

# Development of the National Recreational and Indigenous Fishing Survey

Survey Development Working Group



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## NON-TECHNICAL SUMMARY

**98/169      Development of the National Recreational and Indigenous Fishing Survey**

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### Objectives:

- (1) To develop/refine the output specifications (as per the feasibility study), sampling design, questionnaires and other survey instruments for a national screening and diary survey of recreational fishers.
- (2) To develop/refine the output specifications (as per the feasibility study), sampling design and survey instruments for a survey of indigenous fishing communities.
- (3) To develop/refine the output specifications (as per the feasibility study), sampling design, questionnaires and other survey instruments for a survey of visiting international fishers.
- (4) To pilot test the questionnaires and diary instruments on a small sample in each State/Territory.
- (5) To train a key Survey Manager in each State/Territory in the conduct of the different survey components.
- (6) To develop database systems for data entry, editing and storage of survey information, and analytical tools for analysis and reporting.
- (7) To prepare final documentation for the implementation of a National Angling Survey by all States/Territories (including indigenous communities and international visitors where appropriate) and final costing.

### Summary:

The National Recreational and Indigenous Fishing Survey (National Survey) is a joint initiative of the Commonwealth and State/Territory Governments to obtain fisheries statistics to support the management of non-commercial fishing in Australia. The National Survey has been progressively developed by a Steering Committee for the past four years. A feasibility study was conducted in 1997-98 to select an appropriate survey method for Australian recreational fisheries. It recommended a national telephone screening/diary survey with on-site field surveys and separate components for visiting international fishers and certain indigenous fishing activities. Final development of the National Survey was undertaken during 1998-99 by a Working Group comprising specialist fisheries agency/consultant staff. Funding for the development phase was provided by the Fisheries Research and Development Corporation (FRDC), Natural Heritage Trust (NHT) (Fisheries Action Program) and State/Territory fisheries agencies.

The objective of the development phase was to advance the National Survey concept (as per the feasibility study), into working documents and sampling plans ready for implementation by the States/ Territories. This required finalisation/ refinement of the output specifications sampling design, questionnaires and other survey instruments for the three major components of the National

Survey: the Recreational Fishing Survey (including On-Site Surveys); the Indigenous Fishing Survey; and the Visiting International Fisher Survey. The survey instrument was to be pilot tested on a sample of the general community and the fishing population in each State/ Territory. Key National Survey staff in each State/ Territory were to be trained in the conduct of the various survey components and database management systems, final documentation and costing for the implementation of the National Survey prepared.

To undertake this work, the Working Group adopted a transparent and inclusive approach where inputs were sought from all fisheries agencies and key stakeholders (including peak recreational and commercial fishing bodies). The nature and progress of the project were also broadly publicised to these organisations and through the fishing media. Although six formal workshops/meetings were held throughout the project to discuss and endorse progress, much of the work was necessarily conducted out-of-session. A multi-tasked approach was employed where individual members and small teams were assigned specialist tasks/responsibilities, including for particular survey components (e.g. the Indigenous Fishing Survey) and areas of technical expertise (e.g. statistician). In such cases and throughout the project generally, extensive consultation occurred within the group and externally (expert colleagues/stakeholders).

Although a complex and challenging project in many respects, the National Survey development has been a highly successful undertaking by any measure. While some minor design refinements may be required in the lead-up to the commencement of the study, the stated objectives of the project (in all but one case), have been achieved and in many cases, exceeded. Comprehensive designs have been prepared for the three major National Survey components. These designs comprise detailed output specifications, sampling plans, questionnaires and other survey instruments. The statistical design and analysis, sample allocation, estimation procedures and data aggregation methods have been developed. The sample size for each State/ Territory has been finalised and modelled to provide error estimates for effort and harvest in major fishing regions. The geographical boundaries of the survey were defined, species lists and identification cards developed and a communication strategy composed. A data management model to provide a coherent strategy to manage the diversity of recreational fishing information for access, manipulation and storage was completed.

A training course for State Managers was conducted at the Fisheries Research Institute (NSW) to familiarise staff with the survey instrument. Following a debriefing, working group members began short and long-term pilot tests of the survey instrument in each Australian State/ Territory to assess problematic data elements, respondent burden and general applicability of the method. The short term pilot test has been completed to the satisfaction of the Working Group and the long term test has been in place for seven months without difficulties. The training course and pilot tests have provided State Managers with a level of proficiency to implement the survey and an understanding of the efficacy of the survey tools.

A comprehensive collection of documents has been prepared for the implementation of the National Survey. This documentation includes screening forms, questionnaires, workload control sheets, instruction guides, interview manuals and other survey material for each major component of the National Survey, where appropriate. The Working Group developed a detailed work plan for the survey and confirmed that the final project costing was within the proposed budget. The Working Group is confident that the development phase has confirmed the suitability of this survey instrument for gathering national recreational fishing data. It is confident that the National Recreational and Indigenous Fishing Survey will achieve its objectives and recommends that the project proceed to final implementation in the scheduled period, October 1999 - December 2001.



## **1. BACKGROUND**

A National Policy for Recreational Fishing in Australia was developed by the National Recreational Fisheries Working Group consisting of senior officers in Commonwealth, State and Territory fisheries agencies and published in December 1994. The Policy endorsed the principle that “fisheries management decisions should be based on sound information including fish biology, fishing activity, catches and the economic and social values of recreational fishing”. The Policy also reaffirmed the “urgent need to obtain accurate national information on recreational fishing over a period of time” as “all levels of government have inadequate information for managing many fish stocks of most importance to recreational fishing”.

The Policy recommended that “a national survey of expenditure and participation rates of recreational fishing should be undertaken on a five yearly basis” and that a “national survey can obtain information on participation and expenditure by resident fishers and overseas tourists as well as demographic data and participation by fishery type”. In addition, the Policy suggested that “there was also a need to identify the attitudes of anglers toward their pastime and determine the reasons why people fish and the best means of incorporating these needs into management policies”. Standing Committee on Fisheries and Aquaculture (SCFA) and the Ministerial Council on Forestry, Fisheries and Aquaculture (MCFFA) adopted the National Policy and supported the development of a national recreational fishing survey.

The Commonwealth Fishcare Program (precursor of the Fisheries Action Program) was established in 1995. Fishcare held community workshops around Australia with key stakeholders of the aquatic environment. These workshops canvassed a range of natural resource and habitat issues of interest or concern to a broad cross-section of the community. A common issue was the lack of scientific information on the status of many fishery resources and the level of exploitation by commercial and recreational fishers. Community groups lamented the paucity of information on recreational fishing in view of the apparent growth in the number of participants in this sport. It was acknowledged that government fishery agencies had an obligation to understand the impact of recreational fishing and the sustainability of fish stocks. The workshops strongly agreed with the need for more comprehensive information on recreational fishing activity.

To address the needs of SCFA and stakeholder input from the community workshops, the Fishcare Program facilitated a National Recreational Fishing Survey Workshop in November 1995. Commonwealth, State and Territory representatives discussed the scope of a national recreational fishing survey, stakeholder data needs, and sampling and funding strategies. Considerable progress was made at this workshop and a National Recreational Fishing Survey Steering Committee (the Steering Committee) was established to determine the preferred methodology and the process to complete the development phase and planning for a national survey. The Steering Committee was required to oversee and coordinate the development of the Commonwealth, State and Territory Survey components and advise on the timing, cost and funding options of developing and implementing a national survey.

A feasibility study was prepared by Kewagama Research (West 1998), in consultation with the Steering Committee and Fishcare. The study consolidated the output specifications of each State and Territory, provided a literature review of potential survey methodologies (including international surveys), discussed survey methodologies in light of the output specifications and characteristics of Australian recreational fisheries and explored alternative implementation strategies. The feasibility study recommended a national screening and diary instrument as the most appropriate survey technique for gathering national recreational fishery statistics. The

feasibility study also provided an assessment of development and implementation costs of a national survey.

The Steering Committee met to discuss the report in October 1997 and provided responses both during the meeting and in subsequent weeks to assist Kewagama Research to prepare a final report. The completed report (National Recreational Fishing Survey: Feasibility Study) was presented in April 1998 and was adopted by the Steering Committee at a meeting in May. Consequently, SCFA approved the development of a national recreational fishing survey, along with additional components for indigenous fishing communities and international visitors. The Steering Committee initiated the development of the National Recreational and Indigenous Fishing Survey (National Survey) in July 1998. Funding for the present development project was provided by Fisheries Research and Development Corporation (FRDC), the Fisheries Action Program (FAP) of the Natural Heritage Trust (NHT) and the various State/Territory fisheries agencies. A diagrammatic depiction of the flow of these events is shown in Attachment 12.1.

## 2. NEED

Australian fishery resources support a range of commercial and recreational activities of varying economic and social value. These fishery resources are generally regarded as “common property assets” and are managed by government on behalf of the community. The role of government is to ensure long-term sustainable fisheries production for the prosperity and well being of the community. To achieve this goal, government fishery agencies conduct scientific research to understand fish populations and implement appropriate initiatives to control fishing activity. Scientific research may be directed toward acquiring a knowledge of the biology of fish, the dynamics of fish populations, harvesting techniques, indices of fishing success, environmental perturbations, the political and social alternatives for resource use and theories relating to economic choice.

Clearly, governments require an information base on all extractive and non-extractive users of the resource to effectively manage these fisheries. This has generally been well established for the Australian commercial fishing sector where legislated catch and effort returns have been in place for many decades. However, many Australian inshore fisheries incorporate a significant recreational sector where arrangements to collect fishery statistics are not standard practice. Recreational fishing research has generally been in response to critical management needs such as resource allocation disputes, rather than an orderly monitoring of the status of the sector and its target species. Most State/Territory fisheries agencies have recognised the need for recreational fishing catch statistics and have made progress towards routine data collection. However, few agencies have been able to acquire the resources necessary to conduct a comprehensive, all-encompassing survey of recreational fishing. This total fishery information is most important for resource allocation and stock assessment.

A number of countries have recognised the value of national recreational fishing statistics and implemented regular monitoring programs. The United States, Canada, South Africa and New Zealand conduct national recreational fishing surveys on a regular basis. Individual States within these countries also conduct on-going assessments of the recreational fishing sectors. In Australia, most agencies have conducted recreational fishing surveys on particular lakes, estuaries or coastal regions, but whole-of-State surveys of catch and effort have only recently been considered, despite management calls for this information for several decades. Although increased research effort has been allocated to recreational fishery data collection, an appropriate national assessment of the harvest of this sector has not been attempted. Australia-wide recreational fishing information was, however, collected by PA Management Consultants in 1983, but only in terms of demographic profiling and economic data. Their results drew widespread attention to the scale and economic impact of recreational fishing in Australia, but provided no information on the harvest of aquatic resources by the recreational sector.

An urgent need therefore exists to produce relevant and up-to-date national recreation fishery statistics on resource use and participation. The adoption of the National Policy by SCFA and MCFFA recognises this need and has provided the impetus for the work of the Steering Committee to date and for the research application to enable development of the National Survey to a stage ready for implementation. The primary focus of the survey is to collect nationally consistent and comparable fishery statistics (fishing effort, fish catch, catch rate, species composition and size), participation and demographic information for fishers (age, sex, labour force), economic and attitudinal data for the non-commercial component of Australian fisheries. In addition, and importantly in some fisheries, data is also to be collected from the indigenous and visiting international fishing sectors. These sectors have generally been ignored in other resource

allocation research activities but are considered to contribute significantly economically and/or biologically to some fisheries.

The feasibility study detailed the overall survey methodology which has since been adopted by the Steering Committee. The concept needed to be developed into working documents (e.g. interviewer manuals, questionnaires, workflow plans) and sampling plans ready for implementation by the States and Territories. Additionally, database and analytical tools were required for implementation, along with training of key personnel in each State and Territory. The expertise for preparation of this material is not universally available, although more generalised expertise in recreational fisheries does exist in each State and Territory. The preferred approach, therefore, was to establish a specialist development team with relevant expertise to prepare all material for implementation of the National Survey and to work closely with representatives from each State and Territory to ensure that the needs of all fishery agencies were met.

### **3. OBJECTIVES**

- (1) To develop/refine the output specifications (as per the feasibility study), sampling design, questionnaires and other survey instruments for a national screening and diary survey of recreational fishers.
- (2) To develop/refine the output specifications (as per the feasibility study), sampling design and survey instruments for a survey of indigenous fishing communities.
- (3) To develop/refine the output specifications (as per the feasibility study), sampling design, questionnaires and other survey instruments for a survey of visiting international fishers.
- (4) To pilot test the questionnaires and diary instruments on a small sample in each State/Territory.
- (5) To train a key Survey Manager in each State/Territory in the conduct of the different survey components.
- (6) To develop database systems for data entry, editing and storage of survey information, and analytical tools for analysis and reporting.
- (7) To prepare final documentation for the implementation of a National Survey by all States and Territories (including indigenous communities and international visitors where appropriate) and final costing.

## 4. METHODS

The National Survey has been progressively developed over a number of years by a Steering Committee composed of representatives of Australian fishery agencies and peak recreational and commercial fishing groups. However, for the development work itself, a new entity was established, namely the Survey Development Working Group (SDWG or Working Group), but with a largely similar structure to the Steering Committee in terms of representation. Furthermore (and to streamline the process), a smaller sub-committee was established (the Facilitation Team) to develop more detailed aspects of the National Survey. Facilitation Team members were responsible for specific elements of the survey including project management and the Visiting International Fisher Survey development (David McGlennon), funding arrangements (Murray Johns/Stephen Kerr), survey design and training (Laurie West), data management (Dr Jeremy Lyle), the Indigenous Fishing Survey (Anne Coleman), maps and species identification (Gary Henry). Consultants in the fields of statistical analysis (Dennis Reid) and economic issues (David Campbell) were also commissioned to assist in development work. The composition of the Steering Committee, SDWG and Facilitation Team are shown in Section 11.

An inclusive, multi-tasked approach was employed, whereby each member took responsibility for the development of a component, but sought the assistance and advice of other members of the Working Group, where appropriate. The Facilitation Team held three meetings during the year, but conducted most of its business out-of-session. The Facilitation Team drafted the fundamental business of the survey which was then presented to the Working Group for approval. Three Working Group meetings/ workshops were held to endorse the overall direction of the development, confirm the survey output specifications/basic elements of the survey design and to ratify decisions made by the Facilitation Team and consultants. Minutes and progress reports of the workshops and meetings are included as Attachments 12.2 and 12.3.

Peer review and community consultation were achieved through a formal progress reporting schedule, specialist reviews of particular issues, presentations to peak fishing groups and media releases. Milestone reports were provided to the FRDC and the NHT through FAP as a contractual obligation to these funding agencies. Formal progress reports were submitted to the SCFA Research Sub-committee in recognition of their role in the scientific overview of the project. Peak angling advisory groups, angling associations and individual clubs were advised of the progress of the project. Also, a number of eminent scientists were asked to review particular aspects of the project including the survey design (Professor Ken Pollock, University of North Carolina), economic issues (Professor Tor Hundloe, University of Queensland) and data management (Ms. Kim Finney, CSIRO Marine Research Data Centre). These distinguished academics endorsed the goals and techniques employed by the Working Group to develop and implement the National Survey.

## **5. RESULTS**

### **5.1. Recreational Fishing Survey**

#### **5.1.1 *Output Specifications***

The scope of the survey includes Australian residents, five years of age and older, fishing in all waters (freshwater, estuarine, marine) within the Exclusive Economic Zone (EEZ). All recreational fishing techniques and harvesting activities will be included in the survey. All aquatic organisms (not plants) harvested by recreational fishers will be in scope. The survey will reflect the fishing activities of Australian recreational fishers over a 24 hour day for a period of one year. The scope of the national recreational fishing survey is defined in the output specifications (Attachment 12.4).

##### **5.1.1.1 *Screening Survey***

The national population screening will identify fishers and provide an estimate of the level of participation (% of the population) in recreational fishing. The population screening will obtain demographic information (age, sex, household size, labour force status, ethnicity/aboriginality) and boat ownership details (size, engine etc). Fishing related information (club membership and fishing licences) will also be obtained. Core data elements for this component are detailed in Attachment 12.4.

##### **5.1.1.2 *Diary Survey***

Detailed fishery statistics (fishing effort, catch, catch rate, species composition) will be obtained from the diary component of the survey. Fishing-related information (fishing region, target species, fishing method, platform) and expenditure by fishers will also be gathered from this component. Fishing diaries will provide the core fishery statistics and are, therefore, the fundamental basis of the national recreational fishing survey. Core data elements for this component are detailed in Attachment 12.4.

##### **5.1.1.3 *On-Site Surveys***

On-site (creel) surveys provide an effective verification of certain recreational fishing activities, since it is possible to directly observe catches and assess the species identification skills of recreational fishers. On-site surveys will be conducted throughout Australia during the enumeration phase of the National Survey. Information collected on telephone ownership of fishers will be used to assess coverage of the sample drawn for the national population screening. On-site surveys will be used to assess the ability of recreational fishers to identify fish and to determine the size distribution of common species (by design, the diary survey will collect catch/release data in terms of numbers by species - not size). On-site and diary data will be spatially and temporally standardised wherever possible. Details of output specifications for the on-site survey component are contained in Attachment 12.17 (survey questionnaire).

##### **5.1.1.4 *Economic Data***

The Recreational Fishing Survey will gather information on fishing-related expenditure by recreational fishers. Fishers will be asked to record their expenditure on fishing gear, bait,

magazines, boat fuel and other items associated with their fishing. These data will be collected for “home” and “away” fishing regions and used to estimate the regional economic importance of fishing. Other economic information will also be collected in the survey (e.g. investment in boats used for recreational fishing). A detailed description of the deliberations of the Working Group and the economic consultant, and the resolutions for the National Survey are provided in Attachment 12.5 (Economic Report) - and also in the Output Specifications document (Attachment 12.4).

During the development of the National Survey, a number of government and industry groups expressed a desire to collect data to estimate the value of recreational fishing to the national economy. The Working Group agreed to examine the potential of the survey method to collect information in this regard. Following several meetings and discussions with economists, it was agreed that an estimate of the value of recreational fishing was not possible with the proposed survey instrument. Professor Tor Hundloe supported this decision and advised that an appropriate technique for determining the economic value of recreational fisheries surveys had yet to be published. The Working Group was of the opinion that the quantity of data likely to be required to accurately value a fishery would substantially diminish the collection of data needed to achieve the core fisheries objectives. Nevertheless, it was agreed that the survey would provide a range of economic information and importantly, in terms of regional assessments of fishing-related economic activity (expenditure).

#### **5.1.1.5 Attitudinal Data**

At the completion of the diary survey, an additional interview will be conducted with diarists aged 14 years or more, to gauge their attitude to a number of fishing-related issues. The objectives of the Attitudinal Survey include assessment of the knowledge/ awareness among fishers of fishing regulations, management issues, research and compliance programs and the general level of satisfaction with the administration of fisheries in each State/Territory. The survey may also seek information on the full range of perceptions/motivations which contribute to the whole recreational fishing experience.

By design, the Attitudinal Survey has been positioned after the Diary Survey to minimise any biasing impacts due to educative effects of the former e.g. increased knowledge of regulations. Equally, care is required to minimise/account for any obverse effects. The Attitudinal Survey will be tailored to suit the particular requirements of each fisheries agency. Although a number of potential question areas have been identified (and these are detailed in Attachment 12.4), the final design for each State/Territory has been scheduled for October/November 2000. This will maximise the timeliness and utility of the data collected, especially in relation to any legislative changes which might occur in the meantime.

#### **5.1.1.6 Additional Calibration Surveys**

As an integral component to the design of the Recreational Fishing Survey, three additional surveys will be conducted in each State/ Territory to enable calibration and expansion of substantive survey data for the overall population concerned. The first of these surveys refers to assessment of non-response bias in terms of “non-contacts” in the Screening Survey, i.e. cases where no effective contact has been made with the household and no survey data have been obtained (e.g. participation). Although “non-contacts” will be minimised through extensive “call-backs” by interviewers over an enumeration period approaching 6 weeks (and a small percentage of selected households is expected here, around 5-7%, assessment of any behavioural differences from counterpart (responding) households is nevertheless important. Accordingly, a stratified random sample of 150 “non-contact” households will be followed up in each State/ Territory during April/ May 2000 to enable such assessments/ calibration.



The second calibration survey also refers to non-response assessment for the Screening Survey, but in terms of “refusals”, i.e. cases where no substantive survey data have been obtained due to the respondent declining to take part. Again, such cases are expected to emerge at very low levels (around 4%), but are more likely to occur among households with no previous/ expected fishing activity. Accordingly, a stratified random sample of 150 “refusals” will be followed up in each State/ Territory during April/ May 2000 to enable such assessments/ calibration. Australian Bureau of Statistics and consultant experience has shown that excellent response can be achieved in “refusals” follow-up surveys. The key factor being the use of skilled interviewers and careful explanation/ justification of the follow-up interview.

The third calibration survey will be conducted in each State/ Territory immediately after completion of the Diary Survey, among a sample of 500 households who (in the Screening) reported no expected fishing activity during the diary period. Brief recall questioning techniques will be employed to establish whether any “in-scope” fishing activity was undertaken during the period. This survey provides symmetry in the overall survey design in that, whereas a significant minority of respondents in the Diary Survey as “intending fishers” will actually do no fishing in the period, others reporting no such intention, will actually do some fishing in that time. Experience has shown that the incidence of the latter is quite rare and almost entirely confined to respondents who reported some fishing activity in the 12 months prior to the Screening Survey. Therefore, the sample for the survey will be stratified (and disproportionately sampled) on this basis.

### **5.1.2      *Sampling, Statistical Design and Analysis***

#### **5.1.2.1      *The Sampling Strategy***

The overall sampling strategy for the Recreational Fishing Survey (as proposed in the feasibility study) was endorsed by the Working Group, after some refinement during the development phase. A stratified sampling plan will be drawn from statistical divisions of the national population as published by the Australian Bureau of Statistics. An initial random sample of Australian households will be drawn from 'White Pages' telephone directories (electronic version) for enumeration in the Screening Survey. Those households identified as containing one or more 'intending fishers' will be invited to take part in the second phase Diary Survey (covering a 12 month sampling period) and later, in the Attitudinal Survey. The data collected from the Recreational Fishing Survey are based on a single wave of population sampling (see further discussion in 5.1.3).

For the On-site Surveys, the sampling plan will be determined by each State/Territory to maximise the coverage/utility of the data collected. Spatial and temporal stratification will be undertaken and the present work plan/ budget allows for 28 'sampling days' per State/Territory per month for the 12 months of the study (an increase from the originally-proposed 20 days per month). The remaining discussion in this section (5.1.2) refers to the telephone survey component of the Recreational Fishing Survey

#### **5.1.2.2      *Sample Design***

The design of the survey is based on single-stage cluster sampling (Thompson 1992), where the primary sampling unit is the household (chosen by random sampling), and the secondary unit is the fisher within a household. All eligible fishers within a selected household will be included in the diary phase of the survey, which will collect data on all fishing activities of each selected fisher, for each month over a 12 month period.

Cluster designs are recommended in cases where there is no frame listing of elements, or where a frame listing is prohibitively expensive to obtain (Schaeffer *et al*, 1996). A listing of all fishers in the population is not available, hence no list exists from which a simple random sample may be obtained. A frame listing of households exists in the form of telephone listings, thus a random sample of households can be chosen, and from each of these primary sampling units, the set of all eligible fishers is selected for the longitudinal phase of the survey.

The major advantages of the cluster sampling design in this situation are that it provides the correct weighting to both single and multiple-fisher households, and it provides multiple-fisher data through a single (initial survey) contact, thus substantially increasing the sample size for a given sample expenditure. The statistical efficiency of cluster sampling compared to simple random sampling depends on the correlation between fishers within households. The proposed sampling procedure for the National Survey will allow the estimation of dependence between fishers within households.

Estimates of variables of interest on a fisher basis (and estimates of variance) will be obtained by the formulae which apply to one-stage cluster sampling, *viz*:

The estimator of the population total for a variable of interest over a sample stratum is given by

$$\hat{\tau} = \frac{N}{n} \sum_{i=1}^n y_i = N \bar{y}$$

Where  $N$  is the number of primary units (households) in the stratum population,  $n$  is the number of households in the sample, and  $\bar{y} = \frac{1}{n} \sum_{i=1}^n y_i$  is the sample mean of household totals for the variable of interest.

The variance estimator of  $\hat{\tau}$  is given by

$$\hat{\text{var}}(\hat{\tau}) = N(N-n) \frac{s_u^2}{n}$$

Where  $s_u^2 = \frac{1}{n-1} \sum_{i=1}^n (y_i - \bar{y})^2$  is the sample variance for the primary unit totals.

### 5.1.2.3 Sample Allocation

The allocation of the total gross sample of households to the individual States/Territories is based on the general principle of obtaining estimates of harvest and effort at comparable levels of precision for the lowest level of geographical aggregation for each state. For current purposes (and initial sample selection), this level has been assumed as either the Statistical Division (ABS), or where population size is too small at this level, a combination of Statistical Divisions. However, in the ultimate dataset, several options will be available for regional analyses (e.g. defined fishing regions). The sample allocation depends on assumed values for participation rates, harvest rates and average effort, for which comprehensive data are not available. The sample allocation resulting from this procedure is generally quite similar to the allocation based on the square root of the population of a state divided by the sum of the square roots of each of the States/Territories. The latter procedure is used to allocate interviews between counties for the National Marine Fisheries Service surveys of recreational fishers in the marine waters of the United States. This

method of allocation ensures an adequate level of sampling for geographical areas with relatively small populations.

#### 5.1.2.4 Estimation Procedures

The estimates of harvest and fishing effort will be estimated for each state, home region (Statistical Division or combination of Statistical Divisions), fishing region, and fishing method. The estimate for a state total will be derived by summing the weighted stratum estimates. The usual stratified estimator for the population total and its variance will apply. These are given by

$$\hat{\tau}_{st} = \sum_{h=1}^L N_h \bar{y}_h$$

$$\hat{v}ar(\hat{\tau}_{st}) = \sum_{h=1}^L N_h (N_h - n_h) \frac{s_h^2}{n_h}$$

where  $N_h$  and  $n_h$  are the number of households in the population and sample respectively for stratum  $h$ ,  $\bar{y}_h$  is the sample mean for stratum  $h$ , and  $s_h^2 = \frac{1}{n_h - 1} \sum_{i=1}^{n_h} (y_{hi} - \bar{y}_h)^2$  is the sample variance for stratum  $h$  (Thompson 1992).

#### 5.1.2.5 Harvest Estimates

The total harvest by number of individuals of each species (or species group) is estimated for each fishing region by applying to the sample harvests, a matrix of expansion factors, which are based on the inverse of the sampling fraction for each sample stratum.

#### 5.1.2.6 Effort and HPUE Estimates

Fishing effort is measured by the number of hours spent fishing by all fishers aged five years or more, over the sampling period of 12 months. The total effort estimate for the sample period is obtained by scaling the total effort within each sample stratum by the appropriate expansion factor. For harvest per unit effort (HPUE) within a sample stratum the ratio of total harvest to total effort will be used. This estimator is recommended by Jones *et al.* (1995) for cases where the data are based on completed trips.

#### 5.1.2.7 Aggregation of Estimates

The estimates and variances of harvest and effort are additive across Statistical Divisions as they are estimated independently. Similarly, the national totals involve the direct summation of state estimates and variances.

### 5.1.3 Sample Size

The feasibility study envisaged a two wave screening and diary study, with diarists participating for six months. This was based on previous experience and with the intention of minimising respondent burden. The range of households to be screened was modelled at 60, 80 and 100,000, on the basis of half being screened each six months. Discussion at the workshops resolved to accept a sample size of 80,000 and the expected precision levels that it would achieve. Budgetary constraints resulted in a subsequent reduction of this sample size to 72,000 in the initial funding application for the implementation phase of the survey.

However, during the development phase, serious consideration was given to extending the diary phase to 12 months for each selected household, allowing just one screening survey. This variation to the original proposal gave rise to many potential benefits (cost savings, simpler implementation processes and analyses), but needed to be considered in light of the added burden to respondents. At the time of writing, a specific pilot testing to assess such factors/impacts is 8 months through a 12 month diary phase and is considered to have performed well (Section 5.5). Furthermore, specific procedures have been developed to enable effective calibration for any such (additional) non-response in the diary phase of the survey.

The sampling plan has, therefore, been revised to accommodate a 12 month diary and a single screening survey. As a result of the change from 6 month to 12 month diaries, the survey only requires about half of the (original) 80,000 households (or 72,000 per the funding application) to be screened to collect the same amount of fishing information. However, fine tuning of the sampling plan has suggested a sample size of 42,000 is optimal. The final version of this sampling plan is included as Attachment 12.6.

#### **5.1.4 Implementation Strategies**

After considering various options for 'out-sourcing' project functions, the Working Group has recommended a largely 'in-house' approach to the management, conduct and analysis/reporting components of the Recreational Fishing Survey. Whereas the Principal Investigator would have overall responsibility for the project, the National Project Manager (Gary Henry, NSW Fisheries) would manage and coordinate all day-to-day functions of the survey, including liaison with other survey management/consultant staff. Consultant staff inputs have been minimised and refer to five areas of expertise (survey design, interviewer training/management, statistics, economics, IT development). A State Manager (to be appointed/confirmed for each agency) would undertake responsibility for the survey in each of the seven States/ Territory involved (NSW would have responsibility for the ACT). State manager responsibilities would include recruitment, training and management of survey staff. Each State Manager would be assisted by an Office Manager (to be recruited/appointed) in terms of various administrative, clerical, data entry and editing functions for the survey. Additional support staff (varying by State) have also been identified for data entry functions at peak times.

Interviewers for the survey are to be recruited locally (to the agency concerned) and in accordance with specific criteria to be developed/agreed in the coming weeks. A total of 96 interviewer positions has been identified nationally. These staff (and Office Managers) will receive thorough formal and 'on-the-job' training in all facets of the survey work. Working from home-based offices, interviewers will conduct telephone phases of the survey, including the Screening, Diary and Attitudinal Surveys. Regular liaison/feedback/performance monitoring will be undertaken by survey management staff. The On-site Surveys will be enumerated by field staff recruited by each agency in the areas covered by the sampling plan. Whereas it is expected that most (if not all) telephone survey interviewers will be 'newly' recruited, a number of the On-site interviewer positions might be appropriately filled by existing/experienced staff known to the agencies concerned.

The Survey Offices in each State/Territory would be responsible for all data entry and initial editing/tabulation of survey data. Final editing, tabulation, expansion, analysis and reporting of the survey results would be the primary responsibility of an 'Analysis Team', comprising the National Project Manager, a State Manager with direct experience in such work (at this stage, Dr. Jeremy Lyle, Tasmania) and appropriate consultant staff. A detailed national survey report would be prepared in accordance with a structure (agreed by all agencies) to be finalised in an analysis workshop scheduled for late 2001. Relevant timing, resource inputs and budgetary issues for the implementation of the survey are discussed in Sections 5.7 and 5.8.

### **5.1.5 Survey Documentation**

A substantial set of data forms, questionnaires and training guides has been developed to facilitate and simplify the collection/recording of survey data. This material, known collectively as the survey documentation, is the result of an extensive design and testing program. All recreational fishing data will be recorded on pre-printed survey forms. Instructions and relevant 'prompting' appear on the forms immediately prior to the request for information. Survey documentation is essentially stand-alone material, but it should be used in conjunction with other components of the survey instrument (including specific training and instructions) to produce standardised data collection from a diverse team of interviewers. Transcription of the data from "form" to "digital data repository" would be most efficient if the digital data entry screens closely resembled the forms, and/ or logical sequences of analogue data recording. The survey documentation makes extensive use of codes and pre-defined lists to record information obtained from a respondent. While the vast majority of all survey documentation discussed below (and presented in the Attachments) has been finalised for the survey, some will require further refinement/modification in the lead-up to the commencement of the study (e.g. the Fishing Diary in Attachment 12.10 is the version used for pilot-testing and will be amended for different reference periods, calendar etc).

#### **5.1.5.1 Workload Control Sheet (Screening survey)**

Each interviewer will be provided with a sample of households to contact by way of a Workload Control Sheet (Attachment 12.7). This Sheet forms the basis of contact between the interviewer and the State Manager and is used to quantify the progress of the interviewer and response rates achieved.

#### **5.1.5.2 Screening Survey Questionnaire**

The Screening Survey (Attachment 12.8) is administered to all selected households in the sample (42,000 nationally). The survey asks a range of questions relating to previous or intending fishing activity, boat ownership and demographic profiles. Because a majority (up to 75%) of households contacted will report no previous/expected fishing activity, boat ownership etc., the questionnaire has been constructed in two parts. Part A (first page) allows for such households to be efficiently interviewed (Part A only and mean of less than two minutes) and at the same time, provides a sequencing function for further questioning of fishers, boat owners etc. in Part B (around 10 minutes interviewing time on average). Members of households reporting an intention to fish in the coming 12 months are asked to participate in the diary phase.

#### **5.1.5.3 Survey Kit**

Participating fishers will be issued with a survey kit containing a covering letter, fishing diary and a species identification booklet.

##### **5.1.5.3.1 Covering Letter**

A covering letter will be issued by the Director of Research of each State fishery agency to further explain the objectives of the survey and confirm the scientific credentials of the staff. The covering letter establishes a communication link with participating fishers between the telephone contact and the diary explanation interview. The letter acknowledges appreciation for participating in the survey, explains the contents of the kit and the next phase of the process. Fishers are reassured about the confidentiality of their information and provided with a Survey Office contact, if required (Attachment 12.9).

#### **5.1.5.3.2 Fishing Diary**

Respondents are issued with a personal diary to use as a “memory jogger” (Attachment 12.10) during the survey period. The diary is not returned to the Survey Offices and can be used by respondents as they see fit. The diary contains some examples of the sort of data required and is fully explained to the respondent before the survey starts. The aim of the diary is to minimise recall bias by respondents by providing an opportunity to record the details of their fishing/expenditure events. However, minimisation of respondent burden is also required and accordingly, respondents are asked to only record information in the diary “that they might be likely to forget” when the interviewer calls next (e.g. start/finish times of fishing).

#### **5.1.5.3.3 Species Identification Booklet**

Each fishing household also receives a booklet containing images of the 50 most commonly encountered fish in their State/Territory. The species included have been based on local experience and past surveys. The booklets have been customised for each State and the NSW version has been included in this report as an example (Attachment 12.11). A full master species list is currently being finalised and each species provided with a national code to facilitate consistent reporting. The species identification booklet will enable interviewers and respondents to minimise errors associated with the inaccurate reporting of catch data.

#### **5.1.5.4 Diary Explanation Interview**

Soon after the survey kit has been received by the household, a Diary Explanation Interview is conducted by the interviewer, with at least one intending fisher in each household. The explanation interview (Attachment 12.12) is conducted prior to commencement of the diary period and discusses the examples in the diary, further explains the survey and arranges for the first call to be made once the survey starts.

#### **5.1.5.5 Workload Control Sheet (Diary survey)**

As for the Screening Survey, the progress and performance of interviewers is monitored for the Diary Survey via a special Workload Control Sheet (Attachment 12.13), which is updated by interviewers and re-issued by the Survey Office on a monthly basis.

#### **5.1.5.6 Diary Survey Cover Sheet**

During the 12 month diary phase, respondents are regularly telephoned to collect their fishing and expenditure information. Respondents use their diaries to recall information and relay it to the interviewers. Interviewers use the Diary Survey Cover Sheet (Attachment 12.14) to store a variety of respondent information, contact details and appointments, and to assist with the collection of fishing related information (key definitions/questions and sequencing are detailed on Pages 2 and 3 of the cover sheet).

#### **5.1.5.7 Event Sheet**

The Event Sheet (Attachment 12.15 - NSW version) is the platform for recording respondents’ answers in the Diary Survey. It has been primarily designed on a fishing event basis, that is, each separate fishing activity (as defined) is recorded on a separate event sheet. As such, the Event Sheet is the site for the collection of core recreational fishing data. Fishery statistics (fishing effort, catch, catch rate, species composition), fishing location details (region, sub-region) and fishing

gear/platform (number and type, boat/shore) information are collected using the Event Sheet. Details of all fishing-related expenditure and related information are also collected on the form.

#### **5.1.5.8 Regional Maps**

Interviewers will be provided with maps for their State/Territory which delineate the regions into which fishing and economic activity will be coded. Regional maps will contain the information necessary to enable interviewers to locate the exact fishing position of respondents and to assign region codes accordingly. Regional maps will also contain cities and town, rivers and other distinct waters, and boundaries of defined Economic Regions (as distinct from Fishing Regions). These data may be placed directly on maps or attached as overlays to the maps. The NSW map is illustrated in Attachment 12.16. Each interviewer will be provided with the appropriate State map for their respondents as well as a full set of maps (Book of Maps) for all jurisdictions.

#### **5.1.5.9 On-Site Survey Questionnaire**

On-site "creel" surveys will be conducted throughout Australia to verify recreational fishing data collected by the diary component. Of particular interest will be the data collected on phone ownership, the ability of fishers to identify fish species and the size composition of the recreational catch. A standardised on-site questionnaire has been developed (Attachment 12.17).

#### **5.1.5.10 Attitudinal Survey Questionnaires**

The Attitudinal Surveys will be conducted as the final interview of the diary survey and will be customised for each State/Territory. In this way, questions will be tailored to meet individual needs and reflect topics which are of interest to fisheries agencies at the particular time. It is anticipated that a range of management, research and compliance issues will be examined by the attitudinal survey. As the Attitudinal Surveys will not be conducted until April/May 2001, the questionnaires are scheduled for final development in late 2000.

#### **5.1.5.11 Interviewer Manual**

The interviewer manual is a detailed instruction handbook and guide for interviewers. The manual provides information on all aspects of the process of collecting information from recreational fishers using the telephone/diary survey technique. The manual provides an overview of the research program, the design philosophy of the survey instrument, interviewing etiquette, general field procedures and reporting conventions. The manual is illustrated with a range of examples to assist the interviewer and also provides social comment and standards of behaviour for dealing with respondents. As a detailed definitive document, the manual also provides an important role for those involved in the analysis of the survey results. A copy of the interview manual is provided in Attachment 12.18.

### **5.2. Indigenous Fishing Survey**

The survey instrument described in 5.1 above, has been determined as the most cost-effective and appropriate technique for gathering national fisheries statistics on recreational fishing from the general population. However, this method is not appropriate for two relatively small, but important recreational fishing groups, namely the indigenous communities in northern Australia and visiting international fishers (see separate discussion in Section 5.3).

The relatively low proportion of home phone ownership in indigenous communities necessarily translates to substantial under-representation of related fishing activity through a national telephone survey. For the coastal areas of northern Australia, the inclusion of such information in the study

was considered crucial to regional assessments of non-commercial fishing activity - due to the relatively large proportions of the total populations in these areas, that indigenous communities comprise. Indigenous communities in northern Australia have further characteristics relating to personal/household mobility, language barriers and sensitivities to data gathering by government agencies which may reduce the effectiveness of phone survey techniques.

Accordingly, a separate survey module has been developed for data collection in the selected indigenous communities in northern Australia. Whereas, the scope and data elements for this indigenous survey are fundamentally comparable to the Recreational Fishing Survey, the sampling strategy has been modified to reflect the different social, cultural and economic characteristics of remote communities. The proposed methodology was developed and refined following a substantial review of available literature, consultation with indigenous people and the results of the pilot study. However, pilot testing, discussions with indigenous groups and experience gained by the Australian Bureau of Statistics have suggested that conventional telephone survey definitions and methods are appropriate for aboriginal people living in urban areas (where comparatively high phone ownership rates are believed to exist). Therefore, Australia-wide, coverage of these people will be provided by the Recreational Fisher Survey.

A report on the development of the Indigenous Fishing Survey is contained in Attachment 12.19. The report discusses specific cultural aspects of remote indigenous communities, their understanding of aquatic resource ownership and use and the political sensitivities associated with contacting these people. It also provides a summary of the various survey methods used in other Australian and international surveys of indigenous groups and the value of data available from these studies. Particular sensitivities of north Australian indigenous groups and suggested techniques for overcoming these sensitivities are discussed before the proposed methodology for surveying these people is outlined. The report discusses the output specifications, sampling design and various instruments for a survey of recreational fishing by people living in remote indigenous communities. The remaining discussion in this section (5.2) therefore comprises a summary of key features and procedures for the proposed study.

### **5.2.1 Output Specifications**

A separate Output Specifications document has been prepared and included in the report for this survey component (Attachment 12.19). The scope of the Indigenous Fishing Survey is fundamentally comparable to the Recreational Fishing Survey, with the exception of its geographic boundary. The indigenous survey will encompass northern Australia's coastal areas and catchments from the Kimberley region of Western Australia, throughout the Northern Territory and the west and east coasts of Queensland north of Tully (see map in Attachment 12.19). Persons in scope have been defined as indigenous residents of communities in the study area, aged 5 years or more, without a home telephone connection. All recreational (and traditional) fishing techniques and harvesting activities are included in scope. All aquatic organisms (not plants) harvested by indigenous communities will be in scope. The survey will cover fishing activities over a 24 hour day and for a 12 month period (in parallel to the Recreational Fishing Survey). The range of demographic and fishing-related data collected from indigenous groups will be similar to the Recreational Fishing Survey, but fishing effort will be based on 'days' rather than 'hours'. Conventional economic data cannot be collected, however, behavioural assessments such as the importance of fish in the diet of indigenous people are likely to be included. Attitudinal information will be gathered in a similar manner to the Recreational Fishing Survey.

The Indigenous Fishing Survey will gather information on the level of participation in recreational fishing and the demographic profile of aboriginal communities. Information on fishing region, fishing method, targeting and fishing platform will be recorded. Fisheries statistics (fishing effort, fish catch, species diversity) will be the most important data gathered. These fishery statistics will



allow the survey team to derive a catch rate and an estimated annual fish catch by species for northern Australian indigenous communities on a regional and whole survey area basis. Pilot testing has proven the capacity of the sampling strategy to gather these data. The documentation necessary to commence the indigenous fishing survey (community sample sheet, screening questionnaires, fishing event sheets) have been prepared (Attachment 12.20) and pilot tested during the development period.

### 5.2.2 *Sampling Strategy and Related Issues*

A multi-stage area sample is proposed for the study with a clear hierarchical structure and effective 'links' between ABS area definitions/secondary data and the survey-specific descriptors. A total of 7 'Publication Regions' have been determined for purposes of catch and effort data analysis (1 in WA, 3 in the NT and 3 in Qld). However, for sampling purposes, 42 'Sampling Regions' have been identified on the basis of fishing regions/river catchments, whereby each will be sampled (at some level) in the survey. Other features of the sampling hierarchy include:-

- the general principle that for Sampling Regions containing less than three communities, all communities would be sampled. Those with four or more communities would be stratified where appropriate and random selections made on a minimum 50% basis. Of the total 104 communities in the study area, a sample of 72 would be enumerated in the survey.
- the primary sampling unit is the 'dwelling'. Within each selected community, dwellings would be initially stratified (from community-sourced information) in terms of (i) known fishers (with boat), (ii) other fishers and (iii) non-fishers (see further discussion below).
- random selections would then be made from each stratum above - between 15 and 25 dwellings per community (depending mainly on travel time within). Appropriately disproportionate sampling of non-fisher vs fisher dwellings would be undertaken to ensure the strength of the fisher data. These selections would be made (and the sample 'fixed') during the 'set-up' phase of the study.
- for all survey components (including the catch and effort phase), data would be collected for all residents and visitors aged 5 years or more of selected dwellings on the basis of their presence (staying) at the dwelling at the time of interview. This approach enables the 'dynamics' of the populations to be accounted for and (although resulting in a somewhat complex set of inclusion/exclusion rules), is considered the most appropriate method of maximising both the 'symmetry' of personal selection/coverage criteria and the ability of the survey to collect data on a personal interview basis. Hence, the inclusion in the design strategy of a separate stratum of 'non-fisher dwellings' to enable coverage of fishers/etc. who might move around during the survey - either within or across communities.
- after the 'set-up' phase, each community would be enumerated on a bi-monthly basis throughout the year to collect catch and effort data (either May, July, Sep ... or Jun, Aug, Oct ...) and random/alternating allocations would be made in a 'serpentine' fashion across the study area.
- catch and effort data would be collected on a recall basis for each respondent within the selected dwelling/community for the previous seven days (to the day of visit/interview). The interview days for each community/month would be randomly allocated in advance for the study.

The above sampling strategy has been designed on the basis of a range of information, (including pilot-testing results, ABS data and recommendations) and provides a careful balance between ultimate data utility/coverage and resource usage (field costs). It also provides substantial spatial strength/coverage at the regional level, which has been necessary due to the absence of empirical data to allow for extensive (or further) stratification of communities on the basis of behavioural homogeneity. On the other hand, it is recognised that temporal coverage for individual respondents, dwellings or communities is less robust (one week per month, every second month of the year) - hence the conclusion that detailed substantive survey information (e.g. catch and effort data) will be analysed at the 'publication region' level.

In the Recreational Fishing Survey, where individual households are approached directly, overall response to the survey is very much a function of interviewer performance and respondent reaction on an individual basis. While the same is ultimately true for the Indigenous Fishing Survey, other 'layers' of approval/endorsement for the study are involved initially (Land Councils, Community Councils etc). Given that the above sampling plan requires enumeration of most communities in the study area, the liaison work involved in gaining and maintaining such approval is clearly vital. Extensive exploratory work has already been done in this regard. However, as the survey design has now been determined, a comprehensive liaison program can now be implemented with a view to securing full access/cooperation for all communities selected in the survey.

### 5.2.3 *Implementation Strategies*

As for the Recreational Fishing Survey, a largely 'in-house' approach to management, conduct and analysis/reporting is proposed for the Indigenous Fishing Survey. Although oversight and project management roles would be provided by the Principal Investigator and National Project Manager, primary responsibility for the conduct of the study would be undertaken by the NT State Manager for the Recreational Fishing Survey (Anne Coleman). As Indigenous Fishing Survey Manager, her responsibilities would include all recruitment, training and enumeration functions in the three jurisdictions concerned and general liaison with other State Managers (WA and Qld) and consultant staff. Consultant staff inputs have again been minimised and refer to five areas of expertise (survey design, interviewer training/management, statistics, economics, IT development). The Indigenous Fishing Survey Manager would be assisted by an experienced Field Supervisor (to be appointed/confirmed), the Aboriginal Liaison officer (NT DPI&F) and the Office Manager for the Recreational Fishing Survey (in terms of various administrative and clerical functions). Additional resources have also been identified for all data entry work (due to the demands placed on the Office Manager).

Regional interviewers for the survey will be recruited locally (to the communities concerned) and in accordance with specific criteria to be developed/agreed in the coming weeks. A total of 16 interviewer positions has been identified across the study area. These staff will receive thorough formal and 'on-the-job' training/guidance in all facets of the survey work. Each interviewer will have ongoing responsibility for up to 5 selected communities and will conduct all phases of the survey, on a face-to-face basis in each selected community. The survey comprises two essential phases (i) the Set-up Phase - involving up to four visits to the community (including for recruitment of the Community Interviewer, sample selection and screening survey purposes) and (ii) the Catch and Effort Survey - bi-monthly visits to selected communities to collect catch and effort information (previous 7 days) for selected dwellings. Regular liaison/feedback/ performance monitoring (including field supervision) will be undertaken by survey management staff.

To assist Regional Interviewers in their work, a local interviewer/guide will be identified/recruited within each selected community. Although relatively minor personal inputs are required here, these staff have been shown through pilot-testing to provide a vital role in terms of local knowledge and community cooperation. The NT Survey Office would be responsible for all data entry and

initial editing/tabulation of survey data. Final editing, tabulation, expansion, analysis and reporting of the survey results would be the combined responsibility of the 'Analysis Team' for the Recreational Fishing Survey and the Indigenous Fishing Survey Manager. Relevant timing, resource inputs and budgetary issues for the implementation of this survey are discussed in Sections 5.7 and 5.8.

### **5.3. Visiting International Fisher Survey**

Fishers visiting from overseas represent different methodological challenges, compared with resident recreational fishers or indigenous fishers. They are relatively few in number and (presumably) undertake their fishing activity over widespread areas throughout Australia. Direct access to these fishers through a national (telephone) population scan was therefore not considered possible. A separate sampling strategy for these visiting fishers was developed during 1999.

International airport terminals are the common gathering point for visiting fishers and the Working Group focused on these areas during its development of a sampling strategy. A method of routinely sampling visiting fishers as they leave Australia through international airport terminals was considered most likely to deliver appropriate recreational fishing information.

The Australian Bureau of Tourism Research (BTR) has commissioned AC Nielsen Research to conduct an ongoing quarterly International Visitor Survey (IVS) at Australian international airport terminals. Each year, approximately 20,000 short term visitors (duration of stay less than 12 months), aged 15 years or older, are interviewed at international airports (Sydney, Melbourne, Brisbane, Cairns, Perth, Adelaide, Darwin) as they depart from Australia. Interviews include a question on recreational activities (including fishing) that tourists have participated in during their stay, along with various tourism-related data (length of stay, States/Territories visited etc) and profiling information (country of origin, age, sex etc). Information from the 1997 IVS was examined to determine its value to the National Survey. It was apparent that visiting fishers had a different profile to the average visitor in relation to duration of stay. The vast majority of all visitors (nearly 80%) stay 3 weeks or less whereas over 30% of visitors reporting fishing as an activity, stay longer than 12 weeks. These data were considered to have a direct impact on the type of information which could reliably be collected from respondents in any 'piggy back' recall survey appended to the IVS.

Nevertheless, the IVS offered the most cost-effective approach to collect information on recreational fishing by visiting fishers and discussions have taken place with BTR regarding cooperative research. The BTR has developed a facility which enables users to add a small number of questions on specific topics to the IVS questionnaire. This commercial service allows users to explore particular issues relating to overseas visitors in more detail than is possible through their normal survey. A survey on fishing activity has been planned using this facility, by adding a supplementary question sequence to the IVS. A copy of the IVS questionnaire (Attachment 12.21) has been obtained to allow the facilitation team to frame questions which meet our output specifications and are complementary to the IVS. BTR have agreed in principle for inclusion of this questionnaire and negotiations are underway for a firm quote now that the instrument has been effectively finalised. Preliminary estimates of the cost have been used conservatively in preparation of the budget for this component.

#### **5.3.1 Output Specifications**

The Visiting International Fisher Survey will collect broad scoping data in a similar manner to other components of the National Survey. All short term (less than 12 months) overseas visitors to Australia, 15 years of age and older, will be included in the survey. All recreational fishing techniques and harvesting activities will be included in scope. All aquatic organisms (not plants)

will be included in scope, although limited information in terms of catch and effort by species can be obtained, due to recall bias and species identification problems. Although the IVS is conducted on a quarterly basis, the 12 month survey period will be set to best coincide with the enumeration of other components of the National Survey. While some broad economic data are collected through the standard IVS questionnaire, additional questioning (e.g. fishing-related expenditure) cannot be included, as this would suffer the same recall bias impacts as any detailed catch and effort assessment. However, limited attitudinal information will be gathered in a manner consistent with other survey components.

A separate output specifications document for this survey has not been prepared. However, complete details of the survey data elements discussed below are contained in the survey questionnaire (Attachment 12.22). In addition to routine profiling data from the IVS, the survey will gather information on the level of participation in recreational fishing by overseas visitors. Information on the States/Territories fished in, fishing methods, targeting and fishing platform will be collected. The use of fishing guides and charter services will also be assessed. A measure of fishing effort will be obtained (number of days fished by state by broad method/platform), but no estimate of the catch of fish (numbers by species) by visiting fishers is possible with the survey method. Rather, the survey will measure the incidence of 'any catch' for key target species nominated by respondents. Also, two main areas of attitudinal questioning have been included: assessment of the relative importance of recreational fishing in the decision to visit Australia; and an assessment of satisfaction in terms of the overall fishing experience in Australia (including main 'positive/negative' aspects).

The IVS survey method has been tested and proven by AC Nielsen over a number of years. The additional documentation necessary to commence the Visiting International Fisher Survey has been prepared (Attachment 12.22).

### **5.3.2 Sampling and Implementation Strategies**

The sampling program for the Visiting International Fisher Survey would be conducted by AC Nielsen as part of the standard IVS program. An interview quota for each country of residence group has been devised by AC Nielsen and allocated by airport and month. The survey results will be weighted to Australian Bureau of Statistics figures of international visitor traffic. The IVS is conducted monthly but it has been recommended that our supplementary survey commence at the beginning of a quarter, as data expansion is conducted on that basis. It is intended, therefore, to commence the enumeration of the survey in early April 2000, with completion in late March 2001.

Over this period, it is expected that the IVS will be asked of approximately 20,000 visitors/respondents. A positive response to the "go fishing" prompt will act as a filter for the supplementary questions (Attachment 12.22). However, based on available information, it is expected that around 400-500 respondents will be eligible/interviewed for the fishing questionnaire. Depending on outcomes here, limited capability might therefore be achieved for detailed disaggregations beyond the State/Territory level.

The National Project Manager (with some assistance from consultant staff) will be responsible for all liaison with BTR/Nielsen staff, including during survey preparation, interviewer training, enumeration and analysis. The budget for the survey has also been framed to allow for BTR/Nielsen staff to prepare the relevant tabulated and expanded data at the conclusion of the survey. Interpretation and reporting will remain the responsibility of the Analysis Team for the Recreational Fishing Survey.

#### **5.4. State Manager Training Program**

The second Development Workshop was held at the Fisheries Research Institute (NSW) in November/December 1998. The Committee endorsed the National Survey output specifications and reviewed the draft questionnaires and other documentation that were developed to implement the survey. A significant component of the second workshop then became a training exercise for State Managers in the use of the questionnaires, prior to their involvement in pilot-testing. The training and pilot surveys had three significant objectives. These were: (i) to train key personnel in each State/Territory in general telephone interviewing techniques/conventions and specifically, in the application of the questionnaires themselves; (ii) to test the draft questionnaires for logic and sequence; and (iii) to test the responses of both random and purposively-selected respondents for their understanding and potential burden. After three days of training, each State Manager had a thorough grasp of the concepts involved in the survey instrument as a result of extensive 'class-room' practice/role playing work. Following the training, each State Manager successfully undertook a pilot survey in their home State/Territory. Subsequent involvement by State Managers in the refinement of the survey instruments and ongoing liaison regarding the survey development has led to an increasingly high degree of understanding on their parts. That understanding will be further enhanced in the lead-up to the study, commencing with a State Manager Training Workshop for the implementation phase, scheduled for October 1999.

#### **5.5. Pilot Testing of Survey Methodologies**

##### **5.5.1 Recreational Fisher Survey**

###### **5.5.1.1 Short-term (2 month) Pilot Test**

Following a training course at the Fisheries Research Institute (NSW), State Managers undertook a short pilot test of the screening and diary survey components in their regions. Each State Manager conducted around 30 Screening Survey interviews from randomly selected numbers from the White Pages telephone directories. Intending fishers from these households were invited to take part in a brief Diary Survey (2 months) and in some States, additional known avid fishers were included in the pilot survey to broaden the experience of the State Managers. The objectives of the trial were to familiarise the State Managers with the survey instruments and to increase their own understanding of the "typical" responses to be expected when contacting members of the community. State Managers were also able to comment on the efficacy of the survey tools through their direct involvement in the pilot survey.

An important consequence of the training and pilot survey components was that the State Managers are now in a greatly improved position to recruit, train and manage their interviewers. This direct experience has also provided an understanding of the characteristics of applicants who would succeed (or fail) in establishing rapport with respondents, maintain data integrity and manage the logistical difficulties of telephoning households at appropriate times of the day and week. Additionally, this experience will allow for more realistic contributions in interviewer training, from the viewpoint of a person new to the experience.

###### **5.5.1.2 Long-term (12 month) Pilot Test**

In addition to the two month pilot survey, the concept of a routine 12 month diary period is being tested during the development phase. Commencing in February 1999, the testing is currently in its

8th month (of 12) and a detailed assessment will be undertaken on completion. In the meantime, the following progress summary is provided:-

- the primary objective of the testing is assessment of the impact on survey response rates of a 12 month diary period for selected households (compared with the initially-proposed 6 month period).
- although NSWFRRI staff extended some of their (short-term) pilot-testing to 12 months, the testing is mainly confined to interviewers with direct experience in the diary survey method. Additional sampling (to the 2 month testing) was therefore conducted for the three jurisdictions involved (NSW, NT and Tasmania).
- a total of 164 fisher households was identified from the screening interview process as eligible for inclusion in the diary survey component (i.e. one or more intending fishers). Of these, 116 refer to random selections (White Pages directories). The remaining 48 refer to 'purposive' selections of respondents known to be avid fishers (through various networking sources etc.) to enable fuller assessment of the respondent burden issue. In all but a few cases, the precise objectives of the testing were not revealed to respondents. Rather, it was explained where necessary, as an "important preliminary survey".
- among those eligible for the diary survey component, 144 (88%) agreed to take part. Importantly, of those declining to take part in the survey, none directly relate to the duration of the diary survey and only one was incurred from the avid fisher/purposive group. However, a small number are related to respondent burden generally (e.g. a parent declining on behalf of a Year 12 student, on the basis of study distractions). By contrast, the majority who declined refer to cases where little or no fishing activity was expected in the period and in most such cases, interviewers indicated that they could have 'converted' them, if they had been more persistent.
- of the 144 fisher households included in the diary survey, 135 (94%) have continued reporting (at the time of writing). All 'drop-outs' to date have occurred well before the half-way mark of the diary period. Among these, most refer to re-locations (including marriage separations, inter-state moves etc.). While in the ultimate survey these cases would be routinely 'tracked', no such follow-up was planned in the pilot testing (especially where no counterpart interviewing resources were available in other states). Importantly, none of the 'drop-outs' has been directly attributed to the 12 month diary period, although three ongoing 'non-contact' cases might be attributed to general respondent fatigue. Further to this, only one 'drop-out' has come from the avid fisher/purposive group.
- recent discussions with pilot test interviewers have revealed that all remaining respondents are still highly cooperative - with none being identified as 'remotely' potential refusals/etc before the scheduled end of the testing.

Although the testing is yet to be completed, all indications are that extension of the routine diary period from 6 months to 12 months will have little or no impact on response rates. Furthermore, for 'avid' fishers (where the highest reporting burden does exist), it seems that this burden does not translate to respondent fatigue - and probably due to their 'interest' in the subject matter. Therefore, it is with some confidence that the Working Group has recommended adoption of a single 'wave' screening survey and 12 month diary period for the survey proper.

### **5.5.2 Other Survey Components**

Due to the innovative nature of the Indigenous Fishing Survey, substantial pilot-testing has been required (and is continuing) in the three jurisdictions concerned (WA, NT and Qld). All aspects of the survey instrument are being tested through face-to-face interviews in 6 discrete communities (of different types) across the study area. The results of this testing have already proven invaluable in the design process and will be used to further refine the study procedures. Further details of pilot-testing for this component are contained in Attachment 12.19.

For other components of the National Survey (On-site Survey and Visiting International Fisher Survey), no formal pilot-testing has been required due to the largely routine nature of the studies. Notwithstanding this, a final 'devil's advocacy' process will be undertaken by relevant expert staff before finalisation of the questionnaires (e.g. consultant staff and BTR/Nielsen staff for the visitor survey).

## **5.6. Data Management Strategy**

### **5.6.1 Background**

Population surveys characteristically generate an abundance and diversity of scientific information. The National Survey will be no exception and a variety of information will accrue to the research team from three separate, but linked, components of the survey. These components are the Recreational Fishing Survey, Indigenous Fishing Survey and Visiting International Fisher Survey. Fishery statistics from these components will be collected by different agencies for aggregation into national statistics. Substantial quantities of data will be gathered by phone, diary and face-to-face interviews, and transcribed onto forms, entered onto computer, updated, edited and queried, stored on local and national archives, before being reported. The Working Group recognised the importance of a coherent and workable strategy to manage these data in light of the broad scope of the National Survey and the ongoing need for data access, manipulation and storage.

The Working Group examined the available data management models within fisheries agencies and sought specialist advice on data management and information technology strategies. Dr Tony Rees (CSIRO Marine Research) delivered a presentation on behalf of Ms Kim Finney on the principles of a data management strategy as it might apply to the National Survey. CSIRO indicated that it could further assist the Working Group, either by commenting on a draft strategy or, subject to resources being made available, preparing an appropriate strategy on behalf of the group. The offer to develop a data management strategy for the project was accepted and Kim Finney was commissioned to complete the task. The primary objectives of the strategy were to develop a common data model so that data can be aggregated at the national level, address issues of data custodianship and archiving, and data security and dissemination policies.

Ms Finney, in conjunction with Dr Jeremy Lyle, has developed a data management strategy (Attachment 12.23) which outlines the major considerations that should be addressed in implementing the National Survey. The strategy provides a data model and recommendations for data entry, security, custodianship, accessibility, exchange and archiving. As data are being collected by seven different agencies, the key function of the data model is to provide an agreed set of conventions and standards, that if followed, will ultimately allow for simple integration of the disparately collected datasets. A hybrid data storage model was adopted, with States/Territories responsible for editing, data entry and preliminary error checking of data collected by their jurisdiction. On completion of the project, data will be up-loaded into a central repository (based at

the Bureau of Rural Sciences) for analysis at a national level and on-going maintenance. Each of the participating agencies have indicated their commitment and support for the strategy.

The data management strategy recommends that a relational database management system (RDBMS) application be developed for the National Survey and that, as a minimum, it meets the requirements outlined in the data management strategy in terms of the software/programming languages for information technology system development.

Initially, the Working Group identified the Standard Integrated Recreational Fisheries Information System (SIRFIS) as a potential application for data capture and storage for the National Survey. SIRFIS has been developed to provide a flexible data entry, storage and manipulation tool for information obtained from a range of recreational fishing data sources.

The SIRFIS development team (Queensland Fisheries Management Authority) met with the Working Group in October 1998 to discuss the status of the SIRFIS project and its potential application to the National Survey. The Working Group was advised that while SIRFIS contained modules that could be used to store diary and on-site survey data, specific and additional customisation of SIRFIS would be required to match questionnaire sequencing and introduce necessary range and logic checks for data entry. It was also established that the data query capability of SIRFIS was limited to complete or date-limited data dumps and to be useful to the survey a suite of reports would need to be developed. In addition and significantly, SIRFIS did not include a module designed to handle the screening survey.

A follow-up meeting (November 1998) was held between Dr Lyle, Stephen Kerr (AFFA), the SIRFIS development team and the SIRFIS programming contractors (Farview Technology) to discuss the feasibility of developing SIRFIS to meet the National Survey requirements. Subsequent to this meeting (February 1999), the draft Data Management Strategy (version 1.2) was circulated to Farview Technology as background against which the company was requested to quote on providing a feasibility and specifications report to develop SIRFIS to meet the National Survey requirements. Despite many attempts to seek a response from Farview regarding the survey, no satisfactory response was received.

Furthermore, the SIRFIS application was installed at NSW Fisheries Research Institute (NSWFRI) in November 1998 for testing and evaluation by that agency. Unfortunately, problems were encountered with installation and running of the application and, as a result, it could not be adequately demonstrated to the Working Group at its December 1998 meeting held at NSWFRI.

The Working Group is keenly aware of the expectations for the use of SIRFIS and of the financial cost of developing the application. However, the failure to successfully commission the application, the lack of a screening survey module, the limited ability to produce customised reports for analysis, lack of in-house expertise to develop/trouble-shoot SIRFIS and concerns about on-going maintenance (cost of up-grades, costs of maintenance) meant that the Working Group was obliged to examine other options for data capture.

The Working Group has now examined a range of options for the conduct of this work. The data model developed as part of the data management strategy will be used as a specification document for the development of software for the National Survey. The Working Group agreed that tenders should be let for the database development and that the application should be based on relatively well-established, familiar and proven software with good support from the manufacturer. Several Working Group members cited Microsoft ACCESS software as a possibility for the survey.

It is intended that the tender will be let in two parts. The first part would be to develop software to provide data entry, editing, simple query capability, data storage and data transfer functionality.



The second stage will involve development of statistical analysis and reporting routines. Funding for this work has been included in the survey implementation budget and a timetable has been outlined in the project work-plan. The scope of this work has been confined to the Recreational Fishing Survey and Indigenous Fishing Survey components. For the On-site Surveys, existing agency-based software systems are available in each case ('creel surveys') and for the Visiting International Fisher Survey, AC Nielsen have routine data processing/analysis systems.

### 5.6.2 *Recommendations and Outcomes*

The recommendations contained in the Data Management Strategy (Attachment 12.23), and the outcomes from those recommendations are now discussed in detail.

**Recommendation 1: That a final data model and data dictionary be agreed upon by all participating State and Territory agencies at the conclusion of the pilot surveys and prior to implementation of the National Survey.**

The data model and data dictionary, as developed in the Data Management Strategy, have been agreed upon by the Working Group and adopted as the framework for developing the National Survey database.

**Recommendation 2: That one agency be nominated as the data model and data dictionary custodian.**

The Marine and Freshwater Resources Institute (MAFRI) has assumed the role of data model and data dictionary custodian.

**Recommendation 3: That the Working Group finalise all standard code lists and tables before commencing the National Survey.**

Standard code lists will be finalised as part of the development of the National Survey database application by MAFRI. Codes will be signed off by participating agencies prior to the commencement of the National Survey.

**Recommendation 4: That a Relational Database Management System (RDBMS) based application be developed for the National Survey that, as a minimum, meets the requirements in Section 5 (Attachment 12.23) of the Data Management Strategy. In practice, a more detailed requirements analysis and specification should be developed prior to commissioning any development activity.**

A RDBMS based application is being developed by MAFRI using Microsoft Access and Visual Basic and will be designed to meet the requirements specified in Section 5. In support of that development, a detailed requirements analysis specification is being progressed by Dr Jeremy Lyle (TAFI) and consulting firm Taz-E, in conjunction with the MAFRI database developers. Funding for the requirements analysis has been held back from the Development Phase and the analysis report will be finalised and handed over to MAFRI by late-November 1999.

**Recommendation 5:** It is recommended that the Marine and Coastal Data Directory or “Blue Pages” metadata directory be used to register the National Survey metadata.

It has been agreed that the metadata will be registered on the Marine and Coastal Data Directory. Responsibility for this will rest with participating agencies (local datasets) and the national custodian (national dataset).

**Recommendation 6:** The Working Group approach an agency to assume the role of national custodian.

The Bureau of Rural Sciences (BRS) will assume the role of national custodian and the implementation budget provides for the costs of transfer of data to an Oracle environment and database maintenance for a period of five years.

**Recommendation 7:** That agencies agree that there are two levels of custodianship within the National Survey framework. Each participating agency should then agree to the responsibilities outlined for these levels of custodianship before commencing participation in the National Survey.

Participating agencies have agreed to the two levels of custodianship, local and national. State/Territory agencies will be responsible for managing local datasets and will determine how best to provide access to data in accordance with existing protocols and local data management guidelines.

**Recommendation 8:** The Working Group develop guidelines on data “exclusive use periods” to protect agency research publication interests.

The issue of exclusive use periods has not been considered in detail, however, participating agencies are committed to reporting on their particular data within twelve months of completion of data collection. Since each agency will be custodians of their own data, permission will be required for the release of data that could be used in subsequent publications. Further, an in principle agreement exists between participating agencies that approval will be sought to publish any data that relates to their jurisdiction, for example when publishing regional statistics which traverse State/Territory boundaries.

**Recommendation 9:** The Working Group develop specifications or guidelines for standard National Survey data products that will be made available to the national custodian.

Development of data products will be undertaken during the implementation phase and in conjunction with data analysis.

**Recommendation 10:** Each agency should submit a one-page outline, to the Working Group, prior to National Survey commencement, regarding the steps that it will take to ensure that its responsibilities can be met.

This recommendation was not addressed. Rather it was agreed that since participating agencies have a direct responsibility and interest in managing data collected for their jurisdiction, there is a strong sense of ownership of the survey and the data. For each jurisdiction, however, agency data management protocols will be applied.

**Recommendation 11: The Working Group develop guidelines regarding the release of data with respect to “confidentiality” issues.**

This has not been addressed directly, though policies relating to publishing aggregated data are common to all agencies. As a general rule, where fewer than five operators/fishers are involved, data can not be published. Conversely only aggregated data where at least five operators/fishers are involved can be reported. This principle will apply as a minimum in reporting survey data.

Participating agencies have agreed not to publish nor release data relating to individuals.

**Recommendation 12: The Working Group develop a specification file format for the exchange of data between local agencies and the national custodian.**

The specification file format will be developed as part of the implementation phase and will be done jointly by MARFI and BRS and will be signed off against by participating agencies.

### **5.7. National Survey Work Plan**

The National Survey is a major undertaking with a relatively large number of staff and resources engaged in a complexity of tasks over varying time periods. A thorough work plan is required to ensure that participating staff have a clear idea of their responsibilities and the time to undertake their tasks. The work plan may also be used by funding bodies to assess the progress of the project against stated objectives. Work plans may be used to arrange the allocation of resources. Every component of the National Survey has been planned in detail and allocated a commencement and expected completion date. The full work plan (encompassing several pages) was summarised into the major tasks and components for this report (Attachment 12.24).

The major project tasks were considered to be the Recreational Fishing Survey, the On-site Surveys, the Visiting International Fisher Survey and the Indigenous Fishing Survey. Each of the surveys have been further divided into recruitment, training and enumeration components. The data processing, analysis and reporting phases for each of these surveys have been combined in the summary work plan. (Attachment 12.24). A realistic monthly timetable for these tasks and components has been prepared for distribution to State Managers. The project milestone reports have been framed around this schedule and the National Project Manager will strictly monitor and seek adherence to the workplan.

### **5.8. National Survey Budget**

The Working Group had previously prepared a survey implementation budget for FAP to accompany FRDC and NHT research proposals. Total cost of the implementation phase of the survey was estimated to be about \$3.2 m. The funding was to be split among NHT (49%), FRDC (25%) and State agencies (26%). Individual state/territory agencies were able to use these preliminary budget estimates to anticipate resource requirements for future budget allocations.

A review of the budget has been undertaken for changes in the structure and work plan for the project, since the initial lodgment of the funding application for the implementation phase. However, despite some relatively significant internal amendments, the overall budget for the project has not changed. Equally, the components for each funding body have experienced very little change. The major changes within the budget are discussed below.

Amendment of the sampling strategy from two six monthly waves to a single 12 month wave has resulted in reductions in costs associated with the Screening Survey component. Essentially, such costs are halved by reducing the initial sample from 72,000 to 36,000. Yet, costs for the Diary

Survey component alter little in this respect (as the same number household/diary months occur in each case). However, the recommended sample size for the study has been increased to 42,000 households (aligning with the originally proposed 80,000 sample under a two wave system), resulting in additional outlays for the screening and diary survey components. Strengthening of the sampling in the On-site Surveys from 20 to 28 'sampling days' per month per State/Territory has also resulted in additional outlays. A further amendment to the budget is proposed for the Indigenous Fishing Survey which underestimated the number of communities to be sampled. It is proposed that 72 communities (rather than 60) will now be sampled. Budget amendments were also required due to the change in the National Project Manager position.

The Facilitation Team has examined the proposed budget in some detail to ensure that sufficient funds were available for the project. As with the work plan, the full budget covers several pages, but it has been summarised for this report. The proposed budget and attributions to NHT, FRDC and each State is outlined in Attachment 12.25. The Facilitation Team was confident that the final budget as presented in Attachment 12.25 was sufficient to achieve the goals of the implementation phase of the National Survey.

However, the Facilitation Team was aware of the proposed implementation of a Goods and Services Tax (GST) on 1 July 2000. It recognised that the GST had the potential to significantly alter the funding arrangements for the National Survey. However, without formal advice on the specific aspects of the National Survey that may attract the GST, the Facilitation Team was not in a position to predict the impact on future annual budgets. Further advice on the GST will be sought during the next year and the potential impact on the National Survey will be provided to the funding bodies during milestone reporting.

## **5.9. Communication Strategy**

Clearly, the National Survey will be a major event in recreational fisheries research and the findings will generate a considerable amount of interest among government and industry groups. The results are expected to provide a framework for the management of recreational fishing in Australia in the foreseeable future. Communicating the progress and findings of the National Survey to government, recreational and commercial fishers and the broader community will be an important role of the Working Group. A strategy is required to ensure the dissemination of information is consistent, accurate and reaches the broadest possible target audience. The strategy should address the source, type and recipients of the information.

The Working Group has an obligation to advise funding groups (NHT, FRDC, State agencies) of the intended release of information from the survey. The Fisheries Action Program is the project management arm of NHT and has accepted a coordination role for the National Survey funding arrangements. The Working Group will submit news items and research reports to FRDC and NHT through an officer at the FAP. SCFA Research Sub-Committee has requested that scientific advice from the survey be submitted to them prior to its release. This will be done through the Chairman (Dr Rick Fletcher). State fisheries agencies will be keen to promote the positive aspects of the program to their communities and it is likely that the CEO of each agency will have an interest in promoting the project. The National Project Manager will have access to the broadest range of information on the study and is likely to be in the best position to coordinate the dissemination of information from the project.

While information may be generated from any member agency of the Working Group, it seems appropriate that the National Project Manager should be aware of all information and its intended release. He will advise FRDC and NHT through the FAP of any news and submit scientific reports to the Chairman of SCFA Research Sub-Committee. News and general interest information may be developed during the project and provided to State Managers for release through their Minister

or CEO. The goal of this approach is to ensure the accuracy of scientific statements and to inform, and seek the approval, of funding groups for the release of news.

Recreational fishers are a diverse community group with traditionally difficult lines of communication. But, it is in the interest of all fisheries agencies to develop a strategy to disseminate information to fishers on a regular basis. A newsletter or progress report will maintain interest in the project and a profile for interviewers. It is proposed that the Project Manager consider the development of a newsletter to provide general project news to angling groups several times a year for the duration of the project. The newsletter will be available to all State Managers for release through their own lines of communication. In NSW, this includes Ministerial and Directorial press releases to the electronic and print media, angling associations and clubs. State Managers are likely to have developed a recreational fishing network and a method of distribution that is appropriate to their State.

## **6. BENEFITS**

The development project has been designed and conducted to deliver tools and processes for the implementation of the National Recreational and Indigenous Fishing Survey. As such, the benefits will be more readily seen at the completion of that project. However, the development phase has greatly increased the understanding of fisheries agencies and stakeholders in terms of the complexities of the study ahead. The carefully planned sequence of development tasks has produced a team of highly competent State Managers and associated staff to implement the survey. Accordingly, the project has delivered a survey instrument for detailed examination of recreational fishing in Australia.

Fisheries management, commercial and recreational fishers and the general community will benefit from the development of a survey instrument that will permit the collection of nationally consistent and comparable fishery statistics for the recreational sector. The survey instrument may be implemented on regular occasions (every 5-10 years) to provide an assessment of the impact of recreational fishing on fish stocks, economic indicators related to recreational fishing and the “hard” data on which resource sharing and allocation issues can be resolved. Benefits will accrue through improved stock assessments which will, for the first time in many instances, take account of all harvesting sectors of Australian fisheries.

Attitudinal information collected by the national survey will provide fisheries management with feed-back on the level of awareness by recreational fishers of regulations, their perceptions regarding resource status and resource allocation issues and attitudes to changes in management. This information will also be used to help shape community attitudes towards responsible resource use. Future planning will be greatly enhanced by the comprehensive nature of the information obtained from all sectors of the fishing industry. The importance of individual fisheries can then be assessed (by whatever biological, economic, social or other criteria are deemed appropriate) in relation to the entire harvesting industry.

## **7. FURTHER DEVELOPMENT**

Due to the inherent complexity of the National Survey design, the terms of reference of the present project were necessarily confined to development of survey instruments for the study. As that process has now been completed (including thorough planning for the remainder of the project), the implementation and analysis of the study can now be undertaken. Although by no means a simple task, the study can now be conducted in a most orderly fashion, in the confidence that minimal technical and operational 'unknowns' will be encountered. Clearly, the future development of the project is the implementation of the National Recreational and Indigenous Fishing Survey.

## **8. CONCLUSION**

The present development project has been a highly successful undertaking by any measure. Although some minor design refinements may be required in the lead-up to the commencement of the study, the stated objectives of the project (in all but one case), have been achieved and in many cases, exceeded. Comprehensive designs have been prepared for the Recreational Fishing Survey (including On-site Surveys), the Indigenous Fishing Survey and the Visiting International Fisher Survey. These designs comprise detailed output specifications, sampling plans, questionnaires and other survey instruments. Extensive pilot-testing of survey questionnaires has also been undertaken. Survey Managers in each State/Territory have received thorough training in the conduct of the different survey components. While ultimate database systems for the study are the subject of further development work, the Working Group has identified an effective and achievable strategy in this regard, including a detailed Data Management Strategy/Data Model. A range of documentation has been prepared for all survey components, including comprehensive work plans and budgets for the implementation phase of the project.



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## 10. INTELLECTUAL PROPERTY

The Nation Survey is a joint initiative of Commonwealth and State/ Territory Governments so the funding for each of the three major phases (feasibility, development, implementation) was/ will be provided by these organisations. Commonwealth funding was obtained from the Fisheries Research and Development Corporation and the Natural Heritage Trust. This Commonwealth funding will be administered by the Fisheries Action Program during the implementation phase. State/ Territory funding was obtained from the agency responsible for fisheries research/ management in each Australian State and Territory. As a consequence of the funding arrangements, the intellectual property generated from the project will also be vested jointly in the respective organisations. This intellectual property will be attributed to each organisation in proportion to their financial contribution. In this regard, the attribution of intellectual property from the development phase of the National Survey was 35.5% to the Natural Heritage Trust, 34.8% to the Fisheries Research and Development Corporation and 30% to the participating States/ Territories.

However, in terms of design copyright, certain specific and continuing rights of consultants, Kewagama Research, were recognised prior to the development phase of the project. This matter is detailed in correspondence to the Commonwealth (13 October, 1998) and refers to design-related issues only (as opposed to data) for specific survey methodologies and interviewing techniques (in particular, the 'memory jogger' diary system). The agreement entitles all client bodies to full usage of survey materials in conducting the National Survey (or future repeats), but restricts clients in terms of any "on-selling" or provision of the instrument to a third party, including any "unnecessary" publication of methodological details.

## 11. STAFF

The National Recreational and Indigenous Fishing Survey was developed by staff of the Australian fishery agencies, representatives of the peak recreational and commercial fishing groups and consultants in the fields of survey design, statistics, data management and economics. Members of these groups who have participated in the development of the National Survey include;

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