Addendum to Fisheries Research Quality Survey

The data for the Fisheries Research Quality Survey distributed in July was collected in the first three months of 1996. At that time 1995 publications information was provisional since many publications were still pending. A note was made to that effect in the report.

The 1995 publication information has been updated as of September 1996 and corrections made to Tables 9, 10 and 12.

Revisions have been made accordingly to Section 6: Productivity and Cost of Information which is reproduced below.

6. PRODUCTIVITY AND COST OF INFORMATION

6.1 Number of publications

Several units supplied information on the numbers of different types of publications produced over the last ten years. These are listed in Table 9 which includes averages for the past three years. Most units produced considerably more scientific papers than research reports.

6.2. Productivity and cost of Information

6.2.1. Cost per publication

Cost per publication was estimated from the data in two ways:

a) The total research budget per unit for one financial year was divided by the number of publications (or scientific papers) for the subsequent calendar year (since publications lag behind spending), eg 1995-1996 budget divided by publications in 1996.

b) Each researcher reported on one recently completed project giving the budget and the number of publications, or publications expected. The project budget was divided by the number of publications and the results averaged per State.

Estimations of 'cost per publication' are shown in Table 10.

Table 9. Number of scientific papers, research reports and book chapters produced by Fisheries Researchers over a 10 year period.

		QLD	NSW	NT	S A*	TAS	WA	CSIRO**
1986	Sci. papers	5	9	3	10	1	15	55
	Reports		41	15	2	9	4	55
	Book ch.		10	0	2	0	8	10
	Total		60	18	14	10	27	120
1987	Sci. papers	7	5	3	10	1	15	97
	Reports		34	15	1	11	5	35
	Book ch.		5	0	0	0	1	6
	Total		44	18	11	12	21	138
1988	Sci. papers	14	7	2	6	0	17	56
	Reports		18	15	1	10	8	92
	Book ch.		5	0	0	0	5	14
	Total		30	17	7	10	30	162
1989	Sci. papers	15	7	1	11	3		60
	Reports		21	15	1	11		45
	Book ch.	1	24	0	7	0		12
	Total		52	16	19	14		117
1990	Sci. papers	18	20	3	2	2		65
	Reports	2	19	20	5	7		23
	Book ch.	1	15	0	2	0		16
	Total	21	54	23	9	9		104
1991	Sci. papers	13	24	3	8	3		75
	Reports	11	27	20	7	6		27
	Book ch.	2	2	0	1	0		5
	Total	26	53	23	16	9		107
1992	Sci. papers	21	35	4	10	9		58
	Reports	9	25	20	4	6		46
	Book ch.	1	22	0	6	2		3
	Total	31	82	24	20	17		107
1993	Sci. papers	20	19	4	5	4	20	50
	Reports	14	22	20	1	3	11	7
	Book ch.	3	6	0	3	1	3	9
	Total	37	47	24	9	8	34	66
1994	Sci. papers	35	29	3	9	4	25	75
	Reports	8	11	20	1	15	5	37
	Book ch.	4	5	0	0	2	12	13
	Total	47	45	23	10	21	42	125
1995	Sci. papers	14	33		14	10	37	57
	Reports	30	16		2	26	3	10
	Book ch.	5	23		12	2	4	3
	Total	49	72		28	38	44	70
Average over last 3 years	Sci. papers	23.0	27.0		9.3	6.0	27.3	61.7
	Reports	17.3	16.3		1.3	14.7	6.3	18.0
	Book ch.	4.0	11.3		5.0	1.7	6.3	8.3
	Total	44.3	54.7		15.7	22.3	40.0	87.0

* Reports for South Australia include only formally refereed and published reports, not conference papers.

** CSIRO listed their conference papers separately. They have been included in "reports"

'Cost per publication' is a measure of productivity which does not take into account the quality of the publications nor differences in calculating budgets. The NSW research budget, for example, includes overhead costs for departmental corporate service units located on the research site. In addition, some research requires high capital expenditure. If these differences are taken into account, this cost per publication data may be useful for comparing productivity between years and research units. The quality of the advice given is dependent on the quality of the research and this should be reflected in the quality of publications.

'Cost per publication' does not include the research output 'advice given' which accounts for about a third of research output (see Section 7.1). It is a numerical productivity measure and not an estimate of the cost of a publication.

'Cost per publication' is generally lower when calculated on a project basis as the project data includes direct costs but not overheads. In addition Researchers may have overestimated the number of papers that will be ultimately produced from their project. Results show, however, that there is great variability in the number of papers published per research dollar.

As Table 10a shows, costs per publication fluctuate between years within departments with no clear trend emerging. Of the States that provided several years data Western Australia had a consistently lower budget per scientific paper. (The consumer price index increased between March 1993 to March 1996 by 10.07% ABS, pers. comm.).

Table 10. Average 'cost of publication' per research unit over several years. (Note that this is a productivity measure, not an estimate of the cost of a publication.)

	QLD	NSW	NT	SA	VIC	TAS	WA	CSIRO
a) Budgets/publications per organisation over several years								
1989/90 & 1990								$ 92 k
1990/91 & 1991								$ 107 k
1991/92 & 1992		$93 k						$ 110 k
1992/93 & 1993	$ 164 k	$162 k					$ 100 k	$ 208 k
1993/94 & 1994		$181 k					$ 100 k	$ 106 k
1994/95 & 1995	$ 129 k	$115 k		$ 149 k		$ 97 k	$ 109k	$ 197 k
b) 'Cost per publication ' calculated from individual project data								
Range $'000	6-333	13-753	10-50	5-51	38-120		15-59	20-264
Average	100	137	41	21	79			77

6.2.2. Productivity per unit staff member

Another productivity measure calculated from the survey data is output per unit staff member.

Survey respondents supplied the information on staff numbers given in Table 11. Between 57 and 69% of staff had degrees in most research organisations except in the Northern Territory where 33% hold degrees.

Table 11. Total number of staff members and numbers with various degree qualifications.

	QLD	NSW	NT	SA	TAS	WA	CSIRO
Number of staff	64	103	18	70	35	74	227
Number with PhD	9	21	1	10	6	17	53
Number with Masters but not PhD	8	17	1	8	7	3	10
Number with Bachelors but no postgrad. degree	27	26	4	22	7	23	71
Number with postgraduate Diplomas	9	5	1	?		10	10
Number (and % of total) with PhD, Masters or Bachelors	44 (69%)	64 (62%)	6 (33%)	40 (57%)	20 (57%)	43 (58%)	134 (59%)

Information from Table 11 has been used together with publication data from Table 9 to estimate output per unit staff member over the last three years, 1993 to 1995 (Table 12). The average number of publications or scientific papers for 1993-95 per staff member or per staff member with a PhD, Masters or Bachelors degree is shown in Table 12.

Table 12. Average number of publications and scientific papers produced over three years per staff member and number of scientific papers per unit staff and per staff member with PhD, Masters or Bachelors degree.

	QLD	NSW	NT	SA	TAS	WA	CSIRO
Publ. per unit staff	0.69	0.53		0.23	0.64	0.54	0.38
Scientific papers per unit staff	0.36	0.26		0.13	0.17	0.36	0.27
Sci. papers per staff member with PhD, Masters or Bachelors	0.52	0.42		0.23	0.30	0.63	0.45

Queensland and Western Australia produced more scientific papers per unit staff or per scientific staff than other organisations. Tasmania produces comparatively more reports than scientific papers so although Tasmania's number of scientific papers per staff was in the lower range it had the highest publication per unit staff. Peer review of scientific papers provides an acknowledged quality measure for scientific output so scientific papers per staff is a better comparative measure than 'publications' per staff.

Since Western Australia has a comparatively low and stable 'cost per publication' (Table 10) it could be seen to provide the current benchmark for efficiency in fisheries research in Australia.

FISHERIES RESEARCH

QUALITY SURVEY

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July 1996

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FISHERIES

RESEARCH &

DEVELOPMENT

CORPORATION

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SUMMARY

The general consensus of participants was that Australian Fisheries Research units are competent in producing well designed and appropriately analysed research.

Researchers gave their department's abilities to a) design and b) analyse research a rating of excellent/adequate in 90% and 96% of cases respectively. Confidence of researchers in their project management abilities was not quite as high, with 84% rating their abilities in project management as excellent or good.

The Fisheries Research units in Queensland and Western Australia currently appear to provide the benchmark for productivity measured as publications per unit staff member. In addition cost per unit publication from Queensland and Western Australia seems to be comparatively low.

In Western Australia both core (State provided) and external funding increased steadily over the five year period from 1991/92 to 1995/96. In NSW core funding decreased steadily (by 18% over five years) while external funding increased. Both core and external funding fluctuated in Tasmania and for CSIRO Division of Fisheries.

There was overwhelming support for the idea of having a foresighting type exercise to identify possible future scenarios for the fisheries research industry, with all Research Directors, 90% of Researchers and 83% of Fisheries Managers finding the idea very desirable or desirable and 88% of Researchers and Fisheries Managers expressing an interest in giving feedback to such an exercise. A foresighting exercise could solve some of the problems identified by the survey with current priority setting processes. Problems included lack of transparency and poor communication.

The main factors seen to be influencing the setting of research priorities were 'Fisheries Management problems identified by the department' and 'industry identified needs'. None of the Research units reported considering research done in other research units when they set their own priorities and there appear to be no mechanisms to consider research being done elsewhere in current priority setting processes indicating that there may be duplication of research effort.

All Research Directors, 84% of Researchers and 81% of Fisheries Managers thought that all research output should be subjected to peer review. Scientific papers are currently the only output subjected to rigorous and comparative peer review by external reviewers. A review process would reduce the failure rate of projects, avoid duplication and provide a useful productivity measure.

A third of Fisheries Managers found the dissemination process for research results inadequate and reported using research results 'not regularly' or 'never'. This important message from a significant client group indicates that Researchers should be spending more time considering in what form their information should be presented and how it could be better disseminated.

1. BACKGROUND

At the first meeting of the Research Committee of the Standing Committee for Fisheries and Aquaculture (SCFA) in April 1995 one of the priority issues identified was the lack of national standards for research including review of output. It was decided that preliminary evaluation of existing research structures and performance was required to assess the need for national standards for research.

At the SCFA Research Committee in September 1995, the author presented a proposal for a customer survey to establish whether there is a perceived need for national standards. The concept was accepted and a proposal for the client survey was submitted to FRDC which granted funding for the project in early 1996.

1.1. Objectives

The aim of the project were
- to establish if there is a perceived need for national standards for fisheries research
- to assess the need for peer review of all research output
- to assess current research support systems.

1.2. Participants

The survey aimed to get feedback from a representation of the research community. Five different survey forms were written for the following groups:
1. Research Directors
2. Research Project Managers
3. Fisheries Managers
4. Administration
5. Finance section

The contact in each State and the CSIRO Division of Fisheries (referred to throughout the report simply as CSIRO) was the SCFA Research Committee member who in some cases appointed a coordinator. The contact indicated how many Research Project Managers (called Researchers throughout the report) and Fisheries Managers there were working in the department.

Survey forms for each of the participants were sent to the coordinators who distributed the forms, collected them when complete and returned them to the distribution point.

Sixty four Fisheries Researchers, thirty four Fisheries Managers, seven Directors of Research (or equivalent) as well as an administration and accounting officer from each State returned survey forms. Table 1 shows the numbers of research and management participants from each State.

Table 1. Number of Research and Fisheries Management participants from each State.

	Directors of (Research	Fisheries Researchers	Fisheries Managers	TOTALS
New South Wales	1	16	10	27
Queensland	1	14	4	19
South Australia	1	8	8	17
Western Australia	1	6	7	14
CSIRO Fisheries	0*	13	0*	13
Victoria	1	3	1	5
Northern Territory	1	3	1	5
Tasmania	1	0	3	4
TOTAL	**7**	**63**	**34**	**104**

*Logistic difficulties did not enable CSIRO or AFMA to respond

There was no sampling frame for the survey (ie list of all units in the population). Coordinators were asked to distribute the survey to all project managers of research and all Fisheries Managers. However, research structures are different in each State and the definition of what a 'project manager' is differs as well. For example, in NSW project managers have project and financial accountability for individual projects. In other States there are programs including a number of projects, and only program managers filled in the survey.

No information was collected on what proportion of Researchers and Fisheries Managers returned survey forms.

Not all respondents answered all questions. In particular, respondents who did not take part in priority setting did not answer the questions on the priority setting process.

1.3   Report Structure

The results have been summarised on a nationwide basis (Part A) and also State by State for those States where more than 10 participants returned survey forms (Part B).

Where there are differences between States in Part A this is noted but no comparison between States has been done because of possible differences in respondents between States as noted above.

A summary of the data is attached as Appendix A and examples of the survey forms as Appendix B.

PART A : NATIONAL SURVEY RESULTS

2.   STRATEGIC ISSUES

2.1.   Current strategic Issues

Participants were asked to list the two most important strategic issues of their departments.

Research Directors nominated the following strategic research issues :
- Stock assessments
- Development of fishery simulation models with additional economic performance parameters
- Assessment of the total implications of management alternatives
- Ensuring the provision of the biological information necessary for the sustainable management of fisheries resources
- Development of databases for recreational fishing impact
- Development of aquaculture
- Assessment of wild fisheries
- The provision of excellent research results for policy advice
- Domination of research priority setting process by commercial sector resulting in priorities being based on willingness to pay as opposed to an evaluation of research needs for management
- Yearly diminishing funding for "public good' or community service obligation oriented research e.g. habitat, biodiversity, ecosystem approaches

Issues of strategic importance nominated by Researchers and Fisheries Managers could be divided into eight broad areas (Table 2).

Table 2. Number of times issues of strategic importance were mentioned by Researchers and Fisheries Managers (in brackets).

ISSUE	TOTAL	
Resource Management or Assessment	29	(22)
Conservation and Habitat*	31	(6)
Aquaculture*	16	(5)
Research Planning or QC	13	(4)
Recreational Fishing	2	(1)
Data Management	2	(3)
Communication	2	
Other	9	

* Few equivalent managers to wild stock fisheries managers were available in these categories

The issues most often nominated by Researchers relate to conservation/habitat or resource management /stock assessment. Researchers were also concerned about a variety of other issues including the planning of research. Fisheries Managers overwhelmingly nominated resource management issues due to their dominance in wild fisheries stock management.

The actual issues nominated are listed in the State reports (Part B). They included stock assessment methodology, impacts of fishing activities, control options for exotic species, aquaculture development and environmental effects, coastal habitat destruction and the role of inland wetlands. Several participants also nominated funding and staffing issues.

2.2.   Identifying Future Strategic Issues

The foresighting process is concerned with "creating an improved understanding of possible developments and the forces likely to shape them" (Martin and Irvine 1989) with the aim "not so much to forecast as to show the possibilities for influencing by laying bare the causal relationships of mutual influence patterns" (Wissema 1981). Foresighting assumes that the future can be influenced, and that by identifying possible future scenarios we become aware of what needs to be done to guide towards a preferred option. The end result of the foresighting exercise is seen as less important than the process since the process is what produces this awareness.

There was overwhelming support for a foresighting exercise to identify possible future scenarios for the fisheries research industry, with 90% of Researchers and all Research Directors finding the idea very desirable or desirable and 88% expressing an interest in giving feedback to such an exercise. Fisheries Managers also supported the idea with 83% finding the idea very desirable or desirable and 88% expressing interest in giving feedback (Table 3).

A foresighting exercise for Fisheries Research (and perhaps Fisheries Management?) could identify planning options that would support a preferred direction.

Table 3. Attitude of Research Directors, Researchers and Fisheries Managers for a foresighting type exercise for fisheries research and desire to take part in such an exercise.

	Research Directors	Researchers	Fisheries Managers
Foresighting exercise would be:			
Very desirable	33 %	40 %	29 %
Desirable	66 %	50 %	54 %
Low priority		7 %	18 %
Not necessary		3 %	0 %
Desire to take part			
Yes	100 %	88 %	88 %
No		12 %	12 %

3.   SETTING AND COMMUNICATING PRIORITIES

3.1.   Who sets research priorities?

Forty eight percent of Fisheries Managers and 36% of Researchers who manage projects reported that they do not take part in the process their department uses to set priorities.

Participants were asked who currently takes part in the prioritisation process and who they think should take part. Those nominated as taking part were generally seen as those who should take part although Researchers thought *'the community'* and Fisheries Managers thought *'industry representatives'* should take a greater part .

3.2.   The priority setting process

Several Directors of Research mapped the priority setting processes used in their departments for the survey. These have been reproduced in Figures 1-4.

Figure 1. Priority setting process in Queensland

Figure 2. Current priority setting process used in Western Australia. It may change with the recent restructure.
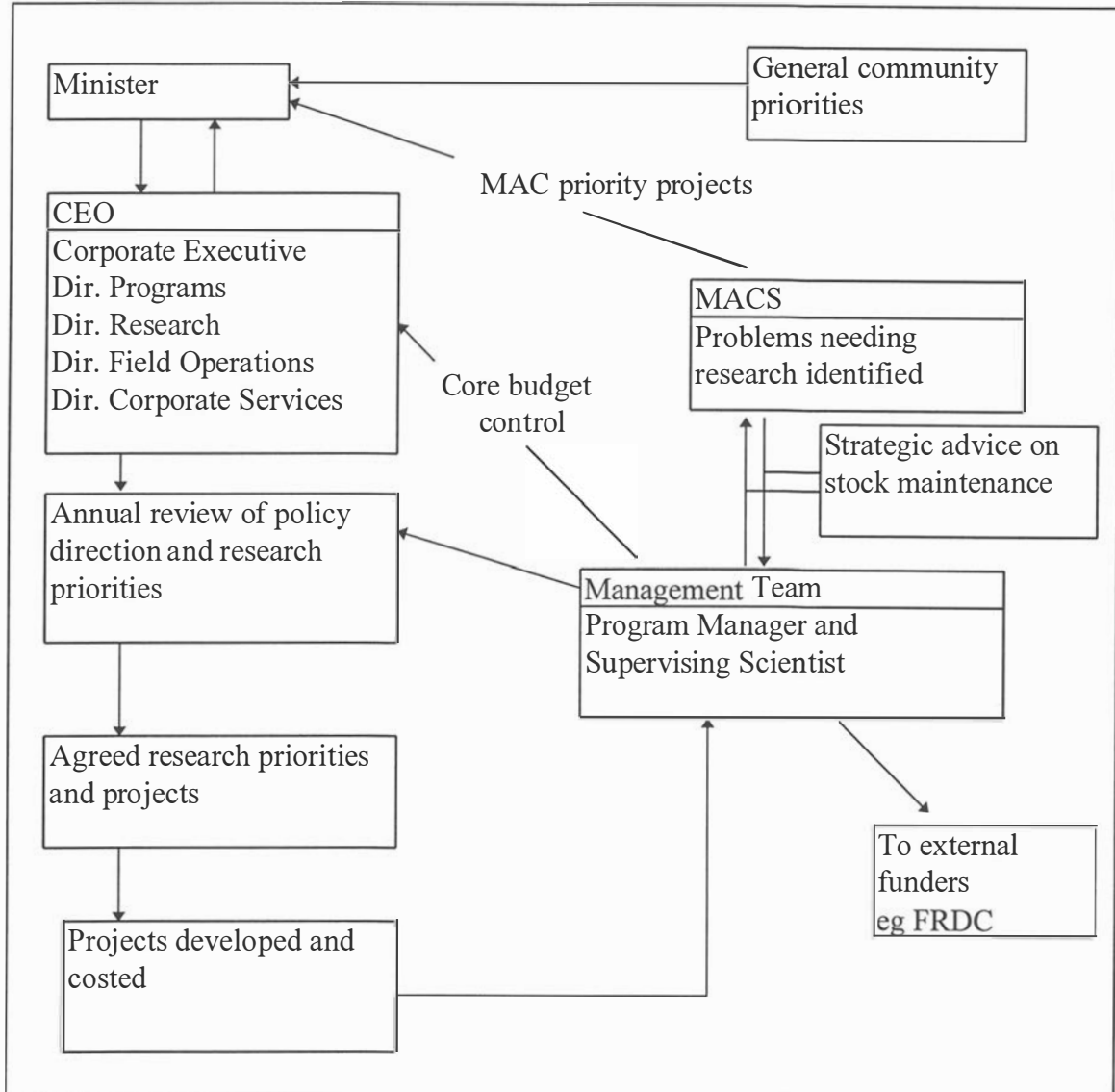
Figure 3. Priority setting process in South Australia
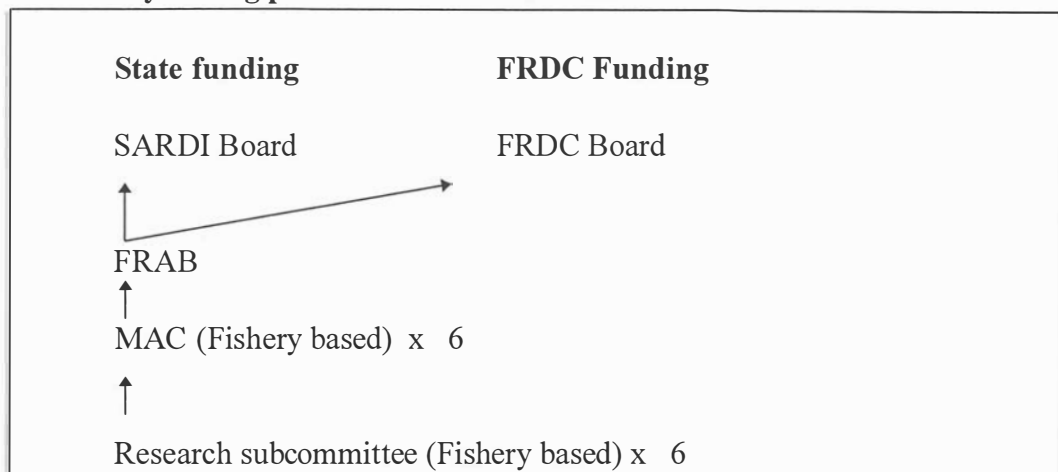
Figure 4. Priority setting process in Victoria
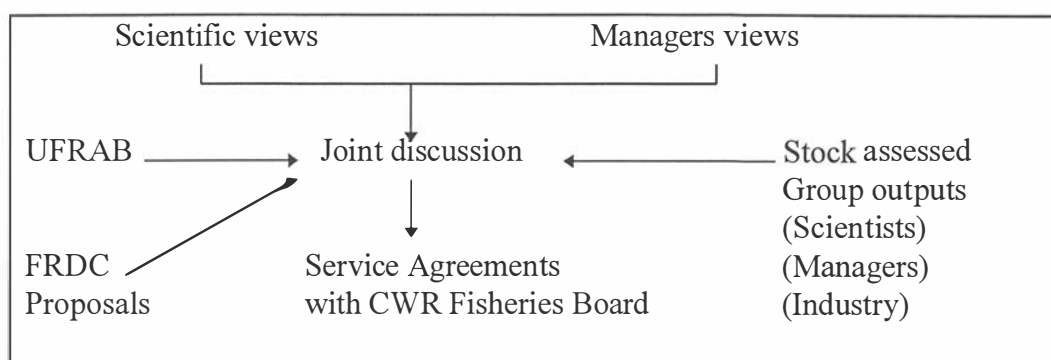
Those who took part in the process of setting priorities were asked to evaluate the process.

They did not judge the processes very highly as Table 4 shows, with 27% of Researchers and 33% of Fisheries Managers judging the process used in their department as inadequate.

Table 4. Evaluation of prioritisation processes used by Fisheries Research units shown as percentages choosing each option.

	Research Directors	Researchers	Fisheries Managers
Excellent	14 %	11 %	29 %
Adequate	71 %	62 %	38 %
Inadequate	14 %	27 %	33 %

There were differences between States for example Western Australian respondents gave their process a better rating than New South Wales respondents. (Table 5).

Table 5. Responses of participants by State on the adequacy of their research prioritisation process.

	QLD	NSW	NT	SA	TAS	VIC	WA	CSIRO
Researchers								
Excellent	0	0	0	2		0	0	3
Adequate	4	7	1	1		3	5	8
Inadequate	3	1	2	4		0	1	2
Fisheries Managers								
1 Excellent	1		1	0	1	0	3	
2 Adequate	1	2	0	1	0	1	3	
3 Inadequate	1	3	0	1	2	0	0	

3.3.   Factors affecting priority setting

Respondents were asked to rate the importance of factors affecting research priorities. '*Fisheries Management problems identified by the department*' and '*industry identified needs*' were the main factors seen to be influencing the setting of priorities (Table 6). Among '*other factors*', one CSIRO researcher nominated 'availability of funding' and another 'environmental factors' while a NSW Fisheries Manager nominated 'suitability for publication in scientific journals'.

'*Research being done elsewhere*' was regarded as unimportant in setting departmental priorities and none of the priority setting processes (Figs. 1-4) showed a mechanism for considering research being done elsewhere. Lack of a mechanism to consider work being done elsewhere could be leading to duplication.

Table 6. Importance of factors affecting the setting of fisheries research priorities. Numbers are averages of numbers of points out of 100 as nominated by Research Directors, Researchers and Fisheries Managers.

	Research Directors	Researchers	Fisheries Managers
Fisheries management problems identified by the department	43	28	33
Industry identified needs	28	27	17
Availability of In-house expertise	11	12	15
Funding body priorities	9	17	18
Research being done elsewhere	5	4	4
Need to keep current staff employed	2	2	7
Other	1	10	6

3.4.   Review of priorities

Prioritisation review processes appear not to be very transparent even to those researchers who take part in setting priorities.

Apart from those in CSIRO, almost all researchers reported that priorities were reviewed 'as required' whereas all but one Research Director reported that priorities were reviewed 'on a predetermined timetable'. Fisheries Managers were divided on the issue with 53% reporting that priorities were reviewed on a predetermined timetable and 47% as required.

3.5.   Communication of priorities

Respondents were asked whether priorities were communicated formally, informally or by both formal and informal means. Five of seven Research Directors indicated that there is a formal process in their department to communicate research priorities and two said the processes are informal. Both Researchers and Fisheries Managers in all States gave mixed responses.

This result would suggest that that either the process to communicate priorities is not properly understood by those who set the priorities, or that there are both informal and formal processes to communicate research priorities to others.

Research Directors were also asked what process existed to communicate departmental priorities outside the department. One respondent said 'formal process', three said 'informal process' and two chose 'no process - they are not relevant to others'

3.6.   Comment on the setting and communication of research priorities

The survey suggests that a process to inform and explain how priorities were set would be rewarding. Almost half of those who carry out or use research reported they took no part in setting research priorities. The process of setting, reviewing and communicating priorities does not seem to be transparent even to those who take part.

Comments in the surveys indicate that there is a desire among Fisheries Managers to have priorities tied to management aims and a desire among researchers to have transparent processes aimed at maintaining the resource and not subject to political pressures.

The fact that research being done elsewhere is not considered when research units set their priorities suggests not enough is being done to coordinate the research effort nationally and avoid duplication. A mechanism to ensure that current research priorities and current research programs is communicated between research units would help avoid possible duplication.

4.   DEPARTMENTAL ABILITIES IN RESEARCH

The general consensus among researchers was that Australian Fisheries Research units are competent in producing well designed and appropriately analysed research. All Research Directors and almost all Researchers rated their department's abilities to design and analyse research as either adequate or excellent. (No questions were asked to gain an objective assessment of these qualities.)

Confidence of Researchers in their project management abilities was not quite as high with 16% rating their abilities in project management as 'inadequate and needing improvement'. As funding mechanisms for research change, greater emphasis is being placed on timely and adequate project reporting, making project management skills increasingly important. Project management is a training need that has to be addressed on the job as it is not usually part of a scientist's formal education.

Directors in five of seven states indicated that project management training was available. Where training is unavailable distance education may address staff needs. Several Universities offer residential programs in Project Management (for example the University of NSW AGSM and Monash Mt Eliza Business School).

Project management abilities could also be fostered by requiring Project Managers of all research projects (internally as well as externally funded) to produce a graph every month plotting the baseline budget, the actual budget and showing the Earned Value* at that point. Such a graph is simple to produce and shows graphically how much the project is under/overspent as well as whether the project is behind or ahead of time. It would be useful to project managers and to management.

* Earned Value =
$\sum$ (% physical completion of each activity   **x**   % weighting of each activity)   **x**   total baseline cost

5.   RESEARCH FUNDING

Support from external sources was received for 100% of research projects done by CSIRO and Queensland DPI, 96% of NSW projects, 61% Tasmanian projects and 54% of South Australian projects.

Six Research units supplied information on their total research budget and on the funding they received from external sources over a number of years. This data together with core budget (total less external) and % external funding are presented in Table 7.

Figure 5 is a graphical representation of the changes in external and total research budgets over time and Table 7 shows the percentage change in core funding and external funding over five years for CSIRO, NSW, Tasmania and Western Australia

Table 7. Fisheries research funding by research unit from 1986 - 1996.

		CSIRO	QLD	NSW	SA	TAS	WA
86/87	External					180,000	
	Core					1,040,000	
	Total					1,220,000	
	% Ext.					15%	
87/88	External					270,000	
	Core					840,000	
	Total					1,110,000	
	% Ext.					24%	
88/89	External					520,000	
	Core					1,230,000	
	Total					1,400,000	
	% Ext.					37%	
89/90	External	5,381,724				200,000	
	Core	4,261,076				1,430,000	
	Total	9,642,800				1,630,000	
	% Ext.	56%				12%	
90/91	External	5,711,398				650,000	
	Core	5,687,702				1,050,000	
	Total	11,399,100				1,700,000	
	% Ext.	50%				38%	
91/92	External	6,559,709		2,114,484		500,000	280,000
	Core	5,237,920		5,476,053		1,380,000	2,720,000
	Total	11,797,629		7,590,537		1,880,000	3,000,000
	% Ext.	56%		28%		27%	9%
92/93	External	7,168,126	2,090,000	2,645,800		615,000	280,000
	Core	6,583,557	3,960,000	4,991,667		1,805,000	3,120,000
	Total	13,751,683	6,050,000	7,637,467		2,420,000	3,400,000
	% Ext.	52%	35%	35%		25%	8%
93/94	External	7,761,681		3,422,197		700,000	710,000
	Core	5,532,319		4,765,085		1,730,000	3,490,000
	Total	13,294,000		8,187,282		2,430,000	4,200,000
	% Ext.	58%		42%		29%	17%
94/95	External	8,303,439	2,720,000	3,304,728	1,066,000	420,000	1,080,000
	Core	5,491,948	3,580,000	4,966,484	3,100,000	3,280,000	3,720,000
	Total	13,795,387	6,300,000	8,271,212	4,166,000	3,700,000	4,800,000
	% Ext.	60%	43%	40%	26 %	11%	23%
95/96	External	7,100,000		4,311,037	1,600,000	450,000	1,170,000
	Core	6,121,400		4,415,531	3,100,000	1,850,000	4,430,000
	Total	13,221,400		8,726,568	4,700,000	2,300,000	5,600,000
	% Ext.	54%		49%	34 %	20%	21%

Note: Data for some States was presented in rounded figures which have been written here in the long form for easy readability although they are not exact eg $4.2m = 4,200,000.

Core funding
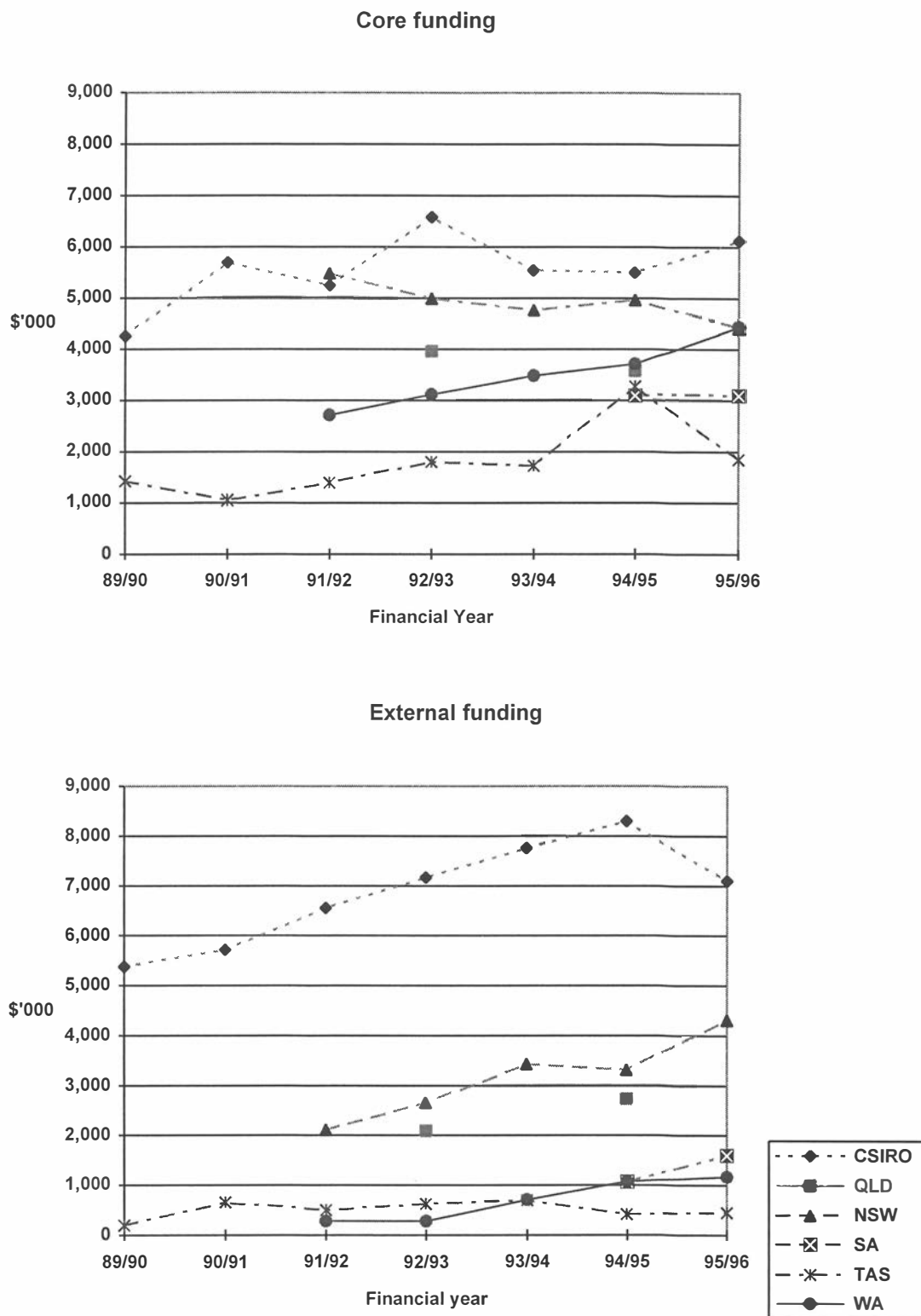
External funding

Figure 5. Change in core and externally sourced research funding over time by State

For CSIRO and Tasmania core funding fluctuated over the past five years between $5.2 and $ 6.5m (CSIRO) and $1.3 and $3.2m (Tasmania). In Western Australia both core and external funding increased steadily while in NSW core funding has decreased steadily while external funding increased (Table 8).

Table 8. Percentage change in core funding and external funding from the financial years 1991/92 to 1995/96.

	91/92 to 92/93	92/93 to 93/94	93/94 to 94/95	94/95 to 95/96	Change over 5 years
CSIRO Core	+26 %	-19 %	-0.7 %	+11.5 %	+17 %
Extern.	+9 %	+8 %	+7 %	+14 %	+8 %
NSW Core	-17 %	-5 %	-4 %	-11 %	-19 %
Extern	+25 %	+29 %	-3 %	+30 %	+104 %
TAS Core	+31 %	-4 %	+90 %	-43 %	+34 %
Extern.	+23 %	+14 %	-40 %	+7 %	-10 %
WA Core	+15 %	+12 %	+7 %	+19 %	+62 %
Extern.	0 %	+154 %	+52 %	+8 %	+317 %

*WA core funding includes industry fees administered by the agency.

6.   PRODUCTIVITY AND COST OF INFORMATION

6.1 Number of publications

Several units supplied information on the numbers of different types of publications produced over the last ten years. These are listed in Table 9 which includes averages for the past three years. Most units produced considerably more scientific papers than research reports.

6.2. Productivity and cost of Information

6.2.1. Cost per publication

Cost per publication was estimated from the data in two ways:

a) The total research budget per unit for one financial year was divided by the number of publications for the subsequent calendar year (since publications lag behind spending), eg 1985-1986 budget divided by publications in 1986.

b) Each researcher reported on one recently completed project giving the budget and the number of publications or publications expected. The project budget was divided by the number of publications and the results averaged per State. (Estimations of publications may have been overstated, leading to a lower cost per publication.)

Table 9. Number of scientific papers, research reports and book chapters produced by Fisheries Researchers over a 10 year period.

		QLD	NSW	NT	S A*	WA	CSIRO**
1986	Sci. papers	5	9	3	10	15	55
	Reports		41	15	2	4	55
	Book ch.		10	0	2	8	10
	Total		**60**	**18**	**14**	**27**	**120**
1987	Sci. papers	7	5	3	10	15	97
	Reports		34	15	1	5	35
	Book ch.		5	0	0	1	6
	Total		**44**	**18**	**11**	**21**	**138**
1988	Sci. papers	14	7	2	6	17	56
	Reports		18	15	1	8	92
	Book ch.		5	0	0	5	14
	Total		**30**	**17**	**7**	**30**	**162**
1989	Sci. papers	15	7	1	11		60
	Reports		21	15	1		45
	Book ch.	1	24	0	7		12
	Total		**52**	**16**	**19**		**117**
1990	Sci. papers	18	20	3	2		65
	Reports	2	19	20	5		23
	Book ch.	1	15	0	2		16
	Total	**21**	**54**	**23**	**9**		**104**
1991	Sci. papers	13	24	3	8		75
	Reports	11	27	20	7		27
	Book ch.	2	2	0	1		5
	Total	**26**	**53**	**23**	**16**		**107**
1992	Sci. papers	21	35	4	10		58
	Reports	9	25	20	4		46
	Book ch.	1	22	0	6		3
	Total	**31**	**82**	**24**	**20**		**107**
1993	Sci. papers	20	19	4	2	20	50
	Reports	14	22	20	1	11	7
	Book ch.	3	6	0	0	3	9
	Total	**37**	**47**	**24**	**3**	**34**	**66**
1994	Sci. papers	35	29	3	4	25	75
	Reports	8	11	20	0	5	37
	Book ch.	4	5	0	0	12	13
	Total	**47**	**45**	**23**	**4**	**42**	**125**
1995	Sci. papers	28	19	2	11	30	31
	Reports	9	10	20	3	4	5
	Book ch.	2	6	0	2	6	1
	Total	**39**	**35**	**22**	**16**	**40**	**37**
Average over last 3 years	Sci. papers	28	22	3	6	25	52
	Reports	10	14	20	1	7	16
	Book ch.	3	6	0	1	7	8
	Total	**41**	**42**	**23**	**8**	**39**	**76**

* Reports for South Australia include only formally refereed and published reports, not conference papers.

** CSIRO listed their conference papers separately. They have been included in "reports"

The estimations of cost per publication are shown in Table 10.

Cost per publication is a measure of productivity which does not take into account the quality of the publications nor differences in calculating budgets. The NSW research budget, for example, includes overhead costs for departmental corporate service units located on the research site. In addition, some research requires high capital expenditure. If these differences are taken into account, this cost per publication data may be useful for comparing productivity between years and research units. The quality of the advice given is dependent on the quality of the research and this should be reflected in the quality of publications.

Cost per publication does not include the research output 'advice given' which accounts about a third of research output (see Section 7.1). It is a numerical productivity measure and not an estimate of the cost of a publication.

Cost per publication is lower when calculated on a project basis as the project data include only direct costs not overheads. In addition Researchers may have overestimated the number of papers that will be ultimately produced from their project, whereas for the units overall the total publications for 1995 will probably increase, lowering cost per publication for 1995.

As Table 10 shows the trend in NSW has been steadily rising cost per publication. It rose by 96% between 1992 and 1994. Costs fluctuated for CSIRO but between 1990 and 1994 the cost per publication rose 17.7%. As a comparison the consumer price index increased between March 1993 to March 1996 by 10.07% (ABS, pers. comm.).

Table 10. Average 'cost of publication' per research unit over several years. (Note that this is a productivity measure, not an estimate of the cost of a publication.)

	QLD	NSW	NT	SA	VIC	WA	CSIRO
a) Calculated from departmental budgets/publications							
1989/90 & 1990							$ 92 k
1990/91 & 1991							$ 107 k
1991/92 & 1992		$93 k					$ 110 k
1992/93 & 1993	$ 164 k	$162 k				$ 100 k	$ 208 k
1993/94 & 1994		$181 k				$ 100 k	$ 106 k
1994/95 & 1995*	$ 161 k	$236 k		$ 388 k		$ 120 k	$ 373 k
b) Calculated from individual project data							
Range	$6-333k	$13-753 k	$10-50 k	$5-51k	$ 38-120k	$15-59k	$ 20-264 k
Average	$ 100k	$ 137 k	$41 k	$ 21k	$ 79 k		$ 77 k

* Publications in 1995 will probably increase since not all 1995 publications have been registered by the research units. This will lower the cost per publication for 1994/95.

6.2.2. Productivity per unit staff member

Another productivity measure calculated from the survey data is output per unit staff member. Survey respondents supplied the information on staff numbers given in Table 11.

Table 11. Total number of staff members and numbers with various degree qualifications.

	CSIRO	QLD	NSW	NT	SA	WA
Number of staff	227	64	103	18	70	74
Number with PhD	53	9	21	1	10	17
Number with Masters but not PhD	10	8	17	1	8	3
Number with Bachelors but no postgrad. degree	71	27	26	4	22	23
Number with postgraduate Diplomas	10	9	5	1	?	10
Number						

Information from Table 11 has been used together with publication data from Table 9 to estimate output per unit staff member. Three measures have been used:
1. the number of publications produced per staff member
2. the number of scientific papers produced per staff member
3. the number of scientific papers produced per staff member with a PhD, Masters or Bachelors degree

Productivity per unit staff member using these three measures is shown in Table 12.

Table 12. Number of publications and scientific papers produced per staff member and number of scientific papers per staff member with PhD, Masters or Bachelors degree.

	CSIRO	QLD	NSW	NT	SA	WA
Publ. per unit staff	0.33	0.64	0.40	1.27	0.11	0.52
Sci. papers per unit staff	0.23	0.43	0.21	0.16	0.08	0.34
Sci. papers per staff member with PhD/Masters/Bachelors	0.38	0.63	0.34	0.50	0.15	0.58

From these calculations it appears that Queensland and Western Australia have the highest productivity per unit staff member. In addition the cost per unit publication from Queensland and Western Australia appear to be relatively stable and comparatively low (Table 10) suggesting that these research units may be able to be used as a benchmark for research support structures.

7.   HOW IS RESEARCH OUTPUT MEASURED?

7.1.   Which research outputs are important?

Directors of Research were asked to evaluate a list of research outputs considered important when measuring productivity in the department. Researchers were given the same list and asked to estimate the time spent on each output. Both were asked to apportion 100 points between the various options.

Table 13 gives the averages of evaluations by each group. Directors indicated that the output of most importance in measuring research is 'advice given', followed by 'scientific papers' and 'technical reports'. Researchers appear to have got the message from their organisations about the varying importance of the different types of output and spend most of their time mostly on giving advice followed by preparing scientific papers and technical reports. There were differences between States. CSIRO Researchers spent more time on scientific papers than giving advice.

Table 13. Importance of factors in measuring research output as nominated by Directors of Research and proportion of time spent by Researchers on each activity. Numbers are averages of numbers of points out of 100.

	Research Directors	Researchers
Advice to management/Minister/community	41	32
Scientific papers	24	25
Technical reports	23	26
Conference papers	7	12
Other	5	5

Note: Information from each Researcher was given equal weight and the totals are slightly different from the average of State values shown in Appendix A.

7.2.   Should all research output be subjected to peer review?

Research Directors and Researchers were asked whether research output was reviewed formally or informally. There was a mixed response, probably because there are several types of research reviewed differently. Scientific papers are currently the only output subjected to rigorous and comparative peer review by external reviewers.

All seven Research Directors also thought peer review for all research would be advantageous. The reasons they gave were as follows:
- Peer review of projects at development stage would reduce the failure rate of projects and measure number of useful papers and avoid duplication.
- Independent quality assurance of our research process
- Should be essential
- Overturn SFCA decision to scrap Research Committees such as Demersal molluscs, Western Fisheries etc.

Most Researchers (84%) and Fisheries Managers (81%) thought that all research output should be subjected to peer review although one Fisheries Manager noted that it might be too time consuming.

A nationally recognised process for review which produced a measurable result would give research units a productivity measure that could be used not only to monitor productivity but also as a PR tool with funding bodies, Fisheries Managers and other clients.

Such a process would help project managers to measure their own productivity and the quality of their outputs. It could augment the one page financial progress reports suggested in Section 3.

8. WHO ARE THE CUSTOMERS FOR RESEARCH?

Research Directors and Researchers were asked to list their customers in order of importance. A summary showing how often each customer was mentioned is given in Table 14.

Table 14. Number of times each customer group was mentioned by Research Directors and Researchers.

Customer	Research Directors	Researchers
Industry	6	59
Other agencies	2	31
Fisheries Managers/Department	3	26
Community	1	24
Funding bodies	1	19
Recreational anglers	1	13
Management bodies	2	11
Other researchers		11
Fish/Fisheries		6
Minister/Government	5	4
Developers/Consultants		2

Five of seven Research Directors nominated the Minister as their most important customer. They also found industry important customers. Fisheries Managers were mentioned only three times but one Director noted that Fisheries Managers were not clients but collaborators of their team. For Researchers, industry was the most often mentioned customer followed by Fisheries Managers, other agencies and the community.

Fisheries Managers are clearly an important client (or collaborator) for research. They were asked if they thought that their input into research was adequate and how regular their contact with departmental researchers was. Their answers, shown in Table 15, show that 66% feel their input is adequate and 70% have regular contact with departmental researchers. A third feel their input is inadequate and have irregular or no contact with departmental researchers.

Table 15. Assessment by Fisheries Managers of their input into Research and their contact with researchers.

	Fisheries Managers
My input into Research is :	
Adequate	66 %
Inadequate	34 %
My contact with departmental researchers is:	
Regular	70 %
Irregular	27 %
None	3 %

9.   DISSEMINATION OF RESULTS

9.1   The dissemination process

When asked who they consider responsible for disseminating their results, 98% of Researchers said that they considered that they themselves were responsible. Research Directors agreed with this assessment but several said that the library and the Research Director were also responsible. Of the 58 Researchers who reported on recently completed projects, 90% had supplied results to Fisheries Managers.

Respondents were asked how effective they thought the process for disseminating their results was and their answers are given in Table 16. Research Directors and Researchers rated the process more highly than Fisheries Managers, a third of whom found the process inadequate. Since Fisheries Managers are one of the more important users of information produced by researchers this result is cause for concern.

Table 16. Effectiveness of the process to disseminate research results as judged by respondents.

	Research Directors	Researchers	Fisheries Managers
Very effective	14 %	21 %	6 %
Adequate	72 %	69 %	59 %
Inadequate	14 %	10 %	34 %

9.2.   The form in which research advice is given/ received

Researchers were asked to state in what form they give advice to Fisheries Managers and industry and Fisheries Managers asked in what form they receive advice. They agreed that both written and verbal advice is given/received (Table 17), however 7% of Researchers and 3% of Fisheries Managers said they did not give/receive advice.

Table 15. Form that advice is given/received by Researchers/Fisheries Managers

	Researchers	Fisheries Managers
Written	3%	3 %
Verbal	0 %	15 %
Written and verbal	90 %	79 %
Do not give /get advice	7 %	3 %

Fisheries Managers were also presented with the list of research outputs presented to other participants (see Section 5) and were asked to apportion 100 points between the various options given according to how they preferred to receive research information.

As Table 18 shows Fisheries Managers would prefer to get research information in the form of technical reports or advice rather than as scientific or conference papers. Technical reports usually incorporate management advice which is not generally acceptable in formal journal articles. If research results are to be fully utilised Researchers need to consider presenting results in various formats, aimed at different stakeholder groups.

Table 18. Weighting given to types of Research output given by Fisheries Managers who were asked to indicate how they preferred to receive advice.

Type of research output	Average weighting
Technical reports	32 %
Advice	24 %
Other*	20 %
Scientific papers	14 %
Conference papers	10 %

* As examples of other types of information they liked to receive Fisheries Managers nominated briefing notes, verbal response to questions, electronic mail, papers/presentations given by researchers to specific bodies such as MACs, concise summaries with management implications, user oriented reports and presentations to fishery group meetings

10.   DO FISHERIES MANAGERS USE RESEARCH RESULTS?

Researchers were asked if they thought that their advice was considered by Fisheries Managers and Fisheries Managers were asked if they were able to use research advice given. Each was asked to choose one of six options. The degree to which Researchers thought reports were used by Fisheries Managers and the degree to which Fisheries Managers reported they used research reports is shown in Table 19. Examples given by Researchers and Fisheries Managers of use made of research results are shown in Table 20 and 21.

Researchers generally thought that the research results they provided were used by Fisheries Managers although 6% felt they were not regularly used and 2% doubted they were used at all.

The majority of Fisheries Managers (60%) reported using research advice consistently or usually but since 9% of Fisheries Managers reported never using research results and 24% reporting they did not use research results regularly the doubts expressed by some researchers have some foundation.

Table 19. Evaluation of the degree to which research results are used as suggested by Research Directors, Researchers and Fisheries Managers as numbers or percentages of participants who chose each option.

	Research Directors	Researchers	Fisheries Managers
Consistently	57%	32 %	39 %
Usually	28%	29 %	21 %
Not regularly	14%	6 %	24 %
As necessary		14 %	6 %
Never		2 %	9 %
Difficult to assess		17 %	

The answers to the questions on dissemination and use of research results indicates that there is a need to re-evaluate the form in which results are delivered and the process by which they are made available. As Section 6 showed, Fisheries Managers are seen as important clients or collaborators so their message about the inadequacy of research result dissemination and inappropriateness of information presentation for their purposes is an important one.

Table 20. Examples of use (or otherwise) made by Fisheries Managers of research results as reported by Researchers.

ADVICE USED
Resource Management
- Orange roughy survey results used to set TAC
- Orange roughy abundance on TAC setting
- Northern shark study, southern shark stock assessments
- Size limits and closure periods for abalone fishery
- Management options for tiger prawns
- Summaries of catch statistics
- Closure of gemfish fishery, setting of state trip limits
- Use of spanner crab research findings in development of spanner crab fishery management plan.
- Stout Whiting Management in S.E. Qld - re: QFMA Board decisions.
- Timing & location of prawn trawl closures.
- Input to Gulf of Carpentaria Inshore Fishery Management Plan.
- Application of conservative harvesting strategies
- Resource allocation of inshore species to determine management changes.
- Management of the abalone fishery.
- Stock assessment group reports

Aquaculture
- Improving aquaculture discharge water quality
- Presentation of oyster research to Tasmanian Oyster Research Council
- Advice on fishmeal imports; development of marine finfish, silver perch and molluscs
- Prepared report of pacific oyster spat from Tasmania
- Results relating to aquaculture development are considered in assessing long-term future of the industry
- Aquaculture proposals/habitat areas - Baffle River, Elliott River, Burnett River. Management decisions - Calliope River.
- Genetic adaptation of feral Pacific Oysters in SA waters and possible impact on local environment.
- Water quality monitoring, scallop dredging effects

Environment
- Removal of culverts at Kooragang Island and replacement with bridge
- Management of floodplain river fisheries, inland lakes and wetlands
- Data supplied to fisheries environmental investigations
- Results of fish community assessment were used by managers to advise other departments on fish habitat issues in western NSW
- Port Pirie heavy metal scare in seafood
- Ben Anderson Fishway Assessment.
- Cairns City Council has accepted water allocation based on my environmental flows research.

ADVICE NOTED
(Some Researchers noted that although their advice was considered it was not always followed and some noted differences between types of managers or noted where advice had not been accepted)
- Reports have been consistently considered, although, at times, the decision by the IMC may differ from recommendations
- Recreational managers use recreational data BUT commercial managers never do
- Knowledge input into Murray cod harvest regulations in SA. NB: always considered at Scalefish Management Committee, not always implemented.
- Reported on lack of recruitment in a threatened species population. No feedback as yet.
- Research showing that current release size of fingerlings in stocking program is not the most cost-effective, has not been used by mangers.
- Failure of managers to provide seed money to projects which subsequently become CSIRO projects.
- Advice has often been ignored eg Translocation of Murray Darling species
- You never get any response back from managers

Table 21. Examples given by Fisheries Managers of decisions in which they have used research advice, or where advice was lacking.

ADVICE USED

Resource Management

- Included catch data and research project outline in industry newsletter
- Increase in minimum size limit for female mud crabs
- Fish sizes (minimum). Minimum mesh sizes. Determination of appropriate seasonal closures.
- Minimum sizes, seasonal & area strategies, quota determination, stock assessment; various/many others. All in past few months including purpose specific commissioned studies.
- Preliminary results from micro-tagging experiments - assessing applications to stock barramundi.
- The final report from the assessment of the seasonal closure of the North Queensland prawn trawl grounds was considered recently by TRAWLMAC in context of the development of a Draft Management Plan, ie whether it should advocate the continuing
- King George Whiting size limit, rock lobsters TAC, Gulf St Vincent prawn (external)
- Abalone fishery (eg closing some areas because of stock problems), NZ rock lobster fishery (adjusting effort from increase in the efficiency of the fleet), Prawn fisheries (determining closure areas to protect small prawns)
- Sand crab fishery, charter boat fishery
- Closure for spawning season, Changes in mesh size from gear selectivity trials. Closure of fishery due to resource concerns
- Catch returns
- Southern shark fishery
- Estimates of breeding stock levels basis for management
- Recent restrictions in Kimberley were based on scientific advice
- Creel survey results - determining appropriate species and numbers of fish for stocking programs.
- Enhance Eucumbene trout fishery
- Fishways , protected species, grey nurse shark, fishing closures

Aquaculture

- QX in oysters
- Clam project identified salinity requirements to be used in site selection
- Old research on culture methods for oysters

Environment

- Menindee Community advisory group, fish passage issues, seagrass and marine vegetation

ADVICE LACKING

- Lack of documentation in relation to the Spencer Gulf prawn fishery
- No current research advice (except by-catch) when limited entry scheme for spanner crab introduced

11.   PROBLEMS IDENTIFIED BY RESPONDENTS

Participants were asked to nominate one thing they would change if given the opportunity.

Issues nominated by Research Directors are given in Table 22 and those nominated by Researchers and Fisheries Managers are listed in Tables 23 and 24 respectively.

Many of the changes nominated related to strategic management of research indicating the high level of dissatisfaction with current strategic management and confirming the need for a foresighting or other strategic planning exercise.

Table 22. Suggested changes to research management as nominated by Research Directors.

- Introduce a national review process for research projects in a series of manageable size sectors, focused on planning of new projects, and reviews of research in progress. ie a structure to prevent the 'reinventing the wheel' syndrome.

- Have a system of truly independent review of quality and relevance of output and national comparison of these results.

- Make Fisheries Research independent (protected) from the regulatory/administration role of the department.

- Increase the level of funding by a level of magnitude so as to
     1) increase capability and capacity to do research
     2) attract and retain experts
     3) promote exchange of ideas/information
     4) increase community awareness of role of R&D

- Get rid of those who fill their pockets with fishermen's money and create conflict between government and commercial sector simply to justify their existence. This would enable at least a 30% increase in productivity for scientists simply in time saved.

- A more unified approach in Australia is required to avoid duplication and a plethora of small research units which are below the threshold size required for adequate fisheries science and the maintenance of long term information collection and data base management.

- Less dependence on FRDC funding and greater level of consolidated revenue funding.

Table 23. Changes to research management suggested by Researchers

Strategic planning
- Increased strategic planning at the national level to eliminate ineffective or duplicate research.
- Improve long term strategic planning and priority setting by most senior policy makers in department including CEO and Research Directors or Board of Management or similar authority.
- More long term strategic planning of research with direct input to and from fishery managers
- Encourage fisheries managers to look to the long term so sensible strategies for fisheries research can be identified and implemented.
- Make the research planning decision structure transparent
- Create sense of purpose for research division
- More long-term strategic thinking.
- There is a need for more independent peer review, with the independent peer reviewer to report to fisheries management committees.
- More attention given to strategic research such as stock recruitment problems rather than concentration on ad hoc research
- Get better agreement on which objectives are important

Priority setting
- Establish a more transparent and better informed process for setting research priorities and for reviewing and incorporating research results into the management process.
Link research priorities to a program of research funding

Independence and relevance of research
- Have research carried out in a more independent framework
- Cost alternative designs for research instead of designing it to fit the money available
- Less politically driven and more scientific research
- Make the research more relevant to the needs of industry. That is, answer the difficult questions about estimates of parameters for a population model rather than doing simple experiments that can be completed quickly and produce a scientific paper.

Funding
- Increase departmental funds for research
- Less dependence on knee jerk reaction by research
- Increased recognition of importance of fisheries science by Government such that reliance on external funds for research is reduced, permitting more strategic research.
- Greater government funding through increased awareness of marine research issues
- Remove the fishing industry from setting, designing and funding fisheries research in Australia - they are simply not committed to long-term sustainable fisheries - the economic incentives are not strong enough!
- Current trend is to direct research towards the short term (3 years) externally funded research projects. Projects designed to attract funds rather than for strategic research needs. Balance should be moved back to strategic projects.
- Over-reliance on applied projects tied to external funding agencies.

Table 23 continued

Organisation
- Ensure adequate scope and time for writing (publishing) and up to 20% of time for examining basic/long term problems.
- Develop a support system for good scientists to reduce their administrative load so they can focus on providing research & development outcomes.
- Increase length of contracts. Three year contracts lead to a high staff turnover and lack of long term experienced staff. We cannot keep staff and when they leave we have difficulty in attracting the right people
- Increase scientific input, decrease industry input and strengthen the resolve of fisheries managers
- Clearer separation of long term strategic research and industry oriented operational research

Communication/Integration
- Improve consultation between managers, resource users and researchers to determine funding priorities for both core and external funding bodies
- Improve consultation between researchers, managers, users and funding agencies
- Ensure good two-way communication
- Clearer links to other types of management
- Improve communications between research, management and industry
- More coordination - less fractures by geographic region or sector
- Better integration between programme and research areas eg mariculture and environment

Training/Education/PR
- Higher level of training/expertise of research managers in subject area
- Convince fisheries managers that fisheries cannot be managed sustainably by ignoring environmental impacts on stock

Table 24. Changes to research management nominated by Fisheries Managers

Organisation
- Flattening of hierarchical controls
- Create a matrix organisation where researchers had some responsibility to fishery managers
- Change in managerial philosophy generally. Tie more into fishery management needs

Funding/Costing
- More review of cost benefit of existing research programs (CB of new projects is adequate)
- Integrated Management Committees should have more say in research priorities and funding and this is being developed. Also more defined role and obligation for SARDI researchers as to what is "core research" to be funded from Treasury and utilised for fisheries management.

Strategic Planning
- Better strategic direction overall
- More strategic, focused, accountable, transparent & better presented research.
- Bring fisheries researchers and fisheries policy/managers together under one unit.
- Core research activity recognised & differentiated from industry driven research programs. Core research (state benefit) should be undertaken by SARDI and other non-core research tendered out, inviting other research bodies (independent of SARDI) to provide a bid for service
- Delete the SARDI Board & the CEO and amalgamate SARDI-Aquatic Sciences with Fisheries. This should lead to closer liaison between the two departments.
- Focus on the strategic needs of the fisheries resources and industry - this includes commercial development of 'pure' research.
- Concentrate on State (NSW) issues and problems. Current research has a wide focus and benefits other States more than NSW
- Generate more data that can immediately be applied to management
- Be more accountable to the department's core objectives. Look at the Act's objectives
- Do more small scale quick (1 month) and rapid response research to answer particular problems.
- Do more research on MEPAs.
- Involve industry more
- Emphasis development as opposed to research. Less research for research sake because funding is available.

Priority setting
- Implementing a formal process of consultation so that research priorities could be tailored to meet the needs of management.

Communication
- Relations between managers and researchers and between researchers and industry must improve. Research scientists to take a more modern, pragmatic view of the world and managers help facilitate more cooperative relationship
- Linkage with industry to be improved
- Get information to industry quickly in a format they can understand
- Increase information exchange (research updates, new projects etc) between research and management
- Better relationship between research and management programs. Cross training for permanent staff. Quick response to urgent issues
- Widely publicise work being done
- Re-establish combined seminars

12. CONCLUSIONS

There was a positive response to the survey from around the country and participants expressed an interest in receiving the results.

The survey aimed to assess 1) the need for national standards for fisheries research, 2) the need for peer review of all research output and 3) the adequacy of current research support systems.

The survey shows that although Fisheries Researchers feel confident in their ability to do well designed and appropriately analysed research (Section 4) they feel current strategic management practises such as priority setting processes (Table 4), dissemination of results (Table 16) and management of strategic issues (Tables 22, 23 and 24) could be improved. This result, together with the overwhelming support from Research Directors, Researchers and Fisheries Managers for the idea of a foresighting exercise to identify strategic options for fisheries research (Table 3), suggests that national standards for fisheries research would be beneficial.

The survey also showed that both Researchers and their client group the Fisheries Managers think there is a need for peer review of all research output (Section 7.2). A formal system of peer review of Fisheries Research could set national standards for research and would address communication and interdepartmental strategic management problems identified by the survey (Section 3.6 and Tables 3, 21, 22 and 23).

The survey provides each agency with the opportunity to review and improve their research process and the transfer of knowledge to clients. Several problem areas within agencies have been identified:

- The processes used to prioritise research and to communicate priorities appear to be inadequate (Table 4). Research done elsewhere does not appear to be considered when setting research priorities which may mean there is duplication of effort.

- Researchers need support to improve their project management abilities. Research outcomes could be enhanced by having all research activities carried out within a project framework similar to that used by FRDC, setting out reporting requirements etc as part of the project. This requirement would help researchers develop their project management skills.

- Fisheries Managers do not appear to be making full use of research results, probably due to the form in which they are provided.

- Processes to disseminate research results to Fisheries Managers are regarded by a third of the Fisheries Managers responding to the survey as inadequate. Only 10% of Researchers thought the dissemination process inadequate indicating that they may be unaware of this problem.

13.   RECOMMENDATIONS

It is recommended :

- That a foresighting type exercise be undertaken to identify planning options for Fisheries Research. The inclusiveness of foresighting would address many of the concerns Researchers expressed about strategic issues.

- That a mechanism for communicating current priorities and projects between departments be established with the aim of avoiding duplication of effort.

- That priority setting processes be assessed with a view to determining how best to increase transparency and a sense of involvement among participants.

- That a peer review process for all research output be established which is recognised by all participants and which gives a measurable output. Such a process would increase the success rate of projects, avoid duplication and provide project managers with a tool to measure their progress.

- That consideration be given to developing forms of communication between Fisheries Researchers and Fisheries Managers that ensures that Managers receive information in the form they can utilise.

- That Research Directors and Managers be encouraged to operate all research in project management form and that Researchers be supported in developing their project management capabilities by training and by requiring regular financial and project progress reporting of all projects.

PART B

Summary of data by State

PART B should be read in conjunction with Appendix A which presents survey data.

PART B summarises but does not reproduce survey data presented in Appendix A.

PART B does list survey information not presented in Appendix A such as 'Strategic Issues' nominated by respondents.

14. QUEENSLAND

Fourteen Researchers and four Fisheries Managers returned survey forms. Not all respondents answered all questions. In particular questions on the research prioritisation process were not answered by those not involved in the priority setting process.

14.1. Setting research priorities.

Who sets research priorities?

Respondents were asked to nominate those who currently participate in priority setting and those who should participate. As Table 25 shows, Researchers felt a wide participation was necessary for priority setting. Fisheries Mangers indicated that the MACs and the QFMA Board and industry were involved in an iterative process.

Table 25. Numbers of times proposed participants in priority setting were mentioned by Researchers.

Participant in priority setting	Researchers	
	Takes part	**Should take part**
CEO	1	1
Director of Research	2	3
Branch Heads	3	3
Researchers	4	5
Fisheries Managers	7	4
Industry	6	5
Community	4	2
MACs		1

What factors are seen to affect research priorities?

Researchers said the single most important factor affecting research priorities was '*industry identified needs*'. This was followed by '*funding body priorities*' and '*fisheries management problems as identified by the department*'. Several nominated political considerations as being important. '*Availability of in-house expertise*', '*research being done elsewhere*' and '*the need to keep current staff occupied*' were of little relevance. Fisheries Managers said 'fisheries management problems as identified by the department' was the only important factor in setting priorities.

Communication and review of research priorities

Respondents were divided as to whether priorities were communicated formally or informally and one said both methods were used. Six of seven Researchers said that priorities were reviewed 'as required' but all three Fisheries Managers said communication of priorities was according to a predetermined timetable.

Is the process adequate?

Nine of fourteen research project managers and three of four Fisheries Managers said they were involved in setting research priorities. Four Researchers found the process adequate while three found it inadequate. None found it excellent. Fisheries Managers were divided in their assessment of the process, one each finding it excellent, adequate and inadequate. This may reflect different research areas

14.2. Departmental abilities to undertake quality research

Standard of experimental design, experimental analysis and project management

Researchers reported they manage between one and five projects each.

Ten of fourteen Researchers found the department's abilities in experimental design either 'excellent' or 'adequate' while four found it 'difficult to assess' or 'poor'. Thirteen of fourteen Researchers found the departments abilities in experimental analysis excellent or adequate. Eleven reported their project management skills to be excellent or good and four said their project management skills were inadequate.

Of the thirteen projects reported in detail, ten attracted external funding. Financial reports were reported to have been on time although most respondents said that this was not their responsibility.

14.3. Productivity and cost of information

Project information

Thirteen projects were reported in detail. Costs for these projects ranged from $30,000 to $1m and completion time was 3 -56 months. Researchers expected between 3 and 11 publications to be produced per project.

An estimate of 'cost per publication' and 'time per publication' for the seven projects for which complete information was reported is shown in Table 26. Since qualitative information on publications is not taken into account this method of measuring productivity has limitations but it may be useful in comparing projects and programs over time.

Table 26. Cost and time required per publication for seven Queensland research projects

	Range	Average
Timespan of projects	18 - 56 months	36 months
Cost of projects	$20,000 - $1m	$440,664
Number of publications	3 - 10	4
Cost per publication	$6,667 - $333,333	$100,286
Time per publication	2 - 12 months	5.1 months

Cost of information can also be computed for the department as a whole from budgets and numbers of publications. The cost per publication figures are indicative only since publications usually lag behind spending but they can show trends over time and may be useful as a comparison between departments.

Table 27 lists Queensland research budget information, which was available for the financial years 1992/93 and 1994/95 and number of publications for calendar years since 1986.

Table 27. Cost per publication deduced from divisional budgets for the financial years since 1991/92 and number of publications produced since 1986.

Year (financial year of budget data)	Total research budget (incl. external) [$ '000]	No. sci. papers and book chapters	No. Research reports	Total publications	Cost per publication [$'000]
1986		5			
1987		7			
1988		14			
1989		16			
1990		19	2	21	
1991		15	11	26	
1992		22	9	31	
1993 1992/93	$ 5,300	23	14	37	$ 143
1994		39	8	47	
1995 1994/95	$ 3,600	30	9	39	$ 92

How is research output reviewed?

There was variation in how Researchers felt their research output was currently reviewed with three reporting that research was reviewed formally, five saying review was informal and two saying the process was non-existent.

Nine of fourteen Researchers and all Fisheries Managers felt research output other than papers would benefit from being subject to the type of peer review currently used for scientific papers. One researcher commented that it would take too long.

14.4. Dissemination of results

Who are the clients for research?

A list of clients as nominated by Researchers is given in Table 28 together with an indication on how often they were mentioned. The table shows that Researchers see industry, management bodies and Fisheries Managers as their most important clients.

Table 28. Clients as nominated by Researchers.

Customer	Number of times mentioned
Industry	16
Management bodies	9
Fisheries Managers	6
Community	5
Other Researchers	5
Recreational anglers	4
Funding bodies	2
Developers/consultants	2

How are research results presented?

Researchers reported that of the time they spent reporting their results, a third was spent preparing technical reports, a third giving advice and a third preparing scientific or conference papers.

What form of information do Fisheries Managers prefer?

Fisheries Managers indicated they preferred getting information in the form of technical reports or verbal advice. They emphasised the importance of reports to MACs on specific issues.

Is the process to disseminate results adequate?

All fourteen Researchers considered that they themselves were responsible for dissemination of their research results and eleven of thirteen reported that they had supplied information about their last project to Fisheries Managers. Although twelve Researchers found the dissemination process adequate or better, two reported the process to be inadequate.

All four Fisheries Managers reported the process to be adequate.

How good is communication between Researchers and Fisheries Managers?

All Fisheries Managers reported their contact with departmental Researchers was regular and said they thought their input into research issues was adequate.

14.5. Do Fisheries Managers use research results?

All Researchers reported giving both written and verbal advice to Fisheries Managers. When asked how much they thought their results were used seven of 14 Researchers thought that their advice was used 'consistently', 'usually' or 'as necessary' while eight thought their advice was not used regularly or found it difficult to tell if their advice was being used.

Table 29 shows examples that the nominated of their results being used or not being used. Fisheries Managers agreed they received verbal and/or written advice from Researchers and all four reported using it 'consistently' or 'usually'.

Table 29. Examples given by Researchers and Fisheries Managers of research information that has been used by Fisheries Managers.

EXAMPLES OF USE GIVEN BY RESEARCHERS • Stout Whiting Management in S.E. Qld. • Timing & location of prawn trawl closures. • Input to Gulf of Carpentaria Inshore Fishery Management Plan. • Ben Anderson Fishway Assessment. • Aquaculture proposals/habitat areas - Baffle River, Elliott River, Burnett River. • Use of spanner crab research findings in development of fishery management plan. • Water allocation for Cairns City Council **EXAMPLES OF NON-USE GIVEN BY RESEARCHERS** • Failure of managers to provide seed money to projects which CSIRO subsequently does • Research showing release size of fingerlings in stocking progr. is not the most cost-effective **EXAMPLES OF USE GIVEN BY FISHERIES MANAGERS** • Reports produced from specifically commissioned research projects. • Papers/presentations given by Researchers to specific bodies such as MACs.

14.6. Strategic research planning

Both Fisheries Managers and Researchers were asked to nominate current strategic issues. The examples nominated are listed in Tables 30 and 31 respectively.

Eleven of thirteen Researchers and three of four Fisheries Managers thought that a foresighting exercise was desirable or very desirable for strategic planning and all but one expressed interest in taking part.

Table 31. Current strategic issues cited by Fisheries Managers.

• Bycatch/Discards/ Waste. • Effectiveness of habitat management/ rehabilitation in sustainability of fish stocks. • An assessment of the habitat consequences of trawling. • Excess capacity & its adjustment (Commercial and Recreational) • Design and effectiveness of fish passage facilities. • Design/ assessment/ application of T.E.Ds.

Table 30. Current strategic issues cited by Researchers. They have been divided into three groups.

Habitat Issues:
- Catchment impacts on fisheries habitat & production.
- Coastal habitat destruction and urban encroachment on its effect on fisheries & aquaculture.
- Effect of commercial fishing & aquaculture on the environment, eg sustainability.
- Habitat issues in Freshwaters.
- Impacts of modifying waterways, ie weirs, fishways.
- Monitoring the effects of habitat disturbance & destruction on our fisheries sustainability. Also allocation of fisheries resource is fair & equitable.
- Preservation of endangered/ threatened fish species.
- Role of freshwater wetlands.
- Catchment management
- Water supply.

Resource Management Issues:
- Maintaining a viable commercial industry.
- Securing industry funding.
- Attaining & analysing data on the status & trend of our exploited fisheries
- ESD of fisheries resources.
- Fisheries resource condition & trend (includes habitat).
- Impacts of fishing activities/by-catch.
- Natural Resource Management/ Monitoring & Assessment.
- Providing "fair" catch allocation of resources.

Stock Assessment Issues
- Developing a sound expertise-base in stock assessment to tackle questions of stock status in all of Queensland's fisheries.
- Development & implementation of Integrated Stock assessment & Monitoring Programme.
- Establishing procedures for determining stock status and condition for exploited stocks.
- Establishing sustainable harvest levels in exploited stocks.
- Identifying and compiling fisheries resources within the state.

Other issues
- Is aquaculture an area for research or for permit and extensions roles only?
- Improving quantitative skills of personnel.
- Increase base funding to our research facilities.
- Increase base funding to our research staff.

14.7. What needs to be changed?

Respondents were asked what they would change in the management of research and their answers are given in Tables 32 and 33.

Table 32. Necessary changes as nominated by Researchers.

Strategic planning issues:
- Demonstrate pursuit of excellence : focus of resources on fewer research exercises of high quality employing a team approach rather than a plethora of smaller exercises where quality can be compromised.
- More strategic planning involving Researchers.
- Research advice to be given reasonable consideration.
- Development of a process for Fisheries Research Management, by managers with a clear mandate and willingness to promote the research function, find appropriate resources, and engender a more professional approach to research generally.
- Better planning for future research with realistic funding sources identified.
- Increased regional strategic planning.
- More and more effective consultation by fisheries managers of the people closest to the industry - the researchers!
- Would like to know and see what advice is given by all managers on management decisions concerning each area of expertise.

Funding/administration issues:
- There is a lack of local information for solving management problems in districts which can only be achieved by officers at a local level. Mega projects and their funding applications are very time consuming and usually are not interested in district problems or small amounts, eg fishway modifications; fauna, flora & habitat inventories for local waterways; impact of weirs on local fish fauna communities, etc - environmental flow allocations, etc..
- Obtain suitable internal funding for small research projects.
- More internal support.
- Allow biologists to get on with their work. Most of us enjoy hard work in a field we have much enthusiasm for. Employ administrative staff to oversee day to day management of budgets, purchasing, corporate service issues which we spend 60-70% of our time on.
- Less management by managers with no background in the field of endeavour.
- More staff on base funding.
- Eliminate the States and go to a central Federal Fisheries agency!
- Freshwater Research has all but been abandoned in DPI. A dedicated group of permanent freshwater scientists could attract considerable funding from external sources to operate many of the projects we've identified as vital.

Table 33. Necessary changes as nominated by Fisheries Managers

- Focus on "need to know: research for use in management.
- All Govt. Fisheries Research funding should be managed by the Fisheries Management Agency to ensure that fisheries research is properly focused on resolving management problems.
- More research in the fisheries/habitat interface.
- Need for socio-economic research - what are the social implications of mgt changes?

15.   NEW SOUTH WALES

Seventeen Researchers and ten Fisheries Managers returned survey forms. Not all respondents answered all questions. In particular questions on the research prioritisation process were not answered by those not involved in the priority setting process.

15.1. Setting research priorities.

Who sets research priorities?

Respondents were asked to nominate those who currently participate in priority setting and those who should participate. As Table 34 shows, both Researchers and Fisheries Managers felt wide participation was necessary.

Table 34. Numbers of times proposed participants in priority setting were mentioned by Researchers and Fisheries Managers.

Participant in priority setting	Researchers		Fisheries Managers	
	Takes part	Should take part	Takes part	Should take part
CEO	8	11	2	6
Director of Research	14	12	6	7
Branch Heads	13	12	6	6
Researchers	8	10	6	6
Fisheries Managers	8	12	3	7
Industry	11	10	3	6
Community	1	7	1	-

What factors are seen to affect research priorities?

Researchers said that '*fisheries management problems as identified by the department*' was the single most important factor affecting research priorities followed by '*industry needs*' and then '*funding body priorities*'. '*Availability of in-house expertise*' and '*research being done elsewhere*' were seen to have less impact on priorities while '*the need to keep current staff occupied*' was of no relevance.

The two Fisheries Managers who said they took part in setting research priorities agreed that that '*fisheries management problems as identified by the department*' was the most important factor in setting priorities but said they thought the desire to publish research papers had an affect on which research was done.

Communication and review of research priorities

Respondents were divided as to whether priorities were communicated formally or informally. Seven of eight Researchers and two of two Fisheries Managers said that priorities were reviewed '*as required*' indicating the lack of a formal process.

Is the process adequate?

Eight of sixteen research project managers and three of nine Fisheries Managers said they were involved in setting research priorities. Seven of the eight Researchers found the process adequate, one found it inadequate. None found it excellent. Two Fisheries Managers judged the process adequate and three inadequate.

15.2. Departmental abilities to undertake quality research

Standard of experimental design, experimental analysis and project management

Researchers reported they manage between one and five projects each. All Researchers found the department's abilities in experimental design and experimental analysis either excellent or adequate and most reported their project management skills to be excellent or good although two said their project management skills were inadequate. The fact that almost all milestone reports were produced on time would support this self assessment.

Of the fifteen projects reported in detail, thirteen attracted external funding. Financial reports were reported to have been on time although most respondents said that this was not their responsibility.

15.3. Productivity and cost of information

Project information

Projects costs ranged from $40,000 to $4.5m and were completed in 4 -72 months. Researchers expected between 2 and 22 publications to be produced per project.

An estimate of 'cost per publication' and 'time per publication' for the seven project for which both external and departmental budgets were reported is shown in Table 35. Since qualitative information on publications is not taken into account this method of measuring productivity has limitations but it may be useful in comparing projects, programs and departments.

Table 35. Cost and time required per publication for seven NSW research projects

	Range	Average
Timespan of projects	4 - 42 months	27 months
Cost of projects	$42,000 - $2.26m	$720,995
Number of publications	2 - 10	5
Cost per publication	$13,000 - $753,000	$137,332
Time per publication	2 - 12 months	5.1 months

Cost of information can also be computed for the department as a whole from budgets and numbers of publications. The cost per publication figures are indicative only since publications usually lag behind spending but may be useful as a comparison over time or between projects.

Table 36 lists NSW research budget information, which was available for the financial years since 1991/92, and number of publications for calendar years since 1986. The cost per publication has been increasing since 1991.

Table 36. Cost per publication deduced from divisional budgets for the financial years since 1991/92 and number of publications produced since 1986.

Year (financial year of budget data)	Total research budget (incl. external) [$]	No. sci. papers and book chapters	No. Research reports	Total publications	Cost per publication [$]
1986		19	41	60	
1987		10	34	44	
1988		12	18	30	
1989		31	21	52	
1990		35	19	54	
1991		26	27	53	
1992 1991/92	$ 7,590,537	57	29	86	$ 88,262
1993 1992/93	$ 7,637,467	25	22	47	$162,499
1994 1993/94	$ 8,187,282	34	11	45	$ 181,939
1995 1994/95	$ 8,271,212	31	11	42	$ 196,933

How is research output reviewed?

There was variation in how researchers felt their research output was currently reviewed with nine reporting that research was reviewed formally and seven saying review was informal or non existent.

Fourteen of fifteen Researchers and five of six managers felt research output other than papers would benefit from being subject to the type of peer review currently used for scientific papers.

15.4. Dissemination of results

Who are the clients for research?

A list of clients as nominated by Researchers is given in Table 37 together with an indication on how often they were mentioned. The table shows that Researchers see industry, Fisheries Managers and the community as their most important clients.

Table 37. Clients as nominated by Researchers.

Customer	Number of times mentioned
Industry	12
Fisheries Managers	9
Community	9
Other agencies	7
Fish/Fisheries	5
Recreational anglers	4
Funding bodies	3
Minister	1

How are research results presented?

Researchers reported that of the time they spent reporting their results, an average of 31% was spent on preparing scientific papers, 31% on preparing technical reports and 22% on giving advice. An average of five scientific papers and two reports were produced per project so longer was spent on each report. Scientific papers are generally written using the results already written in report form which would explain why they take less time.

What form of information do Fisheries Managers prefer?

Fisheries Managers indicated they preferred getting information in the form of technical reports or verbal advice; scientific and conference papers came last in their list of preferred information options.

Is the process to disseminate results adequate?

All sixteen Researchers considered that they themselves were responsible for dissemination of their research results. Thirteen reported that they had supplied information about their last project to Fisheries Managers. Although fourteen Researchers found the dissemination process adequate or better, two reported the process to be inadequate.

Fisheries Managers were not as convinced of the adequacy of dissemination of research results with four judging the process adequate and five inadequate.

How good is communication between Researchers and Fisheries Managers?

Five Fisheries Managers reported their contact with departmental Researchers was regular and four said it was irregular. Six of eight said they thought their input into research issues was inadequate.

15.5. Do Fisheries Managers use research results?

All Researchers reported giving both written and verbal advice to Fisheries Managers and ten of sixteen thought that their advice was used 'consistently', 'usually' or 'as necessary' while the remaining six said they found it 'difficult to assess'. One Researcher noted that there was not enough feedback from Fisheries Managers. Table 38 shows examples that Researchers and Fisheries Managers nominated of research results being used.

Fisheries Managers agreed they received verbal and/or written advice from Researchers but only 3 of 9 reported using it consistently or usually with the remaining six saying they did not use advice regularly.

15.6. Strategic research planning

Both Researchers and Fisheries Managers were asked to nominate current strategic issues. The examples nominated have been divided into groups and are listed in Tables 39 and 40.

Thirteen of fourteen Researchers and nine of ten Fisheries Managers thought that a foresighting exercise was desirable or very desirable for strategic planning expressed interest in taking part.

Table 38. Examples given by Researchers and Fisheries Managers of research information that has been used by Fisheries Managers.

Examples given by Researchers
• Advice on fishmeal imports
• Development of marine finfish, silver perch and molluscs
• Closure of gemfish fishery, setting of state trip limits
• Management of floodplain river fisheries, inland lakes and wetlands
• Prepared report of pacific oyster spat from Tasmania
• Recreational managers use of recreational research data
• Removal of culverts at Kooragang Island and replacement with bridge
• Size limits and closure periods for abalone fishery
• Summaries of catch statistics
Examples given by Fisheries Managers
• Advice written for urgent scenarios
• Briefing notes
• Verbal response to questions

Table 39. List of strategic issues of importance to the department as nominated by researchers. They have been divided into six groups.

Aquaculture
- Identifying and solving research bottlenecks to aquaculture industry development.
- Improve profitability of oyster industry

Stock Assessment
- Biology relevant to stock assessment
- Methods of resource assessments
- Catch statistics relevant to stock assessment
- Stock assessment
- Stock assessment of trawl fishery
- Need to ensure long term support for monitoring research to provide data for effective fisheries management

Conservation and Habitat
- Sustainability of resources
- Conservation of threatened species
- Conservation/restoration of threatened fish populations
- Effects of environmental degradation on fish stocks/fisheries
- Effects of modified river flows on fish
- Habitat assessment
- Identify ways to manage and restore critical fisheries habitats

Recreational fishing
- Participate in a national survey of recreational fishing
- Establishing long term monitoring programs that measure recreational fishing effort/harvest by spp. and region

Data management
- Data quality and long term maintenance

Research Planning and communication
- Effective prioritisation of research funds to the most important departmental obligations
- Solve the ' habitat enhancement or stock enhancement' dilemma
- Research priority setting
- Strategic planning
- Create medium and long term research plans (escape from the 3 year funding cycle)
- Clarify the relationship between multi species fisheries and single species research projects
- Communication of results
- Communication of all stages of research from planning to application with management

Table 40. List of strategic issues faced by the department as nominated by Fisheries Managers divided into five groups.

Aquaculture
- Aquaculture industry development plan for oyster industry
- Disease control
- Environmental impact of aquaculture
- Farming around Pacific Oyster overcatch
- Success of departments stocking program

Stock Assessment
- Establish appropriate harvest level
- Establish standing crop
- Estuary species stock assessment
- Over harvest of eels. Status of juvenile eel stocks
- Stock assessment for important Commercial and Recreational spp.
- Mullet study

Conservation and habitat
- Inventory of degraded estuarine sites
- Evaluation of habitat restoration and feasibility of restoration
- Inventory of marine vegetation
- Representative system for protected areas

Recreational fishing
- Estimate of recreational fish catch

Research Planning and Communication
- Define core business research
- Increase consultation with industry re priorities
  Provide for development of research findings

15.7. What needs to be changed?

Respondents were asked what they would change in the management of research. Both Researchers and Fisheries Managers nominated strategic planning and communication issues as their prime concern. These are listed in Tables 41 and 42.

Table 41. Necessary changes as nominated by Researchers.

Strategic Planning
- Improve long term strategic planning and priority setting by most senior policy makers in department including CEO and Research Directors or Board of Management or similar authority.
- More long term strategic planning of research with direct input to and from fishery managers
- Encourage fisheries managers to look to the long term so sensible strategies for fisheries research can be identified and implemented.
- Establish a more transparent and better informed process for setting research priorities and for reviewing and incorporating research results into the management process.
- Make the research planning decision structure transparent
- Create sense of purpose for research division
- Have research carried out in a more independent framework
- Cost alternative designs for research instead of designing it to fit the money available
- Make the research more relevant to the needs of industry. That is, answer the difficult questions about estimates of parameters for a population model rather than doing simple experiments that can be completed quickly and produce a scientific paper.
- Increase departmental funds for research
- Get better agreement on which objectives are important

Communication
- Improve consultation between managers, resource users and researchers to determine funding priorities for both core and external funding bodies
- Improve consultation between researchers, managers, users and funding agencies
- Ensure good two-way communication

Table 42. Necessary changes as nominated by Fisheries Managers

Strategic Planning
- Focus on the strategic needs of the fisheries resources and industry - this includes commercial development of 'pure' research.
- Concentrate on NSW issues and problems. Current research has a wide focus and benefits other states more than NSW
- Generate more data that can immediately be applied to management
- Be more accountable to the department's core objectives - look at acts objectives
- Do more small scale quick (1 month) and rapid response research to answer particular problems.
- Do more research on MEPAs.
- Improve the link with industry and involve industry more
- Get information to industry quickly in a format they can understand

Communication
- Increase information exchange (research updates, new projects etc) between research and management
- Emphasise development as opposed to research. Less research for research sake because funding is available.
- Better relationship between research and management programs. Cross training for permanent staff. Quick response to urgent issues
- Widely publicise work being done
- Re-establish combined seminars

16.   SOUTH AUSTRALIA

Eight Researchers and eight Fisheries Managers returned survey forms. Not all respondents answered all questions. There appears to have been a problem with photocopying the double sided survey as most Fisheries Managers did not return page 2 of the three page survey. Fisheries Researchers in South Australia work for SARDI while Fisheries Managers are employed by the Department of Primary Industries South Australia (PISA).

16.1. Setting research priorities.

Who sets research priorities?

Respondents were asked to nominate those who currently participate in priority setting and those who should participate (Table 43). As Table 43 shows, Researchers felt wide participation was necessary for priority setting. Fisheries Managers did not appear to receive this part of the survey form.

Table 43. Numbers of times proposed participants in priority setting were mentioned by Researchers.

Participant in priority setting	Takes part	Should take part
CEO	1	2
Director of Research	2	2
Branch Heads	2	1
Researchers	4	5
Fisheries Managers	3	4
Industry	4	4
Community	2	4
SARDI Board	1	1

What factors are seen to affect research priorities?

Researchers said that *'industry needs'* and *'fisheries management problems as identified by the department'* were the most important factor affecting research priorities followed by *'funding body priorities'* and *'availability of in-house expertise'*. *'Research being done elsewhere'* and *'the need to keep current staff occupied'* was of no relevance.

Five Fisheries Managers said they took part in setting research priorities and agreed with Researchers that *'industry needs'* and *'fisheries management problems as identified by the department'* were the most important factors in setting priorities.

Communication and review of research priorities

Six of seven Researchers and two of three Fisheries Managers said that priorities were reviewed '*as required*' indicating there is no formal process.

Respondents were divided as to whether priorities were communicated formally or informally.

Is the process adequate?

Seven of eight research project managers and five of seven Fisheries Managers said they were involved in setting research priorities. Three Researchers found the process excellent or adequate and four found it inadequate. One of two Fisheries Managers judged the process inadequate.

16.2. Departmental abilities to undertake quality research

Standard of experimental design, experimental analysis and project management

Researchers reported they manage between two and 19 projects. All Researchers but one found the department's abilities in experimental design and experimental analysis either excellent or adequate while the eighth thought the department deficient in experimental design. Five of eight reported their project management skills to be excellent or good and three said their project management skills were inadequate. Four of eleven milestone reports were not produced on time indicating that Researchers may need some help in this area.

Of the seven projects reported in detail, six attracted external funding. Two respondent said their financial reports were not produced on time but most said that this was not their responsibility

16.3. Productivity and cost of information

Project information

Seven projects were reported in detail. For these projects, costs ranged from $15,000 to $225,000 and were completed in 8 - 60 months. Researchers expected between 2 and 9 publications to be produced per project.

An estimate of 'cost per publication' and 'time per publication' for the seven project for which both external and departmental budgets were reported is shown in Table 44. Since qualitative information on publications is not taken into account this method of measuring productivity has limitations.

Table 44. Cost and time required per publication for seven NSW research projects

	Range	Average
Timespan of projects	8 - 60	22.6
Cost of projects	$ 15,000 - $ 225,000	$ 47,000
Number of publications	2 - 9	2.3
Cost per publication	5,000 - 50,500	21,319
Time per publication	3 - 8 months	5 months

Cost of information can also be computed for the department as a whole from budgets and numbers of publications. The cost per publication figure is indicative only since publications usually lag behind spending but they can show trends over time.
Table 45 lists number of publications for calendar years since 1986 together with budget information for the year 1994/95, the only year available.

Table 45. Number of publications since 1986, budget for 1994/95 and cost per publication for 1994/95.

Year (financial year of budget data)	Total research budget (including external) [$]	No. scientific papers and book chapters	No. Research reports	Total publications	Cost per publication [$]
1986		12	2	14	
1987		10	1	11	
1988		6	1	7	
1989		18	1	19	
1990		4	5	9	
1991		9	7	16	
1992		16	4	20	
1993		2	1	3	
1994		4	0	4	
1995 1994/95	$ 1,470 k	13	3	16	$ 92 k

How is research output reviewed?

There was variation in how Researchers felt their research output was currently reviewed with two reporting that research was reviewed formally, two saying review was informal, one saying processes were both formal and informal and one saying review processes were non existent.

Six of eight Researchers and five of six Fisheries Managers felt research output other than papers would benefit from being subject to the type of peer review currently used for scientific papers.

16.4. Dissemination of results

Who are the clients for research?

A list of clients as nominated by Researchers is given in Table 46 together with an indication on how often each client group was mentioned. Table 46 shows that Researchers see industry as their most important client.

How are research results presented?

Researchers reported that of the time they spent reporting their results, 46% was spent giving advice and 51% preparing scientific, technical or conference papers. For individual projects reported in detail an average of 2.5 papers and 2 reports were produced.

Table 46. Customers as nominated by Researchers.

Customer	Total
Industry	10
Other agencies	6
Community	5
Fisheries managers	2
Integrated Management Committee	2
Recreational anglers	1
Other researchers	1

Is the process to disseminate results adequate?

All eight Researcher said they were responsible for the dissemination of their own research results and six of seven said they had supplied their latest research report to the appropriate Fisheries Manager. Two of the eight Researchers found the dissemination process inadequate.

How good is communication between Researchers and Fisheries Managers?

Six Fisheries Managers reported their contact with departmental Researchers was regular while two had irregular or no contact with Researchers. Six of eight said they thought their input into research issues was adequate.

16.5. Do Fisheries Managers use research results?

All Researchers reported giving both written and verbal advice to Fisheries Managers and six of seven thought that their advice was used consistently or usually.

Five of eight Fisheries Managers reported they used research information consistently or usually, one said they use it irregularly and two reported they never use research advice.

Table 47 shows examples that Researchers and Fisheries Managers nominated of research results being used

Table 47. Examples given by Researchers and Fisheries Managers of research information that has been used by Fisheries Managers.

Example nominated by Researchers
•   Port Pirie heavy metal scare in seafood
•   Season closures and TACs
•   Application of conservative harvesting strategies
•   Fisheries Management Committee consistently considers stock status reports
•   Resource allocation of inshore species to determine management changes.
•   Murray cod harvest regulations in SA.
•   Scalefish Management Committee always considers but does not always implement advice.
•   Management of the abalone fishery.
•   Genetic adaptation of feral Pacific Oysters in SA waters.
Example nominated by Fisheries Manager
•   Stock assessment/ progress reports supported by scientific publication

16.6. Strategic research planning

Examples of current strategic issues nominated by Researchers are listed in Table 48.

Six of eight Researchers thought a foresighting exercise to identify future directions would be a good idea and expressed and interest in taking part.

Table 48. List of strategic issues of importance to the department as nominated by Researchers.

•   Aquaculture
•   Developing methods for quantifying ecological sustainable development at both the species & ecosystem level.
•   Ecosystem relations of fisheries
•   Providing outcomes to clients that can be economically quantified.
•   Strategic research planning requires that management plans be in place to identify future research needs. At present the plans are non-existent.
•   Sustainability questions
•   Where do we want to be as research providers?
•   Wild fisheries biology
•   Wild fisheries vs. aquaculture integration
•   Wild fisheries stock assessment

16.7. What needs to be changed?

Respondents were asked what they would change in the management of research and their responses are listed in Tables 49 and 50.

Table 49. Changes nominated by Researchers that would benefit management of research.

• Remove the fishing industry from setting, designing and funding fisheries research in Australia - they are simply not committed to long-term sustainable fisheries - the economic incentives are not strong enough!
• More long-term strategic thinking.
• There is a need for more independent peer review, with the independent peer reviewer to report to fisheries management committees.
• Over-reliance on applied projects tied to external funding agencies.
• Reduce the number of interruptions and time wasters, such as this survey.
• Ensure adequate scope and time for writing (publishing) and up to 20% of time for examining basic/long term problems.
• Develop a support system for good scientists to reduce their administrative load so they can focus on providing research & development outcomes.

Table 50. Beneficial changes to research management nominated by Fisheries Managers.

• More strategic, focused, accountable, transparent & better presented research.
• Relations between managers and researchers and between researchers and industry must improve. Research scientists to take a more modern, pragmatic view of the world and managers help facilitate more cooperative relationship
• Priority setting
• Implementing a formal process of consultation so that research priorities could be tailored to meet the needs of management.
• Better strategic direction overall
• To bring fisheries researchers and fisheries policy/managers together under one unit.
• Core research activity recognised & differentiated from industry driven research programs. Core research (state benefit) should be undertaken by SARDI and other non-core research tendered out, inviting other research bodies (independent of SARDI) to provide a bid for service
• Delete the SARDI Board & the CEO and amalgamate SARDI-Aquatic Sciences with Fisheries. This should lead to closer liaison between the two departments.
• Integrated Management Committees should have more say in research priorities and funding and this is being developed. Also more defined role and obligation for SARDI researchers as to what is "core research" to be funded from Treasury and utilised for fisheries management.

17.   WESTERN AUSTRALIA

17.1. Setting research priorities.

Who sets research priorities?

Respondents were asked to nominate those who currently participate in priority setting and those who should participate. As Table 51 shows both Researchers and Fisheries Managers felt a wide participation in setting research priorities is necessary.

Table 51. Numbers of times proposed participants in priority setting were mentioned by Researchers and Fisheries Managers.

Participant in priority setting	Researchers		Fisheries Managers	
	Takes part	Should take part	Takes part	Should take part
CEO	1	-	3	3
Director of Research	4	6	4	2
Branch Heads	3	5	4	2
Researchers	5	4	3	1
Fisheries Managers	3	2	3	4
Industry	3	1	3	4
Community	2	-	-	1
Technical staff	1	1	-	-

What factors are seen to affect research priorities?

Both Researchers and Fisheries Managers indicated that *'fisheries management problems as identified by the department'* were the most important factor affecting research priorities. Researchers nominated '*industry needs*' as almost equally important while the '*availability of in-house expertise*' was seen to affect priorities to a lesser extent. The demands of community groups was mentioned under 'other' as a factor affecting priorities. '*Funding body priorities*' and '*the need to keep current staff occupied*' were seen to have little impact on priorities and '*research being done elsewhere*' was seen to have no impact. Fisheries Managers nominated '*availability of in-house expertise*' as the second most important factor affecting priority setting.

Communication and review of research priorities

There was some variation in the responses about the prioritisation process. Both Researchers and Fisheries Managers were divided as to whether priorities were communicated formally or informally and as to whether priorities were reviewed on a predetermined timetable or 'as required'.

Is the process adequate?

All six research managers indicated they were involved in setting research priorities. Five Researchers found the process adequate and one inadequate while none found it excellent.

17.2. Departmental abilities to undertake quality research

Standard of experimental design, experimental analysis and project management

Researchers reported they manage between one and four projects each, although one said they managed five programs consisting of 40 projects.

Researchers all reported that departmental abilities in experimental design and experimental analysis were excellent to adequate. They also felt that their Project Management skills were excellent or good and reported that their last project report had been on time.

Financial reports were reported to have been either on time or not the responsibility of project managers. This agreed with information from the Finance department which indicated that financial reports had been the responsibility of the Finance department.

17.3. Productivity and cost of information

Project information

Two projects were reported in detail (Table 52). They cost between $30,000 to $473,000 and were completed in 15 - 24 months and Researchers expected between 2 and 8 publications to be produced per project.

Table 52. Cost and time required per publication for two WA research projects

	Project 1	Project 2
Timespan	15 months	24 months
Cost	$ 30,000	$ 473,162
Number of publications	2	8
Cost per publication	$ 15,000	$59,000
Average time per publication	7.5 months	3 months

Cost of information can also be computed for the department as a whole from budgets and numbers of publications. Budget information was available for the financial years since 1991 and number of publications for the calendar years since 1993.

The cost per publication figures shown in Table 53 are indicative only since publications usually lag behind spending but they can show trends over time.

How is research output reviewed?

Three Researchers reported that research was reviewed formally and three informally but were unanimous other research output would benefit from being subject to the type of peer review currently used for scientific papers.

Table 53. Cost per publication deduced from divisional budgets for the financial years since 1991/92 and number of publications produced since 1986.

Year (financial year of budget data)	Total research budget (including external) [$ '000]	No. scientific papers and book chapters	No. Research reports	Total publications	Cost per publication [$'000]
1986		23	4	27	
1987		16	5	21	
1988		22	8	30	
1989					
1990					
1991					
1992 1991/92	$ 3m				
1993 1992/93	$3.4 m	23	11	34	$ 100,000
1994 1993/94	$ 4.2 m	37	5	42	$ 100,000
1995 1994/95	$ 4.8 m	36	4	40	$ 120,000

17.4. Dissemination of results

Who are the clients for research?

A list of clients as nominated by Researchers is given in Table 54 together with an indication on how often they were mentioned. The table shows that Researchers see industry as their most important client. It was noted that Fisheries Managers are collaborators not clients.

Table 54. Clients as nominated by Researchers.

Customer	Number of times mentioned
Industry	7
Department	3
Fisheries Managers	2
Minister	2
Community	1
Recreational anglers	1
Funding bodies	1

How are research results presented?

Researchers reported that of the time they spent reporting their results, half was spent giving advice and the remainder divided almost equally between preparing scientific papers, papers to be given at conferences and technical reports. Most Researchers gave both written and verbal advice.

What form of information do Fisheries Managers prefer?

Fisheries Managers said they preferred getting information in the form of technical reports or verbal advice. Scientific papers came last in their list of preferred options.

Is the process to disseminate results adequate?

Five of six Researchers considered that they were responsible for dissemination of research results themselves and Researchers and Fisheries Managers all found the dissemination process adequate. Fisheries Managers reported getting and using both verbal and written advice.

It was reported by administration that problems with mailing lists were starting to interfere with the process of getting research results to non-scientific staff.

How good is communication between Researchers and Fisheries Managers?

Five of the seven Fisheries Managers reported their contact with Researchers as adequate and regular. Five of seven said they were involved in research priority setting and all found the process excellent or adequate.

17.5. Do Fisheries Managers use research results?

Researchers said they thought that their advice was consistently or usually used by Fisheries Managers although one mentioned that it is often ignored.

17.6. Strategic research planning

Both Researchers and Fisheries Managers were asked to nominate current strategic issues. The examples nominated are listed in Tables 55 and 56.

All Researchers and six of seven Fisheries Managers thought that a foresighting exercise was desirable or very desirable for setting research priorities and expressed interest in taking part.

Table 55. List of strategic issues of importance to the department as nominated by Researchers.

- Directions for aquaculture in WA
- Stock recruitment
- Minimisation of habit damage
- Relative Fishing Power
- Development of more formal framework for stock assessment and reporting over all fisheries
- Development of spatial databases and analysis within GIS framework
- Quality control
- Research prioritisation under cost recovery
- HR - training and maintaining staff

Table 56. List of strategic issues faced by the department as nominated by Fisheries Managers.

- Analyse what we have already collected
- Baseline resource studies - we don't know what is out there until its too late
- Beche-de-mer fishery
- Focus research where it is most effective
- Free researchers from other duties to concentrate on research
- Investigation/quantification of increases in fishing power
- On-going maintenance of monitoring data collection systems
- Resource sharing
- Rock lobster stock estimates
- Shark stock estimates
- Utilisation of traditional knowledge

17.7. What needs to be changed?

Respondents were asked what they would change in the management of research. The issues nominated by both Researchers and Fisheries Managers that needed improvement are shown in Tables 57 and 58.

Table 57. Necessary changes as nominated by Researchers.

- More attention given to strategic research such as stock recruitment problems rather than concentration on ad hoc research
- Current trend is to direct research towards the short term (3 years) externally funded research projects. Projects designed to attract funds rather than for strategic research needs. Balance should be moved back to strategic projects.
- Increase length of contracts. Three year contracts lead to a high staff turnover and lack of long term experienced staff. We can't keep staff and when they leave we have difficulty in attracting the right people
- Clearer separation of long term strategic research and industry oriented operational research
- Less politically driven and more scientific research

Table 58. Necessary changes as nominated by Fisheries Managers

- Flattening of hierarchical controls
- Create a matrix organisation where researchers had some responsibility to fishery managers
- More review of cost benefit of existing research programs (CB of new projects is adequate)
- Change in managerial philosophy generally. Tie more into fishery management needs

18.   CSIRO DIVISION OF FISHERIES

Thirteen respondents from the CSIRO Division of Fisheries returned survey forms.

18.1. Setting research priorities.

Who sets research priorities?

Respondents were asked to nominate those who currently participate in priority setting and those who should participate. The coordinator of the survey for CSIRO pointed out that CSIRO staff may have had difficulty transposing the positions identified to their own organisation. Table 59 shows that respondents felt a wide participation was necessary in setting priorities for research.

Table 59. Numbers of times proposed participants in priority setting were mentioned by Respondents.

Participant in priority setting	Takes part	Should take part
CEO	2	2
Director of Research	0	0
Branch Heads	6	4
Researchers	9	6
Fisheries Managers	7	4
Industry	7	5
Community	0	4
Government Departments	0	1
Environmental groups	0	1

What factors are seen to affect research priorities?

Respondents said that '*fisheries management problems as identified by the department*', '*industry needs*' and '*funding body priorities*' were the most important factors affecting research priorities followed by '*availability of in-house expertise*'. '*Research being done elsewhere*' and '*the need to keep current staff occupied*' was of little relevance.

Communication and review of research priorities

Respondents were divided as to whether priorities were communicated formally or informally.

Eight of thirteen respondents said that priorities were reviewed on a predetermined timetable.

Is the process adequate?

Eleven of thirteen respondents found the process excellent or adequate and two found it inadequate.

18.2. Departmental abilities to undertake quality research

Standard of experimental design, experimental analysis and project management

Respondents reported they manage between one and five projects each. All respondents found the department's abilities in experimental design and experimental analysis either excellent or adequate and most reported their project management skills to be excellent or good although two said their project management skills were inadequate.

18.3. Productivity and cost of information

Project information

The thirteen projects reported in detail cost between $80,000 to $2.4m and were completed in 8 -42 months. The number of publications expected for the projects varied between 2 and 30.

An estimate of 'cost per publication' and 'time per publication' for the thirteen projects is shown in Table 60. Since qualitative information on publications is not taken into account this method of measuring productivity has limitations but it may be useful in comparing projects and programs over time.

Table 60. Cost and time required per publication for thirteen CSIRO research projects

	Range	Average
Time span of projects	2 - 42 months	26.5 months
Cost of projects	$ 80,000 - $ 2.4 m	$ 664,728
Number of publications	2 - 30	7.1
Cost per publication	$ 20,000 - 263,617	$ 67,314
Time per publication	1.2 - 8 months	2.9 months

Cost of information can also be computed for the department as a whole from budgets and numbers of publications. The cost per publication figures are indicative only since publications usually lag behind spending but they can show trends over time.

Table 61 lists CSIRO Division of Fisheries research budget information, which was available for the financial years since 1989/90, and number of publications for calendar years since 1986, and cost per publication calculated from this data.

How is research output reviewed?

Twelve of thirteen respondents said their research output was currently reviewed using a formal process but eleven of thirteen also agreed that research output other than papers would benefit from being subject to the type of peer review currently used for scientific papers.

Table 61. Cost per publication deduced from divisional budgets for the financial years since 1991/92 and number of publications produced since 1986.

Year (financial year of budget data)	Total research budget (including external) [$ '000]	No. scientific papers and book chapters	No. Research reports	Total publications	Cost per publication [$'000]
1986		65	7	72	
1987		103	14	117	
1988		70	12	82	
1989		72	20	92	
1990 1989/90	$ 9,642,800	81	4	85	$ 113,444
1991 1990/91	$ 11,399,100	80	11	91	$ 125,265
1992 1991/92	$ 11,797,629	61	10	71	$ 166,164
1993 1992/93	$ 13,751,683	59	0	59	$ 233,079
1994 1993/94	$ 13,294,000	88	14	102	$ 130,333
1995 1994/95	$ 14,495,387	>32	>3	>35	

18.4. Dissemination of results

Who are the clients for research?

Table 62 lists of clients as nominated by respondents and shows how often each was mentioned. Other agencies, funding bodies and industry are seen as the main client groups.

Table 62. Clients as nominated by Respondents.

Customer	Number of times mentioned
Other agencies	12
Funding bodies	11
Industry	9
Scientists	6
Community	2
Recreational fishing industry	1

How are research results presented?

Respondents reported that of the time they spent reporting their results, an average of a third was spent on preparing scientific papers, and a quarter each on preparing technical reports and giving advice. An average of seven scientific papers and 2.8 reports were produced per project.

Is the process to disseminate results considered to be adequate?

All thirteen respondents considered that they themselves were responsible for dissemination of their research results and they all found the dissemination process adequate or excellent.

18.5. Do Fisheries Managers use research results?

Eleven respondents reported giving both written and verbal advice to Fisheries Managers and ten thought that their advice was used consistently, usually or 'as necessary'. Table 63 shows examples that they nominated of their results being used.

Table 63. Examples given by Respondents of research information that has been used by Fisheries Managers.

• Management options for tiger prawns
• Data supplied to fisheries environmental investigations
• Improving aquaculture discharge water quality
• Presentation of oyster research to Tas Oyster Res. Council
• Orange roughy survey results used to set TAC
• Northern shark study, southern shark stock assessments
• Orange roughy abundance on TAC setting

18.6. Strategic research planning

Respondents were asked to nominate current strategic issues. The examples nominated are listed in Table 64.

All respondents thought that a foresighting exercise was desirable or very desirable for strategic planning and twelve of thirteen expressed interest in taking part.

Table 64. List of strategic issues of importance to the department as nominated by respondents. The issues have been divided into six groups.

Aquaculture/Mariculture
- Appropriate siting of aquaculture
- Detecting/preventing disease in aquaculture
- Enhanced production technology
- Genetic improvement of mariculture spp.
- Mariculture : development of strategic plan to underpin tactical research

Environment/Habitat issues
- Ecosystem management
- Effects of fishing
- Environmental impact of aquaculture
- Environmental research - what areas should we be involved in
- Examination of impact of fishing on marine environment and effects of environmental change on fisheries
- Habitat vs impact of trawling
- Human impacts on environment

Strategic planning issues
- Ever increasing sophistication and specialisation required for cutting edge or comprehensive strategic research projects
- Adequate staffing to allow timeliness of results
- Maintaining long term strategic research in an uncertain and variable funding environment

Methodology
- Development of new tools for genetic analysis
- Expansion of methodologies to provide better information

Sustainability
- Sustainability of by-catch
- Development of multi-species approach to fisheries management
- SBT stock status
- Yellow-fin marlin by-catch

18.7. What needs to be changed?

Respondents were asked what they would change in the management of research. The issues nominated are listed in Table 65.

Table 65. Suggested changes that would benefit research management.

Research strategy/planning
- Link research priorities to a program of research funding
- Less dependence on knee jerk reaction by research
- Increased recognition of importance of fisheries science by Government such that reliance on external funds for research is reduced, permitting more strategic research.
- Greater government funding through increased awareness of marine research issues
- Increased strategic planning at the national level to eliminate ineffective or duplicate research.

Communication/Integration
- Clearer links to other types of management
- Improve communications between research, management and industry
- More coordination - less factures by geographic region or sector
- Better integration between programme and research areas eg mariculture and environment

Training/Education/PR
- Higher level of training/expertise of research managers in subject area
- Convince Fisheries Managers that fisheries cannot be managed sustainably by ignoring environmental impacts on stock
- Increase scientific input/decrease industry input/strengthen resolve (backbone) of Fisheries Managers

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Acknowledgments

APPENDIX A : SUMMARY OF SURVEY DATA

Appendix A. Summary of results.

Qu. Nr.	Question	Answer options	CSIRO	QLD	NSW	NT	SA	VIC	WA	Sum	Sum for qu.	%
RESEARCHERS : SUMMARY OF DATA												
	PROJECT INFORMATION											
1	Nr of projects I manage	(Range)	1-8	1-5	1-5	1-3	2-19	7 to 29 (per work unit)	1-40			
		(Median)	6	1.5	2	2	3	23 (per work unit)	2			
	Total number of projects		65	28	38	6	42	59	50			
2	No. with external funds		50	21	34	2	21	39	11			
	Ave. % ext. funded	Average	77%	75%	89%	33%	50%	66%	22%			
3	PM skills	Excellent	1	1	1	0	1	0	1	**5**	61	8%
		Good	10	10	11	3	4	3	5	**46**		75%
		Inadequate	2	3	2	0	3	0	0	**10**		16%
4	Milestone report on time	On time	36	11	18	2	7	3	6	**83**	95	87%
		Not on time	4	2	2	0	4	0	0	**12**		13%
5	Financial report on time	On time	7	6	6	2	1	2	4	**28**	61	46%
		Not on time	0	0	0	0	2	0	0	**2**		3%
		Not my responsibility	6	8	9	1	4	1	2	**31**		51%
6	Project attracts external funding	Yes	12	10	13	3	6	2	2	**48**	57	84%
		No	1	3	2	0	1	0	2	**9**		16%
7	Total budget (ext.+ int.)	Range [$ ' 000]	80 - 2,400	20 - 1,000	40 - 4,500	20 - 300	15 - 225	80 - 2400 (per group)	30 - >640			
		Average [$ ' 000]	634	219	736	123	94	1,265 (per group)	414			
8	Length of project in months	Range	8-24	3-56	4-72	6 - 40	8 - 60	12 to 24	15-24			
		Average	26.5	34	30.2	18.7	22.6		21			
9	No. papers written/in prep	Range	1-18	1-9	1-16	0-2	1-7	2 to 18	2-8			
		Average	7.0	4.0	5.3	1.0	2.6	10	4.7			
10	Number of reports	Range [$]	1-7	0-5	1-7	1-4	1-5	1 to 35	1-6			
		Average	2.8	2.2	2.1	2.0	1.9	19 per unit	3			
11	Rpt supplied to FMs	Yes	12	11	13	3	6	3	4	**52**	58	90%
		No	1	2	2	0	1	0	0	**6**		10%

Appendix A. Summary of results.

Qu. Nr.	Question	Answer options	CSIRO	QLD	NSW	NT	SA	VIC	WA	Sum	Sum for qu.	%
RESEARCHERS : SUMMARY OF DATA												
	GENERAL INFORMATION											
13	I am involved in setting research priorities	Yes		5	8	3	7	3	6	**32**	50	**64%**
		No		9	8	0	1	0	0	**18**		**36%**
14	The prioritisaton process is :	Excellent	3	0	0	0	2	0	0	**5**	47	**11%**
		Adequate	8	4	7	1	1	3	5	**29**		**62%**
		Inadequate	2	3	1	2	4	0	1	**13**		**28%**
15	Communication of priorities	Formal	7	2	4	2	1	3	3	**22**	45	**49%**
		Informal	3	4	3	1	2	0	3	**16**		**36%**
		Not relevant to others	1	0	0	0		0	0	**1**		**2%**
		Both formal and informal	0	1	1	0	4	0	0	**6**		**13%**
16	Review of priorities	Predetermined timetable	8	1	1	1	1	2	3	**17**	47	**36%**
		As required	5	6	7	2	6	1	3	**30**		**64%**
17	Factors affecting research priorities(averages)	Availability of In-hs expetise	17	5	8	14	14	7	13	**78**	706	**11%**
		Need to keep curr staff employed	2	2	2	2	2	0	3	**13**		**2%**
		Fisheries Management prob ident by dept	23	18	38	12	29	38	40	**198**		**28%**
		Funding body priorities	20	21	20	18	18	17	3	**117**		**17%**
		Research being done elsewhere	5	2	4	13	4	2	1	**31**		**4%**
		Industry identified needs	19	34	25	24	31	30	31	**194**		**27%**
		other	12	22	4	17	2	7	11	**75**		**11%**

Appendix A. Summary of results.

Qu. Nr.	Question	Answer options	CSIRO	QLD	NSW	NT	SA	VIC	WA	Sum	Sum for qu.	%
RESEARCHERS : SUMMARY OF DATA											
18	Departmental ability in exp. design	Excellent	10	2	7	0	1	2	0	**22**	63	35%
		Adequate	3	8	9	2	6	1	6	**35**		56%
		Difficult to assess		4	0	1	1	0	0	**6**		10%
19	Departmental ability in exp. analysis	Excellent	11	4	11	1	2	2	4	**35**	62	56%
		Adequate	2	8	5	1	6	1	2	**25**		40%
		Difficult to assess	0	1	0	1	0	0	0	**2**		3%
20	Research output review	Formal	12	3	9	1	2	2	3	**32**	57	56%
		Informal	1	5	3	1	2	0	3	**15**		26%
		both	0	0	2	1	1	1	0	**5**		9%
		No process	0	1	1	0	1	0	0	**3**		5%
		No review	0	1	1	0		0	0	**2**		4%
21	Time spent preparing:	Scientific papers	30	22	31	29	21	12	23	**168**	711	24%
		Conference papers	16	11	13	12	10	6	17	**85**		12%
		Technical reports	25	33	31	21	20	12	15	**157**		22%
		Advice to management/ Minister/community	23	33	22	40	46	70	45	**279**		39%
		Other	9	7	3	0	3	0	0	**22**		3%
22	Review other research output?	Yes	11	9	15	3	6	3	6	**53**	63	84%
		No	2	5	1		2	0	0	**10**		16%
23	I am responsible for dissemin. of my results	Yes	13	14	16	3	8	3	5	**62**	63	98%
		No	0	0	0		0	0	1	**1**		2%
24	Process for dissemination	Very effective	5	3	1	1	2	0	1	**13**	62	21%
		Adequate	8	9	13	2	4	2	5	**43**		69%
		Inadequate	0	2	2	0	2	0	0	**6**		10%

RESEARCHERS : SUMMARY OF DATA

Qu. Nr.	Question	Answer options	CSIRO	QLD	NSW	NT	SA	VIC	WA	Sum	Sum for qu.	%
25	Research advice to managers and industry	Written	0	0	0	0	1	0	1	**2**	60	**3%**
		Verbal	0	0	0	0	0	0	0	**0**		**0%**
		Written and verbal	11	13	14	3	7	3	3	**54**		**90%**
		Dont give advice	1	0	2	0	0	0	1	**4**		**7%**
26	I think research results considered	Consistantly	3	2	3	3	5	1	3	**20**	63	**32%**
		Usually	4	4	5	0	2	1	2	**18**		**29%**
		Not regularly	1	3	0	0	0	0		**4**		**6%**
		As necessary	3	1	2	0	1	1	1	**9**		**14%**
		Never	0	1	0	0	0	0	0	**1**		**2%**
		Difficult to assess	2	3	6	0	0	0		**11**		**17%**
29	Foresighting exercise would be:	Very desirable	7	4	7	1	1	1	3	**24**	60	**40%**
		Desirable	6	7	6	2	5	2	2	**30**		**50%**
		Low priority	0	3	0	0	1	0		**4**		**7%**
		Not necessary	0	0	1	0	1	0		**2**		**3%**
30	Foresighting - take part	Yes	12	13	13	3	6	2	4	**53**	60	**88%**
		No	1	1	1	0	2	1	1	**7**		**12%**

Appendix A. Summary of results.

Qu. Nr.	Question	Answer options	QLD	NSW	NT	SA	TAS	VIC	WA	Sum per option	Sum per question	%
	FISHERIES MANAGERS : SUMMARY OF DATA											
1	1. Our dept does research in area I manage	Yes	1	10	1	8		1	5	26	31	84%
1		No	3	0	0	0		0	2	5		16%
2	2. My input into the research is	Adequate	4	2	1	6		1	5	19	29	66%
2		Inadequate	0	6	0	2		0	2	10		34%
3a	3. Contact with dept researchers	Regular	4	5	1	6		0	5	21	30	70%
3a		Irregular	0	4	0	1		1	2	8		27%
3a		None	0	0	0	1		0	0	1		3%
3b	3b Contact with external researchers	Regular	2	2	0	0		0	1	5	29	17%
3b		Irregular	2	4	1	5		0	4	16		55%
3b		None	0	2	0	3		1	2	8		28%
4	4. Dissemination process	Very effective	0	0	1	1	0	0	0	2	32	6%
4		Adequate	4	4	0	3	2	0	6	19		59%
4		Inadequate	0	5	0	4	1	1	0	11		34%
5	5. I get research advice	Written	0	1	0	0	0	0	0	1	33	3%
5		Verbal	0	3	0	2	0	0	0	5		15%
5		Both	4	6	1	5	2	1	7	26		79%
5		Do not get advice	0	0	0	1	0	0	0	1		3%
6	6. I am able to use results	Consistantly	2	2	1	3	2	0	3	13	33	39%
6		Usually	2	1	0	2	0	0	2	7		21%
6		Not regularly	0	6	0	1	0	1	0	8		24%
6		As necessary	0	0	0	0	1	0	1	2		6%
6		Never	0	0	0	2	0	0	1	3		9%
7	7. Peer review of other research output?	Yes	4	5	1	5	1	1	4	21	26	81%
7		No	0	1	0	1	0	0	3	5		19%

Appendix A. Summary of results.

Qu. Nr.	Question	Answer options	QLD	NSW	NT	SA	TAS	VIC	WA	Sum per option	Sum per question	%
	FISHERIES MANAGERS : SUMMARY OF DATA											
8a	**8. I prefer to get information**	Scientific papers	13	15	10	25		0	11	74	601	12%
8b		Conference papers	10	7	10	0		0	15	42		7%
8c		Technical reports	26	32	20	50		10	29	167		28%
8d		Verbal advice	18	28	50	0		15	26	137		23%
8e		Other	33	19	10	25		75	19	181		30%
10	**10. Foresighting for research**	Very desirable	1	5	0		0	1	1	8	28	29%
10		Desirable	2	4	1		3	0	5	15		54%
10		Low priority	3	1	0		0	0	1	5		18%
10		Not necessary	0	0	0		0	0	0	0		0%
11	**11. I would like to take part**	Yes	4	8	1		3	1	6	23	26	88%
11		No	0	2	0		0		1	3		12%
13	**13. I am involved in priority setting**	Yes	3	3	1	2		1	5	15	29	52%
13		No	1	6	0	5		0	2	14		48%
14	**14. Evaluation of prioritisaton process**	Excellent	1		1	0	1	0	3	6	21	29%
14		Adequate	1	2	0	1	0	1	3	8		38%
14		Inadequate	1	3	0	1	2	0	0	7		33%
15	**15. Communication of priorities**	Formal	2	2	1	2	2	0	3	12	22	55%
15		Informal	1	1	0	1	0	1	3	7		32%
		Both	0	1	0	0	1	0	0	2		9%
15		Not relevant to others	0	1	0	0	0	0	0	1		5%
16	**16. Review of priorities**	Predetermined timet.	3		1	1	2	1	2	10	19	53%
16		As required	0	2	0	2	1	0	4	9		47%

Appendix A. Summary of results.

	FISHERIES MANAGERS : SUMMARY OF DATA											
Qu. Nr.	Question	Answer options	QLD	NSW	NT	SA	TAS	VIC	WA	Sum per option	Sum per question	%
17a	17. Factors affecting research priorities(averages)	In house expertise	0	12	2	17	20	0	24	75	694	11%
17b		Current staff	0	8	10	13	8	0	4	43		6%
17c		FM ident. problems	100	25	10	23	22	60	45	285		41%
17e		Funding bod. prior.	0	13	2	5	15	20	3	58		8%
17f		Res. elsewhere	0	2	2	8	5	0	3	20		3%
17g		Industry needs	0	20	5	30	30	20	9	114		16%
17h		Other	0	20	70	7	0	0	4	101		15%

APPENDIX B   :   EXAMPLES OF SURVEY FORMS

FISHERIES RESEARCH SURVEY

Questionnaire to be filled in by Fisheries Researchers

A. PROJECT INFORMATION

Qu. 1. I currently manage the following number of research projects ....

Qu. 2. Of these, the following number get external funding? ....

Please answer the following questions by circling alternatives given in italics or numbering the boxes.

Qu. 3. I would rate my project management skills as :

Excellent / Good / Inadequate - I would like to improve

Qu. 4. The last milestone report for my project was produced:

on time / not on time / .... of .... produced on time (for >1 project)

Qu. 5. The last financial report for my project was produced :

on time / not on time/ not my responsibility

Information about my last completed project:

(please complete as many questions as you can):

Qu. 6. The project attracted external funding: *Yes / No*

Qu. 7. Budget external funds $...............................

internal funds $...............................

Qu. 8. Time from start to finish (submission of final report): ....(months)

Qu. 9. Number of scientific papers generated / expected from results: ....

Qu. 10. Number of reports generated from results: ....

Qu. 11. Report has been supplied to fisheries manager/s : *Yes / No*

1

B. PRIORITY SETTING

Qu. 12. Setting research priorities - Who takes part: (Please tick relevant boxes)

	Currently takes part	Should take part
CEO	☐	☐
Director of Research	☐	☐
Research Branch Managers	☐	☐
Researchers	☐	☐
Fisheries managers	☐	☐
Industry representatives	☐	☐
Community representatives	☐	☐
Other (please name)...............................	☐	☐

Qu. 13. I am involved in the setting of research priorities for my department

Yes / No   (If No - please go to Section C)

Qu. 14. The prioritisation process I am involved in is:

excellent / adequate / inadequate

Qu. 15. We have communicated our priorities to others by

a formal process / informally /our priorities are not relevant to others

Qu. 16. Our research priorities are reviewed:

on a predetermined timetable / as required

Qu. 17. The factors that affect the setting of research priorities in our department are :
(Apportion 100 points depending on importance)

☐ Availability of expertise In-house

☐ Need to keep current permanent staff occupied

☐ Fisheries management problems identified by our department

☐ Priorities identified by research funding bodies

☐ Research being done by other fisheries research institutions

☐ Industry identified needs

☐ Other (please name)...

C.   PROJECT DESIGN AND ANALYSIS

Qu. 18. The experimental design of projects in our department is generally :

excellent / adequate / difficult to assess

Qu. 19. The ability of our department to analyse experiments is generally:

excellent / adequate / difficult to assess

D.   RESEARCH OUTPUT

Qu. 20. My research output is reviewed using

formal procedures / informal procedures / no procedures /output not reviewed

Qu. 21. I spend time in the following proportions preparing:
(Please divide 100 points between the boxes)

☐   Scientific papers published in referees journals

☐   Papers presented at conferences

☐   Technical reports

☐   Advice to management/minister/community

☐   Other (please specify).......................................……......

Qu. 22. There is currently a process to peer review scientific papers. Do you think peer review of the other research output would be advantageous?

Yes / No

E.   DISSEMINATION OF RESULTS

Qu. 23. I am responsible for the dissemination of research results:

Yes / No

Qu. 24. The process for disseminating my results has been

very effective / adequate / inadequate

Qu. 25. I give research advice to managers and industry

in written form / in verbal form / both / I do not give advice

Qu. 26. I think my research results have been considered by fisheries managers :

consistently / usually / not on a regular basis / as necessary / never /

difficult to assess

Could you give recent examples ....

....

Qu. 27. Please list your customers in order of importance.

....

....

....

....

....

F.   STRATEGIC PLANNING

Qu. 28. Two strategic research issues that are currently most important for our department are:

1. ....

2. ....

Qu 29. Foresighting is a methodology developed to identify several possible future scenarios for an industry. I consider a foresighting type exercise for the fisheries research industry would be

very desirable / desirable / low priority / not necessary

Qu. 30 If a foresighting exercise was done for the fisheries research industry I would be interested in giving feedback to such an exercise.

Yes / No

Qu. 31 If there was one thing you could change in the way Fisheries   Research is managed, what would it be?

....

....

....

4

FISHERIES RESEARCH SURVEY

Questionnaire to be filled in by Fisheries Managers

Please answer the following questions by circling alternatives given in italics or numbering/ticking the boxes.

A. PROJECT INFORMATION AND DISSEMINATION OF RESULTS

Qu. 1 Our department does carry out research project/s related to the fisheries I manage

Yes / No

Qu 2. The input I have into the research on issues related to the fisheries that I manage is

Adequate / Inadequate

Qu. 3. The contact I have with researchers working on research relevant to fisheries I manage is :

Departmental researchers *:* *Regular / Irregular / None*

External researchers *:* *Regular / Irregular / None*

Qu. 4. The process for disseminating results to me from departmental research projects for fisheries I manage has been

very effective / adequate / inadequate

Qu. 5. I get research advice from researchers

in written form / in verbal form / both / I do not get advice

Qu. 6. I have been able to use research results in fisheries management:

consistently / usually / not on a regular basis / as necessary / never

Could you give recent examples ....

....

....

Qu. 7. There is currently a process to peer review scientific papers. Do you think peer review of the other research output would be advantageous?

Yes / No

Qu. 8. I prefer to get information in the following format:
(Please divide 100 points between the boxes)

☐ Scientific papers published in referees journals

☐ Papers presented at conferences

☐ Technical reports

☐ Verbal advice

☐ Other (please specify)..

B.   STRATEGIC PLANNING

Qu. 9. Two strategic research issues that are currently most important for our department are:

1. ....

2. ....

Qu 10. Foresighting is a methodology developed to identify several possible future scenarios for an industry. I consider a foresighting type exercise for the fisheries research industry would be

very desirable / desirable / low priority / not necessary

Qu. 11. I would be interested in giving feedback to such an exercise.

Yes / No

C. RESEARCH PRIORITY SETTING

Qu. 12. Setting research priorities - Who takes part: (Please tick relevant boxes)

	Currently takes part	Should take part
CEO	☐	☐
Director of Research	☐	☐
Research Branch Managers	☐	☐
Researchers	☐	☐
Fisheries managers	☐	☐
Industry representatives	☐	☐
Community representatives	☐	☐
Other (please name)................................	☐	☐

Qu. 13. I am involved in the setting of research priorities for my department

Yes / No   (If No - please go to Qu. 18)

Qu. 14. The prioritisation process I am involved in is:

excellent / adequate / inadequate

Qu. 15. We have communicated our priorities to others by

a formal process / informally /our priorities are not relevant to others

Qu. 16. Our research priorities are reviewed:

on a predetermined timetable / as required

Qu. 17. The factors that affect the setting of research priorities in our department are :
(Apportion 100 points depending on importance)

☐ Availability of expertise In-house

☐ Need to keep current permanent staff occupied

☐ Fisheries management problems identified by our department

☐ Priorities identified by research funding bodies

☐ Research being done by other fisheries research institutions

☐ Industry identified needs

☐ Other (please name)...

Qu. 18 If there was one thing you could change in the way Fisheries   Research is managed, what would it be?

....

....

....

FISHERIES RESEARCH SURVEY

Questionnaire to be filled in by Director of Research

Please answer the following questions by circling alternatives given in italics or numbering/ticking the boxes.

A.   STRATEGIC ISSUES

Qu. 1. The two strategic research issues that are currently most important for our department are:

1. ....

2. ....

Qu 2. Foresighting is a methodology developed to identify possible future scenarios for an industry. I consider a foresighting type exercise for the fisheries research industry would be

very desirable / desirable / low priority / not necessary

B.   PRIORITY SETTING

Qu. 3. Setting departmental research priorities - Who takes part:
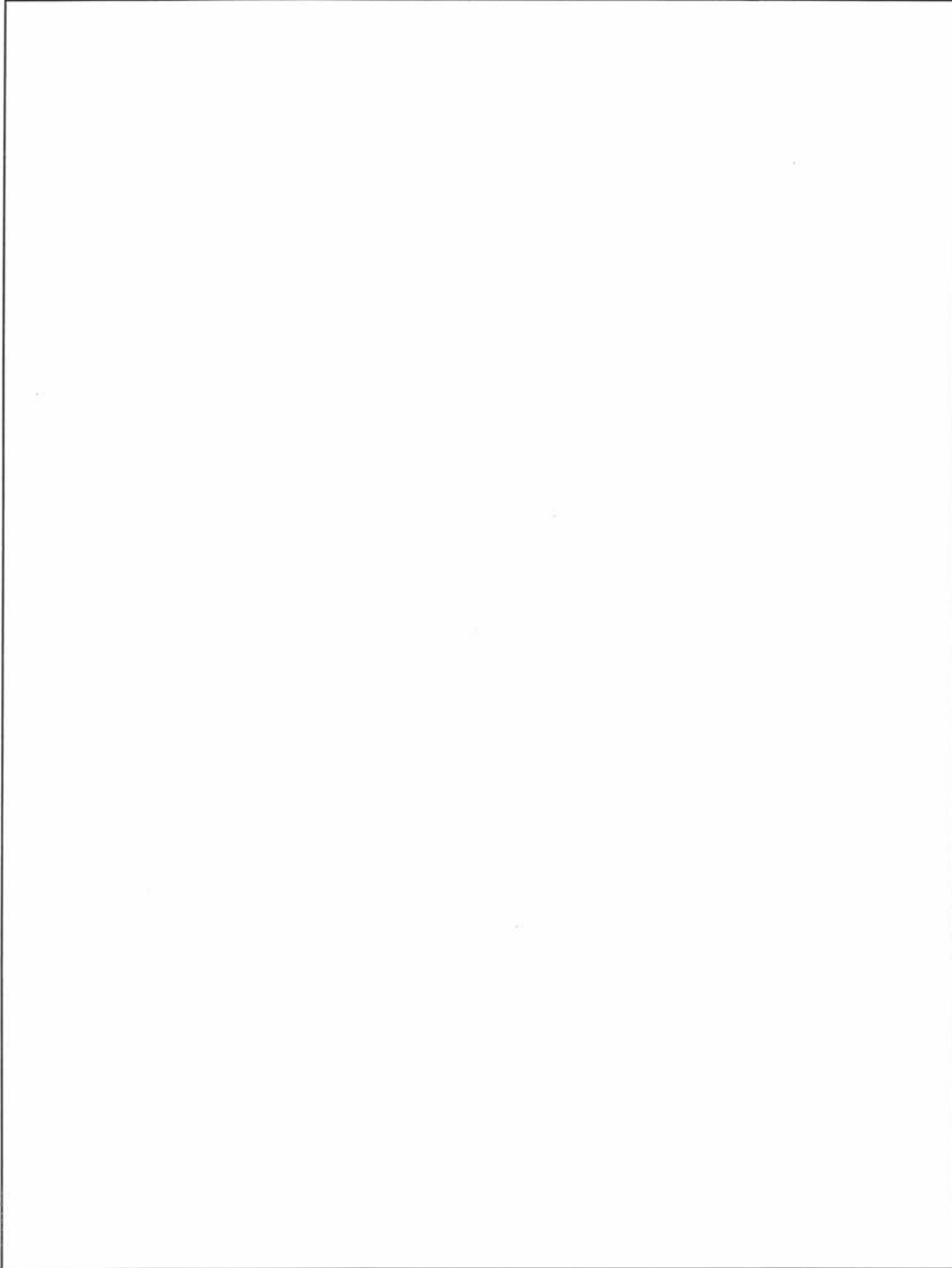
(Please tick relevant boxes)

	Currently takes part	Should take part
CEO	☐	☐
Director of Research	☐	☐
Research Branch Managers	☐	☐
Researchers	☐	☐
Fisheries managers	☐	☐
Industry representatives	☐	☐
Community representatives	☐	☐
Other (please name)...............................	☐	☐

Qu. 4. Research priorities in our department are set by:

a formal process / an informal process

Qu. 5. **If priorities are set by a defined process could you please map the process in the space below using arrows to denote steps.**

Qu. 6. The factors that affect the setting of research priorities in our department are :

(Apportion 100 points depending on importance)

☐ Availability of expertise In-house

☐ Need to keep current permanent staff occupied

☐ Fisheries management problems identified by our department

☐ Priorities identified by research funding bodies

☐ Research being done by other fisheries research institutions

☐ Industry identified needs

☐ Other (please name)..

Qu. 7. I think our current prioritisation process is:

excellent / adequate / inadequate

Qu. 8. Our research priorities are reviewed:

on a predetermined timetable / as required

Qu. 9. We communicate our priorities within the department by

a formal process / informally / no process - they are not relevant to others

Qu. 10. We communicate our priorities to other departments by

a formal process / informally / no process - they are not relevant to others

PROJECT DESIGN AND ANALYSIS

Qu. 11. The ability of our department for experimental design of projects is generally :

excellent / adequate/ inadequate

Qu. 12. The ability of our department for qualitative analysis of results is generally:

excellent / adequate / inadequate

Qu. 13. The project management capabilities of our researchers is

excellent / adequate / inadequate

Qu. 14. Training opportunities for our researchers in project management is:

available / unavailable / unnecessary

RESEARCH OUTPUT

Qu. 15. To review research output the department has

formal procedures / informal procedures / no procedures / difficult to assess

Qu. 16. The following people take part in reviewing research output:

(Please tick relevant boxes)

☐ CEO

☐ Director of Research

☐ Research Branch Managers

☐ Researchers

☐ Fisheries managers

☐ Industry representatives

☐ Community representatives

☐ Other (please name)...

Qu. 17. Factors our department considers important in measuring research output

(Please apportion 100 points between the boxes depending on importance)

☐ Scientific papers published in referees journals

☐ Papers presented at conferences

☐ Technical reports

☐ Advice to management/minister/community

☐ Other (please specify)...

Qu. 18. The following groups have prime responsibility for the dissemination of research results:

Researchers / Library / Director / Advisory Section / Other (please specify):

....

Qu. 19. Research advice is generally given to managers and industry

in written form / in verbal form / both / don't know

Qu. 20. Our process for disseminating results is

very effective / adequate / inadequate / don't know

Qu. 21. I think research results are considered by fisheries managers :

consistently / usually / not on a regular basis / as necessary / never /
difficult to assess

Could you give recent examples ....

....

....

....

Qu. 22. There is currently a process of peer review for scientific papers. I think peer review of other research output of fisheries research institutions would be

advantageous / disadvantageous / neither advantageous nor disadvantageous /
valuable for some researchers

Please explain :...

....

....

Qu. 23. Please list your customers in order of importance.

....

....

....

....

....

Qu. 24. We have a problem attracting staff in the following research areas (write none if there is no problem) :

....

Qu. 25. This is probably because :

its a new field / we cannot offer enough pay / quality of applicants is

inadequate / don't know / other (specify): ....

Qu. 26. If there was one thing you could change in Fisheries Research, what would it be?

....

....

....

....

....

....

CUSTOMER SURVEY   :   FISHERIES RESEARCH

Questionnaire to be filled in by library or administration staff

_____

RESEARCH RESULTS

Qu. 1. Research results may be written up as papers published in scientific journals; reports for funding bodies and/or internal reports for management. Could you please fill in the numbers of publications from this institution for as many years as you have information:

Total number of scientific papers		Number of research reports	
1986	....	1986	....
1987	....	1987	....
1988	....	1988	....
1989	....	1989	....
1990	....	1990	....
1991	....	1991	....
1992	....	1992	....
1993	....	1993	....
1994	....	1994	....
1995	....	1995	

Number of books/ book chapters

1986	....
1987	....
1988	....
1989	....
1990	....
1991	....
1992	....
1993	....
1994	....
1995	....

Please answer the following questions by circling correct alternatives given in italics. More than one answer may be circled.

Qu. 2. Are research results are regularly disseminated in other forms?

Press releases / Magazine articles / Handouts written for non-scientific personnel /

Other (please describe) : ....

....

Qu. 3. Dissemination of research information from this department is :

      Excellent / Adequate / Needs improvement / Difficult to assess

Qu. 4. Is there a formal system for sending out information to non research staff?

      Yes / No

Comments :...

Qu. 5. The groups named below get research information by :

      Please label with   1 = *Scientific papers*
                           2 = *Departmental reports*
                           3 = *Verbal information*
                           4 = *Other (please specify)*

Fisheries researchers : ....

Fisheries managers   : ....

Industry   : ....

Community   : ....

Funding bodies   :...

STAFFING STATISTICS

Qu 6. The number of staff employed at this research division
              (include permanent and temporary staff)   ....

Qu. 7. Number of staff with PhD : ....

Qu. 8. Number of staff with Masters but no PhD: ....

Qu. 9. Number of staff with Bachelors but no post graduate degrees: ....

Qu. 10. Number of staff with postgraduate diplomas:

....

Qu. 11. Number of staff currently undertaking higher education:

....

Qu. 12. This organisation *has/ does not have* a formal policy for staff undertaking educational studies.

Study support is offered in the form of (please circle relevant alternatives):

study leave

financial support

staff may work on approved Masters/PhD project during working hours

other: ....

CUSTOMER SURVEY   :   FISHERIES RESEARCH

C. Questionnaire to be filled in by Finance/Accounting Department

Qu. 1. Please fill in the following table giving yearly research budgets for as many years as you have information available:

Yearly budget for research projects	External funds received
1986/87 :	1986/87 : ....
1987/88 :	1987/88 : ....
1988/89 :	1988/89 : ....
1989/90 :	1989/90 : ....
1990/91 :	1990/91 : ....
1991/92 :	1991/92 : ....
1992/93 :	1992/93 : ....
1993/94 :	1993/94 : ....
1994/95 :	1994/95 : ....
1995/96 :	1995/96 : ....

Qu. 2. The number of research projects being undertaken by this department in 1995/1996 is:

....

Qu. 3. The number of these research projects with external funding :

....

Please answer the following questions by circling alternatives given in italics..

Qu. 4. Financial management of research projects is the responsibility of :

project manager / financial department /

other (please specify) ....

1

Qu. 5. Accounting and reporting procedures in this department:

facilitate project reporting / make project reporting difficult / don't know

Qu. 6. Milestone reporting for research projects is the responsibility of :

project manager / financial department / both /

other (specify) ....

Qu. 7. Financial reporting to funding bodies is the responsibility of:

project manager / financial department / other(specify) ....

Qu. 8. Producing the financial reports with the information we are supplied is:

easy / difficult / don't know

Qu. 9. The reporting requirements for internally funded projects

is the same as / different from externally funded projects.

Qu. 10. Number of externally funded projects for which the last milestone report was produced on time :

.... from a total of ....

Qu. 11. Number of externally funded projects which produced their last financial report on time:

.... from a total of ....