recreational fishing regulations are necessary to meet conservation goals. Most fishers also expressed support for the specific recreational fishing regulations in place at the time of the survey, including size, bag, and possession limits, closed seasons, closed areas, and no-take species. Most fishers were opposed to the introduction of recreational fishing licences.

Awareness of the proposed changes to the Inshore Fishery was low among recreational fishers, with only about half of surveyed fishers being aware there was a new plan being developed, and only about 30% being aware that a draft plan was released and opened

for comment at the time of the survey. Only a small minority (approximately 10%) of surveyed fishers reported that they had participated in the public consultation program to provide comments on the draft plan, and few fishers (approximately 30%) indicated they would likely participate in public consultation in the future. Likewise, only approximately 6% of fishers felt that their concerns were strongly considered by such consultation processes.

D) Seafood Consumers

Demographics

A total of 887 people completed a survey about their seafood consumption. Overall, approximately 91% of households contacted had consumed fresh seafood in the 12 months prior to survey. The majority of respondents were female (77%) as might be expected considering we surveyed 'main grocery buyers'. Respondents were from a range of age groups, with those from the SEQ predominantly aged over 60 years (34%), and many GBR respondents (26%) were aged 40-49 years. Consumers reported a wide range of household incomes for the previous financial year, with the modal income category being over $100,000, for both regions.

Fishing Participation

Seafood consumers showed a mixed response with respect to participating in recreational fishing. The majority of consumers from SEQ (59%) stated that no-one in their household recreationally fished, whereas 56% of GBR consumers did have a recreational fisher(s) in their household. Of those consumer households who did report recreational fishing activity, most stated that this occurred less often than once a month or while on holidays (54% SEQ, 41% GBR).

Patterns of Consumption

The proportion of respondents who had eaten fresh seafood in the past twelve months was very high (90%). The frequency of consumption of fresh seafood in the past year ranged from more than twice a week (for 4% of consumers) to less than once a month (for 16% of consumers). Most consumers reported a frequency of once a week (26%), or 2 to 3 times per month (25%).

In relation to the most recent occasion they ate fresh seafood, most SEQ consumers reported that it had been bought from a supermarket (31%), whereas most GBR consumers had obtained fresh seafood from a seafood store (35%). Seafood obtained by consumers catching it themselves, or caught by friends or family was reported by 12% of SEQ and 27% of GBR consumers.

Most consumers stated they had bought fresh seafood in the past 12 months (90%). Those consumers who stated they had not purchased fresh seafood in the past year were asked to respond to a series of statements concerning their reasons for not buying seafood: Most GBR fishers (84%) and half of the SEQ fishers stated they had access to enough seafood through their own or others' recreational fishing. Many SEQ fishers (54%) stated they did not trust the freshness of bought seafood.

Prawns were the species group most preferred by the largest proportion of consumers, from both regions (26%), followed by Atlantic salmon for SEQ consumers (listed by 11%), and coral trout for GBR consumers (listed by 15%). The largest group of

consumers (35%) stated that they had eaten their most preferred and second preference species of fresh seafood less than once a month in the past year.

Most consumers had typically bought their preferred seafood species (73% SEQ; 56% GBR). Less than 20% of SEQ consumers, and approximately 32% of GBR consumers, stated their preferred seafood species had been self-caught or caught by others. Of those consumers who reported that their preferred species had been bought, or both bought and caught, most stated that they knew the seafood was from Queensland (44% of SEQ buyers; 60% of GBR buyers). About one third of SEQ consumers and one quarter of GBR consumers did not know the origin of their bought fresh seafood.

Seafood buyers showed a strong preference (96%) for Australian seafood over imported seafood, and for Queensland seafood over any other (91%). Most buyers (65%) also stated a preference for eating seafood caught in the wild, rather than that grown in aquaculture or fish farms. Approximately 90% of buyers agreed that they preferred to buy, and 71% of buyers indicated they deliberately seek out fresh seafood caught in Queensland, and there was a high level of satisfaction (90%) with the quality of Queensland wild-caught fresh seafood.

Perception of Management
Consumers are interested in fisheries issues, although few hear about them often, and very few are involved in public consultation or are likely to get involved in the future. The level of knowledge consumers have about regulations and revision of management is very low. Consumers appear divided or unsure about whether they receive fair treatment in management decisions.

Following collection and collation of the baseline data for all sectors, any additional information regarding limitations or caveats found with indicators were added to the indicator wish lists. The resulting indicator ‘wish lists’ are shown in Appendix 7.

Step 3) Assign weights to 9 screening criteria for candidate indicators;

All attendees placed each criterion on a circular target with 5 rings, with the centre ring depicting the most important rank. There was some immediate consensus on the rank for some criterion, however most required discussion (see Appendix 8 for the minutes of the meeting). The final agreed weights are shown in Table 4.

Table 4 Ranks and associated weights assigned to each of the nine screening criteria. These ranks were agreed to by consensus within the workshop.

Criteria	Rank of importance	Weight
Concreteness	Medium	3
Theoretical basis	Medium	3
Stakeholder awareness	Low	1
Cost	High	5
Measurement	High	5
Historical data	Medium	3
Sensitivity	High	5
Responsiveness	High	5
Specificity	Medium	3

Step 4) Score the indicators against the criteria;

Disregarding the weights of the criteria for now, each indicator in the wish list was given a score for each criterion in terms of how well the indicator fulfilled the criterion. As indicators were scored, some were removed due to duplication, or were reworded to better fit current knowledge. Given the extensive list for some sectors, particularly the commercial fishing sector, attendees decided to first judge the level of importance of each indicator. In the case of the commercial sector, this took significant time and meant that only those indicators of highest importance (score of 5) received scores against the screening criteria.

Future indicator wish-lists would benefit from further refining prior to the final workshop, if possible. Stakeholder participation is beneficial in ensuring indicators are relevant, that the suite of indicators is more complete, and that stakeholders gain ownership of the indicators (Garcia et al. 2000; Belfiore 2003; Fraser et al. 2006; Grafton et al. 2007). However, participatory processes can result in a long list of indicators; this means the process of indicator selection can become quite complicated and take longer than expected (Fraser et al. 2006).

Step 5) Summarise scoring results;

The scores for each criterion within each scored indicator were entered into Microsoft Excel, and the scores were weighted according to the weights of each criteria (see Methods for more detail). An overall weighted score was determined as a percentage of the ideal score (i.e. where all criterion were rated as ‘5’). These weighted scores were also weighted according to their relative importance (weighted score x importance ÷ 5). The final scores for each indicator for each sector are shown in Appendix 9.

Step 6) Determine how many indicators are needed;

The number of indicators needed is directly related to how many can be collected affordably, how many are being collected already, and the level of complexity of the indicators considered most important (Franquesa 2001; Jennings 2005; Rice and Rochet 2005). The number of indicators needed is likely to differ between sectors, and potentially between years depending on resources available. As such, we had difficulty

placing a limitation on the specific *number* of indicators needed. Instead, we have outlined the most important according to each objective, leaving it up to Fisheries Queensland and other stakeholder groups to make the final decision. Other authors agree it is difficult and perhaps unnecessary to agree on a short list of indicators valid in every context, but that it should be possible to identify a ‘‘menu’’ of indicators from which managers could choose to self-assess their efforts (Belfiore 2003).

Step 7) Make the final selection of a complimentary suite of indicators;

The indicators with the highest final weighted (by screening criteria and importance) scores were listed against each objective for the monitoring system. Only those indicators which were ranked as 4 or 5 in importance and scored a final weighted score of 50 or over were included. In a few cases, indicators were included with lower scores to ensure each objective was monitored. Some attempt was made to ensure that if no candidate indicator performed well on all the important criteria for a given use, then the suite should try to balance strengths and weaknesses (Rice and Rochet 2005). See Table 5 – Table 8 for the final indicator lists for each sector, listed against the objectives of the monitoring system. This is the final suite of indicators recommended to stakeholders and managers.

The final selection of indicators is likely to evolve over time as management goals change, and more information on indicators is collected. The information provided in this report regarding indicator selection should allow managers and stakeholders to make informed decisions if revision of indicators is required within the review of the Performance Management System (PMS). The final selection will in the end be a political choice (Hauge et al. 2005), developed by consensus and dialogue. All steps in the framework were included in the dialogue in this instance, leading to the selection of the final suite of indicators. This means the most important stumbling blocks have been addressed. This is an improvement over a haphazard or manipulative approach, and a step towards the rigour and transparency required (Rice and Rochet 2005).

Step 8) Clearly present final suite of indicators and information on their selection to all users.

This report is for use by Fisheries Queensland, GBRMPA, QSIA, Sunfish and QSMA. To judge the quality and relevance of an indicator, users need a transparent presentation of the scientific background and of the uncertainties involved (Hauge et al. 2005). A short paper will be developed for each sector which will include the final suite of indicators and associated summarised notes for the relevant sector, information regarding the benefits of monitoring the indicators and suggestions of how the sector representative groups can help with the monitoring system. They will also be directed to the final report for further information.

Collection and collation of much of the data associated with the selected indicators has been completed prior to management change through the baseline data reports (see Tobin et al. 2010b; a; Tobin et al. 2010c; Tobin et al. 2010d).

Table 5 Final list of indicators for each monitoring goal for the inshore COMMERCIAL fishing sector.
Only those indicators with an importance rank of '5' are included in this table[2].
Indicators or sub-indicators that are listed more than once are shown in grey text following the first listing.

Goal 1) Measure the impacts of management changes

Sub-goal	Indicator	Sub-indicator	Weighted Score (%)	Notes	Data source
1.1 Understand the fishery as it is now	Demographics	Age	68	Linked to many indicators it becomes very valuable.	Could collect with licence information
		Income		Income from fishing and income from other sources gives proportional income from fishing (dependence)	
		- from fishing	89		FQ
		- from other sources (incl spouse)	50		Survey
		- notional level of income	64	Related to satisfaction with income.	Survey
		Business attitude	50	Including whether they have a formal business plan.	Survey
	Patterns of use – industry wide	Operator trends			FQ
		- Number of operators	91		
		- Number of new operators	91		
		- Avg duration	91		
		- Turn-over	91		
		- Latency within industry	86		
		% small and large operations	84	Need to define small and large operations – e.g. boat size, holding capacity, revenue, invested capital, # dories, # crew.	FQ
	Patterns of use - each operator	Symbols / quota held (details & % dependency on each)	94	Relates to diversity of fleet, adaptive capacity and ability to effort shift.	FQ
		Species targeted	100	Relates to diversity of fleet, adaptive capacity and ability to effort shift.	FQ
		- % dependency on each	70		
		- diversity (# of per operator)	100		

[2] Due to the large number of indicators on the original 'wish list' indicators of lesser importance were not scored against the screening criteria.

Sub-goal	Indicator	Sub-indicator	Weighted Score (%)	Notes	Data source
1.1 Understand the fishery..		Type of fishing gear used	100		FQ
		Ports - home port - range along coast	 75 65		FQ
		Seasonality	90		FQ
	Business structure	Licence owned/leased	59	FQ have general data, but if want to link other indicators for individual fishers, need a survey. This applies to many indicators.	FQ
		Debt owed on business	57		Survey
	Economics - industry wide	Licence / quota values	87		FQ
		Economic impact - direct and flow-on (via input-output analysis) - household income - contribution to gross state / regional production	 89 87 76		Survey, other?
		Beach price per species*	?		FQ
		GVP*	?	Measure of value of the fishery.	FQ
	Economics - individual operators	Annual turnover (gross fishing income)	92		FQ
		Invested capital (items and age/depreciation) [3]	92		Survey
		Major expenses	92		Survey
		Labour paid and unpaid	92		Survey

* Ranked as '5' in importance but not scored against the criteria.

[3] Replaced boat details. Boats would be included within invested capital. Combination of profit, major expenses (together giving revenue) and invested capital would provide estimate of return on invested capital.

Sub-goal	Indicator	Sub-indicator	Weighted score (%)	Notes	Data source
1.1 Understand the fishery..		Economic profit	92	Economic profit is calculated by deducting running costs, fixed costs, the opportunity cost of labor, the opportunity cost[4] of capital goods (including economic depreciation) from gross revenue (see Brinson et al. 2006 for more information).	Survey
		Profitability components - Catch rates	92	To measure the performance of the fishery	FQ

Goal 2) Measure the performance of the fishery management plan post-implementation. *Therefore fulfil management goals for this fishery (i.e. sub-goals here).*

Sub-goal	Indicator	Sub-indicator	Weighted score (%)	Notes	Data source
2.1 Provide stability, certainty and security	Perception of:				Survey
	- Access		89		
	- Threats to fishing		91		
	- Policy		63	(See Marshall 2007)	
	Property rights				
	- Existence of		98		FQ
	- Transferability		98		Survey
	- Perception of confidence in		83		
	Industry trends	Turn-over within industry	91		FQ
2.2 Minimise and simplify legislation	Perceptions of:				Survey
	- Regulations[5]		81		
	- Regulation complexity		81		
	Compliance rates		96		QBFP

[4] The opportunity cost of an item is defined as the value of the next best alternative (Allen et al. 2002, in Brinson et al. 2006).
[5] Perceptions of policy below, related to stability, certainty and security. Similar, but were given a different score.

Sub-goal	Indicator	Sub-indicator	Weighted score (%)	Notes	Data source
2.3 Ensure fair access	Perception of: - Access		89		Survey
	Patterns of use	Species targeted - % dependency on each - diversity (# of per operator)	100 70 100		FQ
		Ports - home port - range along coast	 75 65		FQ
	Proportion of fishable shared vs commercial only vs closed area		100		FQ, GBRMPA
2.4 Encourage a diverse fishing fleet	Type of operations	Symbols / quota held (details & % dependency on each)	94		FQ
		Species targeted - % dependency on each - diversity (# of per operator)	100 70 100		FQ
		Type of fishing gear used	100		FQ
		Ports - home port - range along coast	 75 65	 % 'localisers' vs 'roamers'	FQ
		Income - from fishing - from other sources (incl spouse) - notional level of income	 89 50 64	Level of dependency on fishing alone	 FQ Survey Survey
		Licence owned/leased	59		FQ
	Latent effort		86		FQ
2.5 Acknowledge industry role in regions	Economic contribution to gross state / regional production		76		Other?
	Economic impact - direct and flow-on (via input-output analysis)		 89		Survey, other?
	Labour paid and unpaid		92		Survey

Sub-goal	Indicator	Sub-indicator	Weighted score (%)	Notes	Data source
2.6 Ensure a profitable fishery now and in the future	Selling practices	Location of sales - % international, interstate, or local	?[6]		QSMA
		How product is handled (eg. Ice slurry)	53		QSMA, FQ
		Post harvest value adding (e.g. portion control, fillet, niche)	59		
	Economics	Annual turnover (gross fishing income)	92		FQ, Survey
	Number of operators - regional - state		91		DPI&F
	Invested capital (items and age/depreciation)		92		
	Licence / quota values		87		FQ
	Beach price		?		QSMA, FQ
	Technology progress (recent, potential, etc)		67		FQ
2.7 Ensure efficient use of the resource	Level of catch in quota fisheries		100		FQ
	Patterns of use		-	From multiple indicators above	FQ
	Proportion of fishable shared vs commercial only vs closed area		100		FQ, GBRMPA
	Markets for byproduct - current - Amount of fish wastage		 73 94		FQ, QSMA
2.8 Minimise waste	# of reported and verified incidences of discards		94		FQ, GBRMPA, DEWHA?
2.9 Encourage value-adding	Selling practices	Location of sales	?[7]		QSMA
		How product is handled (eg. Ice slurry)	53		
		Post harvest value adding (e.g. portion control, fillet, niche)	59		

[6] This was given a '4' in importance at the workshop but not scored against the criteria. While we haven't included other indicators ranked as '4', we considered this one important for this particular goal following discussion post-workshop.

[7] This was given a '4' in importance at the workshop but not scored against the criteria. While we haven't included other indicators ranked as '4', we considered this one important for this particular goal following discussion post-workshop.

Sub-goal	Indicator	Sub-indicator	Weighted score (%)	Notes	Data source
	Markets for byproduct				FQ, QSMA
	- current		73		
	- Amount of fish wastage		94		
	Beach price		?		QSMA
2.10 Acknowledge economic contribution to regions	Economic impact				Survey, other?
	- direct and flow-on (via input-output analysis)		89		
	Labour paid and unpaid		92		
	Number of marketers / processors		75		?
	Health of the commercial industry	See economic indicators above	-	If commercial industry is healthy, related businesses will be.	FQ, Survey
2.11 Ensure effective education/ communication	Compliance rates		96		QBFP
	Social networks	Contact with FQ/QSIA	54		Survey, FQ
2.12 Ensure good governance	Perceptions of:			Good governance = people's confidence in ability of managers to manage the fishery sustainably according to what community finds acceptable. Relates directly to public support for management (DEDUCE consortium 2007).	Survey
	- Policy		63		
	- Transparency in decision making		63		
	- Institutional cooperation		63		
	- Fair allocations		63		
	Fishers' confidence in agencies		63		Survey

Table 6 Final list of indicators for each monitoring goal for the inshore CHARTER fishing sector.
Only those indicators with an importance rank of '4' or '5' and an overall weighted score of 50 or above are included in this table.
Indicators or sub-indicators that are listed more than once are shown in grey text following the first listing.

Goal 1) Measure impacts of management changes.

Sub-goal	Indicator	Sub-indicator	Weighted score (%)	Notes	Data source
1.1 Understand the fishery as it is now	Demographics	Age	69	FQ could collect much of this from licence applications	Survey
		Income - from fishing - from other sources (incl spouse) - satisfaction with income	 77 72 65	Dependency on the fishery.	Survey
		Length of time in industry	69	Related to resilience.	Survey
	Patterns of use – industry wide	Operator trends - Number of operators - Regional distribution of operators - Number of new operators - Average duration - Turn-over	82	All scored together. Up to managers to decided which of these most important. Same for all grouped indicators and sub-indicators.	FQ, Survey
		Diversity of operations - % small and large - % extended and day trips - % inshore only vs diverse	91	Need to define small and large operations – e.g. boat size, carrying capacity, revenue, invested capital...	FQ, Survey
	Patterns of use - each operator	Permits held - details - % dependency on each	91	Relates to diversity of fleet, adaptive capacity and ability to effort shift.	FQ, Survey
		Species targeted - % dependency on each - diversity	91	Relates to diversity of fleet, adaptive capacity and ability to effort shift.	FQ, Survey
		Type of fishing - gear used - habitat - % use / preferred	91		FQ, Survey

Sub-goal	Indicator	Sub-indicator	Weighted score (%)	Notes	Data source
		Ports - home port - # ports used - distance travelled from port - range along coast	91		FQ
		Trips - avg number of clients per trip - avg number sites visited per trip	91		FQ, Survey
	Business structure	Boats: - Number of boats - Length of largest boat - Age of boats - Replacement value - Boat owned/debt owed – amt?	56		Survey
	Economics - industry wide	GVP	60		FQ
	Economics - individual operators	Annual turnover Annual profit Invested capital Return on investment	62		FQ, Survey
		Costs - Trip price - fixed (mooring, insurance, etc) - variable (fuel, bait, gear, maintenance) - Debt	66		Survey

Goal 2) Measure the performance of the fishery management plan post-implementation. *Therefore fulfil management goals for this fishery (i.e. sub-goals here).*

Sub-goal	Indicator	Sub-indicator	Weighted score (%)	Notes	Data source
2.1 Provide stability, certainty and security	Perceptions of: - Access (now and future goals) - Competition between and within sectors - Income and costs - CPUE over time - Threats to fishing		 89 89 89 89 89		Survey
	Resilience of fishers	How long fishers intend to remain in industry What would make them leave? Importance of fishing Perception of risk Ability to plan, learn and re-organise Ability to cope Level of interest in change	59	(See Marshall and Marshall 2007for ways to measure resilience)	Survey
2.2 Minimise and simplify regulations	Perceptions of regulations and complexity	Perceptions of: - Regulation concepts - Current management - Need for new management - Regulations' complexity	 89 89 89 89		Survey
2.3 Acknowledge role in regional tourism	Origin of clients - % tourist vs local - # of tourists brought into the region Tourist preferences		49	Ranked as '4' in importance, but criteria rated low due to difficulty in measurement and lack of historical data	Tourism Qld and Tourism Aus
2.4 Monitor the value of industry	GVP		60		FQ

Sub-goal	Indicator	Sub-indicator	Weighted score (%)	Notes	Data source
2.5 Ensure confidence in consultation	Participation in consultation Satisfaction with consultation Likelihood of future participation		61		Survey
	Perceived impact of management acceptable / understood		89		Survey
2.6 Ensure fair access	Perceived volume of user conflict (within/between sectors)		71		Survey
	Proportion of fishable shared vs recreational only vs closed area		98		FQ, GBRMPA
2.7 Ensure long-term viability of downstream industries	Health of charter sector	See economic and patterns of use indicators above	-	If charter industry is healthy, related businesses will be.	FQ
2.8 Monitor contribution to communities	Direct employment from industry		65		Govt records?
	Economic impact - regional, state		51		?
2.9 Ensure effective education/ communication	Social networks	Contact with charter rep / QPIF	52		Survey
	Perceptions of fishers re education / communication	Education / communication Information sources Trusted sources	92 92 92		Survey
2.10 Ensure good governance	Perceptions of: - Policy - Transparency in decision making* - Fair allocations*		 89 ? ?	Good governance = people's confidence in ability of managers to manage the fishery sustainably according to what community finds acceptable.	Survey
	Fishers' confidence in agencies*		?		

* These were ranked as '4' in importance but not scored against the criteria.

Table 7 Final list of indicators for each monitoring goal for the inshore RECREATIONAL fishing sector.
Only those indicators with an importance rank of '4' or '5' and an overall weighted score of 50 or above are included in this table.
Note: Indicators or sub-indicators that are listed more than once are shown in grey text following the first listing.

Goal 1) Measure impacts of management changes.

Sub-goal	Indicator	Sub-indicator	Weighted score (%)	Notes	Data source
1.1 Understand the fishery as it is now	Demographics	Age	64	Related to diversity	RFISH
		Gender	64		
	Patterns of use – industry wide	Number of fishers Number of new fishers	88	Sustainability (including retention) and recruitment to the fishery	RFISH
		Overall fishing effort (or distribution of effort)	75		
		Sp harvest rate	74		
	Patterns of use - each fisher	Trips - Frequency - Length - Seasonality	 95 95 95	All scored the same in this group. Up to managers to decided which of these most important. Same for all grouped indicators and sub-indicators.	RFISH
		Ports - main port - # ports used - distance travelled from port	 54 54 54	Some available from RFISH. Survey required for some.	RFISH?
		Type of fishing - boat/shore - gear used – bait, lure, etc	 70 70		RFISH
		Preferred species	66		RFISH
		Importance of: - number of fish - size of fish	 66 66	Motivations	RFISH
		Habitat preferred - salt/fresh - inshore/offshore - % fishing time inshore	 57 57 57		Survey
		Utilisation of catches - % own use vs give to family/friends	81		Survey

Sub-goal	Indicator	Sub-indicator	Weighted score (%)	Notes	Data source
	Economics	Expenditure	64		Survey, RFISH
		Value of the fishery	46[8]	Clarity needed on how to measure	Survey, FQ?
	Social	Satisfaction	71		Survey, RFISH?
		Centrality to lifestyle	61	(See Sutton 2006)	
		Amount of time available for fishing	59		
		Factors affecting fishing participation	56		
		2nd best use of time after fishing	56		
		Reasons for stopping fishing	56	(See Sutton et al. 2009)	

Goal 2) Measure the performance of the fishery management plan post-implementation. *Therefore fulfil management goals for this fishery (i.e. sub-goals here).*

Sub-goal	Indicator	Sub-indicator	Weighted score (%)	Notes	Data source
2.1 Simplify regulations	Perception of:				Survey
		- Current regulations	89		
		- Need for	89		
		- Confidence in	89		
		- Availability of information for	89		
		- Support for	89		
		- Complexity or regulations	89		
2.2 Ensure continued ability for recreational fishers to catch a fish	Perception of:				Survey
		- ability to catch a fish on a given trip	89		
		- change in satisfaction	89		
		- CPUE / fishing quality over time	89		

[8] Ranked as '5' in importance but scored low according to screening criteria due to low scores in measurement, stakeholder understanding and historical data. Included here due to proximity to 50%.

Sub-goal	Indicator	Sub-indicator	Weighted score (%)	Notes	Data source
2.3 Ensure fair access	Perception of: - Access - Competition between and within sectors - Threats to fishing		 89 89 89		Survey
	Patterns of use		-	Multiple indicators above	RFISH
	Proportion of fishable shared vs recreational only vs closed area		98		FQ, GBRMPA
	Anglers' expectations and satisfaction with amenities		71		Survey
2.4 Monitor confidence in sustainable management	Perception of current regulations - Need for - Confidence in - Availability of information for - Support for - Complexity of		 89 89 89 89 89		Survey
2.5 Ensure confidence in consultation process	Participation in consultation Satisfaction with consultation Likelihood of future participation in consultation		61	FQ will have idea of numbers participating, but need survey to link participation with satisfaction and likelihood of future participation.	Survey
	Perception of impact of management – acceptable / understood		89		Survey
2.6 Ensure effective communication / education	Perceptions of fishers re: - Education/communication - Main information sources - Trusted sources		 89 89 89		Survey
2.7 Ensure long-term viability of downstream industries	Number of boat registrations (minus those that don't fish ~ 25%- BS)		88		GBRMPA
	Health of recreational sector	Participation and diversity	88	Multiple indicators above. Healthy recreational fishery will mean healthy support industries.	RFISH

2.8 Ensure fair access for diverse economic brackets	Diversity of demographics	64	Multiple indicators above.	RFISH
	Diversity in patterns of use	68	Multiple indicators above.	RFISH
2.9 Monitor contribution to communities	Expenditure - Regional - State	 64 64		RFISH - Jackie Robinson
	Facilities	71		Council?

Table 8 Final list of indicators for each monitoring goal for Queensland Seafood CONSUMERS.
Only those indicators with an importance rank of '4' or '5' and an overall weighted score of 50 or above are included in this table.
Note: Indicators or sub-indicators that are listed more than once are shown in grey text following the first listing.

Goal 1) Measure impacts of management changes.

Sub-goal	Indicator	Sub-indicator	Weighted score (%)	Notes	Data source
1.1 Understand Queensland seafood consumers	Demographics	Age	68	These may be correlated with purchasing habits, and therefore may change over time as the population changes	Survey
		Household income	68		
		Family structure	55		
		Stage in lifecycle	55		
	Patterns of consumption	How much		Define time frame. Suggest previous 12 months.	QSMA
		- quantity	84		
		- frequency	84		
		Species			Survey
		- preferred	73		
		- import / local	65		
		- consumed and preferred	75		
		- willingness to pay for local and/or wild-caught	62		
		Seafood source		QSMA should have information on where most seafood purchased, including local	Survey, QSMA?
		- most recent	65		
		- bought / not bought	65		
		Price			QSMA, Survey
		- paid	55		
		- willingness-to-pay	62		
		Willingness to pay for ecologically sustainable fisheries and eco-labelling	78		Survey
	Perceptions of fisheries	of commercial fisheries	78		Survey
		of fisheries management			
		- confidence in	75		
		How perceptions affect their purchasing behaviour	66		

Goal 2) Measure the performance of the fishery management plan post-implementation. *Therefore fulfil management goals for this fishery (i.e. sub-goals here).*

Sub-goal	Indicator	Sub-indicator	Weighted score (%)	Notes	Data source
2.1 Ensure local seafood is available	Consumer perception of availability of local seafood		65		Survey
	Consumer demand	Species	55		Survey
		Quality	68		
		Value	55		
	Satisfaction of demand		81		Survey
2.2 Monitor perceptions regarding fisheries management	Perceptions of fisheries management - confidence in		75		Survey
	How perceptions affect their purchasing behaviour		66		
2.3 Monitor perceptions of recreational and commercial fishing industry	Perceptions of these fisheries[9]		78		Survey
	How this affects their purchasing behaviour		66		
2.4 Ensure fair access	Patterns of consumption (see above)		-		Survey
	Perceptions of consumers	Local seafood availability	65		
		Satisfaction of demand	81		

[9] Previous indicator was for perception of commercial fisheries only. Perception of recreational fisheries not considered important (ranked '3'). It's up to managers / QSMA to decide if this importance changes in light of this goal.

Indicator Monitoring System

Indicators need to be monitored over time to describe trends, and to monitor the evolution across time of changes in resources or management measures. Management agencies should ensure a systematic compilation of at least part of the information used in order to guarantee the continuity of the task (Franquesa 2001; Jennings 2005). Other stakeholder groups may assist in data compilation if possible.

Indicator monitoring will be simpler for some sectors than others, depending on the availability of existing programs and data. Data availability and their quality and quantity vary greatly between fisheries and between fishing sectors (Garcia et al. 2000; Jennings 2005). First, use should be made of existing data and programmes of data collection and information (Garcia et al. 2000; Jennings 2005), such as Fisheries Queensland CFISH and RFISH programs. However, there is also the potential and need to use existing information that is not generally compiled or reported, such as information from fishers themselves, or fishery stakeholders groups such as QSIA, QSMA, and Sunfish.

Some authors suggest there are numerous disadvantages to using solely available data for social indicators (Jackson et al. 2004) and there will also be a need to collect new types of information not currently available (Garcia et al. 2000). Longitudinal stakeholder surveys are the most likely tool, which can also be supplemented by focus groups if needed. Surveys, although difficult and expensive, may be the only way to understand the dynamics between social, economic, and ecological factors (Jackson et al. 2004). While logbook data, for instance, may provide an overview of the fishery behaviour, only surveys can link behaviour with demographics, motivations, satisfaction, and attributes of resilience.

For the commercial fishing sector most of the indicators selected are collected through the licensing and logbook system (CFISH) already in place within Fisheries Queensland. There is now regular monitoring is a commitment from Fisheries Queensland to also collate available socio-economic data. There are some additional indicators which could be collected when fishers pay licence fees, or by a directed survey on an annual or bi-annual basis. It may be possible to link indicator suites to individual fishers within Fisheries Queensland, although privacy issues will prevent others from doing this.

For recreational fishers, the RFISH surveys are re-commencing this year (2010), providing an opportunity to collect many of the indicators for the recreational fishing sector, particularly within the ‘exit’ surveys that will be completed in 2011: The exit surveys are conducted with fishers who participate in the RFISH program. This report and the baseline data report for the recreational sector (Tobin et al. 2010a) are being provided to the Fisheries Queensland staff who co-ordinate the RFISH program. Some discussion has already been held with those staff. Monitoring of trends in the recreational sector would be simpler with a recreational licensing system, if it exists in the future, not only to outline general trends, but also to provide a sampling framework for directed surveys. Current support for recreational licences is low at present, however (see Tobin et al. 2010a). However, random telephone surveys of the population are becoming less representative and more expensive as phone lists become out of date and more people favour mobile phones over landlines.

The charter fishing sector is more challenging to monitor in the Inshore Fishery given the lack of compulsory licensing and logbook completion for operators fishing in waters less

than 2 m deep or a waterway (Mark Lightowler, Fisheries Queensland, *pers. comm.*, 21/3/2009). Most Inshore Charter fishers apparently do hold a licence and complete logbooks, however, providing an opportunity to collate available information, and for additional information collection opportunities either through the licensing system or a directed survey.

For the three fishing sectors in the Inshore Fishery there is an existing monitoring system (the Performance Measurement System PMS), and a commitment from Fisheries Queensland to monitor socio-economic indicators within this system. Further, Fisheries Queensland has agreed to review the socio-economic indicators within the PMS in the 2010/11 financial year, using this report as a guide. The PI of this project will be involved in the PMS review (Mark Lightowler, Fisheries Queensland, *pers. comm*., 15/04/10).

Seafood consumers are not included in the PMS at this stage, and they will be the most challenging to monitor given specific surveys will be required to collect almost all of the indicators. Hopefully, the value of the data in the baseline data reports will encourage Fisheries Queensland to continue collection data for these socio-economic indicators for all Inshore Fishery stakeholders, including Queensland seafood consumers. Given the value of the data to the QSMA, it is hoped that organisation is able to assist Fisheries Queensland with information collection. Certainly QSMA has been very supportive of the project to date.

Not decided upon in this monitoring system is the setting of reference points for each indicator. In some cases a reference point may not be specified, but instead a required trajectory or direction guides decision making. The debates over setting reference points, trajectories or directions, and taking management action, will long and difficult and heavily influenced by short-term economic and social concerns (Garcia et al. 2000; Jennings 2005). The frequency of data collection for each indicator has also not been decided. Frequency of collection will vary between indicators. Fisheries Queensland currently collates information on an annual basis in their Status Reports, however not all indicators may need to be collected within that time frame. Some can be collected/ collated each year (e.g. information from CFISH logbooks / licence frames), while others will require dedicated surveys, perhaps every 2 to 5 years. The frequency of collecting for the fishing sectors at least will be decided in the review of the PMS.

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Benefits and adoption

This research directly benefits the Inshore Fishery managers who will adopt the findings from this project within their long-term PMS monitoring system for the Inshore Fishery. This research provides a clear set of indicators selected by transparent methods by all stakeholders in the fishery. Queensland fisheries are managed under the principles of Ecologically Sustainable Development (ESD) (Department of Employment Economic Development and Innovation 2009); The socio-economic indicators, when monitored on a regular basis, will further assist managers by helping ensure all Inshore Fishery sectors remain socially and economically sustainable, making meeting the goal of ESD more complete (Jennings 2005; Lahn et al. 2007). Prior fisheries management has focussed almost completely on biological sustainability, assuming economic and social sustainability will follow (Brinson et al. 2006). Through the monitoring system, managers will be able to clearly monitor whether changes to management will affect, or are affecting, fishers; whether social and economic goals for the fishery are being met (Sabatella and Franquesa 2004; Jennings 2005; Lahn et al. 2007); and whether the fishing sectors are socio-economically resilient to change (Marshall and Marshall 2007).

Some of the indicators will also provide alternatives to biological indicators for the fishery: for instance a change in commercial fisher behaviour may indicate a change in a resource before a biological indicator detects the change (Charles et al. 2002). This provides benefits to managers via rapid feedback about biological issues, has the potential to improve communication between fishers and managers, and by including fisher knowledge more clearly in fisheries management fosters the role of stewardship from fishery stakeholders (Fraser et al. 2006).

A socio-economic indicator monitoring system can provide the longitudinal perspective necessary to more fully integrate socio-economic information into decision-making (Garcia et al. 2000; Rice and Rochet 2005), providing benefits to fishery and Marine Park managers as well as fishery stakeholders. Further, with fishery managers more clearly and transparently accounting for socio-economic goals, and monitoring the outcomes of such goals, all fishery sectors benefit from the research. Fishers benefit from having their needs more clearly considered and included in the management system. Consideration of socio-economic status and needs prior to management change will help impacts of management changes to be understood, predicted, and minimised (Lahn et al. 2007). Further, greater understanding and consideration of socio-economic factors will improve socio-ecological resilience within the whole fishery by providing understanding of the diversity of social and economic factors that exist in, and drive, the socio-ecological system (Lahn et al. 2007; Marshall 2007; Marshall 2008; Cinner et al. 2009).

The benefits of this research for managers and fishers are more related to non-market benefits and continued sustainability. For consumers, however, there is potential for improvement in market penetration and user satisfaction by ensuring consumer demands are more clearly considered, and changes in expectations or demands are monitored over time. Consumers also benefit from being formally considered as a stakeholder and a group to consider in fisheries management, which is rare, if not non-existent elsewhere (e.g. see Lampl 1989; Dovers 1994; Hancock 1995; Hushak 2000). This is particularly important in fisheries where the majority of product is sold locally (see Tobin et al. 2010d), and hence much of the resource is allocated to local consumers.

The benefits outlined here exceed those stated in the original application, and the full extent of the benefits became clearer as the project progressed. The beneficiaries are the same, but extend to consumers who were not listed in the initial application due to their prior exclusion as explicit stakeholders in the fishery.

Fisheries Queensland has provided commitment to include the socio-economic indicators in the PMS for the Inshore Fishery. This commitment ensures inclusion of the indicators listed within this report which provides essential guidance for what to include in the PMS framework. Fisheries Queensland are commencing a review of the PMS for the Inshore Fishery early in the 2010-11 financial year. They will be using this report as a basis for the socio-economic section of the review, and will be including the PI for this project in the review process (Mark Lightowler, Fisheries Queensland, *pers. comm.* 15/04/10).

Further Development

Reference points are yet to be set for each indicator or suite of indicators. This will require some thought and discussion between managers and stakeholders during the review of the PMS, perhaps more in relation to the direction or trajectory of change, rather than specific reference points (Garcia et al. 2000; Jennings 2005). Frequency of data collection for each indicator also requires discussion during the PMS review. Retrospective analysis and review of the chosen indicators is also essential, after a monitoring system is initiated (Rice and Rochet 2005). Social indicators will need regular modifications to refine methodology and account for shifts in the social environment (Lahn et al. 2007).

There is a need to encourage stakeholder groups to contribute to data collection, particularly for seafood consumers: perhaps QSIA will see links with consumers as vital stakeholders of commercial seafood, and work with QSMA to provide data to managers. It is clear from previous research that including stakeholders in the development, collection and perhaps interpretation of indicators is essential to improve transparency, acceptance of outcomes, and empower stakeholders to participate or make necessary changes (Garcia et al. 2000; Belfiore 2003; Fraser et al. 2006; Grafton et al. 2007). Following completion of this report, we will be developing short papers to disseminate information about the indicators to stakeholder groups, including information on the selection process, the indicators selected, and how they may help provide relevant information – through either representative groups collecting information, or individual fishers providing information through surveys or licensing information.

For indicators to be a successful tool, an adequate form of reporting the outcomes is essential. Results of indicator monitoring must be accessible to a wider audience, meaning indicators and their interpretation need to be presented in a form easily understood by the user (Garcia et al. 2000). During the workshops for the project it was recognised that stakeholder understanding of the indicators themselves was less important than other criteria, but that the effective communication of outcomes was essential.

Outcomes from indicator monitoring will be reported within the Fisheries Queensland PMS system, in the form of Status Reports for the fishery. Reporting will need to be kept transparent and available to all resource stakeholders.

The process of developing the suite of indicators followed here can be used for other fisheries and user groups: For instance, the same process is being adapted within a Marine and Tropical Sciences Research Facility (MTSRF) project exploring the socio-economic characteristics of GBR users, including fishers and tourism operators. Completion of a scientific paper on the process used here will allow the process to be duplicated nationally and internationally, further testing the adjusted Rice and Rochet (2005) framework for socio-economic indicators in fisheries. While indicators themselves will be fishery and region specific (Garcia et al. 2000; Dhakal and Imura 2003; Lahn et al. 2007), the process can be duplicated.

Regarding the process, however, a more accurate method for selecting the suite of indicators based on the criteria scores should be explored – Rice and Rochet (2005) recommended against providing simple weighted scores to compare indicators, however

other methods (such as radar plots) were not useable for such an exhaustive list of indicators as was developed here. This particular case study benefits from the initial development of specific goals and objectives, meaning the associated indicators were quite clear (Ormsby et al. 2004; Rice and Rochet 2005): this and the addition of the importance score hopefully reduced the problems associated with simple weighted scores.

The indicators and baseline data were initially established to explore the impacts of management change in the East Coast Inshore Finfish Fishery. Now that those management changes have been implemented (in March 2009), a commitment to collect data post-management change and explore positive and negative effects of the management change are required.

Planned outcomes

The planned outcomes for this project were:

1) Up-to-date socio-economic information for Queensland's East Coast Inshore Finfish Fishery stakeholders;
2) A better understanding of the issues surrounding socio-economic monitoring of this fishery including what should be monitored and what methodologies are appropriate for a long-term socio-economic monitoring system;
3) Improved capacity for predicting and assessing the socio-economic consequences of management actions in Queensland's Inshore Fishery; and
4) An enhanced capacity to measure and monitor the socio-economic status of the Inshore Fishery on Queensland's east coast over time.

The outputs of this project include a detailed socio-economic baseline for commercial, charter and recreational fishers and seafood consumers within the Inshore Fishery, and a list of the most important and useable socio-economic indicators for use in long-term monitoring of these stakeholders. These indicators will be adopted within the Fisheries Queensland PMS for the fishing sectors of the Inshore Fishery. These outcomes directly contribute to the planned outcomes for the project. Baseline data provided in associated reports (see Tobin et al. 2010b; a; Tobin et al. 2010c; Tobin et al. 2010d) provide up-to-date socio-economic information for Inshore Fishery stakeholders, and this report on the selection of socio-economic indicators provides a better understanding of the issues surrounding socio-economic monitoring of the fishery. Together, these reports provide improved capacity for predicting and assessing the socio-economic consequences of management actions in this fishery: the baseline data provides pre-management change information, and the indicator lists provide guidance on what to collect post-management change, with indicators directly related to such objectives.

Overall, the recommended indicators, which will be adopted within the current Fisheries Queensland monitoring system (PMS), enhance the capacity to monitor the socio-economic status of stakeholder groups within the Inshore Fishery over time. This project provides a transparent process to select indicators, with input from all fishery stakeholders.

Further momentum and commitment is now needed from Fisheries Queensland and other stakeholder representative groups to ensure the monitoring system continues to its full potential, and that a monitoring system is developed for Queensland seafood consumers.

Conclusion

This project provides a detailed socio-economic baseline of the Queensland Inshore Fishery for all stakeholder groups (commercial, charter and recreational fishers and seafood consumers) prior to management change (see Tobin et al. 2010b; a; Tobin et al. 2010c; Tobin et al. 2010d). The suite of socio-economic indicators developed for each stakeholder group (see Table 5 to Table 8) will allow continued directed monitoring of the socio-economic status of the fishery, allowing exploration of the impacts of management change and whether the socio-economic goals of management are being achieved (Sabatella and Franquesa 2004; Jennings 2005; Lahn et al. 2007). These outcomes meet the priority of Fisheries Queensland to measure the impacts of management change on the stakeholders in the fishery, and the expectation of DEWHA for Fisheries Queensland to monitor of the performance of the Inshore Fishery Management Plan through the PMS process. The inclusion of social and economic monitoring in fisheries management will help ensure all Inshore Fishery sectors remain socially and economically sustainable, making meeting the goal of ESD more complete (Jennings 2005; Lahn et al. 2007).

Socio-economic monitoring has numerous other benefits. For instance, monitoring of indicators will allow the detection of social and/or economic change resulting from environmental or external factors, and help to ensure continued social and economic sustainability of all sectors within the fishery (Sabatella and Franquesa 2004; Jennings 2005; Lahn et al. 2007). Changes in socio-economic factors (e.g. fisher behaviour) may also alert fishery managers to changes in the resource before biological indicators detect any change (Charles et al. 2002). Importantly, by integrating socio-economic factors more directly and transparently in management decisions and monitoring, the needs of stakeholders are more clearly considered (Garcia et al. 2000; Rice and Rochet 2005; Lahn et al. 2007). This can improve the effectiveness of management (Garcia et al. 2000; Brinson et al. 2006; Lahn et al. 2007) and increase the confidence of stakeholders in the management agency and their policies. This increased confidence will likely have flow-on benefits related to how fishers and consumers perceive policy and consequently how they cope with policy change in the future (Marshall 2007). Further, greater understanding and consideration of socio-economic factors will improve socio-ecological resilience within the whole fishery by providing understanding of the diversity of social and economic factors that exist in, and drive, the socio-ecological system (Lahn et al. 2007; Marshall 2007; Marshall 2008; Cinner et al. 2009).

While indicators are likely to be region, fishery and sector specific (Garcia et al. 2000; Dhakal and Imura 2003; Lahn et al. 2007), the process outlined in this report can be adopted in other case studies. The process adjusted from Rice and Rochet (2005) was very successful, particularly in ensuring that the indicators were selected and developed in consultation with appropriate stakeholders, so that indicators and their outcomes are relevant and understood (Garcia et al. 2000; Belfiore 2003; Fraser et al. 2006; Grafton et al. 2007). The process of engaging stakeholders to select key indicators provides a valuable opportunity for stakeholder empowerment and education (Fraser et al. 2006).

What is needed for the method to become more robust is exploration into how to best summarise the final indicator scores. While participation from stakeholders is essential, participatory processes can result in a long list of indicators, meaning the process of indicator selection can become quite complicated and take longer than expected (Fraser

et al. 2006). The long list of indicators initially selected made the process of summarising scores difficult. This particular case study benefits from the initial development of specific goals and objectives, meaning the associated indicators were quite clear (Ormsby et al. 2004; Rice and Rochet 2005): this and the addition of the importance rank reduced the problems associated with using simple weighted scores.

Overall, we were able to fulfil all objectives and provide all planned outputs for the project. The success of the project was in-part due to the support and participation from Fisheries Queensland and the fishery stakeholders who participated in the surveys and workshops. The future of the indicator monitoring system now depends on the continued commitment from Fisheries Queensland, hopefully with assistance from stakeholder representative bodies such as QSIA and QSMA.

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Appendix 1 Intellectual property arising from the research.

Not applicable. All results are open to public dissemination.

Appendix 2 Staff that have been engaged on the project.

Name	Organisation
Renae Tobin	Fishing and Fisheries Research Centre, James Cook University
Stephen Sutton	Fishing and Fisheries Research Centre, James Cook University
Ann Penny	Fishing and Fisheries Research Centre, James Cook University
Mark Lightowler	Fisheries Queensland, DEEDI
Claire Lightowler	Fisheries Queensland, DEEDI
Lew Williams	Fisheries Queensland, DEEDI
Joshua Maroske	Fisheries Queensland, DEEDI
Anthony Roelofs	Fisheries Queensland, DEEDI
Brad Zeller	Fisheries Queensland, DEEDI
Owen Li	Fishing and Fisheries Research Centre, James Cook University
Elodie Ledee	Fishing and Fisheries Research Centre, James Cook University
Jessica Nilsson	Fishing and Fisheries Research Centre, James Cook University
Tom Bridge	School of Earth and Environmental Sciences, James Cook University
Johanna Brugman	School of Earth and Environmental Sciences, James Cook University
Mark Kelton	School of Earth and Environmental Sciences, James Cook University
Mark Yates	School of Earth and Environmental Sciences, James Cook University
Carly Laird	School of Earth and Environmental Sciences, James Cook University
Blanche Danastas	School of Earth and Environmental Sciences, James Cook University
Aaron Randall	School of Earth and Environmental Sciences, James Cook University
Tom Brewer	School of Marine and Tropical Biology, James Cook University
Penny Blackmore	School of Earth and Environmental Sciences, James Cook University
Beth Barban	Fishing and Fisheries Research Centre, James Cook University
Ann-Maree Lynch	Fishing and Fisheries Research Centre, James Cook University

Appendix 3 List of attendees for the initial workshop, held on the 3rd of September 2007 at Seagulls Resort, Townsville.

Name	Organisation	Sector
Renae Tobin	Fishing and Fisheries Research Centre (FFRC), James Cook University (JCU)	Research
Steve Sutton	FFRC, JCU	Research
Elizabeth Zanetti	FFRC, JCU	Research
Ann Penny	FFRC, JCU	Research
Bill Sawynok	Sunfish Qld, RecFishing Services, CapReef	Recreational fishing
Andrew Tobin	Queensland Seafood Industry Assoc. (QSIA)	Commercial fishing
Andrew Mead	Aussie Barra Charters	Charter fishing
Martin Perkins	Queensland Seafood Marketers Association (QSMA)	Seafood consumers
Mark Lightowler	Department of Primary Industries and Fisheries (DPI&F)	Fisheries management
Lew Williams	DPI&F	Fisheries management (economist)
Brad Zeller	DPI&F	Fisheries management (PMS)
Karen Lawrence	Great Barrier Reef Marine Park Authority (GBRMPA)	Marine Park Management (social scientist)
Randall Owens	GBRMPA	Marine Park Management (Fisheries)
Perry Smith	FRDC Socio-economic Working Group	Research
Romy Greiner	River Consulting	Research

Appendix 4 Background information provided to attendees of the initial workshop.

BACKGROUND INFORMATION

Queensland's inshore fishery is important to recreational, charter and commercial fishers and seafood consumers alike. Queensland Department of Primary Industries and Fisheries (DPI&F) are planning to implement a new Queensland East Coast Inshore Finfish Fishery (ECIFF) Management Plan in late 2007/early 2008. This plan will likely introduce significant changes to Queensland fisheries in the area most used by Queensland recreational, charter and commercial fishers.

Any management changes will have socio-economic consequences for Queensland fishers and supply issues for seafood consumers. Most fishery stakeholders recognise this, and agree that these impacts need to be measured, understood, and mitigated when possible. However, with little consideration of socio-economic impacts occurring in the past, reliable methods for evaluating social and economic factors have not yet been developed. Measuring, documenting, and mitigating socio-economic impacts has been difficult due to a lack of longitudinal socio-economic data on recreational, charter and commercial fisheries. Further, there is a lack of baseline socio-economic data for inshore fisheries specifically. Such baseline data prior to management change is essential to monitor any impacts that occur due to management implementation. Measurement of impacts resulting from management changes can assist in estimating, and thus reducing, costs of future management changes. Baseline data can also be used to begin a long-term monitoring system based on socio-economic indicators.

Project objectives

The specific objectives of this FRDC project are to:

1. **Develop a set of socio-economic indicators that are appropriate to monitor over time for Queensland's east coast inshore fisheries stakeholders (i.e. recreational, charter and commercial fishers and seafood consumers).**

2. Collect baseline socio-economic data for Queensland's east coast inshore fisheries stakeholders (i.e. recreational, charter and commercial fishers and seafood consumers).

3. Develop, in cooperation with fishers and managers, a practical and cost-effective socio-economic indicators monitoring system that can be used to measure and assess change in the socio-economic status of the inshore fisheries on Queensland's east coast.

Objective #1 is the focus of this workshop.

What are socio-economic indicators?

Socio-economic indicators can provide a practical and cost-effective method for gathering information on the socio-economic situation and development in the fishing industry, and the effects that management changes have on the fishery stakeholders (Sabatella and Franquesa 2004). Socio-economic indicators can be used to monitor changes in stakeholder groups, assess or predict effects of changes in management or

resource status, and identify human use of resources (e.g. participation rates, demographic trends, technology used, etc) (Lahn et al. In prep). Socio-economic indicators can incorporate and monitor stakeholder group concerns and interests into the management process, and determine the impact of management decisions on stakeholders (Lahn et al. In prep). Indicators may also be able to identify communities that may be vulnerable to management shifts or changing access to a resource (Larcombe et al. 2002). Moreover, when monitored on a regular basis, socio-economic indicators can provide the longitudinal perspective necessary to more fully integrate socio-economic information into decision-making, policy analysis and Performance Measurement System (PMS) frameworks.

Socio-economic indicators may include basic demographic and use patterns, but also such things as satisfaction, expectations, or participation rates for recreational fishers; profit, or measures of social well-being for charter and commercial fishers; and demand for, or satisfaction with availability of local seafood for consumers. When these indicators are monitored over time, a change in the level of the indicator would prompt investigation by fisheries managers into the cause for change. It's important to note that indicators are meant to describe what is happening, not to explain why changes occur (Moscardo and Ormsby 2004). Causes for changes in indicator status may include such things as management impacts, changes in fish stocks, or conflict between user groups.

Appropriate indicators are currently unknown and are likely to be fishery specific. Therefore the goal of this workshop is to work closely with fisheries managers and stakeholders to develop an appropriate set of indicators to focus on for each sector in Queensland's inshore fisheries. Collection of baseline socio-economic data directly following this workshop will be based on the chosen indicators. The project also aims to design a long-term socio-economic indicators monitoring system for Queensland's inshore fishery which can be adopted by Queensland fishery managers.

What are the key features of indicators?

Indicators must be able to measure the socio-economic impact of changes in the resource, be clear enough to all stakeholders in such a way that they don't raise any doubt regarding their reliability, and allow an assessment of costs attached to any alternative management actions (Franquesa 2001). Characteristics of "good" indicators include: they can be measured regularly; they are cost effective and relatively easy to measure; they are comparable over time; they are reliable, accurate and sensitive to changes, and they are easy for managers to understand and use (Moscardo and Ormsby 2004).

How can we determine which indicators to use?

Given the relatively recent introduction of the use of socio-economic indicators for marine resource use, there is no consistent or standard process to follow so far (Lahn et al. In prep). There is little research designed to develop and test systematic measures of variables that could be used as indicators, and little research available on the reliability, validity and sensitivity of social indicator measures (Ormsby et al. 2004). There is a lack of information in the literature for specific indicators and few examples elsewhere that could be used as models (Moscardo and Ormsby 2004).

What we do know from the literature is that indicators must be based on an understanding of the current socio-economic systems (Lahn et al. In prep). Also, clear management goals and objectives must be defined prior to determining which indicators are most appropriate, and acceptable ranges of each indicator must be determined before engaging in data collection (Ormsby et al. 2004; Rice and Rochet 2005; Lahn et al. In prep).

Selecting the right number of indicators is difficult and requires a detailed understanding of the nature of user interactions with the resource and the factors most important to the stakeholders (Ormsby et al. 2004). To keep any model manageable and cost-effective (while still fulfilling the needs of all users), limitations must be placed on the number of indicators, thereby potentially reducing the ability of each monitored condition to be adequately represented. Therefore we need to define the management goal prior to data collection (Ormsby et al. 2004; Rice and Rochet 2005).

Examples of potential indicators

Commercial/charter fisheries:

From Franquesa, R. 2001. *Spain - Methodology and use of socio-economic indicators for managing fisheries*

- Demographic information (age, number of children, education level, etc)
- Direct employment from fishing industry (in region/state/country)
- Productivity (on various scales)
- Contribution to GNP
- Average fisher wage
- Landing prices
- Invested capital
- Salary cost
- Opportunity cost
- Profit (gross, net and rate)

From Lahn, J., Vella, K., Innes, J. and Prideaux, B. In prep. *Plan for a Social, Economic and Institutional Research and Monitoring Program for the Great Barrier Reef*. GBRMPA, Townsville.

- Quality of life (capacity to achieve personal and family goals and participate in community life) - measured by income, size of business, changes in number of individuals in industry, aging of industry, etc
- Sensitivity to change - a function of education level, number of years in industry, income, pension dependency, working age population and industry dependence

Recreational fisheries:

From Sutton, S.G. 2006. *An Assessment of the Social Characteristics of Queensland's Recreational Fishers*. CRC Reef Research Centre Technical Report No. 65, CRC Reef Research Centre, Townsville.

- Demographic information
- Motivations for fishing – indicator of the benefits people expect to receive
- Satisfaction with fishing – indicates the extent to which these benefits are being obtained

Plan for this Workshop

This workshop marks the very start of this FRDC project. We aim to:

- get a better understanding of the needs of managers and stakeholders of the Queensland east coast inshore fisheries and the current socio-economic situation;
- outline goals of socio-economic indicators monitoring system for GBR use and users;
- develop a draft list of socio-economic indicators for each stakeholder group; and
- refine the draft list to what are considered the most important indicators for each sector.

Communication with managers and stakeholders will be on-going after this workshop (via an e-mail working group) to help us refine the list of indicators prior to collection of baseline data.

We look forward to your participation!

Appendix 5 Minutes, including discussion about candidate indicators, from the initial workshop.

MEETING START: 9am

WELCOME AND INTRODUCTIONS – RENAE TOBIN

PRESENTATION BY RENAE TOBIN
OVERVIEW OF SOCIO-ECONOMIC INDICATORS
See background docs and hand-outs from meeting.

DISCUSSION:
AT: The most important thing is to find out when the management plan will come in.
ML: Planned before the end of next year. We would like to see the RIS released this year.
BZ: What's the minimum time we are looking at?
ML: 2-3 month consultation period once the RIS is released depending on whether it is around Christmas. After that a couple of months to get feedback from working groups and MAC, and then get legislation drafted. A lot depends on how busy parliamentary council is. Unless something comes up, it's likely to be mid next year.
AT: How does that play into this project?
RT: It gives a little breathing space to collect baseline data.
AT: How long can the RIS sit there prior to release?
ML: Difficult to answer. Nothing should be changed over the next month or so.
RT: Safe to assume it will be coming. We can't do much about the timing but we still need to determine the baseline data needed.

MP: Marketers seem to be left out of the list. No longer fish available, making it harder and harder for marketers. Things happening on marketing chain which impacts down the line. Eg. Importing Spanish mackerel from the Kimberley. Currently no market for RTE, etc…This is something to think about.
RT: While we won't be surveying marketers themselves, only fishers and consumers, there is scope for looking at externalities like the effects of marketing changes, other costs to fishers, etc. However this project is focussing on fishers and consumers themselves.
PS: Consumers will cover this in the project
ML: Lots of other businesses and groups will be impacted as well e.g. bait and tackle shops. There'll be lots of potential impacts but difficult to get your head around.
RT: FRDC wants us to include consumers as well. If we are monitoring the fishers they can be an indicator of other drivers as well such as fuel costs, etc.
AT: With the inshore commercial fishery, fuel price is a minor part of the costs. The inshore fishery is typified by diverse operations. Net fishermen can target lots of different species every year. This may come out in the CFISH data. I.e. Individual activity on net symbols, target species listed.
LW: Not everyone records that detail in their logbooks. We can determine target in hindsight based on their catch.

RO: There is still a lot of latent effort in the fishery which is a big issue in this fishery. There are number of families where dependency on the fishery is small.
LW: The reason people do activities is to generate income. Some fishers have complete dependency, others are what we call "lifestylers". There are four stages to person's life-cycle: 1) they fish hard when they start; 2) then they have family etc to support; 3) then they start thinking about the sustainability of the resource, 4) then they do just enough to make what they need for their style of life. If you are in the third stage you are only working 50 days instead of 300 days. That's their choice.
RO With that excess capacity – you have the effect of impacting on the industry.

AT: Most recreational fishers would like to see less licences. 15% of licenses land less than 1 tonne per year. Big loss of areas is an issue, as it results in licenses moving to new areas due to spatial closure.
LW: There are lags of 2 – 5 years for impacts of management.
RO: In the case of the RAP, local inshore licenses were bought back but the fishers bought another license - there has been no gain for the fishermen or the resources.
ML: We could talk about latent effort all day. This is also affected by skipper competency.

PS: What are the key drivers for management changes in the inshore fishery?
ML: Sustainability and profitability.
PS: What are you basing that on?
ML: Extensive consultation, working groups for PMS, shark, netting etc.
There are appropriate stakeholders on each of those working groups – they put forward recommendations to the department.
PS: What baseline economic, social, biological data to you have?
ML: We have a lot biological data but the social and economic data is lacking, which is point of this project. There have been significant changed imposed by other agencies that has impacted on fishers. We will know more when RiS is released e.g. If there are too many fishery symbols. In 2004 we started a process to remove latent effort from the net fishery 900 licences down to 450. RAP and complementary zoning from state marine parks has changed that again.

LW: To clarify, GBR stops at low water mark.

PS: The benchmark with be to define optimal participation – what is the best return for investment?
AT: From a fishermen's perspective, you'll need to average that across a couple of years.
PS: That's fine. From an outsiders' perspective, how do you look at local effects?
ML: Some inshore fisheries have local perspective. Northern fishery (from Tannum Sands, north) has an N2 symbol, and N1 is south of that to the border.

BS: One of the difficulties we have is to define succinctly what we are trying to get out of the plan. Unless you know that, it makes it difficult to pull out the indicators. I.e. define what level of sustainability we want for the fishery and what do we measure to deliver that. There is a problem of defining what the actual goals are.

GOALS OF MANAGMENT

Goals were added to the board from ML – DPI&F goals for the inshore fishery, based on information from the MAC.

1) <u>Commercial fishery:</u>

a) <u>Social</u>

- **Minimise and simplify legislation**
- **Provide stability, certainty and security**

RT: This can be done by simply asking the fishermen.
PS: Security is vital.
ML: Fishers now have a property right which is transferable.
MP: Security is a huge issue in Queensland, e.g. spanner crabs – had quota, transferable right, then RAP took away a lot of their fishing area which greatly affected their fishery.
AT: Scary for fishermen in Moreton Bay at the moment as they are unsure if there is going to be any compensation for lost area.
ML: Chicken and egg problem – need to decide whether to determine the cost before or after the change. Huge costs involved in estimating impacts. We can talk to the community to see how much it is going to cost and take that to the government.
MP: EPA is doing the sell to recreational fishermen but not to commercial fishermen who rely on this fishery.

AT: There is a lack of security for charter fishers given the removal of licences for inshore charter fishers.
AM: There's been a breakdown because of lack of control of regulations. There is very little security because anyone can get a permit.
ML: Inshore charter fishers don't have to fill out logbooks but offshore fishers do. We are still getting the information from most of the inshore charter operators that were previously licensed.
AM Are you sure? I'm not filling mine in. Do you need a permit to become a charter fisher? No body knows what permits and tickets are required. Very dangerous and no security.
RT: We seem to be missing the charter fishers.
ML: I'll take that back to management, but charter fishermen will not be considered specifically during the RIS.
RO: Inshore charter fishers are applying expertise. What they catch will be important indicators of the health of the fishery.
AM: The obligation to fill in logbooks and provide data doesn't exist.
AT: Perhaps if enough issue is made of this during the RIS something can be done?
ML: Perhaps.

- **A diverse fishing fleet (small and big operators)**

ML: This goal is Important for social and economic reasons. The goal came from the MAC.
RO: Most of the product from this fishery is domestic as opposed to other fisheries which have an export market. Are locals expecting to be able to buy local fish without having net fishers?
AT: There are a lot of issues there. The inshore fishery could turn into an export fishery at some stage.
MP: Having a diverse fishing fleet is really important. In the case of the trawl fishery, DPI wanted a diverse fleet but then bought out all the small operators.
ML: Those small operators didn't have capacity to maintain their boats.
MP: They were mostly lifestyle fishers like Lew explained. When the small boats went, the marketing industry plummeted. There was no longer year-round supply of prawns to local ports.
ML: If there is a buyback scheme how would you say to those small operators that you don't want to buy their licences? How you stop people from applying for buyback? If they apply, they can be bought out.
RO: There is a Western Australian Lobster report of relevance which looked at small towns' dependency on fisheries. The dependency of these towns diminished over time – e.g. tourism increased, population boomed for other reasons. Such dependency indicators could be useful.
ML: Resource booms may be affecting this, e.g. mining.

- **Acknowledge industry's role in regions**
- **Stress caused in commercial sector with management changes**

BS: Before we move on, that gives me no picture of what direction you want to drive this fishery. It creates a huge amount of uncertainty. Let's continue with commercial for now. We don't know where to look for indicators.
BZ: Let's add other goals – top priority for goals for social management.
RT: I think this will become clearer when we get to determining indicators later in the meeting.

b) <u>Economic</u>

- **Ensure a profitable fishery**
- **Efficient use of the resource**
- **Diverse fishing fleet – linked to social**
- **To encourage value adding**
- **To acknowledge the economic contribution to regions**
- **To ensure profitable fisheries into the future.**

BS: What about sustainability drivers?
PS: Should we add biological drivers? This is a social and economic project.
AT: While we're delving into these issues, there are many issues outside of the scope of fishery management that have much bigger effects of the fishery, e.g. land use, industry, etc.
RO: The factor of resource sharing, resource allocation exists. Think of having a look at external factors and how they are affecting the fishery.
AT: Would be good to see something that like that incorporated into the management plan, but it would get incredibly complex.
BS: The biggest thing occurring is climate change and freshwater allocation across Australia (people, industry, environment). This may deliver things that are unachievable.

2) Recreational fishery

a) Social

- **Reduce complexity**
- **Ability to catch a fish**
- **Fair access to the fish**
- **Confidence in sustainable management**
- **Confidence in consultation process and communication**

RO: By providing more access (boat ramps), this would change allocations every time a new one goes in.

b) Economic

- **Viability of downstream businesses**
- **Provide fair access for diverse economic brackets**
- **Acknowledge economic contribution to regions**

3) Charter

a) Social

- **Reduce complexity**
- **Stability, certainty, security**
- **Acknowledge roll in regional tourism**
- **Fair access to the fish**
- **Confidence in sustainable management**
- **Confidence in consulation process and communication**

b) Economic

- **Ensure a world class fishery that attracts tourists**
- **Ensure longterm viability of downstream operations**

4) Consumers

a) Social

- **Ensure local seafood is available for the public**

b) Economic

- **Availability of affordable local seafood**

AT: Affordability should not come into. Availability of product is what is important. Cheap imports are too competitive.
ML: Affordability is important. For example, consumers in the tailor fishery stopped tailor from becoming recreational only because they wanted an affordable product available.
PS: "Affordability" concerns me. Basically it is the willingness-to-pay and supply and demand. Availability is important but integrity of the product and willingness to pay is more so.

Efficient markets will differentiate quality effectively. Income is determined by your order in the queue.

AT: There are fairly simple indicators. Look at seafood retailers that only sell local fish and see how they go.

PS: Depends if you are measuring consumers or retail outlets.

RG: Affordability is a fair enough goal. We want to develop an indicator frame work that tells us where we sit on the scale.

PS: The key aspect I am concerned with is that the information is the right information for consumers. Individual fishermen can decided what part of the market they can target.

RT: Ruello's FRDC report surveyed consumers. From that I envisage we can investigate what the demands of the consumers are, including affordability, willingness to pay for local, well managed product. In Ruello's consumer surveys, consumers were willing to pay more for product from a well managed fishery.

PS: Do you get penalised for being a lousy grader etc? That is what we mean by marketing efficiency. Green labels are fine if they are worth their while, but people already have an expectation of Australian seafood being 'green' so eco-labels may be unnecessary.

ML A lot of commercial fishermen were worried that the recreational push for resource allocation would show economic value of catching of a tonne of fish would be worth more to recreational fishers than commercial fishers.

POTENTIAL INDICATORS

Discussion of indicators based on goals outlined above. Free to add more goals as we go. Some discussion captured at the bottom of each table.

SS: This is quite significant what we're doing today. Not that long ago the goals of management plan were only biological. It's significant that managers are discussing socio-economics as goals of the fishery. This project has a lot of work to achieving those indicators. We do not have the baseline information particularly on consumers etc. We are trying to get some directions on how to collect that information so that at the end of the project we have something meaningful.

RT: What information should we collect for each of these goals? We're looking at specific sectors individually. Feel free to add more goals as we go.

COMMERCIAL FISHERY:

Goal	Indicator	Discussion
Minimise and simplify legislation	- Perception of fishers re regulations' complexity - perceptions of QBFP re regulations' complexity - # of pages within regulations - Level of compliance - Costs of enforcing compliance	Fishers need to easily understand and have ownership of the regulations. Can measure perceptions before and after management change. Currently there is a misunderstanding (by recreational fishers) of what commercial fishers can and can't do – issues of conflict arise.
Provide stability, certainty and security	- Perception of fishers - Existence and transferability of property rights - # of investment warnings - Resilience - Turn-over within industry - # of people employed - Policy perception - Stress levels – ability to cope - Workplace safety - # of injuries/ incidents; # of fishers that operate certain nets – eg if decline due to safety issues	Resilience – needs some work to get operational – perhaps discuss more via e-mail? - Not actually returning to original state… - "Ability to cope with change" Turn-over may have mixed messages Workplace safety – govt keeps good records
Fair access	- Perception of fishers – re current access and changes to access - Loss of potential fishery area - Loss of species - Proportion of fishable vs closed area - Goals of future access - Patterns of use – eg distance travelled	Need definition of fair access! Need clarity on where whole fishery will be? Need information on trade-offs between each sector

Effect of change of access	- Patterns of use - Dependency on sp / area - Distribution of seafood – local vs non? - Perception of fishers	
Diverse fishing fleet	- # of operations – size, boat size, # symbols, - Diff types of nets / techniques used - Patterns of fishing - Dependency on fishing - % of family income - Latent effort	
Acknowledge industry role in regions	- Regional distribution of operations – incl size of operations - Post-harvest value-adding (eg is there signif processing industry) - Amt of industry expenditure kept in community – net multipliers - Employment – direct and indirect - Opportunity cost	
Ensure profitable fishery now	- Baseline… - Selling practices - Annual profit - Profit per fish / sp - # operators – regionally & state - Return on investment - Quality of boats – turnover - Symbol / licence / boat value - Beach price – min, max and modal - Beach price vs operational cost – input-output price ratio analysis	Issues with sellers licence and 'safe-food' Trade-off bw # of operators and profitability Operational cost – can use proxy for most influential cost (eg fuel cost)
… in the future	- Technology progress - Labour, fuel, import price of product	Import price sets base price for local product
Efficient use of the resource	- Level of catch in quota fisheries (spot mack, tailor) - Methods of capture - Return per unit effort - Areas available to fish - New markets for byproduct	Need to catch fish in more economically profitable way
Minimise waste	- Complaints about wastage / discards - # of fishers utilising BRDs (where relevant – e.g. tunnel net)	

Encourage value-adding	- Selling / handling practices - New markets for byproduct - Beach price – range bw max and min - Development of niche markets - Amt of promotion of 'green' products	Concerns about need for 'green' image or need for marketing it. Aus products already have good image.
Acknowledge $ contribution to regions	- Net multipliers – input-output. How much stays local - Flow-on effects – labour etc - # of marketers / processors	Key – draw boundary around it Concern about what # of processors tells you… Likely mobile processors will increase.
Effective education/ communication	- Perceptions of fishers - % of breaches of regs per unit of inspection	
Good governance	- Diffs bw perceptions of fishing community vs wider community of policy - Community/fisher confidence in agencies - Perception of transparency in decision making - Institutional cooperation - perception and knowledge of… - Fair allocation	= people's confidence in ability of managers to manage the fishery sustainably according to what community finds acceptable Relates to fair allocation / access
Understanding of the industry	- Demographics - Patterns of use	

DISCUSSION

- **Minimise and simplify legislation**

AT: "Number of fishermen" is not going to tell you anything due to mishmash of regulations.

PS: Has to be some level of ownership by the fishermen of the regulations. Rather than having these regulations imposed on them. Compliance would rely on this ownership.

ML: At the moment, the regulations (Fisheries Regulations 1995) are being reviewed and in the New Year and this should hopefully simplify things. That regulation will feed into the 2008 management plan.

ML: Can we collect people's views of where the legislation is simpler? There will be extensive communication plan after implementation of the plan. After that I would like to see a measure of whether that has been effective.

BZ: Concurrent to that you could ask them what their expectations are.

RT: Most of what we collect now will be about fisher's perceptions of the regulations as they exist now.

RO: Perhaps this could apply to the boating patrol as well.

BS: Lists of bag and size limits are currently very complicated. WA has a better way of doing things, where they group main species, then bread-and-butter species, etc. Have things grouped in chunks that are easier to handle and find.

PS: Try level of compliance and costs of enforcement. You will know if these are effective.

BZ: Are these governance or social indicators?

BS: It's about how well people understand the regulations.

BZ: To what extent are we going to look at governance type indicators?

PS: If you're benchmarking for the management criteria see federal fisheries management – Perry to send information.

RO: This fishery has complicated sharing arrangements. Lack of understanding in the community about what a net fisherman can and can't do. Much of the community mixes up netting and trawling.
ML: There are a few steps in the process including that people can understand what commercial fishers can do. At the moment we leave that to industry and management could do a lot better regarding communicating that information.

- **Stability, certainty and security**

ML: We put out investment warnings – perhaps that could be an indicator – i.e. # of warnings.
RT: Nadine Marshall has done a lot of work on measuring resilience of fishers. Based on information such as perceived ability to cope, related to age of operator, # of years in industry, previous experience, training/education, financial leeway, perception of policy and risk, etc.
SS: Indicators of resilience is a lot simpler than resilience itself. Turnover might be a good indicator.
PS: Resilience is often defined as returning to a specific state, but fisheries are unlikely to return to the previous state following management change.
RO: Can be defined as "the ability to cope with change" (all agreed this is the best definition here).
SS: We need some measure of how well they can adapt.
RG: How about the number of people employed?
PS: Is turnover healthy or unhealthy? Could be interpreted either way.
BS: The number of people entering and leaving the fishery should be a good indicator of the health of the industry.
ML: Transparency of decision making (perceptions of) is important
RT: Policy Perception – again, Nadine Marshall related this to the perception of risk, i.e. how fishers felt they could cope with the changes. Those that are more involved in developing policy generally felt more positively about the policy change and felt they were better able to adapt or cope.
PS: Could look at the differences between fishing industry and wider community. A lot of decision making in marine parks hasn't been very friendly to the commercial fishing industry.
SS: The community is another stakeholder. It's not included specifically in this project.
RT: Perhaps community perceptions would be incorporated in consumers.
BZ: Suggest that governance becomes a specific goal (Done).
RO: Community perception of how government agencies work together and confidence in those management agencies.
BZ: I.e. Institutional cooperation.
RT: Hard to measure, but could measure perception and knowledge of this cooperation.
PS: Another aspect is fair allocation – fits into governance.
RG: Previous studies have looked at stress levels such as via suicide rate following reduction in resources (such as due to drought, etc).
BS: Should we add in suicide rate?
PS: Perhaps we should just include stress. Look at drought literature, rural males and mental health etc. Also look at workplace safety and perceptions of this – in a dangerous industry. I.e. number of injuries, incidents – listed by Workplace Safety agencies/govt departments.
AT: Workplace safety is a good one.
ML: Could look at number of fishers operating certain nets. There might be a decline because of safety issues.

- **Fair Access**

ML: Loss of fishery area, loss of species…
SS: How do you define "fair"?
(long discussion of "fair" Everyone has a different concept of "fair").

SS: Not for us to define here.
BS: It's not agreement that you looking for – what is required is clarity. If you define what you want from a specific fishery, this should make it clearer. This could be easier if management plans were clearer with their objectives.
ML: The management plan will be applied in two stages: 1) The majority of the management, 2) will be primarily to do with closures. That is when we will get into these fair access issues. This won't be applied generally throughout the entire state but will be involving local communities.
RO: The share of the pie changes.
RT: Fairness is a perception – need to measure that.
PS: Key information is what the trade offs are between parties. Without this information you will be arguing semantics.
LW: There is a base level. Look at it as a systems component – What are the net costs and benefits to society.
PS: What precisely are you trading off?
LW: Have to look at it in the social context.
ML: There are two ways to allocate resources or provide access changes: 1) Community decisions, or 2) Government decisions.
RO: There are changes in fishing power. The shear increase in recreational fishers has changed the allocation of power.
BS: There is actually a decline in the number of recreational fishers at the moment.
AT: Commercial fishers do not consider what there is at the moment as fair access.
RT: Probably neither do many recreational fishers or charter fishers.
PS: The political process says that what is there is now is fair access.
RT: We are trying to monitor over time, so a change is something. We need to start with what is there now.
KL: What about distances travelled, patterns of use? That might tell you something if it has changed due to allocation issues.
PS: Patterns of use is definitely a useful measure.
SS: Should we have some idea about what the changes of access are and how that affects the person involved?
RO: It's a shifting baseline. What sort of indicators can we use for the Port Douglas (grey mackerel) situation?
LW: That one is perception vs realty.
ML: An indicator might be the supply of local seafood to local markets.
RT: Added goal of Effect of change of access.
PS: We have biological indicators moving on to the economic.
BZ: Our ability to monitor at the community level is not very good.
BS: Capreef have collected this data. Whose role and responsibility is to collect this information?
LW: Need some sort of perception measure?

- **Diverse fishing fleet**

ML: Need information on patterns of fishing.
LW: Dependence of fishing on family income.
PS: Latent effort. Might have diversity in theory but not practice.

- **Acknowledge industry role**

RO: Regional distribution of operations.
PS: Post harvest value adding, amount of industry expenditure.
RG: Employment - direct and indirect
PS: Opportunity costs.

- **Ensure profitable fishery now**

RT: Need a baseline to start with.
MP: Looked at this in the trawl fishery. Lots things have crept up. E.g. there is a 20kg of cuttlefish for a trawler – sometimes they catch 2, other times 80kg and they have to throw the excess back. Catches are patchy so that rule doesn't work. Are there things in the inshore fishery that we aren't aware of that could work the same way?
AT: The net fishery may encounter that problem with the sharks.
RO: Measure of dependence of non-working on working elements of the fishery.
MP: Certain species of shark are under threat, not all species – can't tar the whole industry with that brush.
AT: Profitability is a complex issue due to fishers' ability to get sellers licence, and the impact of 'food safe' regulations which will affect profitability. These are outside scope of this workshop.
MP: We've got this problem where 50% food safe issues are related to seafood.
AT: Cost of operation varies as does profitability depending on what various season are like.
PS: Trade off between number of operators and profitability.
ML: Comes down to number of current operators and comes back to latent effort issues. Comes down to character of fishers as well. Baseline is worrying. Is the current level viable?
PS: Can't make that assumption.
LW: Fishers won't stay in the business if they're not being profitable.
RO: We've got both profitability and sustainability issues.
LW: Got to think in terms of tropical species, which are faster growing and hence recovery is quicker.
KL: What about investment?
LW: Quality of boats is helpful.
AT: Licence / quota value and boat value.
MP: Re. market prices, we get prices from fishermen every three months. Takes some work to put it together.
AT: Would like to see minimum and maximum prices rather than just average.
LW: Difficult to strike average price due to variation in quality of product.
AT: Value of product is important - Beach prices.
RO: Beach prices vs operation costs.
LW: There are methods applicable across rural industries.
RG: Is there technological progress within this fishery?
LW: Step function in efficiency – i.e. when new technology is brought in efficiency steps up. Unlikely to be effort creep in this fishery compared to others – would know about it when new gear introduced.
LW: Look at labour, fuel and import price for product.

- **Efficient use of the resource**

ML: Level of catch in Quota fishery – particularly spotted mackerel.
LW: Mackerel is an economic effect not a biological one.
MP: Need to catch the fish in efficient way to meet with demand
AT: Spawning closures, for example, are not an efficient way to use the resource.
AT: CPUE could be used outside of quota fisheries
PS: Rather <u>return</u> per unit effort

ML: Areas available to fish.
RO: Wastage of resource – i.e. dead fish, bycatch.
ML: Could consider marketability of bycatch.
KL: Could monitor complaints about discards.
ML: Number of fishers utilising BRDs – e.g. tunnel net fishery
PS: Maximising returns per fish.
LW: That would be through proper handling of product.
BS: Developing niche markets.
RT: Think that is the role of the marketers and fishers. We can ask consumers what they want and provide feedback.
PS: Did some work looking at eco-labelling. Tassie Salmon (clean and green image). Australian salmon worked due to timing of supply rather than green image.
MP: We are considered green already so we don't need to market that clearly.

- **Acknowledge economic contribution to regions**

PS: How much of profit stays local? Key issue is drawing the boundary around regions and expenditures - difficult
ML: Number of marketers in the region.
MP: This is important in some areas.
LW: Number of processors has declined more than fishers since the RAP.
AT: The potential for wharf trade is huge and growing, so the number of processors may not tell you anything about impacts of management.
LW: Need someone to handle and process fish – good indicator. Most can't handle lots of variation in incoming product and therefore remain profitable.

RECREATIONAL FISHERY:

Goal	Indicator	Discussion
Simplify regulations	- Perception of fishers re regulations' complexity - Perceptions of QBFP re regulations' complexity - # of pages - Level of compliance - % non-compliance (i.e. cautions and breaches) - Costs of enforcing compliance - Perception in relation to need for regulation	
Ability to catch a fish	- Perceptions - Motivation, fishing expectation, fishing satisfaction - # of successful trips	# successful trips - CapReef – presence/absence data; DPI&F – snapper; RFISH??; independent data sets (Bill) Expectations of catch would differ depending on sp, diff areas (nth – sth)
Fair access	- Perception of fishers – re current access and changes to access - Loss of potential fishery area - Loss of species - Loss of size / trophy fish - Proportion of fishable vs closed area - Goals re future access - Patterns of use – eg distance travelled	
Effect of change of access	- Patterns of use - Dependency on sp / area - Perception of fishers	
Confidence in sustainable management	- Perceptions of fishers - Perception of own and other sectors – re impact on resource, management, etc	
Confidence in consultation process	- Perceptions of fishers - Perception of impact of management – acceptable / understood	
Effective communication	- Sources of information - Perception of fishers and others - Perceived credibility of info source - Level of support from support industries	
Ensure viability of downstream industries (boat and tackle shops)	- Boat registrations (minus those that don't fish – 25%-BS) - # bait and tackle shops - Level of imports (wholesale) - Anglers' purchase behaviour - Health of recreational sector	Industry tackle assoc – surveys to bait and tackle shops Imports – see Perry's report Linked with health of rec and comm. sector

Fair access for diverse economic brackets	- Demographic description of the fishery - # shore vs boat fishers - Land based access points vs boat ramps - Avg dist to ramps - Disabled fishers	- RFISH - Dave Bateman
Monitor contribution to communities	- Employment levels – direct, indirect - Tourist fishers, incl grey nomads - Expenditure – regional, state - Community health - Facilities	
Understanding of the industry	- Demographics - Patterns of use	

DISCUSSION:

RT: copied over some commercial fishery indicators

AT: Perceptions can be a little misleading at times. E.g. the Port Douglas situation where perception is far from reality. Skewed by vocal minority. Does R-fish include number of successful trips?

General discussion: Yes, though unsure if all unsuccessful trips are included. Could be some binary data there. CapReef has binary data.

RG: This is along the notion of consumptive orientation of anglers.

RO: It is important to understand why people release fish, catch and release vs undersize, poor eating.

RT: There is some information for this in RFISH – i.e. why anglers released fish. For those anglers that listed a reason for releasing fish in the last survey, most reasons were because the fish was undersize.

PS: Levels of compliance - what does this mean?

RT: % of breaches within the inspections. Looking at boating patrol records and including cautions.

BS: Surveys always ask why they go fishing but need to know, if you couldn't catch a fish, would you still go out on the water?

SS: Interesting that catching a fish is often third or fourth. But it's still there.

BS: This is very much a moving baseline with recreational fishers.

AT: What level can you set the expectations at?

PS: Training/experience levels.

BS: 10% of the anglers catch 90% of the fish. The majority do not have any effect on the resource.

ML: Half of all Queensland recreational fishers fish south of Noosa.

BS: As you go further north, they go fishing more often and it has higher value to the communities.

RO: and greater expectation of the quality of the experience.

PS: Loss of size/trophy fish could be an indicator.

RO: Also, people's knowledge of appropriate catch and release techniques.

AT: Given the large scale impact of MPA's the core basic of fisheries management changes (size and bag limits) may have been large in the past, but are now seen as quite moderate. Individual fishers' perceptions will shift when faced with spatial changes.

BS: Surprisingly 4 out of 5 rec fishers support green zones as long as it is "not is my backyard". Over time support will increase if those zones will show benefits of those changes.

AT: That is a large task for the Marine Park Authority.

RG: Are there questions that are knowledge based? How can we measure that?
RT: Ask where they got their information.
RO: Do recreational fishers understand that their sector may impact the resource?
AT: Lots of information available on the internet now. They are changing perceptions.
KL: Television is still the way most people prefer to get their information.
BZ: Need to know the impact of management that will be acceptable.
ML: Or perhaps fishers' understanding of management – why the decisions are made.
RO: MAC attendees are committed people. The silent majority is what you don't know what they are thinking. Like to see how much they are at variance with what you think you know.
BS: The credibility of the information source is the most important part of the process. Need to get the message across. Find out which ones people trust.

PS: Regarding "Ensure viability of downstream industries (boat and tackle shops)", do we care about big department stores?
ML: Bait and tackle shops tend to be area specific.
PS: Concerned that any effects on fishing tackle shops are not important.
AT: Can we look at boat registrations and take out the ones that don't fish?
BS: 25% or so of boat owners do not fish.
BS: Tackle shops have had increase in sales since RAP.
RO: Support from tackle shops – a lot of recreational fishers get their information from tackle shops. Have an opportunity to positively or negatively influence their opinions and the success/ acceptance of the regulations.
BS: Tackleshops have a lot of credibility with recreational fishers.
BS: What proportion of shops could apply for compensation from RAP?
MP: Ship brokers have been paid out.
ML: Why do we keep comparing this to RAP effects? We're focussing on future changes to the inshore fishery.
AT: This new management plan will not have the impact that spatial changes have had.
LW: This is to collect baseline information. From there we can start to ask "what if".
ML: Do we want to measure the downstream impacts and how do we do this? The number of bait and tackle shops.
LW: What percentage of sales goes through bait and tackle shops?
KL: What about employment numbers?
ML: Difficult to do in the scope of this project.
BZ: Depends on our definition of the fishery.
ML: If they are in the fishery, how would we measure this?
PS: Industry Tackle Association run several surveys. Record it at the wholesale level looking at imports – the only gate we have.
PS: Problem is what is "bait and tackle"?
ML: How well the downstream businesses are going will be directly related to how healthy the recreational fishery and commercial fisheries are. Therefore this indicator is probably taken care of.
RG: Could you find out about purchase behaviour?
BS: Unlikely issue because there are so many other things that affect it.
ML: Let's just say that it is linked with the health of the recreational and commercial fisheries.

BS: How can you measure fair access for diverse economic brackets?

KL: Number of shore fishers vs boat fishers, number of boat ramps, distance travelled. Avg distance to ramps.

RT: How do we measure economic contribution to communities?
PS: Expenditure – same as tourism.
MP: Employment levels – include fishing tourism, imported contribution from visiting fishers.
RO: Must pick up the grey nomads, highly seasonal.
SS: Boat ramp surveys will pick them up but they are largely missed by RFISH and by this project as we're doing residential surveys.
BZ: Recreational fisher infrastructure – can this be a contribution to community? Council's probably get involved – community conservation and fisher groups etc.

CHARTER FISHERY:

Goal	Indicator	Discussion
Simplify regulations	- Perception of fishers re regulations' complexity - perceptions of QBFP re regulations' complexity - # of pages - Level of compliance - % non-compliance (ie cautions and breaches) - Costs of enforcing compliance - Perception in relation to need for regulation	
Stability, certainty, security	- Perception of fishers - Resilience - Presence/absence of property rights? - # of charter fishers – regional, state - Duration within industry - Turn-over within industry - # of people employed - Policy perception - Stress levels – ability to cope - Workplace safety - # of injuries/ incidents - % client return	Issues with property rights – none now, and probably outside scope of monitoring, but is impt for stability and security of industry
Acknowledge role in regional tourism	- Origin of clients - Tourist preferences	- Tourist surveys by Tourism Qld and Tourism Aus - National & International Visitor Surveys
Monitor value of industry	- # days fished x avg price of trip (x # of operators / boat) - GVP - # of tourists brought into the region - # community members as clients	
Confidence in consultation	- Perceptions of fishers - Perception of impact of management – acceptable / understood	
Fair access	- Perception of fishers – re current access and changes to access - Loss of potential fishery area - Loss of species - Loss of size / trophy fish - Proportion of fishable vs closed area - Goals of future access - Patterns of use – eg distance travelled	
~~Ensure world-class fishery that attracts tourists~~		Too hard… See "Acknowledge role in regional tourism"

Long-term viability of downstream industries	- Health of charter sector	
Monitor contribution to communities	- Employment levels – direct, indirect - Expenditure – regional, state	
Understanding of the industry	- Demographics - Patterns of use	

DISCUSSION:

RT: copied a bunch of information from previous tables.
ML: At the moment anyone can get a licence, it is a matter of whether that becomes restricted.
RO: It depends of where they work as to whether they need a permit from GBRMPA for offshore fishing.
AM: There is no limit on the number of charter fishers at the moment. And they can't onsell anything. This has created a lot of uncertainty
ML: How can we measure the impact of charter fishers?
AT: There is no requirement for gathering information about fishing activities. There is also no information on demographics of clientele. The charter sector of this fishery is nice small and neat.
AM: Valuable data is being lost by not using this sector for ongoing data collection.
AT: Fine scale information supplied by charter fishermen could potentially be very valuable. RFISH and CFISH are not as useful.
ML: The inshore plan is not going to change this with the charter fishery.
RO: If you got significant comment from the RIS could that change?
AT: Most people would be encouraging of something going on if they were aware of licensing problems.
BS: There is data being collected by the offshore charter operators but not inshore operators.
LW: Offshore data collection started in 1996.
ML: Since the new licensing laws came in there has been some data sent in by inshore operators as well, although they don't need to send it.
AM: A few years ago it looked like a charter licence may have become valuable but it didn't happen. Charter fishing is very valuable.
AT: Charter logbooks can get good data from areas that CFISH can't access.
AM: Yes, this is a big loss for the DPI itself.
RT: Regardless of the lack of licences now, we need to get a baseline on how the charter fishermen feel about security. Current state is important.
SS: Here is a chance to collect some information. Should we be asking where clients are coming from? Will this be a good indicator? We shouldn't be limiting ourselves to data we already have.
RO: Charter fishermen could be an indication for other factors such as water quality or development affecting where they are fishing.
ML: The government has made the decision there will be no licences for charter fishermen and this will not change with new RIS.
PS: I think it is a good indicator as it is affecting the industry.
AM: It is devaluing our industry.

SS: Is the base price a good indicator – daily rate etc? As more people enter the fishery that is likely to change.
PS: Important in valuing the industry as well. Number of tourists brought in to region as well.
RO: This information is really important. It is lacking at the moment and will be necessary in future management.

AM: If we don't record the catch and effort information – potentially they could take away fishing areas without the data to prevent it.
PS: This is a major impact in terms of the value of the inshore fishery.
AM: It's certainly a growing industry and is being ignored by management.
BS: This is a circular argument. It's not going to happen when a political decision is required. Would be easy to collect as part of CapReef.
AM: Voluntary supply may get a little vague.
BS: We need to supply an incentive for charter fishers to complete logbooks. It is doable to incorporate this into our CapReef surveys.
RT: We will collect as much socio-economic data possible from the inshore charter fishers. We can't collect catch and effort within this project. Tourism operators collect information on clients – can this be done for charter fishers?
KL: There are national and international visitors surveys from Tourism Australia available (KL to check on availability via GBRMPA)
PS: These surveys are not great but will provide a base.
KL: There's information on origin of clients.
PS: The key thing that is missing is that they are unacknowledged in the industry. There are no statistics on the value of the industry. Potentially very important.
AM: This is a growth industry and we may see a shift with more recreational fishers using charter operators.

ML: The health of the charter fishery is an indicator of the long term viability of downstream industries.

RT: We need to get an understanding of the industry – make sure demographics is in every section.

CONSUMERS:

Goal	Indicator	Discussion
Ensure local seafood available	- Availability of local seafood - Consumer demand – amount, sp, quality, value, seasonality, range of product - Satisfaction of demand - Current distribution of product	Marketing info - QSMA
~~Availability of affordable local seafood~~	See prev	
Perceptions re fisheries management	- Consumer perceptions - How that affects their behaviours	
Perceptions of rec and comm. fishing industry	- Consumer perceptions - How that affects their behaviours	
Fair access	- Consumer perceptions	
Understand consumers	- Demographics – related to demand, consumption patterns – how much, where from, price paid, species preferred	

DISCUSSION

RT: Need data on availability of local seafood – from QSMA.

MP: This is a complex issue. Marketers increasingly are only selling local fish. Some marketers will actually add location of capture to marketing information.

SS: In this instance we are referring to product from the inshore fishery.

AT: If export industries open up, fishers shouldn't be restricted to local markets

BS: Consider the carbon footprint for food. Local seafood at the local level. If you can get the same price locally or as export it should be sold locally.

AT: Logical. If an operator can get the same price locally he's not going to go through the hassle of transporting it elsewhere.

MP: Queensland seafood has always been niche marketed. Have to measure availability, seasonally.

RT: If the consumers want local seafood, then it becomes more economically viable.

LW: There is a bulk market, the cheap end of the market. Can't compete with the import price. Need to encourage consumers to "buy seafood locally". Restaurant market – need to crack into. Handling has to be better and is very specific niche market. The consumer that will pay most for seafood is the restaurant patron. Indicator = proportion sold into different sectors.

AT: The consumer also gets the benefit of eating good quality fish at a restaurant.

AT: There is a lot of demand for whole fresh fish for display purposes but a lot of inshore fishers don't have the facility to store whole fish. Economic viability, niche marketing is the way to go.

BS: Increased range of product coming from the inshore fishery.

RT: Can look at long term satisfaction of consumers with product.

MP: And consumer satisfaction with quality.

RT: We can also ask about how consumers feel about the management of the fishery and how that affects their purchasing behaviour.
MP: The consumer doesn't care much about the management…
RT: Beg to differ – previous studies show they do and are willing to pay more if they now the fishery is well managed.
PS: People do actually care wider than the quality of seafood.

RT: Would be good to get some marketing information as well.
PS: Where do consumers source their fish from?

FURTHER DISCUSSION

RT: From here, I will put this together in a table which we can work on progressively via e-mail.

BS: We also need to help Renae with potential sources of data. Renae, please include a column for data sources in the tables you send out.

PS: Something worth talking about in terms of indicators – what are the key factors we are looking at with these demographics? Do we need all this detail? Is it worthwhile breaking up demographics?

DISCUSSION RE DEMOGRAPHICS

1) Recreational fishery

- Household income
- Amt of time for rec activity
- 2nd best use of time after rec fishing
- Stage in life cycle

2) Commercial fishery

- Age
- Income – fishing plus other sources
- Length of time of industry
- Education/training
- Stage of lifecycle
- Alternative sources of employment – relate to opportunity cost
- Business attitude
- Notional level of income? Or satisfaction with income?

PS: Try to get away from traditional measures of demographics where you just get a description of the fishery. Think about what it means.

SS: Demographics are not direct measures but will give information about resilience of change.

RT: You can relate those basic demographics to more complex issues such as resilience.

PS: Need to know if they will adapt, adopt or opt out.

RT: See Nadine Marshall's work.

RO: Going back to the latency, if all fishermen are approaching the industry as a business, latency would not be so prevalence.

LW: Some people have a different notional level of income that effects their effort and demographics. Some will stop fishing when they reach the income they're happy with, others will keep working to maximise their income.

RT: Ok, we'll discuss these more in the future when the tables are put together. We'll also have a look at what other studies are collecting. We'd appreciate your feedback over e-mail in the next month. Thanks for your help!

MEETING END: 4:45PM

Appendix 6 List of attendees for the final workshop, held on the 9th of November 2009 at The Ibis Hotel, Townsville.

Name	Organisation	Sector
Renae Tobin	Fishing and Fisheries Research Centre (FFRC), James Cook University (JCU)	Research
Steve Sutton	FFRC, JCU	Research
Ann Penny	FFRC, JCU	Research
Nadine Marshall	CSIRO Sustainable Ecosystems	Research
Bill Sawynok	Sunfish Qld, RecFishing Services, CapReef	Recreational fishing
Bill Gilliland	Queensland Seafood Industry Assoc. (QSIA)	Commercial fishing
Andrew Mead	Aussie Barra Charters	Charter fishing
Martin Perkins	Queensland Seafood Marketers Association (QSMA)	Seafood consumers
Mark Lightowler	Fisheries Queensland	Fisheries management
Lew Williams	Fisheries Queensland	Fisheries management (economist)
Joshua Maroske	Fisheries Queensland	Fisheries management (economist)
Anthony Roelofs	Fisheries Queensland	Fisheries management (PMS)
Rachel Pears	Great Barrier Reef Marine Park Authority (GBRMPA)	Marine Park Management (Fisheries)
Randall Owens	GBRMPA	Marine Park Management (Fisheries)
Lachlan Marsh	Independent Facilitator	Facilitator

Appendix 7 Socio-economic indicator wish lists for each Inshore Fishery sector.

A) Commercial Inshore Fishers

Goals: 1) Understand the fishery

2) Measure the performance of the fishery management

Sub Goal 2.1: Provide stability, certainty and security
Sub Goal 2.2: Minimise and simplify legislation
Sub Goal 2.3: Ensure fair Access
Sub Goal 2.4: Encourage a diverse fishing fleet
Sub Goal 2.5: Acknowledge industry role in regions
Sub Goal 2.6: Ensure a profitable fishery now and in the future
Sub Goal 2.7: Ensure efficient use of the resource
Sub Goal 2.8: Minimise waste
Sub Goal 2.9: Encourage value-adding
Sub Goal 2.10: Acknowledge economic contribution to regions (including long-term viability of downstream industries)
Sub Goal 2.11: Ensure effective education/communication
Sub Goal 2.12: Ensure good governance

Indicators:

Indicator	Sub Indicator	Goals*	Data source	Collected in Baseline?	Caveats / Points to note
Demographics	Age	1	Survey	Y	Could collect this with licence information.
	Income - from fishing - from other sources (incl spouse) - notional level of income - satisfaction with income	1, 2.1	Survey	Y Y Y Y Y	Low income fishery but fishers generally happy with that. Really important to include satisfaction with income and notional level. Be more clear about other income – fishers' own, and household Revise household income categories – incomes have increased since the initial categories were developed years ago.
	Length of time in industry	1, 2.1	Survey FQ?	Y	Can trends be collated from FQ licence buyer information?
	Family history within industry	1, 2.1	Survey	Y	Would be better to ask for involvement of **spouse**– relates to social resilience outside industry; and **dependents**– relates to recruitment of new fishers.

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
	Previous/ other education/training/experience	1	Survey	Y	Need to also know if fishers would **return** to other training/experience if they had to leave fishing.
	Stage of lifecycle	1	Survey	Y	Hard to define so not discussed in report. Need clear definition at outset.
Demographics contd.	Alternative sources of employment	1	Survey	N	While fishers might have alternatives, they prefer not to use them – important to know how they would feel about having to use alternatives.
	Business attitude	1	Survey	N	What does this mean? We asked fishers if they a 'business plan'. Need clearer definition here. Hard to measure.
	Marital status - involvement of spouse in fishing business	1	Survey	Y	Relates to resilience. See family history.
	Family structure – number of dependents	1	Survey	Y	Relates to resilience – more dependents may lower resilience due to need to provide for others. Also see family history.
Patterns of use[10] – <u>industry</u> wide	Operator trends - Number of operators - Number of new operators - Avg duration - Turn-over - Latency within industry	1, 2.1, 2.6, 2.10	FQ licensing information	 Y Y Y Y Y	Some information available from FQ, but need more accurate information on the number of new operators (recruitment to fishery), how long they are staying for, and turn-over. If there is high turnover there may be issue with satisfaction/viability in the fishery not noted through a general count of operators.
	Diversity of operations - % small and large - % Aus vs foreign owned licences	1, 2.1, 2.4	FQ	 Y N	Need to define small and large operations. Would be good to get this information from FQ.
Patterns of use - <u>each operator</u>	Symbols / quota held - details - % dependency on each	1, 2.1, 2.4	FQ, Survey	Y	Relates to diversity of fleet, adaptive capacity and ability to effort shift.

[10] Patterns of use, business structure, and economics are important for goal of ensuring there is a diverse fishery.

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
	Species targeted - % dependency on each - diversity (# of per operator)	1, 2.3 2.4 2.7	FQ	Y	Relates to diversity of fleet, adaptive capacity and ability to effort shift.
	Type of fishing - gear used	1, 2.3 2.4 2.7	FQ, Survey	N	Fishers are restricted by regulations in the gear they use in this fishery. How likely is it to change over time? Likely longer time-frame and change should be well documented anyway.
	Ports - home port - # ports used - distance travelled from port - avg, min and max per trip - range along coast	1, 2.3 2.4, 2.5	FQ, Survey	 Y N Y	Range / distance took a lot of time to calculate for the baseline surveys. Would be better from logbooks if port of origin is known. Spread along coast is important.
	Seasonality	1	FQ	N	Should be able to get this from logbooks – i.e. seasonality in fish targeting / fishing activity. Difficult in such a diverse fishery.
	Trips - frequency - length	1	FQ	N	Difficult in multi-species, multi-endorsement fishery.
	Location of sales: - % international, interstate, or local	1, 2.3 2.5, 2.6, 2.9, 2.10	QSMA, Survey	Y	Need to define 'local' clearly – we used region level, and treated 'elsewhere in Queensland' as another location.
	Recreational fishing participation	1	Survey	Y	Relates to conflict issues, motivations for fishing…
Business structure	Licence owned/leased	1, 2.1	FQ, Survey	Y	Relates to resilience – economic dependence plus security.
	Owner-operator/skipper	1, 2.1	Survey	Y	Relates to resilience – economic dependence plus security.

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
	Boats: - Number of boats - Length of largest boat - Age of boats - Quality - Boat owned/debt owed – amt?	1 2.4 2.5	Survey	 Y Y Y Y Y	 We assessed quality broadly via replacement value.
	Number of family members involved in business	1 2.4	Survey	N	We didn't collect this directly – see family history.
	Crew - number - level of dependency	1, 2.5	Survey	 Y Y	Relates to flow of benefits. In terms of full time, part time or casual.
	Formal business plan	1, 2.1	Survey	Y	See business attitude above.
Economics - industry wide	Licence / quota values	1, 2.1	FQ, Survey	N	Licence values are complicated due to quota for some species and multi-endorsement nature of fishery.
	Economic impact - state and regional - direct and flow-on (via input-output analysis) - value of output - employment - household income - contribution to gross state / regional production	1, 2.1, 2.5, 2.6, 2.10	FQ, Survey, other?	N	Difficult and data intensive for many of these. Need clearer definitions including what they will achieve. Input-output analysis has a tendency to be misused in allocation decisions due to confusion in terminology (Hundloe 2002).
	Beach price per species	1, 2.6, 2.9	FQ, QSMA	Y	Documented for key species in baseline report. Long list for multi-sp fishery.
	GVP	1, 2.1, 2.6	FQ	Y	Standard measure. Is it really useful?
	Value of the fishery	1, 2.6	FQ	N	By what measure? Need to define clearly.
Economics - individual operators	Annual turnover (income)	1, 2.1, 2.4	Survey	Y	Hard to get accurate measure in a phone survey, and many may not be willing to share specific information. Perhaps best done in categories?

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
	Annual profit	1, 2.1, 2.4, 2.6	Survey	Y	A few fishers stated "a good business man has minimal profit to avoid tax". Concerned this is not a good measure on its own. Although Hundloe (2000) stated profit is the best measure of a sustainable fishery…
	Profit per fish / sp	1 2.6	Survey + FQ beach price?	N	Difficult to estimate in multi-sp fishery.
	Invested capital	1	Survey	Y	Data intensive. Need to include primary vessel hull and permanent fixtures (without electronics or gear), electronic gear onboard primary and tender boats, license package and other capital items such as tender vessels and fishing gear. Other invested capital items such as sheds, cold-rooms and jetty/moorings can also be included. The baseline surveys could not collect all of this given time constraints.
	Return on invested capital	1, 2.1, 2.6	Survey	Y	Very useful, but need more detailed information to get an accurate measure (see invested capital). While this figure can give some indication of a company's ability to allocate capital towards profitable investments, it becomes more useful when it is compared with the 'cost of capital': i.e. the opportunity cost for a particular investment.
	Costs - fixed (mooring, insurance, etc) - variable (fuel, bait, gear, maintenance)	1, 2.1, 2.6	Survey	Y	Could get more detail but concern about accuracy for phone surveys. Fixed vs variable is a compromise, and gives idea of costs of things like temporal closures where fixed costs are paid regardless.
	Debt	1, 2.1, 2.6	Survey	Y	Relates to resilience. Be clear about whether this is fishing related debt or other household debt – both may be important, and a fisher's ability to cover this debt may also be linked to whether they have other sources of income. For baseline surveys we collected debt related to boat and licence.

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
	Economic profit		Survey	N	Includes the opportunity cost of capital and allowances for unpaid labour.
	Profitability components - Catch rates - Prices received - Fishing costs	1, 2.1, 2.4, 2.6	FQ + Survey	N	Need someone in the department willing to put this together.
	Prices paid and received index - Changes in earnings: - Changes in total catch, species composition; - Changes in total revenue; - Changes in exchange rate; - Changes in market prices; - Cost changes: - Fuel costs, fuel use, marketing costs, and freight.	1, 2.1, 2.4, 2.6	FQ + Survey	N	Data intensive.
Perception of fishers re. stability certainty and security	Perceptions of: - Access - Competition between and within sectors - Income and costs - CPUE over time - Threats to fishing	2.1 2.3	Survey	Y	Relates to security, resilience, satisfaction, etc.
Resilience of fishers	How long fishers intend to remain in industry What would make them leave? Importance of fishing	2.1	Survey	Y N Y	Would be good to know trigger points that would make fishers leave.
	Perception of risk Ability to plan, learn and re-organise Ability to cope Level of interest in change	2.1	Survey	Y Y Y Y	These were presented as resilience statements developed by Marshall and Marshall (2007). Resilience statements were useful to provide a 'score' of resilience but should be considered with other variables (e.g. demographics, patterns of use, economics).

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
Property rights	Existence of Transferability Perception of confidence in	2.1	FQ + Survey	Y Y N	Important for security.
Workplace safety	# of injuries/ incidents # of fishers that operate certain nets	2.1 2.1	MSQ	Y N	MSQ have total commercial fishery injury and fatalities – not sector / gear specific.
Perceptions of regulations and complexity	Of current regulations Of complexity # of pages of regulations	2.1, 2.2, 2.3, 2.11	Survey	Y Y N	Relates to security, perception of agency, etc.
Compliance rates + costs of enforcing		2.2, 2.11	QBFP	Y N	Relates to whether fishers support the regulations and agency.
Industry trends	Turn-over within industry # of people employed # of investment warnings	2.1, 2.10	FQ	Y/N N N	Should be available via FQ. High turn-over might indicate low resilience within the fishery.
Proportion of fishable shared vs commercial only vs closed areas		2.1, 2.3	FQ, GBRMPA	Y/N	Hard to obtain due to multiple layers of management and no clear outline of creek/river closures for the inshore fishery
Expenditure – net multipliers	Community Regional	2.5, 2.10	Survey	N N	Amount of industry expenditure kept in community. Potentially data intensive. See Fenton and Marshall 2001 for earlier example.
Employment from industry	Direct Indirect	2.5, 2.10	Survey	N N	Important for regional contribution estimates. We only looked at direct crew.
Opportunity cost		2.1	FQ	Y	Opportunity cost in baseline report provided by DEEDI - opportunity cost of capital was set at 10% based on a combination of the 10-year long Government bond rate of 5.6% and a risk premium of 4.4% inherent in the commercial fishing industry as suggested by the Queensland Rural Adjustment Authority. Is this an accurate measure? How much does it change?
Number of operators	Regional State	2.4, 2.5, 2.10	FQ	N Y	Should be available via FQ. Hard to get information at regional level.

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
Selling practices[11]	How product is handled (eg. Whole fillet niche market Post harvest value adding	2.6, 2.7, 2.8, 2.9	QSMA	Y N Y	Generalised information at this stage, but may improve if the industry develops more niche markets?
Beach Price	min, max and modal vs operational cost (input-output price ratio analysis)	2.6, 2.9	FQ	Y/N N	We managed to get average beach price only for the baseline surveys.
Markets for byproduct	Current Recent developments Future ideas	2.7, 2.8, 2.9	QSMA	Y N N	
Import price of product		2.6	QSMA	N	This turned out difficult to get for the baseline surveys.
'Green products"	Availability of Amount of promotion of	2.7, 2.9	QSMA	Y N	Currently no green products in the fishery. Important to note if/when this changes.
Level of catch in quota fisheries		2.6, 2.7	FQ	Y	For baseline surveys this only applied to spotted mackerel and tailor. There were new quotas implemented in March 2009 for shark and grey mackerel.
Complaints about wastage / discards		2.8	FQ	N	Proved difficult to get for baseline surveys
Technology progress	Recent Scope for future	2.6, 2.7	FQ	N	
No. of fishers utilising BRDs		2.8	FQ	N	Where relevant e.g. tunnel net.
Net Multipliers – input/output		2.10	FQ	N	Used to determine how much value stays local. Didn't have a good understanding of this for the baseline surveys. Appears data intensive
Flow on effects	Labour	2.10	Survey	Y	We only looked at crew for the baseline surveys. A lot more needed if this included
Number of marketers/processors		2.10	QSMA	N	Didn't have this information for such a large area.

[11] Selling practices, markets, green products etc should be linked to consumer surveys to track customer demand for, and satisfaction with, products.

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
Health of the commercial industry	See economic and patterns of use indicators above	2.10	Survey and FQ	Y	Combination of indicators used here. Be clear in what is to be included.
Perceptions of fishers (education / communication)	- Education/communication - Main information sources - Trusted sources	2.11	Survey	Y Y N	Need to link to any communication efforts.
Participation in consultation Satisfaction with consultation Likelihood of future participation in consultation		2.11	Survey	Y Y Y	More related to management change, but also linked to communication, plus satisfaction / trust in management.
Social networks	Contact with QPIF/QSIA	2.1, 2.11	Survey	Y	Social networks important for resilience.
Perception of governance	Perceptions of: - Policy - Transparency in decision making - Institutional cooperation - Fair allocations	2.12	Survey	Y Y N Y	Good governance = people's confidence in ability of managers to manage the fishery sustainably according to what community finds acceptable. Should collect information regarding perceived transparency in decision making – didn't collect for baseline. Transparency of information and decisions promotes greater acceptance of management change, even from those who are impacted negatively (Grafton et al. 2007).
Confidence in agencies	From fishers From community	2.12	Survey	Y N	See perception of governance. We didn't have scope for community surveys, though we did ask consumers.
Volume of user conflict (within/between sectors)	Perception of fishers Relevant complaints Reports of vandalism	2.3, 2.12	Survey, FQ	Y N N	Important for security, satisfaction, etc.

B) Inshore Charter Fishers

Goals: 1) Understand the fishery

2) Measure the performance of the fishery management

Sub Goal 2.1: Provide stability, certainty and security
Sub Goal 2.2: Minimise and simplify legislation
Sub Goal 2.3: Acknowledge role in regional tourism
Sub Goal 2.4: Monitor the value of industry
Sub Goal 2.5: Ensure confidence in consultation
Sub Goal 2.6: Ensure fair access
Sub Goal 2.7: Ensure long-term viability of downstream industries
Sub Goal 2.8: Monitor contribution to communities
Sub Goal 2.9: Ensure effective education/communication
Sub Goal 2.10: Ensure good governance

Indicators:

Indicator	Sub Indicator	Goals	Data source	Collected in Baseline?	Caveats / Points to note
Demographics	Age	1	Survey	Y	Could collect this with licence information.
	Income - from fishing - from other sources incl spouse - notional level of income - satisfaction with income	1 2.1	Survey	 Y Y Y Y	Be more clear about other income – fishers' own, and household. Revise household income categories – incomes have increased since the initial categories were developed years ago.
	Length of time in industry	1, 2.1	Survey, FQ?	Y	Can trends be collated from FQ licence information?
	Previous/other training/experience	1	Survey	Y	Need to also know if fishers would **return** to other training/experience
	Stage of lifecycle	1	Survey	Y	Hard to define so not discussed in baseline report. Need clear definition at outset.
	Alternative sources of employment	1	Survey	Y	While fishers might have alternatives, they prefer not to use them – important to know how they would feel about having to use alternatives..
	Marital status -involvement of spouse in fishing business	1	Survey	Y Y	Marital status relates to resilience in general. If spouse is involved in fishing business vs employed elsewhere also relevant to resilience.

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
	Family structure – number of dependents	1	Survey	Y	Also involvement of children in industry – recruitment.
Patterns of use – industry wide	Operator trends - number of operators - regional distribution of operators - number of new operators - Avg duration - Turn over	1, 2.1, 2.4, 2.8	FQ	 Y Y Y Y Y	Some information available from FQ, but need more accurate information on the number of new operators (recruitment to fishery), how long they are staying for, and turn-over. There seems to be high turnover - may be issue with satisfaction/viability in the fishery not noted through a general count of operators.
	Diversity of operations - % small and large - % extended and day trips - % inshore only vs diverse	1, 2.4	FQ	 N N Y	Need to define small and large operations. Would be good to get this information from FQ.
Patterns of use – operator level	Permits held - details - % dependency on each	1, 2.1	FQ, Survey	 Y N	Information is fairly vague about this for inshore fishery. Species targeted might be more relevant.
	Species targeted - % dependency on each - diversity	1, 2.1, 2.6	Survey, FQ	 Y Y	Relates to diversity of fleet, adaptive capacity and ability to effort shift.
	Type of fishing - gear used - habitat % use/preferred	1, 2.1, 2.6	Survey	N	Habitat use important to see relative importance of Inshore Fishery, although species will likely reveal the same information.
	Ports - home port - # ports used - distance travelled from port - avg min and max per trip - range along coast	1, 2.6, 2.8	Survey, FQ	 Y N Y Y Y	Distance/range took a lot of time to calculate. Would be better from logbooks if port of origin is known. Spread along coast is important in terms of contributions to communities, effort concentration, etc.
	Seasonality	1	FQ	N	Should be able to get from logbooks.

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
	Trips - frequency - length - avg number of clients per trip - avg number sites visited per trip	1, 2.1, 2.6	FQ + Survey	N	Relate to fishery / habitat / species / seasonality?
Business structure	Boats: - number of boats - length of largest boat - Age of boats - Quality - Boat owned/debt owned – amt	1, 2.1	Survey	 Y Y Y Y Y	 We assessed quality broadly via replacement value.
	Number of family members involved in business	1, 2.1, 2.8	Survey	Y	See demographics above.
Business structure contd…	Crew - number - level of dependency	1, 2.1, 2.8	Survey	 Y Y	Relates to flow of benefits. In terms of full time, part time or casual
	Formal business plan	1, 2.1	Survey	Y	Relates to ability to plan – i.e. within resilience measure.
Economics -industry wide	Value of the fishery Licence values Licence fees GVP	1, 2.4, 2.7	FQ + Survey	N N Y N	How to measure value of the fishery? Licence values not available – indicated from fees. Not all inshore fishers need a licence now – not a good measure for this fishery?
Economics -individual operators	Annual turnover	1, 2.1, 2.4, 2.7	Survey	Y	Hard to get accurate measure in a phone survey, and many may not be willing to share specific information. Perhaps best done in categories?
	Annual profit	1, 2.1, 2.4, 2.7	Survey	Y	Concerned annual profit is not a good measure on its own. Although Hundloe (2000) stated profit is the best measure of a sustainable fishery…
	Trip price	1, 2.1, 2.4, 2.7	Survey	N	For clients. May be dependent on many factors.
	Invested capital Return on invested capital	1, 2.1, 2.4, 2.7	Survey	Y Y	Invested capital and ROIC appear very useful, but need more detailed information to get an accurate measure – see Commercial tables.

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
	Costs - fixed (mooring, insurance, etc) - variable (fuel, bait, gear, maintenance)	1, 2.1, 2.4, 2.7	Survey	Y	Could get more detail but concern about accuracy for phone surveys. Fixed vs variable is a compromise, and gives idea of costs of things like temporal closures where fixed costs are paid regardless.
	Debt	1, 2.1	Survey	Y	Relates to resilience. Be clear about whether this is fishing related debt or other household debt – both may be important, and a fisher's ability to cover this debt may also be linked to whether they have other sources of income. For baseline surveys we collected debt related to boat.
	Economic profit	1, 2.1	Survey	Y	Includes the opportunity cost of capital and allowances for unpaid labour.
Perception of fishers re. stability certainty and security	Perceptions of: - Access (now and future goals) - Competition between and within sectors - Income and costs - CPUE over time - Threats to fishing	2.1	Survey	 Y Y Y Y Y	Relates to security, resilience, satisfaction, etc.
Resilience of fishers	How long fishers intend to remain in industry What would make them leave? Importance of fishing	2.1	Survey	Y N Y	Would be good to know trigger points that would make fishers leave.
	Perception of risk Ability to plan, learn and re-organise Ability to cope Level of interest in change	2.1	Survey	Y Y Y Y	These were presented as resilience statements developed by Marshall and Marshall (2007). Resilience statements were useful to provide a 'score' but should be considered with other variables (e.g. demographics, patterns of use, economics).
Property rights	Existence of Transferability Opinion of importance of	2.1	FQ + Survey	Y Y N	Important for security. Currently not very secure and fishers hoping for this to improve.

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
Workplace safety	# injuries/accidents	2.1	MSQ	Y	MSQ have data for total number of injuries for commercial vessels which includes passenger carrier vessels and other tourism operations – cannot separate charter fishers from this group.
Perceptions of regulations and complexity	Perceptions of: - Regulation concepts - Current management - Need for new management - Regulations' complexity	2.1, 2.2, 2.9	Survey	 Y Y Y Y	Relates to current security as well as support for, and ability to understand, regulations.
# of pages of current regulations		2.2	FQ	N	Stakeholders initially thought fewer pages would mean less complexity…
Compliance rates + costs of enforcing		2.2, 2.9	QBFP	Y N	Only have data from recreational sector entirely, no separation from charter
Industry trends	# of people employed % Client return Regional distribution	2.1, 2.8	Survey, FQ	N N Y	Important for regional contribution estimates. Would be good from FQ
Origin of clients	- % tourist vs local - # tourists brought into region Tourist preferences	2.3, 2.4, 2.8	Survey	Y N N	Important for regional contribution estimates, also security of the industry?
Participation in consultation Satisfaction with consultation Likelihood of future participation Perceived impact of management acceptable / understood		2.1, 2.2, 2.9	Survey	Y Y Y Y	More related to management change, but also linked to communication, plus satisfaction / trust in management.
Social networks	Contact with charter rep / QPIF Main information source	2.1, 2.9	Survey	Y Y	Social networks important for resilience.
Perceptions of fishers re education / communication	Education / communication Information sources Trusted sources	2.1, 2.9	Survey	Y Y N	Need to link to any communication efforts.
Proportion of fishable shared vs recreational only vs closed area		2.1, 2.6	FQ, GBRMPA	Y	Hard to obtain due to multiple layers of management and no clear outline of creek/river closures

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
Volume of user conflict (within/between sectors)	Perception of fishers Relevant complaints Reports of vandalism	2.6	Survey, FQ	Y N N	Important for security, satisfaction, etc.
Health of the charter sector	See economic and patterns of use indicators above	2.1, 2.7, 2.8	Survey	Y	Combination of indicators used here. Be clear in what is to be included.
Employment from industry	Direct Indirect	2.4, 2.7, 2.8	Survey	N N	Important for regional contribution estimates. We only looked at direct crew.
Expenditure	Regional State	2.4, 2.8	Survey	N	Important for regional contribution estimates. Data intensive.
Perception of governance	Policy Transparency in decision making Of institutional cooperation Of fair allocations	2.10	Survey	Y Y N Y	Good governance = people's confidence in ability of managers to manage the fishery sustainably according to what community finds acceptable. Should collect information regarding perceived transparency in decision making – didn't collect for baseline. Transparency of information and decisions promotes greater acceptance of management change, even from those who are impacted negatively (Grafton et al. 2007).
Confidence in agencies	From fishers From community	2.10	Survey	Y N	See perception of governance. We didn't have scope for community surveys, though we did ask consumers.

C) Inshore Recreational Fishers

Goals: 1) Understand the fishery

2) Measure the performance of the fishery management

Sub Goal 2.1: Simplify regulations
Sub Goal 2.2: Ensure continued ability for recreational fishers to catch a fish
Sub Goal 2.3: Ensure fair access
Sub Goal 2.4: Monitor confidence in sustainable management
Sub Goal 2.5: Ensure confidence in consultation process
Sub Goal 2.6: Ensure effective communication/education
Sub Goal 2.7: Ensure long-term viability of downstream industries (boat and tackle shops)
Sub Goal 2.8: Ensure fair Access for diverse economic brackets
Sub Goal 2.9: Monitor contribution to communities

Indicators:

Indicator	Sub-indicator	Goal	Data source	Collected in Baseline	Caveats / Points to note
Demographics	Age	1, 2.7, 2.8	Survey, RFISH	Y	Can track whether demographic is aging, whether new younger fishers are recruiting, etc.
	Gender	1 2.8	Survey, RFISH	Y	
	Household Income	1, 2.8	Survey, RFISH	Y	When looking at **access to diversity** of incomes, hard to know what is normal – ABS stats not very useful in this regard. Revise categories – incomes have increased since the initial categories were developed years ago.
	Area of Residence	1	RFISH	N	To explore regional distribution.
	Education	1, 2.8	Survey, RFISH	Y	Diversity of access…
	Family Structure	1, 2.8	Survey, RFISH	Y	Diversity of access…
Patterns of use – industry wide	Number of fishers (participation)	1, 2.7, 2.9	Survey, RFISH	Y	
	Number of new fishers	1, 2.7	Survey, RFISH	Y	To ensure recruitment, and explore turnover.

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
	Overall fishing effort (or distribution of effort)	1, 2.9	RFISH	N	Need more regional information from RFISH diary surveys.
	Sp harvest rate	1	RFISH	N	Broad estimates available for main species from RFISH, but some concerns over accuracy particularly at regional scale.
	Fishing rights	1	FQ	Y	E.g. licence. Currently non-existent, but interesting to track if this changes.
Patterns of use – each fisher	Duration of fishing experience	1	Survey, RFISH	Y	To explore turnover.
	Trips - frequency (avidity) - length - seasonality	1, 2.7	Survey, RFISH	 Y N N	 Not sure if trip length is important but could estimate from RFISH diary program. Hard to get good information on seasonality of fishing.
	Ports - main port - # ports used - distance travelled from port - avg, min and max per trip	1, 2.3, 2.8, 2.9	RFISH	N	Would be good to explore regional distribution of fishing effort. Could get some of this from RFISH diary surveys.
	Type of fishing - boat/shore - gear used – bait, lure, etc	1, 2.8	Survey, RFISH	 Y Y	Gear used only collected in broad categories (line, spear, crabbing etc).
	Preferred species	1, 2.3	Survey, RFISH	Y	Important to follow demand / preference, even if fishers are not successful in catching many – may be very different to main catch.
	Importance of: - number of fish - size of fish	1, 2.2	Survey, RFISH, previous surveys	N	We asked about satisfaction with but not importance of these factors for the baseline surveys. Doesn't seem to vary much between other previous surveys. Would be good to link importance and satisfaction.
	Habitat preferred - salt/fresh - inshore/offshore - % fishing time inshore	1, 2.3, 2.8	Survey, RFISH	Y	To determine relative importance of the Inshore Fishery.

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
	Catch/release (consumptive orientation)	1, 2.3	RFISH	Y	Information available from RFISH on the proportion of catch that is released, but it is not clear what proportion were released because they were regulated vs because fishers CHOSE to release a fish they could have kept. General information available from (Sutton 2003)
	Utilisation of catches - % own use vs give to family/friends	1, 2.3	Survey	Y	Relates broadly to consumptive orientation.
	Boats - ownership - number - size - purpose (fishing/other)	1, 2.7	RFISH?	N	Can look at boat registration data but it doesn't specify which boats are used for fishing / not. Boat registration trends alone can be misleading.
Economics	Expenditure	1, 2.7, 2.9	Survey	Y	Expenditure needs to be put into context – see WTP. REFS
	Willingness to pay	1, 2.7	Survey	Y	We collected WTP on a broad scale in terms of how much more fishers would be willing to pay per trip before they would choose NOT to fish. Not on a per species basis.
	Value of the fishery	1, 2.7, 2.9	FQ?	N	By what measure? Need to define.
	Economic impact -gross output, value added, household income, employment, direct effects, flow on effects (production induced and consumption induced)	1, 2.7, 2.9	Survey	N	Data intensive. Not scope to collect in baseline surveys.

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
	Gross and net value (net = gross less operating costs (on water = boat fuel, repairs and maintenance, mooring/storage, licences, charter boat hire, fishing guides, bait, berley, ice, fishing licences, tournament entry, opportunity cost of time spent fishing; off water = travel, accommodation; travel operating costs)).	1, 2.7, 2.9	Survey	N	We had some information on expenditure but not enough to be able to calculate these indicators. Data intensive.
Social benefits	Motivations Expectations	1, 2.2	Previous surveys	Y Y	We used Sutton's findings for motivations and expectations given they don't tend to vary much over all. However, it would be good to LINK these with satisfaction explicitly.
	Satisfaction	1, 2.2, 2.3	Survey	Y	
	Centrality to lifestyle	1	Survey, previous surveys	Y	Relative importance of fishing. Also see (Sutton 2006).
	Amount of time available for fishing	1	Surveys	N	Affected by many external factors
	Factors affecting fishing participation	1, 2.7	Previous surveys	Y	Collected by Sutton (2006)
	2nd best use of time after fishing	1	Previous surveys	N	Omitted in baseline surveys due to time constraints. Thought it more important to know relative importance of fishing vs all activities rather than what fishing is competing with.
	Reasons for stopping fishing	1, 2.7	Previous surveys	Y	Collected by Sutton et al. (2009)
	Club membership	1, 2.6	Survey, RFISH	Y	
	Value of fishery to the community	1, 2.7, 2.8, 2.9	FQ?	N	By what measure? Need to define this.
	Social capital	1	Surveys?	N	By what measure? Need to define this.

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
Perception of fishers re. stability certainty and security	Perceptions of: - Access (current and goals) - Competition between and within sectors - ability to catch a fish on a given trip - change in satisfaction - CPUE / fishing quality over time - Threats to fishing	2.2, 2.3, 2.4	Survey	Y	Relates to security, resilience, satisfaction, etc.
Successful trips	Number / % of trips where fishers: - catch a fish - catch a legal fish	1, 2.2, 2.3	RFISH?	N	Level of detail difficult – can RFISH show this?
Perceptions of regulations and complexity	Of current regulations - need for - confidence in - availability of - support for Of complexity	2.1, 2.4, 2.6	Survey	Y Y	Governance, confidence in regulations and agencies.
# of pages of current regulations		2.1	FQ	N	Stakeholders initially thought fewer pages would mean less complexity…
Compliance rates + costs of enforcing		2.1, 2.4, 2.6	QBFP	Y N	Have data from recreational sector entirely, which includes the charter fishing sector. Not a lot of detail in reports from QBFP.
Participation in consultation Satisfaction with consultation Likelihood of future participation in consultation		2.5, 2.6	Survey	Y Y Y	More related to management change, but also linked to communication, plus satisfaction / trust in management.
Perception of impact of management – acceptable / understood		2.4, 2.5, 2.6	Survey	Y	Transparency of information and decisions promotes greater acceptance of management change, even from those who are impacted negatively (Grafton et al. 2007).
Perceptions of fishers (education / communication)	- Education/communication - Main information sources - Trusted sources	2.5, 2.6	Survey	Y Y N	Relates to availability of information. Should link to any communication efforts.

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
Social networks	- Sunfish membership - Fishing club membership - Contact with QPIF	2.6	Survey, RFISH	Y Y Y	Social networks important (REF INFO)
Proportion of fishable shared vs recreational only vs closed areas		2.3	FQ, GBRMPA	N	Hard to obtain due to multiple layers of management and no clear outline of creek/river closures for the commercial inshore fishery.
Anglers expectations and satisfaction with amenities		2.3, 2.8	Survey	Y	
Diversity of demographics		1, 2.8, 2.9	Survey, RFISH	Y	Combination of indicators above.
Diversity of patterns of use		1, 2.8	Survey, RFISH	Y	Combination of indicators above.
Number of boat registrations (minus those that don't fish)		2.7	Dept of Transport	Y	
Number of bait and tackle shops		2.7, 2.9	Industry tackle assoc.	N	Outside the scope of the baseline surveys. Some meeting attendees suggested this is more indicative of the number of large department store style shops rather than demand for tackle.
Level of imports		2.7	Industry tackle assoc.	N	
Angler's purchase behaviour		2.7	Industry tackle assoc.	N	How to measure?
Health of recreational sector (participation and diversity)		2.7, 2.8	Survey, RFISH	Y	Combination of above indicators – participation, effort, diversity, recruitment – over time.
Land based access points vs boat ramps		2.3, 2.8	Councils	N	Difficult to get reliable estimates of either access points.
Access points for disabled fishers		2.3, 2.8	Councils	N	
Employment levels	- direct - indirect	2.7, 2.9	Various.		Can only measure by reference to input suppliers (e.g. bait and tackle shops, boat and engine stores, etc). Outside scope of the baseline surveys.
Expenditure	Regional State	2.7, 2.9	RFISH	N	

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
Tourist fishers incl Grey Nomads		2.8, 2.9	Tourist surveys	N	Hard to quantify except for small, random regional studies.
Facilities		2.3, 2.8 2.9	Council	N	Can explore satisfaction with facilities, but availability is difficult for state – more a regionally specific issue?
Community Health		2.8, 2.9	Survey	N	By what measure? Beyond scope of baseline surveys.

D) Queensland Seafood Consumers

Goals: 1) Measure impacts of management changes

Sub Goal 1.1 Understand Queensland Seafood consumers

2) Measure the performance of the fishery management plan post implementation

Sub Goal 2.1: Ensure local seafood is available
Sub Goal 2.2: Monitor perceptions regarding fisheries management
Sub Goal 2.3: Monitor perceptions of recreational and commercial fishing industry
Sub Goal 2.4: Ensure fair Access

Indicators:

Indicator	Sub-indicator	Goals	Data source	Collected in Baseline	Caveats
Demographics	Age	1	Survey	Y	Demographics may be correlated with purchasing habits, and therefore may change over time as the population changes. Both age and gender were collected in relation to the respondents (main grocery buyer). Likely not reflective of consumers in general.
	Gender	1	Survey	Y	
	Household income	1	Survey	Y	Revise categories – incomes have increased since the initial categories were developed years ago.
	Family Structure	1	Survey	Y	
	Stage in lifecycle	1	Survey	N	Hard to define so not discussed in baseline report. Need clear definition at outset.
Patterns of consumption	How much - frequency - quantity	1, 2.4	Survey, QSMA	 Y N	 Quantity hard to collect / define at individual consumer level
	Species - diversity - preferred - wild/farmed - Import/local - consumed and preferred - willingness to pay for local and/or wild-caught	1, 2.1, 2.4	Survey, QSMA	Y	We used survey data for this indicator. Would be good to see how it compares to sales information.

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
	Seafood source - most recent - bought / not bought - constraints on purchasing	1, 2.1, 2.4	Survey, QSMA	 Y Y Y	Would be good to see how it compares to sales information in terms of common source of local seafood. Need more detail on constraints
	Price - paid - willingness to pay	1, 2.4	Survey, QSMA	N	Would be good to see how it compares to sales information.
	How consumed (main/entrée etc)	1, 2.4	Survey	N	
	Regarded as everyday meal – Why?	1	Survey	N	
	Reasons for liking (health, treat etc)	1	Survey	N	
	Support of ecologically sustainable fisheries and eco-labelling - willingness to pay for these	1, 2.2, 2.4	Survey	Y	How do the survey findings compare to actual sales? Are there eco-labelled Inshore Fishery products available? Perhaps not now, but may change in the future.
Perceptions of fisheries	Of commercial fisheries Of recreational fisheries	1, 2.2, 2.3	Survey	Y Y	May affect purchasing behaviour and support of management.
	Of fisheries management - knowledge of - confidence in	1, 2.2	Survey	Y	Good governance = people's confidence in ability of managers to manage the fishery sustainably according to what community finds acceptable.
	Regarding current and future resource allocations	1, 2.2, 2.3, 2.4	Survey	Y	Consumers rarely considered in allocation decisions. This will show whether they are happy with that or not.
	Of threats concerning seafood (pollution, food contamination etc)	1, 2.2	Survey	Y	
	How these affect purchasing behaviour	1, 2.2, 2.3	Survey	Y	Some may have more effect than others, or might be disjoint between perceptions and behaviour.
Availability of local seafood	- Perception of consumers - Actual availability	2.1, 2.4	Survey, QSMA	Y N	We asked about satisfaction with availability. Need more information on actual availability. Supply-demand.
Consumer demand	Amount	1, 2.1, 2.4	QSMA	N	Collected satisfaction, but unable to collect actual amount demanded.

Indicator	Sub Indicator	Goals*	Data source	Baseline?	Caveats / Points to note
	Species	1, 2.1, 2.4	Survey, QSMA	Y	
	Quality	1,2.1, 2.4	Survey, QSMA	Y	Collected satisfaction with. Need information on actual quality or more detail on what constitutes QUALITY seafood.
	Value	1,2.1, 2.4	Survey, QSMA	N	Value might be dependent on other factors.
	Seasonality	1,2.1, 2.4	QSMA	N	Does QSMA have data on seasonality of sales?
	Range of product	1,2.1, 2.4	Survey. QSMA	N	Hard to explore.
Satisfaction of demand		2.1, 2.4	Survey	Y	
Current distribution of product		2.1, 2.4	QSMA	Y	Had information from commercial baseline surveys stating most Inshore Fishery product is sold locally or elsewhere in Queensland. Would be good to get more detailed information. Does QSMA have this?
Perception of fishers re access	- current access to species - goals of future access	2.2, 2.4	Survey	Y N	As a stakeholder…

Appendix 8 Minutes of discussions from the final workshop held on November 24th, 2009 at the Ibis Hotel, Townsville.

MEETING MINUTES

9:00 Workshop start

Renae Tobin – **Opening presentation**
Background on need for and definition of indicators. Eight step process adapted from Rice and Rochet 2005

Questions and comments:

Bill Sawynok: Just a note that recreational fishers are increasing in CapReef region, largely due to lay off from the mining sector due to GFC.

Mike Lightowler: So we will be making sure that some criteria will be more important than others?

Renae Tobin: yes…

Lachlan Marsh (facilitator) – **Presentation:** Introduction to methods for weighting the screening criteria

Weighting of screening criteria
All attendees assigned a rank (1-5, low-high importance) to each of 9 screening criteria, by placing each criteria on the appropriate ring on the target.

Discussion followed to reach consensus on ranks. Some specific comments made for each criteria.

Nadine Marshall: I put *cost* really low because social indicators may not be cost effective but are still interesting.

Bill Sawynok: Reality of the world that it must be considered. Two that come out seeming most important are *cost* and *measurability*.

Lew Williams: Interesting that *specificity* came out neutral.

Bill Sawynok: could we multiply them out?

All ranks for all criteria multiplied (number of votes x rank) to give overall score for each criteria (total for each rank) :

Rank \ Criteria	Concreteness	Theoretical basis	Public awareness	Cost	Measurement	Historical data	Sensitivity	Responsiveness	Specificity
5	6	2	1	9	8	2	2	2	2
4	3	3	2	2	3	3	3	5	4
3	3	5	4	1	2	6	7	6	3
2	1	3	4	1	0	0	1	0	2
1	0	0	2	0	0	2	0	0	2
SCORE	**52**	**43**	**35**	**58**	**58**	**42**	**45**	**48**	**41**

Nadine Marshall: Why is *sensitivity* not high? Would like to think that is the most important.

Bill Sawynok: It will probably multiply out quite high

Rachel Pears: Surprised about *historical data* being so low.

Discussion about each criterion, to gain consensus:

Cost and measurement

Consensus that these are ranked 5.

Sensitivity

Nadine Marshall: Interested in *sensitivity* – what's the point of collecting information if it is not sensitive? E.g.: If some management changes and we are counting the number of boats and there is a change in the number of boats. Would argue that the change in number of boats may not be because of management change.

Bill Sawynok: *Cost* and *measurement* does outweigh *sensitivity*. If it responds well to change but costs too much it becomes unfeasible.

Renae Tobin: Agree that *cost* and *measurement* should be given a higher weight, maybe put *sensitivity* at 4?

Anthony Roelofs: pragmatism came in as being observable.

Some agreed it was more important given the original definition on the wall poster rather than the adjusted definitions.

Renae Tobin: We adjust the original definitions to fit this specific process. If you think they need a clearer definition we can certainly change that.

Agreed to rank sensitivity as a 4.

Public Awareness

Anthony Roelofs: *Public awareness* seems to be a major issue. Needs to be a lot of work done to develop indicators that are understood.

Bill Sawynok: Actually what the public needs to understand is the end result, not necessarily the process to get there.

Steve Sutton: We are not talking about the general public but stakeholder awareness.

Renae Tobin: Return on invested capital is difficult to understand but also a very important indicator. Agree *Public awareness* is very important of fisheries issues and the end result, but not of the individual indicators.

Randall Owens: *Public awareness* comes into it later on when you are actually presenting the information.

Consensus to rank *public awareness* as a 1.

Concreteness and Historical Data

Steve Sutton: I would have put *concreteness* lower. Doesn't matter too much if it is abstract, e.g. resilience is an abstract concept. Things that are very abstract may be very useful.

Mike Lightowler: I think that *concreteness* should be lower – agree with Steve

Bill Sawynok: Balance between *concreteness* and *sensitivity* – *sensitivity* should be higher

Rachel Pears: I think *historical data* should be higher due to having some existing data makes it easier to measure. The other one I am concerned about is *specificity*.

Renae Tobin: I ranked *specificity* low because some changes may not be specific to fisheries as well as those that are specific to fisheries – the idea of the indicator is to trigger a response to find out why there was a change. May find it's both specific and non-specific to fisheries.

Nadine Marshall: Humans will have things in common that will change in relation but difficult to say that's what the change is.

Bill Sawynok: There is nothing in the world that is specific to fisheries.

Lew Williams: We have to be careful about *historical data* due to it being unreliable at best.

Renae Tobin: Can we put historical data at 3?

Anthony Roelofs: I think it shows a lot of useful information.

Consensus to rank *historical data* at 3.

Specificity

Nadine Marshall: An example of why *specificity* should not be rated too high: In Florida after the net ban, the divorce rate in fishing communities went up…not specific to the fishery but indicative of change.

Steve Sutton: However, if you don't put a lot in weight on it…you might end up with indicators responding to things outside of the fishery e.g. GFC.

Bill Sawynok: I disagree. There are lot of things not related to fisheries but impact on the fishery. For example, it seems in Rockhampton, recreational fishing effort has increased due to layoffs from mines caused by the GFC.

Nadine Marshall: Probably need to explain the difference between *sensitivity* and *specificity*….

Steve Sutton: (Gave definition as per Jennings table)

Steve Sutton: It does seem that things going on outside of the fishery might be relevant.

Lew Williams: Such as amount of disposable income.

Bill Gilliland: Trends change. It is possible people got sick of fishing resulting in a decline of recreational fishers?

Rachel Pears: is "relevance" a more useful term than *specificity*?

Nadine Marshall: Can you manage fisheries in isolation of the rest of the world (GFC)?

Bill Sawynok: As well as social factors contributing to fisheries changes other things such as expectation of catch rates are important but you can't really treat that in isolation.

Martin Perkins: The problem with the trawl fishery is they manage everything in isolation of the rest of the world.

Randall Owens: Fisheries are impacted by a whole suite of things….and are not managed in isolation.

Lachie Marsh: It seems like we are discussing *specificity* from two different angles.

Joshua Maroske: Are we saying that external factors are more important than internal? Are we trying to measure as many things as possible or a few things really well? Quality vs Quantity.

Bill Sawynok: If we don't think about external things we might lose information.

Steve Sutton: Might be the definition we need to address. Are you only measuring what you want to measure. NOTE: using Jennings definition instead of more specific definition from Steve.

Renae Tobin: *Specificity* means you intend it to measure what you want it to measure…It's specific to the goal of the monitoring, not necessarily to fisheries.

Responsiveness

Nadine Marshall: I would imagine *responsiveness* and *sensitivity* will be more important than cost and measurement. You can measure the height of a chair easily and cost effectively but it doesn't really tell me anything about the quality of the chair.

Steve Sutton: If it is too expensive to measure or you can't measure it…you won't go ahead with the indicator.

Bill Sawynok: Think the four in the centre are correct (*cost, measurement, sensitivity, responsiveness*).

Theoretical Basis

Lew Williams: Nice to have but not very practical

Nadine Marshall: I think it is very important

Anthony Roelofs: Managers need to see that it is coming from sound theoretical basis.

Steve Sutton: You could measure boat colour and it is cost effective and measureable but won't tell you anything, theoretical basis behind indicators is really important

Lew Willliams: I have reservations about different agencies bringing up different theoretical bases. This means the results you get depend on the assumptions.

Lachie Marsh: The way I understand it is, that it is the reason behind what you are doing.

Lew Williams: is it actually valid to compare old studies with new ones? Generally you are better off using the most recent studies.

Steve Sutton: If someone comes from outside and says why are you measuring that? And the answer is I don't know, it is not very effective.

Randall Owens: This is not a stagnant process…will keep evolving.

Bill Sawynok: Perhaps we should reduce the scales into three categories

Lew Williams: *Theoretical basis* needs to be considered but be wary of.

Rachel Pears: That should be applied to all of these criteria…*cost* needs not just to be low cost but cost effectiveness. So when we are talking about *theoretical basis* we should consider the theoretical basis is good.

Lew Williams: You need to be wary of older research in terms of *theoretical basis*. Can't make a valid comparison with more modern research

Steve Sutton: Having that *theoretic basis* will help up understand the variable better – perhaps allow us to make better judgements of the variables.

Lew Williams: not saying it is not important but sometimes you can't use it sensibly – e.g. cost data.

Bill Sawynok: Much easier on a three scale than a five scale.

Renae Tobin: Definitely can collapse to a three scale to simplify – the research we based this on recommended a three scale to reduce complexity. We made it five for this exercise knowing that people would always want to choose some in the middle.

Ranks changed to 3 point scale of 1 (low), 3 (medium) and 5 (high).

This made consensus possible for remaining criteria.

The group decided on the following weights:

Concreteness:	**3**
Theoretical Basis:	**3**
Public Awareness:	**1**
Cost:	**5**
Measurement:	**5**
Historical Data:	**3**
Sensitivity:	**5**
Responsiveness:	**5**
Specificity:	**3**

Scoring indicators against all screening criteria.

Broke into groups to score indicators for specific sectors, as follows:
Group 1: Commercial Fishing Sector and Seafood Consumers

Group 2: Recreational Fishing Sector and Charter Fishing Sectors

All indicators scored for Recreational and Charter fishers plus seafood consumers, including an extra column for 'importance'. The commercial sector had too many indicators listed to score in a day, so the Group 1 members decided to rank each indicator in terms of importance and score criteria only for those indicators that were ranked as 5 (high importance).

Some issues all seemed to agree on:

- There will be a need to revisit the indicators to decide on the final list
- Some indicators are only or most useful grouped with other indicators. There will be some need to look at indicators in groups.

ACTIONS:

1) Renae to tally scores and importance ranks and report to attendees as soon as possible.
2) Revision of indicator 'wish-lists' based on scores and importance ranks.
3) Indicator groupings to be discussed via e-mail with interested participants.
4) Final list of indicators for each sector to be reached by consensus with interested attendees during February (some key attendees unable to contribute until then) and presented in final report for the project.

Appendix 9 List of indicators scored against screening criteria. Final scores weighted by criteria and importance are shown.

A) Commercial Inshore Fishers

Indicator	Sub Indicator	Concreteness	Theoretical basis	Stakeholder awareness	Cost	Measurement	Historical data	Sensitivity	Responsiveness	Specificity	WEIGHTED SCORE (as %)	IMPORTANCE[12]
Demographics	Age	5	3	5	5	5	5	1	2	1	68	5
	Income[13]											
	- from fishing	5	5	5	4	4	5	4	5	4	89	5
	- from other sources (incl spouse)	5	4	5	2	4	3	3	3	1	63	4
	- notional level of income	5	3	5	2	5	3	3	3	1	64	5
	- ~~satisfaction with income~~[14]											
	Length of time in industry	5	5	5	5	5	5	1	1	1	68	3
	Family history within industry (spouse and dependents	5	3	5	3	3	5	1	1	1	53	1
	Previous/ other education/training/experience	5	4	5	5	5	3	1	1	1	63	2
	Stage of lifecycle	1	3	2	3	3	2	1	1	1	38	1
	Alternative sources of employment										-	2
	Business attitude[15]	2	4	4	1	3	1	5	2	1	50	5
	Marital status										-	2
	- involvement of spouse in fishing business										-	2
	Family structure – number of dependents										-	3

[12] Only the most important ('5' rank) indicators were scored against the screening criteria for the commercial sector (except for the first few indicators) – hence the final score weighted against criteria and importance is not shown for this sector.
[13] Income from fishing and income from other sources gives proportional income from fishing (dependence).
[14] Considered the same as asking for notional level of income.
[15] Including whether they have a formal business plan.

Indicator	Sub Indicator	Con	T.B.	S.A.	$	M	H.D.	Sens	R	Spec	WTD SCR (%)	IMPT
Patterns of use[16] – industry wide	Operator trends											
	- Number of operators	5	5	5	5	5	5	3	4	5	91	5
	- Number of new operators	5	5	5	5	5	5	3	4	5	91	5
	- Avg duration	5	5	5	5	5	5	3	4	5	91	5
	- Turn-over	5	5	5	5	5	5	3	4	5	91	5
	- Latency within industry	5	5	2	5	5	5	3	3	5	86	5
	Diversity of operations										-	4
	- % small and large	5	4	3	5	5	5	3	4	3	84	5
	- % Aus vs foreign owned licences										-	1
Patterns of use - each operator	Symbols / quota held (details and % dependency on each)	5	5	5	5	5	5	4	4	5	94	5
	Species targeted	5	5	5	5	5	5	5	5	5	100	5
	- % dependency on each	4	5	5	2	3	1	4	4	5	70	5
	- diversity (# of per operator)	5	5	5	5	5	5	5	5	5	100	5
	Type of fishing gear used	5	5	5	5	5	5	5	5	5	100	5
	Ports											
	- home port	5	4	5	5	5	5	2	2	2	75	5
	- # ports used	5	3	3	3	3	2	3	3	5	65	4
	- distance travelled from port	5	3	3	3	3	2	3	3	5	65	3
	- avg, min and max per trip	5	3	3	3	3	2	3	3	5	65	3
	- range along coast	5	3	3	3	3	2	3	3	5	65	5
	Seasonality	5	5	4	5	5	5	2	5	5	90	5
	Trip frequency										-	2
	Trip length										-	1
	Location of sales:											
	- % international, interstate, or local										-	4
	Recreational fishing participation										-	1

[16] Patterns of use, business structure, and economics are important for goal of ensuring there is a diverse fishery.

Indicator	Sub Indicator	Con	T.B.	S.A.	$	M	H.D.	Sens	R	Spec	WTD SCR (%)	IMPT
Business structure	Licence owned/leased	5	5	1	2	5	1	2	2	3	59	5
	Owner-operator/skipper										-	4
	Boats:											
	- Number of boats										-	3
	- Length of largest boat										-	3
	- Age of boats										-	4
	- ~~Quality~~										-	
	~~- Boat owned/debt owed – amt?~~										-	
	*Debt owed on whole business[17]	5	5	5	2	4	1	2	2	2	57	5
	Number of family members involved in business										-	2
	Crew number										-	3
	- level of dependency										-	4
	~~Formal business plan~~ (above)											
Economics - industry wide	Licence / quota values	5	5	5	5	3	3	5	5	3	87	5
	Economic impact											
	- state and regional										-	3
	- direct and flow-on (via input-output analysis)	4	3	1	3	3	3	3	2	1	89	5
	- value of output										-	4
	- employment										-	4
	- household income	5	5	5	2	5	4	5	5	4	87	5
	- contribution to gross state / regional production	5	5	5	5	5	5	2	2	2	76	5
	Beach price per species										-	5
	GVP										-	5
	~~Value of the fishery~~											

[17] Replaced boat debt. Considered important to include all fishing related debt (e.g. for cold rooms, licence, etc)

Indicator	Sub Indicator	Con	T.B.	S.A.	$	M	H.D.	Sens	R	Spec	WTD SCR (%)	IMPT
Economics[18] - individual operators	Annual turnover (gross fishing income)	5	5	5	4	5	3	5	5	4	92	5
	~~Annual profit~~											
	~~Profit per fish / sp~~											
	Invested capital (items and age/depreciation)	5	5	5	4	5	3	5	5	4	92	5
	~~Return on invested capital~~											
	~~Costs~~ ~~- fixed (mooring, insurance, etc)~~ ~~- variable (fuel, bait, gear, maintenance)~~ *Major expenses	5	5	5	4	5	3	5	5	4	92	5
	Labour paid and unpaid[19]	5	5	5	4	5	3	5	5	4	92	5
	~~Debt~~											
	Economic profit	5	5	5	4	5	3	5	5	4	92	5
	Profitability components - Catch rates - ~~Prices received~~ - ~~Fishing costs~~	5	5	5	4	5	3	5	5	4	92	5
	~~Prices paid and received index~~ ~~- Changes in earnings:~~ ~~- Changes in total catch, species composition;~~ ~~- Changes in total revenue;~~ ~~- Changes in exchange rate;~~ ~~- Changes in market prices;~~ ~~- Cost changes:~~ ~~- Fuel costs, fuel use, marketing costs, and freight.~~											

[18] Four most important economic indicators decided upon were Gross income, major expenses, capital items and age (depreciation), and labour (paid and unpaid).

[19] New addition at this workshop. See previous footnote.

Indicator	Sub Indicator	Con	T.B.	S.A.	$	M	H.D.	Sens	R	Spec	WTD SCR (%)	IMPT
Perception of fishers re. stability certainty and security	Perceptions of:											
	- Access	5	5	5	2	5	4	5	5	5	89	5
	- Competition between and within sectors										-	3
	- CPUE over time										-	3
	- Threats to fishing	5	5	5	3	5	3	4	3	5	81	5
	- ~~Income and costs~~											
Resilience of fishers	How long fishers intend to remain in industry										-	3
	What would make them leave?										-	3
	Importance of fishing										-	3
	Perception of risk										-	3
	Ability to plan, learn and re-organise										-	3
	Ability to cope										-	3
	Level of interest in change										-	3
Property rights	Existence of	5	5	5	5	5	4	5	5	5	98	5
	Transferability	5	5	5	5	5	4	5	5	5	98	5
	Perception of confidence in	4	4	4	4	3	3	5	5	5	83	5
Workplace safety	# of injuries/ incidents										-	3
	# of fishers that operate certain nets										-	2
Perceptions of regulations and complexity	Of current regulations	4	5	5	2	4	3	5	5	4	81	5
	Of complexity	4	5	5	2	4	3	5	5	4	81	5
	# of pages of regulations										-	1
Compliance rates		5	3	5	5	5	5	5	5	5	96	5
+ costs of enforcing											-	1
Industry trends	~~Turn-over within industry~~ (above)											
	# of people employed (direct and indirect)										-	4
	# of investment warnings										-	1
Proportion of fishable shared vs commercial only vs closed areas		5	5	5	5	5	5	5	5	5	100	5
~~Expenditure – net multipliers~~	~~Community~~ ~~Regional~~											

Indicator	Sub Indicator	Con	T.B.	S.A.	$	M	H.D.	Sens	R	Spec	WTD SCR (%)	IMPT
~~Employment from industry~~	~~Direct~~ ~~Indirect~~ (above)											
~~Opportunity cost~~												
~~Number of operators~~	~~Regional~~ ~~State~~											
Selling practices[20]	How product is handled (eg. Ice slurry)	5	5	5	3	3	3	1	1	1	53	5
	Post harvest value adding (e.g. portion control, fillet, niche)	4	5	5	4	3	3	1	2	2	59	5
~~Beach Price~~	~~min, max and modal~~ ~~vs operational cost (input-output price ratio analysis)~~											
Markets for byproduct	Current	5	5	5	5	5	3	2	2	2	73	5
	Amount of fish wastage[21]	5	5	5	4	4	5	5	5	5	94	5
	~~Recent developments~~ ~~Future ideas~~											
Import price of product											-	1
'Green products"	Availability of										-	4
	Amount of promotion of										-	1
Level of catch in quota fisheries		5	5	5	5	5	5	5	5	5	100	5
~~Complaints about wastage / discards~~ # of reported and verified incidences of discards[22]		5	5	5	4	4	5	5	5	5	94	5
Technology progress	Recent, potential, etc	5	5	5	5	5	4	1	1	1	67	5
~~No. of fishers utilising BRDs~~												
~~Net Multipliers – input/output~~												
~~Flow on effects~~	~~Labour~~											

[20] Selling practices, markets, green products etc should be linked to consumer surveys to track customer demand for, and satisfaction with, products.
[21] New addition at the workshop
[22] New addition at the workshop to replace complaints about wastage / discards. Considered more concrete.

Indicator	Sub Indicator	Con	T.B.	S.A.	$	M	H.D.	Sens	R	Spec	WTD SCR (%)	IMPT
Number of marketers/processors		5	5	5	5	5	4	2	2	2	75	5
Health of the commercial industry	See economic and patterns of use indicators above										-	5
Perceptions of fishers (education / communication)	- Education/communication										-	2
	- Main information sources										-	2
	- Trusted sources										-	2
Participation in consultation											-	4
Satisfaction with consultation											-	4
Likelihood of future participation in consultation											-	1
Social networks	Contact with QPIF/QSIA	4	5	1	2	5	1	2	2	1	54	5
Perception of governance	Perceptions of:											
	- Policy	2	4	4	2	2	3	5	5	1	63	5
	- Transparency in decision making	2	4	4	2	2	3	5	5	1	63	5
	- Institutional cooperation	2	4	4	2	2	3	5	5	1	63	5
	- Fair allocations	2	4	4	2	2	3	5	5	1	63	5
Confidence in agencies	From fishers	2	4	4	2	2	3	5	5	1	63	5
	~~From community~~											
Volume of user conflict (within/between sectors)	Perception of fishers										-	4
	Relevant complaints										-	1
	Reports of vandalism										-	1

B) Inshore Charter Fishers

Indicator	Sub Indicator	Concreteness	Theoretical basis	Stakeholder awareness	Cost	Measurement	Historical data	Sensitivity	Responsiveness	Specificity	WEIGHTED SCORE (as %)	IMPORTANCE	WT X REL. IMPORTANCE (%)
Demographics	Age	5	5	5	5	5	1	2	2	2	69	5	69
	Income - from fishing	5	5	4	5	3	1	3	4	5	77	5	77
	- from other sources incl spouse	5	5	4	5	3	1	3	4	2	72	5	72
	~~- notional level of income~~												
	- satisfaction with income	4	4	3	5	3	1	2	3	4	65	5	65
	Length of time in industry	5	5	5	5	5	1	2	2	2	69	5	69
	Previous/other training/experience	5	5	3	5	5	1	2	2	2	68	3	41
	Stage of lifecycle	4	3	3	5	5	1	1	1	1	55	3	33
	Alternative sources of employment	5	5	3	5	5	1	2	2	2	68	3	41
	Marital status	4	3	3	5	5	1	1	1	1	55	3	33
	-involvement of spouse in fishing business	5	5	3	5	5	1	2	2	2	68	3	41
	Family structure – number of dependents	4	3	3	5	5	1	1	1	1	55	3	33
Patterns of use – industry wide	Operator trends[23] - number of operators - regional distribution of operators - number of new operators - Avg duration - Turn over	5	5	5	5	5	5	3	3	2	82	5	82

[23] Many of the grouped indicators were scored together.

Indicator	Sub Indicator	C	T.B.	S.A.	$	M	H.D.	Sens	R	Spec	WTD SCR (%)	IMPT	WT X IMPT (%)
	Diversity of operations - % small and large - % extended and day trips - % inshore only vs diverse	5	5	3	5	5	5	4	4	4	91	5	91
Patterns of use – operator level	Permits held - details - % dependency on each	5	5	3	5	5	5	4	4	4	91	5	91
	Species targeted - % dependency on each - diversity	5	5	3	5	5	5	4	4	4	91	5	91
	Type of fishing - gear used - habitat % use/preferred	5	5	3	5	5	5	4	4	4	91	5	91
	Ports - home port - # ports used - distance travelled from port - ~~avg min and max per trip~~ - range along coast	5	5	3	5	5	5	4	4	4	91	5	91
	~~Seasonality~~												
	Trips ~~- frequency~~ ~~- length~~ - avg number of clients per trip - avg number sites visited per trip	5	5	3	5	5	5	4	4	4	91	5	91
Business structure	Boats: - number of boats - length of largest boat - Age of boats - ~~Quality~~ Replacement value - Boat owned/debt owned – amt	5	4	4	5	5	2	2	2	3	70	4	56

Indicator	Sub Indicator	C	T.B.	S.A.	$	M	H.D.	Sens	R	Spec	WTD SCR (%)	IMPT	WT X IMPT (%)
	~~Number of family members involved in business~~												
	Crew - number - level of dependency	5	5	5	5	4	3	2	2	2	70	3	42
	Formal business plan	4	2	2	5	5	1	2	2	2	60	2	24
Economics -industry wide	Value of the fishery	2	4	3	1	2	1	2	2	2	39	2	16
	Licence values	5	5	5	5	5	5	3	3	3	84	1	17
	Licence fees	5	5	5	5	5	5	3	3	3	84	3	51
	GVP	4	5	2	2	1	2	4	4	3	60	5	60
Economics -individual operators	Annual turnover Annual profit Invested capital Return on invested capital	4	4	4	2	4	2	3	3	3	62	5	62
	Costs - Trip price - fixed (mooring, insurance, etc) - variable (fuel, bait, gear, maintenance) - Debt	5	5	4	2	4	2	3	3	3	66	5	66
	~~Economic profit~~												
Perception of fishers re. stability certainty and security	Perceptions of: - Access (now and future goals)	4	5	4	5	4	3	5	5	4	89	5	89
	- Competition between and within sectors	4	5	4	5	4	3	5	5	4	89	5	89
	- Income and costs	4	5	4	5	4	3	5	5	4	89	5	89
	- CPUE over time	4	5	4	5	4	3	5	5	4	89	5	89
	- Threats to fishing	4	5	4	5	4	3	5	5	4	89	5	89

Indicator	Sub Indicator	C	T.B.	S.A.	$	M	H.D.	Sens	R	Spec	WTD SCR (%)	IMPT	WT X IMPT (%)
Resilience of fishers	How long fishers intend to remain in industry What would make them leave? Importance of fishing Perception of risk Ability to plan, learn and re-organise Ability to cope Level of interest in change	2	4	2	5	4	1	2	2	3	59	5	59
Property rights	Existence of Transferability Opinion of importance of										-	1	-
Workplace safety	# injuries/accidents										-	1	-
Perceptions of regulations and complexity	Perceptions of:												
	- Regulation concepts	4	5	4	5	4	3	5	5	4	89	5	89
	- Current management	4	5	4	5	4	3	5	5	4	89	5	89
	- Need for new management	4	5	4	5	4	3	5	5	4	89	5	89
	- Regulations' complexity	4	5	4	5	4	3	5	5	4	89	5	89
# of ~~pages of~~ current regulations		5	3	2	5	5	5	5	3	5	88	3	53
Compliance rates + costs of enforcing		5	5	5	5	3	5	3	4	5	85	3	51
~~Industry trends~~	~~# of people employed~~ ~~% Client return~~ ~~Regional distribution~~												
Origin of clients	- % tourist vs local - # tourists brought into region Tourist preferences	5	5	3	4	2	1	3	3	2	62	4	49
Participation in consultation Satisfaction with consultation Likelihood of future participation		4	4	3	5	5	3	2	3	5	76	4	61
Perceived impact of management acceptable / understood		4	5	4	5	4	3	5	5	4	89	5	89
Social networks	Contact with charter rep / QPIF	4	3	2	3	3	1	4	4	4	65	4	52
	Main information source	4	3	2	3	3	1	2	2	2	50	3	30

Indicator	Sub Indicator	C	T.B.	S.A.	$	M	H.D.	Sens	R	Spec	WTD SCR (%)	IMPT	WT X IMPT (%)
Perceptions of fishers re education / communication	Education / communication	4	5	4	5	5	3	5	5	4	92	5	92
	Information sources	4	5	4	5	5	3	5	5	4	92	5	92
	Trusted sources	4	5	4	5	5	3	5	5	4	92	5	92
Proportion of fishable shared vs commercial only vs closed area		5	4	5	5	5	5	5	5	5	98	5	98
Volume of user conflict (within/between sectors)	Perception of fishers	4	5	4	5	4	3	5	5	4	89	4	71
	Relevant complaints										-	1	-
	Reports of vandalism										-	1	-
Health of the charter sector	See economic and patterns of use indicators above												
Employment from industry	Direct	5	5	5	4	4	2	2	2	2	65	5	65
	Indirect	5	5	5	2	2	2	2	2	2	53	4	42
~~Expenditure~~ Economic impact	Regional and State	4	4	3	1	2	1	3	3	3	51	5	51
Perception of governance	Policy										-	4	-
	Transparency in decision making										-	4	-
	Of institutional cooperation										-	2	-
	Of fair allocations										-	4	-
Confidence in agencies	From fishers										-	4	-
	From community										-	1	-

C) Inshore Recreational Fishers

Indicator	Sub-indicator	Concreteness	Theoretical basis	Stakeholder awareness	Cost	Measurement	Historical data	Sensitivity	Responsiveness	Specificity	WEIGHTED SCORE (as %)	IMPORTANCE	WT X REL. IMPORTANCE (%)
Demographics	Age	5	5	5	5	5	5	3	3	1	81	4	64
	Gender	5	5	5	5	5	5	3	3	1	81	4	64
	Household Income	5	5	5	5	3	5	2	1	1	65	3	39
	Area of Residence	5	5	5	5	5	5	1	1	1	68	3	41
	Education	5	3	4	5	5	3	1	1	1	61	2	24
	Family Structure	5	4	4	5	5	3	4	1	1	72	3	43
Patterns of use – industry wide	Number of fishers (participation) Number of new fishers	5	5	5	4	2	5	5	5	5	88	5	88
	[24]Overall fishing effort (or distribution of effort)	4	5	5	2	1	5	5	5	4	75	5	75
	Sp harvest rate	5	5	5	3	3	4	3	3	5	74	5	74
	Fishing rights	1	1	1	1	1	1	1	1	1	20	1	4
Patterns of use – each fisher	Duration of fishing experience	5	5	5	1	5	5	3	3	2	70	3	42
	Trips												
	- frequency (avidity)	5	5	4	5	4	5	5	5	4	95	5	95
	- length	5	5	4	5	4	5	5	5	4	95	5	95
	- seasonality	5	5	4	5	4	5	5	5	4	95	5	95
	Ports												
	- main port	5	5	5	5	4	2	2	2	2	68	4	54
	- # ports used	5	5	5	5	4	2	2	2	2	68	4	54
	- distance travelled from port	5	5	5	5	4	2	2	2	2	68	4	54
	- avg, min and max per trip	5	5	5	5	2	2	2	2	2	62	4	49

[24] With other information here for distributional factors.

Indicator	Sub Indicator	C	T.B.	S.A.	$	M	H.D.	Sens	R	Spec	WTD SCR (%)	IMPT	WT X IMPT (%)
	Type of fishing												
	- boat/shore	5	5	4	3	4	5	2	2	4	70	5	70
	- gear used – bait, lure, etc	5	5	4	3	4	5	2	2	4	70	5	70
	Preferred species	4	5	5	3	3	3	5	5	5	82	4	66
	Importance of:												
	- number of fish	4	5	5	3	3	3	5	5	5	82	4	66
	- size of fish	4	5	5	3	3	3	5	5	5	82	4	66
	Habitat preferred												
	- salt/fresh	5	5	5	5	3	3	2	3	3	72	4	57
	- inshore/offshore	5	5	5	5	3	3	2	3	3	72	4	57
	- % fishing time inshore	5	5	5	5	3	3	2	3	3	72	4	57
	~~Catch/release (consumptive orientation)~~												
	Utilisation of catches - % own use vs give to family/friends	5	5	5	3	3	3	5	5	3	81	5	81
	Boats												
	- ownership	5	5	5	5	4	5	3	3	2	79	3	48
	- number	5	5	5	5	4	5	3	3	2	79	3	48
	- size	5	5	5	5	4	5	3	3	2	79	3	48
	- purpose (fishing/other)	5	5	5	3	3	5	3	3	2	70	3	42
Economics	Expenditure	5	5	5	2	2	4	3	3	3	64	5	64
	Willingness to pay	3	4	2	4	3	3	1	2	1	52	1	10
	Value of the fishery	2	4	1	2	1	1	3	3	3	46	5	46
	Economic impact -gross output, value added, household income, employment, direct effects, flow on effects (production induced and consumption induced)	4	5	2	1	2	1	1	1	1	36	5	36
	~~Gross and net value~~												

Indicator	Sub Indicator	C	T.B.	S.A.	$	M	H.D.	Sens	R	Spec	WTD SCR (%)	IMPT	WT X IMPT (%)
Social benefits	Motivations	3	5	5	5	3	3	3	3	3	71	2	28
	Expectations	3	5	5	5	3	3	3	3	3	71	3	43
	Satisfaction	3	5	5	5	3	3	3	3	3	71	5	71
	Centrality to lifestyle	5	5	3	4	5	3	3	3	3	76	4	61
	Amount of time available for fishing	5	5	3	4	4	3	3	3	3	73	4	59
	Factors affecting fishing participation	5	5	3	4	3	3	3	3	3	70	4	56
	2nd best use of time after fishing	5	5	3	4	3	3	3	3	3	70	4	56
	Reasons for stopping fishing	5	5	3	4	3	3	3	3	3	70	4	56
	Club membership	5	1	5	5	5	5	3	4	3	80	3	48
	Social value of fishery to the community	1	3	1	1	1	1	1	1	1	24	5	24
	Social capital	1	2	1	4	2	1	1	1	1	34	3	20
Perception of fishers re. stability certainty and security	[25]Perceptions of:												
	- Access (current and goals)	4	5	4	5	4	3	5	5	4	89	5	89
	- Competition between and within sectors	4	5	4	5	4	3	5	5	4	89	5	89
	- ability to catch a fish on a given trip	4	5	4	5	4	3	5	5	4	89	5	89
	- change in satisfaction	4	5	4	5	4	3	5	5	4	89	5	89
	- CPUE / fishing quality over time	4	5	4	5	4	3	5	5	4	89	5	89
	- Threats to fishing	4	5	4	5	4	3	5	5	4	89	5	89
Successful trips	[26]Number / % of trips where fishers:												
	- catch a fish	4	5	5	3	3	3	5	5	5	82	3	49
	- catch a legal fish	4	5	5	3	3	3	5	5	5	82	3	49

[25] Some perceptions more important than others, depending on circumstance.
[26] Covered in catch and effort, patterns of use.

Indicator	Sub Indicator	C	T.B.	S.A.	$	M	H.D.	Sens	R	Spec	WTD SCR (%)	IMPT	WT X IMPT (%)
Perceptions of regulations and complexity	Of current regulations	4	5	4	5	4	3	5	5	4	89	5	89
	- need for	4	5	4	5	4	3	5	5	4	89	5	89
	- confidence in	4	5	4	5	4	3	5	5	4	89	5	89
	- availability of information for	4	5	4	5	4	3	5	5	4	89	5	89
	- support for	4	5	4	5	4	3	5	5	4	89	5	89
	Of complexity	5	3	2	5	5	5	5	3	5	88	3	53
# of ~~pages of~~ current regulations		5	5	5	5	3	5	3	4	5	85	3	51
Compliance rates + costs of enforcing		4	4	3	5	5	3	2	3	5	76	4	61
Participation in consultation Satisfaction with consultation Likelihood of future participation in consultation		4	5	4	5	4	3	5	5	4	89	5	89
Perception of impact of management – acceptable / understood		4	5	4	5	4	3	5	5	4	89	5	89
Perceptions of fishers (education / communication)	- Education/communication	4	5	4	5	4	3	5	5	4	89	5	89
	- Main information sources	4	5	4	5	4	3	5	5	4	89	5	89
	- Trusted sources	4	5	4	5	4	3	5	5	4	89	5	89
Social networks	- Sunfish membership[27]	1	2	1	4	2	1	1	1	1	34	3	20
	- Fishing club membership	1	2	1	4	2	1	1	1	1	34	3	20
	- Contact with QPIF	1	2	1	4	2	1	1	1	1	34	3	20
Proportion of fishable shared vs recreational only vs closed areas		5	4	5	5	5	5	5	5	5	98	5	98
Anglers expectations and satisfaction with amenities		3	5	5	5	3	3	3	3	3	71	5	71
Diversity of demographics		5	5	5	5	5	5	3	3	1	81	4	64
Diversity of patterns of use		5	5	5	4	3	3	2	3	3	68	5	68
Number of boat registrations (minus those that don't fish)		5	5	5	4	2	5	5	5	5	88	5	88
Number of bait and tackle shops		5	4	3	5	3	2	3	2	4	68	3	41

[27] Same as social capital.

Indicator	Sub Indicator	C	T.B.	S.A.	$	M	H.D.	Sens	R	Spec	WTD SCR (%)	IMPT	WT X IMPT (%)
~~Level of imports~~													
Angler's purchase behaviour											-	1	-
Health of recreational sector (participation and diversity)		5	5	5	4	2	5	5	5	5	88	5	88
Land based access points vs boat ramps (including disabled fishers)		5	5	5	3	3	3	3	3	4	70	3	42
~~Access points for disabled fishers~~ (see previous)													
Employment levels	- direct	4	5	2	1	2	1	1	1	1	36	5	36
	- indirect	4	5	2	1	2	1	1	1	1	36	5	36
Expenditure	Regional	5	5	5	2	2	4	3	3	3	64	5	64
	State	5	5	5	2	2	4	3	3	3	64	5	64
Tourist fishers incl Grey Nomads	Catch, effort, #'s, impact	4	3	4	2	2	1	3	3	2	51	4	41
Facilities		3	5	5	5	3	3	3	3	3	71	5	71
Community Health		1	3	1	1	1	1	1	1	1	24	5	24

D) Queensland Seafood Consumers

Indicator	Sub-indicator	Concreteness	Theoretical basis	Stakeholder awareness	Cost	Measurement	Historical data	Sensitivity	Responsiveness	Specificity	WEIGHTED SCORE (as %)	IMPORTANCE	WT X REL. IMPORTANCE (%)
Demographics	Age	5	5	5	5	5	5	1	1	1	68	5	68
	Gender	5	5	5	5	5	5	1	1	1	68	1	14
	Household income	5	5	5	5	5	5	1	1	1	68	5	68
	Family Structure	5	5	5	5	5	5	1	1	1	68	4	55
	Stage in lifecycle	5	5	5	5	5	5	1	1	1	68	4	55
Patterns of consumption	How much												
	- frequency	5	5	5	5	5	5	3	3	3	84	5	84
	- quantity	5	5	5	5	5	5	3	3	3	84	5	84
	Species												
	- diversity	3	3	4	3	3	2	2	2	2	51	4	41
	- preferred	4	5	5	5	5	3	1	3	3	73	5	73
	- wild/farmed	5	5	5	5	5	3	1	3	3	75	3	45
	- Import/local	5	5	5	5	5	3	1	1	1	65	5	65
	- consumed and preferred	5	5	5	5	3	3	3	3	3	75	5	75
	- willingness to pay for local and/or wild-caught	4	5	4	4	3	1	3	3	1	62	5	62
	Seafood source												
	- most recent	5	5	5	5	5	3	1	1	1	65	5	65
	- bought / not bought	5	5	5	5	5	3	1	1	1	65	5	65
	- constraints on purchasing	4	4	4	4	3	2	3	3	1	62	4	49
	Price												
	- paid	5	5	5	5	5	5	1	1	1	68	4	55
	- willingness to pay	4	5	4	4	3	1	3	3	1	62	5	62
	How consumed (main/entrée etc)	5	5	5	5	5	1	1	1	1	61	1	12
	Regarded as everyday meal – Why?	5	5	5	5	5	1	1	1	1	61	1	12
	Reasons for liking (health, treat etc)	5	4	4	3	3	3	1	1	1	50	4	40

Indicator	Sub Indicator	C	T.B.	S.A.	$	M	H.D.	Sens	R	Spec	WTD SCR (%)	IMPT	WT X IMPT (%)
	Support of ecologically sustainable fisheries and eco-labelling	5	5	3	5	3	2	1	1	1	56	4	45
	- willingness to pay for these	5	5	5	5	4	4	3	3	2	78	5	78
Perceptions of fisheries	Of commercial fisheries	5	5	5	5	4	4	3	3	2	78	5	78
	Of recreational fisheries	5	5	5	5	4	3	3	3	2	76	3	45
	Of fisheries management												
	- knowledge of	5	5	5	5	3	3	2	2	2	67	3	40
	- confidence in	5	5	5	5	3	3	3	3	3	75	5	75
	Regarding current and future resource allocations	5	5	3	5	3	1	1	1	1	54	3	32
	Of threats concerning seafood (pollution, food contamination etc)	5	5	5	5	3	1	1	1	1	55	3	33
	How these affect purchasing behaviour	4	5	5	4	4	2	3	2	2	66	5	66
Availability of local seafood	- Perception of consumers	5	5	5	5	5	3	1	1	1	65	5	65
	- Actual availability	5	5	5	5	5	5	5	5	5	100	3	60
Consumer demand	Amount	5	5	5	5	5	5	1	1	1	68	1	14
	Species	5	5	5	5	5	5	1	1	1	68	4	55
	Quality	5	5	5	5	5	5	1	1	1	68	5	68
	Value	5	5	5	5	5	5	1	1	1	68	4	55
	Seasonality	5	5	5	5	5	5	1	1	1	68	2	27
	Range of product	5	5	5	5	5	5	1	1	1	68	1	14
Satisfaction of demand		5	5	5	5	5	3	3	3	3	81	5	81
Current distribution of product		5	5	5	4	3	3	3	3	3	72	1	14
Perception of fishers re access	- current access to species	5	5	5	5	5	3	3	3	3	81	3	48
	- goals of future access	5	5	5	5	4	1	1	1	1	58	3	35