



Ministry of
Fisheries
Te Tautaki i nga tiri a Tangaroa

SOUTH ISLAND FRESHWATER EEL FISHERIES PLAN



Longfinned Eel



Shortfinned Eel

(ANG 11, ANG 12, ANG 13, ANG 14, ANG 15, ANG 16, ANG 17)

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DRAFT

ACKNOWLEDGEMENT

The existing South Island Eel Plan and the six associated regional plans were developed between 1994 and 1998 to advise the Minister on introducing eels into the quota management system. MFish acknowledges the hard work and commitment of all those involved in developing those plans. MFish looks forward to the future, working with those who are able to continue the work for which the existing plans have set the foundation.

EXECUTIVE SUMMARY

1. A South Island Eel Management Plan was developed in 1996 and six associated regional plans were finalised in 1998. These plans are now being reviewed. The review encompasses the freshwater, estuarine, and marine areas of the South Island of New Zealand. It provides for the management of the shortfin eel, *Anguilla australis*, and the longfin eel, *Anguilla dieffenbachia*.
2. There are six management areas within the South Island Eel fishery plan area, ANG 11 to ANG 16. The commercial catch of freshwater eels was 271.8 t (or about 65% of the combined total allowable commercial catches for the South Island) for the 2005-06 fishing year. The fishery for the whole of New Zealand earned almost \$5.6 million in the same year in exports (of approximately 625 t).
3. Eels are a taonga species for tangata whenua. Customary authorisations, mataitai reserves, and other tools are used to recognise customary use and management of eels. The levels of recreational and illegal harvesting of eels are not known.
4. Eels undertake a spawning migration to sea at the end of their life cycle, for which they require unimpeded access to the sea. Eels are of a considerable age when they migrate; shortfin females are 9-41 years, and longfin females are 27-61 years. There is, therefore, a long period of time before eels reach reproductive maturity and migrate to sea, during which time they may be caught by fishers or killed by non-fishing activities.
5. Dams present physical barriers to upstream migration of elvers, and downstream migration of large, migrating eels. These and other non-fishing activities have had a very significant impact on eel populations that may be greater than commercial and non-commercial harvesting.
6. No formal stock assessments for eels are available, nor is reliable data to determine sustainable catch levels. Given the biology of eels, there is a high risk that the current exploitation levels for longfin eels in particular, coupled with non-fishing impacts (such as dams and drainage), are not sustainable.

Introduction

BACKGROUND

7. In December 1994, the then Minister of Fisheries, Hon Doug Kidd, invited Ngāi Tahu to form a consultative committee with the Crown and commercial fishers to address eel fisheries issues. The invitation arose out of Ngāi Tahu's concerns about the effective management of the eel fishery, including concerns raised in the Ngāi Tahu Waitangi Tribunal Claim and the negotiations that led to the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 (the Settlement Act).

8. The Minister's letter to Ngāi Tahu made reference to his responsibilities under section 10 of the Settlement Act¹, and section 28D of the Fisheries Act 1983. He also indicated his wish to introduce eels into the quota management system (QMS), and the desire to formulate policies in consultation with Ngāi Tahu and the fishing industry on the most appropriate management strategies to manage the eel fishery sustainably. The working group that was subsequently formed was named Te Waahi Pounamu Eel Working Group (TWP).

9. TWP was expanded in early 1996 to include iwi and industry representatives from the top of the South Island. The working group was renamed Te Waka a Maui me ona Toka Mahi Tuna (TWM).

10. TWM and six regional management committees were formally established as ministerial advisory bodies under the Ministry of Agriculture and Fisheries (Restructuring) Act 1995. The Minister appointed committee members, set honoraria for committee members, and approved terms of reference for the committees. A senior Ministry of Fisheries' (MFish) staff member was appointed chairperson of TWP and its successor TWM. MFish also employed two staff members for two years to assist with developing the plans.

11. TWM, together with MFish, developed an overall South Island Eel Management Plan (the South Island Plan), which was approved by the then Minister of Fisheries, the Hon. Doug Kidd, in December 1996. The regional management committees developed their respective regional plans, complementing the South Island Plan, and were completed in 1998. The regional plans are:

- Te Tau Ihu Mahi Tuna (Nelson/ North Marlborough) Eel Management Plan;
- North Canterbury/ South Marlborough Eel Management Plan;
- Te Waihora (Lake Ellesmere) Eel Management Plan;
- South Canterbury/ Waitaki Eel Management Plan;
- Arai Te Uru (Otago/ Southland) Eel Management Plan; and
- Tai Poutini Tuna (West Coast) Eel Management Plan.

¹ Which include the need to consult with tangata whenua about, and develop policies to help recognise, use and management practices of Maori in the exercise of non-commercial fishing rights

12. Participants at a workshop on eel management (Ngāi Tahu Tuna Wananga), convened by Ngāi Tahu in July 2006, requested a review of the South Island Plan. MFish considers that it is timely to undertake a review, with tangata whenua and stakeholders, of the six regional management plans and the South Island Plan (the existing plans).

13. The South Island Plan includes the following vision statement for the South Island eel fishery:

“To ensure the sustainability of the eel fishery through good management which provides for a customary, recreational and commercial harvest”.

14. The existing plans contain a number of recommendations and objectives. Stakeholders, tangata whenua, and MFish will work together to reassess those recommendations and objectives as part of this review. This first chapter is intended only to outline the current situation and available information from the Government’s perspective.

PURPOSE OF THE REVIEW

15. This review of the existing South Island eel plans² will be a collaborative effort between the Government, tangata whenua, and stakeholders to maximise value to New Zealanders through sustainable use of fisheries and protection of the marine environment.

16. The review of the existing plans is incomplete because it only outlines, from the Government’s perspective, available information and changes in the current situation for the South Island eel fishery that have occurred since the existing plans were prepared. Completion of the review requires collaboration with tangata whenua and stakeholders to ensure the best available information³ on the current situation is available for consideration. Collaboration is also required to review the management objectives, assess the fishery, recommend any new management measures and propose a revised operational plan for the future management of the fishery.

17. Management measures proposed through this review and any resulting operational plan will be prioritised for implementation against measures proposed in other fisheries plans. MFish, tangata whenua, and stakeholders will continue to monitor the revised plan. Any revised plan will itself be fully reviewed as required.

SCOPE OF THE REVIEW

18. The South Island eel fishery is based on two freshwater eel species: the shortfin eel, *Anguilla australis*; and the longfin eel, *Anguilla dieffenbachia*. A third species of freshwater eel, the Australasian longfin (*Angilla reinhardtii*) has, to date, only been reported in North Island landings.

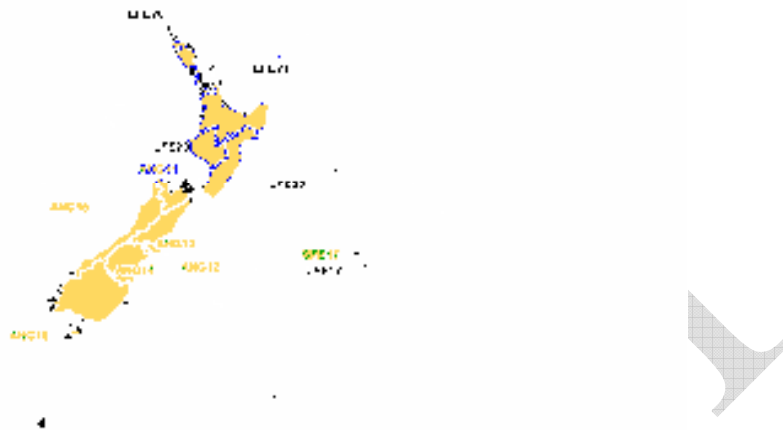
19. A significant recommendation of the existing plans was that South Island eels be introduced into the QMS. Following these recommendations, South Island eels were

² Fisheries plans approved under section 11A of the Fisheries Act 1996 will be the main tool for maximising value of New Zealand’s fisheries while ensuring statutory obligations are met.

³ Section 10 of the Fisheries Act 1996 requires the best available information to be used for fisheries management.

introduced into the QMS on 1 October 2000 with the species combined under fishstock codes ANG11 to ANG16 (Figure 1).

Figure 1: New Zealand eel fishstocks



20. The review of the existing plans, therefore, encompasses freshwater eels occurring in the six management units ANG11 to ANG16 (Table 1). MFish proposes that the outcome of the review is a revised South Island eel fisheries plan that includes the six regional plans as separate chapters (or individual appendices) of an overall South Island Eel Fisheries Plan.

Table 1: SI eel fishery management areas and fishstocks

Common name	Area	Fishstock
Freshwater eel	Nelson/ North Marlborough	ANG11
Freshwater eel	North Canterbury/ South Marlborough	ANG12
Freshwater eel	Lake Ellesmere	ANG13
Freshwater eel	South Canterbury/ Waitaki	ANG14
Freshwater eel	Otago/ Southland	ANG15
Freshwater eel	West Coast	ANG16

Section 1: The Current Situation

21. In this section, the aim is to provide the best available information on the current situation across the three broad outcomes of MFish's Statement of Intent (SOI):

- protecting the health of the aquatic environment
- people are able to realize the best value from the sustainable and efficient use of fisheries, and
- credible fisheries management.

22. An important consideration is delivery on the Crown's obligations to Maori. This is seen as fundamental to MFish and affects all activities undertaken to support achievement of MFish's overall fisheries outcome. For this reason, meeting Crown obligations to Maori has been folded into each of the three contributing outcomes outlined above.

THE HEALTH OF THE AQUATIC ENVIRONMENT IS PROTECTED

Biodiversity

Draft standard is to identify and maintain biological diversity of the aquatic environment.

23. Section 9 of the Fisheries Act 1996 outlines environmental principles that must be taken into account by those exercising or performing functions, duties, or powers under the Act, that relate to use of fisheries resources or ensuring sustainability. One of these environmental principles is that biological diversity of the aquatic environment should be maintained.

24. The direct impact of eel fishing activities on habitat values or, more generally, the biological diversity of the aquatic environment, is low. Of more consequence is the direct modification of habitat for other purposes (e.g. farming, flood control, irrigation, drain clearance, dams, and culverts) unrelated to fishing activities. However, fishing activities are likely to be of consequence to biodiversity in an indirect way. These effects can be taken into account when considering management activities under the Act.

25. Research using Geographical Information System (GIS) modeling has been undertaken to assess the amount and quality of habitat that is potentially available for eels across New Zealand. About 5% of longfin eel habitat is in waters that are closed to commercial fishing and have safe exits for migrant females. Another 11% is in waters that are protected in their upper reaches but where migrant females could be fished further downstream and 17% is located in small streams that are rarely fished. In all, it is estimated that about 33% of present habitat in both the North and South Islands is either in reserves or is rarely fished. (reference – see Plenary)

Eels as a top predator

26. The role of large eels in maintaining biodiversity is an important factor to consider when setting sustainability measures for the eel fishery. As a top predator, eels are important to determining the trophic structure of their aquatic environment. Once eels reach a certain size, their diet of aquatic insects and snails becomes one with a greater emphasis on fish species (including small eels). The loss of a significant proportion of large eels from an area may therefore influence the abundance of, and inter-relationships between, other species.

27. A reduction in the number of large eels may also enable introduced species to assume the role of top predator, but the actions of these species may have less desirable impacts on the aquatic environment. The distribution and abundance of introduced predatory or omnivorous fish may increase to the broader detriment of the aquatic environment, including possible effects on biodiversity.

Measures to maintain biodiversity

28. There are a number of tools available under the Act to meet the obligation to maintain biological diversity. Examples include closing areas to fishing, catch limits, and size limits.

29. There is also a range of controls under other legislation that support the objective of maintaining biodiversity. Examples include: under the Conservation Act 1987, the creation of marginal strips along rivers and lakes which may support habitat of consequence to eels; and, under the Reserves Act 1977, restrictions on the taking or killing of indigenous fauna. Areas declared off limits to the public for defence or water supply purposes may also contribute to biodiversity outcomes.

Risk associated with fishery use

30. Certain introduced species of plants and animals taken as bycatch in the eel fishery may be accidentally or deliberately transferred to locations where those species do not already exist. There are laws in place that prohibit the transfer or release of live aquatic life into freshwater without an appropriate authority.

31. There are ways for MFish to further reduce the risk that aquatic life is not inappropriately disposed of. For example, from 1 April 2007, brown bullhead catfish (an introduced and unwanted species) are to be killed on capture by amateur fishers, while commercial fishers will not be able to sell brown bullhead catfish in a live state.

32. Other measures reduce the risk that early life stages of various species are not transferred or released into the wild in a live state (e.g. periodic salt bathing of fishing gear used in freshwater, washing down trailers before being used in another major catchment area). Some of these measures are proposed to be developed into a code of practice with fishery interests by 1 October 2007.

Benthic impacts

33. Eels are caught by static fishing methods such as fyke nets and hīnaki. These methods of fishing have minimal benthic impacts.

Habitats of Particular Significance to Fisheries Management

34. Eels occupy a broad range of habitats. As juveniles, eels are frequently encountered in wetlands, flood plains and lowland lakes and estuarine areas, and may burrow into the sediment. The density of eels found is related to the slope and altitude of the habitat. Longfin eels dominate waters of higher altitude and slope and are often found in the headwaters of many catchments. Shortfin eels predominate lower in the catchments and in lowland lakes and wetlands. Where riparian vegetation or normal water flow characteristics have been modified at various levels of a catchment, the ability of the habitat to support the full size distribution and number of eels within a eel population (natural or modified) is likely to be affected as vegetative stream bank cover is increasingly important for larger eels.

35. Eels undertake a spawning migration towards the end of their lifecycle, for which they require unimpeded access to the sea. Without adequate fish passage where barriers such as dams are placed across rivers and lakes, juvenile eels may not be able to enter a catchment that earlier generations once had free access to, and adult eels may not be able to complete downstream migration for spawning purposes. Further discussion of the impacts of human activities on eel habitat is outlined in the subsequent 'Other resource users' section.

Associated or dependent species

36. Maintaining associated and dependent species above a level that ensures their long term viability is another of the environmental principles set out in the Act. There is no information to suggest that any 'associated or dependent species' of eels have been affected to such a level that their long term viability has been threatened.

37. 'Associated and dependent species' are defined under the Act as any non-harvested species taken or otherwise affected by the taking of any harvested species.

38. There are a variety of species taken as a bycatch of the eel fishery, most of them are harvested species, and only a few would be associated or dependent species. Bycatch species include koi carp, catfish, brown and rainbow trout, rudd, goldfish, flounders, mullets, and smaller species such as galaxiids and bullies. Koura may be taken in some circumstances, although the quantity involved is unknown.

39. Cormorant or shag species are sometimes attracted to the movement of fish caught in fyke nets set in shallow water. These birds are partially protected under the Wildlife Act 1953, and so usually count as associated or dependent species. Their capture is known more from northern waters of the North Island, but is likely to occur in suitable habitats elsewhere.

40. Non-commercial fishers are not legally able to possess certain species in a live state. Upon capture, even as bycatch, non-commercial fishers must kill species such as koi carp and, from April 2007, catfish.

41. Eels were once considered a threat to the introduced trout fishery, and efforts were made to cull eels or restrict their movement into waterways stocked with trout. However, research has since indicated that eels do not prey extensively on juvenile trout. The predatory behaviour of large eels on trout may ensure that the population structure of prey populations is enhanced from an angling perspective.

42. In terms of the environmental principles of the Act, the long-term viability of trout, as an associated and dependent species, is likely to be ‘maintained’ as a result of eel fishing activities, either at the levels experienced in more recent times, or at the lower levels of catch experienced historically. MFish does not consider that the long-term viability of trout will be affected by eel management practices, even in the event that catch limits for eel stocks are further reduced.

Extent of capture

43. The principal fishing methods used to take eels are quite target specific, and are unlikely to give rise to significant levels of catch of associated and dependent species. Methods such as gaff, hand-gathering, bobbing, and spear are very unlikely to result in any bycatch, while fyke net and pots/hīnaki are capable of taking a range of species. The range of associated and dependent species taken will vary according to the area of fishing activity.

Protected species

44. There are no protected species typically found in conjunction with the eel fishery.

Other Resource Users

45. The existing South Island eel plans express concerns about certain non-fishing activities having significant detrimental effects on eel populations. Activities noted include drainage, spraying, contamination of waterways, channel-clearing, water extraction, and hydro-electric power generation. Although the actual reduction in eel numbers from these activities is unknown, the existing plans suggest that the reduction in eel numbers from non-fishing activities is likely to be greater than from fishing.

46. The existing plans note that eel populations are significantly reduced since European settlement from the 1840s, largely due to wetland drainage, habitat modification brought about by irrigation, channelling of rivers and streams, and the subsequent reduction in aquatic habitat. It is estimated that only 9.4% of New Zealand’s original wetlands remain, and it is likely that most lowland wetlands are privately owned⁴.

47. On-going drain maintenance activities by mechanical means to remove weeds may cause direct mortality of eels through physical damage or by stranding and subsequent desiccation. Lack of protection of riparian vegetation, through a lack of either fencing on farms or adequate buffer zones near urban or forestry developments, may also affect the distribution of eels in some rivers. Point and non-point pollution of waterways leads to degradation of aquatic habitat, deterioration in the health and size of eel stocks, and chemical residues in eels effecting export markets. Removal of gravel and sand from within streams has detrimental effects on aquatic habitats and eels.

48. Dams present physical barriers to upstream migration of elvers, and downstream migration of larger, migrating eels. Direct mortality occurs through damage by hydro-electric turbines and flood control pumping. Hydro-electric turbine mortality is affected by eel length, turbine type, and turbine rotation speed. The mortality of larger eels (specifically,

⁴ Ministry for the Environment, 2007: Protecting Our Places: Introducing the national priorities for protecting rare and threatened native biodiversity on private land.

longfin females), is estimated to be 100%. Given the large amount of water stored in hydro lakes, this source of mortality could be significant and have an impact on the number of eels migrating to sea in spawning condition. At the time the existing plans were written, most of the South Island lake habitat suitable for longfin eels was in catchments that contained hydro-electric power schemes.

49. It appears unlikely that the effect of land-based activities on eels will have diminished since the existing plans were developed. It is probable that the adverse effects have increased as a result of (i) large-scale water abstraction for irrigation⁵, and (ii) the wide-spread development of the dairy industry in parts of the South Island, for example, South Canterbury and Southland.

50. MFish only has tools directly available to it to control fishing and fishing related effects. Other agencies have the responsibility of controlling land based activities and the use of water resources. MFish would welcome suggestions from stakeholders as to how non-fishing activities which impact eel populations and the eel fishery might be addressed.

51. Regional Councils have responsibility under the Resource Management Act 1991 (RMA) for managing the effects of all land-based, non-fishing activities of concern in the existing plans. Despite some Regional Councils showing some willingness to address or improve the factors that affect the natural and physical integrity of the aquatic environment, there appears to be a need for a more coordinated approach to mitigating the effects of land or water resource use at both a regional and national level.

52. Under the Conservation Act 1987, regulations can be made requiring the provision of fish passages in dams or other structures which impede the natural movement (upstream or downstream) of freshwater fish. At present, fish passages are governed under Part 6 of the Freshwater Fisheries Regulations 1983, while dams are governed under the Resource Management Act 1991. More land and water resource users undertaking voluntary initiatives would better ensure that fish passage and habitat values are enhanced. Increased efforts by Regional Councils to monitor the conditions of resource consents, and take enforcement action when required, would also be beneficial.

53. New Zealand is a party to the Ramsar Convention on Wetlands (the Convention). Waituna Lagoon, Southland, and Farewell Spit in Nelson are both included on the List of Wetlands of International Importance (the List). As well as designating wetlands for inclusion on the List, parties to the Convention undertake “to formulate and implement their planning so as to promote the conservation of the wetlands included in the List, and as far as possible the wise use of wetlands in their territory.”⁶ Thus, the Convention indirectly provides protection for eel habitat. Eel habitat in other parts of the conservation estate managed by the Department of Conservation may also help to mitigate the effects of non-fishing impacts on eel populations.

⁵ For example, eel researchers, report that there are numerous waterways surveyed in the past as containing eels that are no longer exist as waterways (Jellyman, pers. comm.).

⁶ Article 3(1) of the Convention

Harvest strategies

This section is under review due to the draft discussion document on harvest strategy standards. An addendum to the guide will be provided as soon as it is available.

Draft harvest strategy standards (s13)

54. The South Island eel fishery was introduced into the QMS on 1 October 2000 with species combined under fishstock codes ANG 11 to ANG 16. The fishing year for all fisheries extends from 1 October to 30 September, except for ANG 13 (Lake Ellesmere) which has a fishing year from 1 February to 30 January.

Productivity

55. Both shortfin eel and longfin eel are considered to be species with low productivity, based on their natural mortality rate, fecundity, size and age at maturity, breeding strategy, maximum age and growth characteristics, as outlined in the following paragraphs.

Natural mortality rate

56. Estimates of natural mortality are only available from two sites, as follows:

Unexploited shortfins (Lake Pounui)	M = 0.038
Unexploited longfins (Lake Pounui)	M = 0.036
Unexploited shortfins (Lake Rotoiti)	M = 0.042

57. The available estimates, and what is generally known about the life history characteristics of eels, indicate that natural mortality is relatively low.

Fecundity

58. Fecundity is an important consideration for management as the fishery is based on pre-spawning fish. The level of egg production to ensure sufficient recruitment of eels is unknown. Fecundity estimates in migrant eels show that egg counts increase with total length and total weight. A female longfin eel of 4 kg in weight is likely to carry approximately eight million eggs, whereas a female longfin eel of 2 kg is likely to carry approximately 3.5 million eggs. Female longfin eels are long-lived and take several decades to reach reproductive maturity. There is a long period of time before eels reach maturity and migrate to sea, during which they may be caught by fishers or killed by non-fishing activities (e.g. drainage clearance, pollution events).

Length and age at maturity

59. Age at migration may vary considerably between areas depending on growth rate. Males of both species mature at a smaller size than females. Migration appears to be dependent on attaining a certain length/weight combination and condition. The range in recorded age and length at migration for shortfin males is 5-22 years and 40-48 cm, and for females 9-41 years and 64-80 cm. For longfin eels the range in recorded age and length at migration is 11-34 years and 24-67 cm for males, and 27-61 years and 90-158 cm for

females. However, because of variable growth rates, eels of both sexes and species may migrate at younger ages.

Maximum age

60. Maximum recorded age is 60 years for shortfin and 106 years for longfins. The technique used for ageing eels in New Zealand has been validated.

Growth

61. Growth rates for eels are usually linear. Growth in freshwater is highly variable and dependent on food availability, water temperature and eel density. Shortfin eels often grow considerably faster than longfins from the same location. South Island shortfins take, on average, 12.8 years (range 8.1-24.4 years) to reach 220 grams (minimum legal size for commercial fishers), compared with 17.5 years (range 12.2-28.7 years) for longfins.

Sustainability indicators and stock status

62. There is no formal stock assessment available for freshwater eel stocks in New Zealand. The status of longfin eel is not known, yet the most probable scenario is that these stocks could undergo some further decline at the present management settings. It has been classified as in “gradual decline” following a review of the threat status of native flora and fauna by the Department of Conservation⁷. Evidence from catch-per-unit-effort indices throughout New Zealand and observations of changes in length/weight, species composition, and sex ratios of eel populations suggest that eel stocks have significantly declined in recent decades.

63. Estimates of current and reference biomass of longfin eel have recently been derived using GIS techniques that classified all waters throughout New Zealand. Field survey data of biomass per kilometre was extrapolated from field studies (212 sites) to all New Zealand waters, noting that biomass was strongly related to the mean annual low flow and gradient of the waterway in question. The biomass estimate of longfin eels in the North Island was the same as that for the South Island, at 6,000 tonnes each. The highest longfin eel biomass was found in large rivers in coastal and lowland regions. Computer simulations demonstrated that fishing activities systematically reduced both the mean length and mean weight of harvestable eels (>220 g) and the total biomass of eels present.

64. Conventional modelling studies on eel populations in New Zealand are still relatively new. Initial results indicate that exploitation rates of 5 to 10% are sufficient to reduce the spawning biomass within the fishery by 83% and 96.5% respectively. Longfin female eels are considered recruitment over-fished at these exploitation levels. By inputting a range of data about the fishery into the various models, it has been concluded that the exploitation rate is within this range. There are a number of ways to reduce the exploitation rate in order to ensure that there is sufficient recruitment of juvenile eels into the fishery generally.

65. Some significant preliminary work has been undertaken in 2006-07 on development of a conventional, but suitably structured, population dynamics stock assessment model that may serve to provide a basis for future recommendations on catch limits. This model was

⁷ The “gradual decline” classification is the lowest threat ranking and indicates an expected decline of 5-30% over the next ten years and into the future if current threats continue.

developed for the Southland eel fishery because of available information. In the medium term, refining the biomass estimates derived from the GIS modelling approach would also be of assistance.

66. The Working Group concluded in May 2007 that there is a high risk that the current exploitation levels of longfin eels, coupled with past and present human impacts, are not sustainable. Based on available information, the Fishery Assessment Working Group did not consider that the same level of risk applied to shortfin eels. However, the present management settings may not necessarily allow shortfin stocks to rebuild from their existing depleted state.

67. The Eel Fishery Assessment Working Group (the Working Group) considers that more specific management action is required to improve the spawner escapement of longfin eels. It is not possible to recommend specific reductions in total allowable catch (TAC) but measures are required to increase the spawner escapement of longfin eels to improve recruitment. Measures could include reductions in catch levels, change to catch limits, and area closures.

Information Status

68. The amount of information on the characteristics of the fishery and the means to monitor changes in relative abundance, size and age structure, and species composition has improved considerably since the early 1990s. The development of integrated stock assessment models for the eel fishery is dependent on the collection of such information over time, and further analysis of the feasibility of applying such models.

69. As a result, the level of information available to support the management decisions required for eels under the Act remains limited. MFish is committed to the collection of further information about the various eel stocks and species characteristics, particularly where the collection of such information is of assistance to understanding trends or informing management decisions at a range of levels.

Research

70. MFish has commissioned a considerable amount of research on the eel fishery over the last decade. MFish-commissioned research is documented in the report entitled “Freshwater Eel Fisheries: Chronology of Research 1994/95 to 2006/07” (September 2006). The current MFish research focus is documented in the report entitled “Freshwater Eels: Draft Medium Term Research Plan 2006-2009”.

71. Research activity can be grouped into several main areas including:
- a) characterisation (species, sex, length, weight and age by catchment)
 - b) monitoring of the commercial eel fishery incorporating the development of catch per unit effort (CPUE) indices
 - c) studies to better evaluate age and growth
 - d) feasibility of developing eel stock assessment models
 - e) evaluation of transfer techniques for the purposes of enhancing the resource

- f) eel population status surveys in local areas of importance to non-commercial interests
- g) monitoring the recruitment of juvenile eels
- h) assessing the adequacy of escapement of adult eels in spawning condition
- i) a GIS mapping project to deliver better estimates of expected biomass in lakes, rivers and streams, and
- j) estimating the non-fishing mortality of eels as a result of other water resource users (e.g. drainage and drain clearance, fish passage restrictions, pollution, irrigation works, flood control pumping etc).

72. Research commissioned by MFish to be undertaken in the 2006-07 fishing year is outlined in the 'Services' section of this plan. Proposed research for the 2007-08 fishing year is similarly noted.

Total allowable catch

73. The Fisheries Act 1996 contains provisions to ensure a stock is managed sustainably. A key measure is the government setting of a total allowable catch (TAC) for stocks. A TAC sets an upper limit on take from a fishery. When setting a TAC a number of specific and general provisions of the Fisheries Act 1996 are taken into account. These include:

- the maximum sustainable yield
- level of the stock's long term viability
- interdependence of stocks
- social, cultural and economic factors
- environmental principles
- information principles
- international obligations
- the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992
- effects on the aquatic environment
- relevant services, and
- other Crown statutory plans, policy statements, and management strategies

74. There are six stocks which each combine shortfin eel and longfin eel in the South Island. The TAC for each of these stocks has been set under section 13 of the Act (see Table 2 below for tonnages).

75. In contrast, the TACs for the North Island stocks were set under section 14, and longfin and shortfin eels are managed as separate stocks. Section 14 is used instead of section 13 on the basis that, because of the biological characteristics of a species, maximum sustainable yield is not easily calculated.

76. The Working Group concluded in May 2007 that there would be a higher risk to ensuring longfin eel sustainability over the longer term if fishing was undertaken to the full extent of the catch limits applied to all eel stocks. The risk to ensuring sustainability would be relatively less, yet still of consequence, if longfin eel continued to be caught at the level of recent catch (i.e. in the time period after catch limits were applied).

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