

# PAUA (PAU 5D) – FINAL ADVICE

## Minister's Preliminary Views

1 The Ministry of Fisheries (MFish) has presented two options for setting the Total Allowable Catch (TAC) and reducing the Total Allowable Commercial Catch (TACC) to halt the decline in the PAU 5D stock. The options are presented in Table 1.

**Table 1 Options for setting the TAC and TACC in PAU 5D for the 2002- 03 and 2003- 04 fishing years, and probabilities of an increase in biomass by 2007.**

Fishing Year		Option 1	Option 2	Status Quo
2002- 03	TAC (tonnes)	169.0	159.0	192
	TACC (tonnes)	124.0	114.0	148.9
2003- 04	TAC (tonnes)	154.0	134.0	192
	TACC (tonnes)	109.0	89.0	148.9
<b>Probability of the recruited biomass increasing by 2007</b>		At a TAC of 154 tonnes = 61.0%	At a TAC of 134 tonnes = 77.5%	37.2%
<b>Probability of the spawning biomass increasing by 2007</b>		At a TAC of 154 tonnes = 57.5%	At a TAC of 134 tonnes = 68.2%	41.8%

- MFish also proposed that consultation be carried out with the recreational fishing sector to determine appropriate measures to constrain the recreational catch, and that a new stock assessment be carried out in 2005, along with a review of the TAC, TACC and recreational management measures.
- Your initial position on this proposal was to support option 2, which provides for the TAC to be set at 159 tonnes for the 2002- 03 fishing year with a further reduction to 134 tonnes the following fishing year. Under this option, the TACC would be reduced from 148.81 tonnes to 114 tonnes for the 2002- 03 fishing year

with a further reduction to 89 tonnes the following fishing year. In your view, option 2 would appear to provide the best chance to reduce catches to a level that will halt the decline in the PAU 5D stocks and optimise the potential for a rebuild. Furthermore, the “stepped down” approach proposed by MFish will help to mitigate the social and economic consequences on the industry of a significant reduction to the current TACC.

- The recreational catch makes up a significant proportion of the total catch of PAU 5D. You supported MFish undertaking consultation with recreational fishers on ways to constrain the recreational catch within the 22 tonne allowance proposed for this sector. You noted that a significant amount of the recreational catch is taken from the statutory and voluntary non-commercial areas along the Otago and Southland coast. You stated an interest in receiving information on the health of the paua fishery in these recreational fishing areas.

## **Fishery Assessment**

### ***Submissions***

- **Dr Jeremy Prince** (fisheries assessment researcher, PAU 5D quota owner and diver) considers that while the stock assessments are the best that can be achieved with the data available, he also considers them to be inaccurate as:
  - Research surveys tend to survey relatively sheltered paua beds that can be monitored regularly within tight timeframes. Thus, research surveys inadvertently monitor a small subset of stocks with smaller sizes of maturity, which turn out to be the stocks most robust to fishing. Thus, the monitored trends tend to be more stable than the actual stocks.
  - Statistical zones used to report commercial catch contain 100s-1000s of disparate populations responding differently to different target fishing pressures.
  - Dr Prince considers that the result is that the stock assessments are modelling the decline of a large relatively unproductive stock, while it is actually a complex dynamic of small but highly productive stocks being fished unevenly by divers. He considers that the paua resources are more depleted than the assessments estimate (or the original biomass was larger and more productive than now estimated). He urges you to treat the assessments with caution as he believes they give an overly optimistic view of the resources.

### ***MFish Discussion***

- The model treats the whole of PAU 5B as if it were a single stock with homogeneous biology, habitat and fishing pressures. The PAU 5B stock, in reality, is highly heterogeneous with respect to all these factors. The effect of this simplification in the model, especially with respect to predictions, is unknown. Serial depletion, if it occurs, may cause the model results to be overly optimistic with respect to parts of the population that is being fished or surveyed. Hyperstability in CPUE could also cause model results to be overly optimistic.
- The MFish Shellfish Stock Assessment Working Group and the Plenary have reviewed the 2000 stock assessment for PAU 5D. This assessment constitutes the best information available, and MFish believes that the proposed TAC (and

TACC) has been developed using this information. Section 10 of the Fisheries Act 1996 requires that you make your decision based on the best available information. Therefore, the information on the stock in the stock assessment is the best available information and has been used to propose the TAC, and TACC for PAU 5D. Dr Prince does not supply any new information to support his views.

## **TAC, TACC, and Allowances**

### ***Submissions***

- The **New Zealand Paua Management Company** (NZPMC) (representing 171 shareholders; 72.7% of paua quota holders and 65% of paua quota) agrees that areas of the PAU 5D fishery are over-fished and require significant reductions in harvesting levels. It considers that the productive areas with the best water clarity have been the hardest hit, and that a TACC reduction is a crude, ineffective tool for addressing localised depletion.
- NZPMC have made an application to MFish for a special permit that they consider will:
  - Reduce harvesting pressure in the stressed areas in the 2002-03 year by specifying that 20 tonnes of paua quota be taken outside of the heavily fished areas of PAU 5D, being taken instead from less intensively fished areas in PAU 5D.
  - Use scuba and the 20 tonnes of quota to survey paua stocks in those parts of PAU 5D seldom commercially fished because of depth, sea condition or water turbidity.
  - Provide stock assessment information for a considerable part of the fishery, which was not covered in the NIWA survey that formed the basis of the 2002 stock assessment.
  - Undertake the survey work between 1 November 2002 and 1 March 2003 so that the results are available for decision making on the sustainability measures for 2003-04 year.
- NZPMC submits that the decision you make should take into account their special permit application.
- NZPMC note that neither of the options presented in the IPP take into account the localised depletion problem, or the effect of the special permit. They request that you defer any TACC reduction for the 2002-03 fishing year while their requested special permit provides additional information, but that PAU 5D must be included in the 2003-04 sustainability round.
- If you decide a TACC cut is warranted anyway, they submit that the impact of the special permit should be taken into account in determining the scale of the cut. If you decide to cut the TACC this year, they submit that the appropriate starting point is Option 1, but that the size of the cut should be reduced by 20 tonne to take into account the 20 tonne transferred catch specified in the special permit.
- The **New Zealand Seafood Industry Council** (SeaFIC) wishes to bring to your attention the suite of management proposals developed by NZPMC to address

issues across all paua fisheries (including contractual shelving arrangements and investment in reseeded technology and research).

- **Te Ohu Kai Moana (TOKM)** state that they support the special permit lodged by NZPMC as it will obtain information on areas not included in the PAU 5D assessment, reduce commercial effort in stressed areas, and provide information to enhance the present assessment. TOKM urges you to discuss with officials the effects of the special permit and the likelihood of it being granted. TOKM is prepared to put its support behind the project if the special permit is approved, provided you agree to defer any TACC reductions for 12 months. If the project does not proceed, TOKM reserves the right to reassess its position.
- **AP Musson** (PAU 5 commercial diver) supports Option 1 combined with a reseeded of 6,500 10 mm paua spat per month throughout the PAU 5D area.
- **Te Runanga o Ngai Tahu (TRONT)** submission outlines the collective views of Mahinga Kai Hi Ika (Customary Fisheries Unit) and Ngai Tahu Seafood (NTS). TRONT acknowledge the stock assessment that current harvesting levels are unsustainable, and that the IPP (p 186) acknowledges the oral evidence of Tangata Tiaki that customary harvesters are finding it increasingly more difficult to access paua.
- TRONT prefers Option 2. It believes the onus is on the paua industry to implement other measures (area closures, reseeded, MLS increases, micro-management and distribution of effort) if they wish to lessen the TACC reductions.
- NTS supports the position of NZPMS on management of the fishery.
- **Dr Prince** supports Option 2 as it offers the largest catch reduction, but he does not consider that it is sufficient. He considers a TACC of about 45 tonnes for 5-10 years is required if some stock rebuild is to occur.
- **Paul Young, Jason Lovett, and Theo White** (PAU 5D quota holders and divers) all agree that there has been a decline in the paua stocks and consider that Option 2 does not go far enough. They support the 40% reduction in the first year, the 2002-03 fishing year.
- **SJ Stanley** (PAU 5D quota holder and diver) agrees that there has been a decline in the paua stocks. He comments that the PAU 5B experience suggests a larger catch reduction, earlier, is more effective than having smaller reductions spread over time. He supports Option 2 to address the stock decline. He is concerned that the Ministry states that the recreational take is increasing in the face of declining stocks, and requests that the bag limit be reduced. He contends that, as the paua stocks recover, the Ministry needs to ensure that increasingly available paua are not taken by recreational fishers finding it easier to take more, as this would mean a transfer of catch from commercial to recreational fishers with no gain in fisheries management.

- **Lynda Young** (PAU 5 quota holder) submits that she prefers Option 2. She recommends that the reduction in harvest should apply to both commercial and recreational fishers.
- **Andrew Parker** (PAU 5 commercial diver) prefers Option 2.
- The **New Zealand Seafood Industry Council** (SeaFIC) reminds you that, in your final decision letter of 24 September 2001 for the 2001-02 year, you stated that MFish would complete a shelving policy during the coming year. SeaFIC requests an update on the status of this policy. In the meantime SeaFIC supports the use of the NZPMC shelving proposal as an option available to PAU 5D quota holders. MFish notes that no shelving arrangement was put forward for PAU 5D.
- **Te Ohu Kai Moana** (TOKM) prefer shelving options to TACC reductions, provided there is evidence that there will be full participation by all quota owners.
- **SJ Stanley** considers that industry shelving should be allowed in combination with TACC cuts, but with a cut-off date of 20 October by which fishers must have organised their shelving.
- **Andrew Parker** requests that large scale shelving of quota be available to reduce the harvest rather than TACC reductions. He considers shelving to be difficult to run and organise on a voluntary basis, so he recommends that MFish has a role in organising the shelving.
- **Dr Jeremy Prince** strongly supports quota shelving being ended, as it was intended as a short-term measure. In the long-term, it creates anomalies in the quota market, and energy is dissipated on chasing individuals about shelving quota instead of developing management plans.
- **Lynda Young** considers that a reduction in the TACC would be preferable to shelving.
- The **New Zealand Recreational Fishing Council** (NZRFC) considers that the depleted state of the PAU 5D fishery is the result of an unrealistically high TACC being set and the quota appeals being added to the TACC. They assert that the commercial industry has reaped the benefit of these high TACCs that have now resulted in the fishery declining. Recreational fishers are finding it harder to get paua, and are now getting most of their paua from recreational-only areas. NZRFC assert that these recreational-only areas still have good stocks, which they suggest indicates that the decline in the open areas is the result of commercial fishing activity. They are opposed to a bag limit reduction, as they claim that will only result in fishers fishing more frequently. They would consider more favourably the rotational closure of areas, which would have to be done in consultation with and support from local iwi and communities.
- NZRFC support Option 2 with a TAC of 159 tonnes and a TACC of 114 tonnes being set for the 2002-03 fishing year.
- **Option 4** accept that there is a significant decline in the paua stocks. They attribute this decline to mis-management by the Ministry through allowing quota

appeals to increase the TACC, through subdivision of PAU 5 resulting in subsequent increased commercial harvest in PAU 5A and 5D, and through failing to take action when there was a well-documented decline in biomass and catch-per-unit-effort. As a consequence, Option4 are totally opposed to bag limit reductions being used as part of the rebuild strategy for this fishery.

- The **Southcoast Underwater Club** (based in the Gore area and representing 75 members) claim that paua stocks have declined significantly in the area open to commercial fishing, but that stocks are still healthy in recreational-only areas where most recreational harvest is coming from. They consider that the commercial industry is causing the decline in these stocks. They, therefore, strongly oppose any reduction in bag limits for recreational fishers.
- **Peter Hayes** (recreational fisher based in the Tokonui area) claims that paua stocks have declined significantly as a result of the excessive commercial fishing in the area. He claims recreational fishers have been forced into the recreational-only areas. He is opposed to any bag limit reductions.
- **Theo White** (commercial and recreational fisher) does not support a reduction in the bag limit as he considers there is enough paua in the non-commercial areas to support recreational fishers.
- A petition was received signed by 22 recreational fishers from the Tokonui/Waikawa/Fortrose area; **RJ Chisholm, RW Poole, PS Poole, GC Harvey, HK McLean, S Hays, D Halliday, SJ Olive, CS Olive, JR Earwater, JJ Leith, SW Shirley, A Poole, Allan Strang, Russell Crosbie, Colin McCallum, Mervyn Crosbie, Chris Alcock, Robert Brunton, WG Brunton, IM Poole.** They have observed a decline in paua numbers in the Catlins since 1945 which they attribute to commercial fishers over-fishing the area, issuing of export licences for paua, certain ethnic groups pillaging paua, and customary permits. They are opposed to any bag limit reductions.
- **Te Whitinga Harris** (customary fisher belonging to a North Island iwi, who has been resident in Southland for 40 years) supports a bag limit reduction from 10 to 8 paua per day. He considers that 10 or even 8 fish, of the minimum legal size of 125 mm, comprise a considerable daily take.

## ***MFish Discussion***

### ***Management Options***

- No TAC has been set for PAU 5D. MFish notes your explicit statutory obligations that require you to set a TAC that maintains a stock at, or moves a stock towards, a level that can produce the Maximum Sustainable Yield (MSY). The 2002 stock assessment for PAU 5D determined that current biomass is less than the size that will support  $B_{MSY}$ . Under current catch levels, both the recruited and spawning biomass are expected to decline further by 2007.
- All submissions generally accept that the PAU 5D fishstock is in a depleted state and that a reduction in total catch is required to: (i) halt the decline in stock biomass, (ii) reduce exploitation rate to a more appropriate level, and (iii)

commence stock rebuilding. However, there are differing views on the rate and the mechanism to achieve these management objectives.

- In considering the way, and the rate at which, a stock is moved towards the biomass that will support maximum sustainable yield, you must have regard to such social, cultural and economic factors as you consider relevant. MFish considers that relevant factors that should be taken into account include the NZPMC special permit application, the issue of quota shelving arrangements, and the proposed “step down” approach of the TAC/TACC over a two-year period.

### *NZPMC Special Permit Application*

- As noted above, NZPMC have made an application (on 19 July 2002) to MFish for a special permit that they consider will:
  - Reduce harvesting pressure in the stressed areas of PAU 5D in the 2002-03 year.
  - Provide stock assessment information for a considerable part of the fishery that was not covered in the NIWA survey that formed the basis of the 2002 stock assessment.
  - The New Zealand Paua Management Company (NZPMC) requests that you defer any TAC/TACC reduction for the 2002-03 fishing year while their requested special permit provides additional information and transfers 20 tonnes of catch from stressed areas to less-fished areas in PAU5D. Te Ohu Kai Moana support NZPMC position, but if the special permit application is declined, they reserve their position to make further submissions. Ngai Tahu Seafood also support the NZPMC position
  - NZPMC consider that, if approved, the special permit proposal will negate the need for a TAC/TACC reduction in PAU 5D for the 2002-03 fishing year.
  - There are some areas of PAU 5D, particularly in northern PAU 5D, not usually fished for paua. This is because of depth, sea conditions, and water turbidity. Use of scuba gear would allow these areas to be fished. NZPMC propose to fish 20 tonnes of quota, using scuba, in these areas. This will transfer fishing effort from heavily fished areas within PAU5D to less fished areas within PAU 5D. No information is available on the status of these less-fished stocks. MFish notes that this proposal will not reduce the total catch across PAU5D or increase the abundance of the stock. It will, however, provide new stock assessment information.
  - NZPMC are proposing that you postpone any consideration of TACC reductions for 2002-03 while the special permit programme is undertaken to provide additional information. Or, if you wish to make quota cuts, NZPMC prefers Option 1, with the size of the cut reduced by the 20 tonnes transferred catch specified in the special permit. This would result in a TACC reduction of only 4.81 tonnes. NZPMC contend that it is inappropriate for you to fix in place sustainability measures for 2002-03 that cannot be comprehensively reviewed for the 2003-04 fishing year.

- MFish received the special permit application on 19 July 2002 and has not yet evaluated the scientific merit of the special permit proposal. An assessment of the effect on the PAU 5D stocks and of the effect on other stakeholders will also need to be made. If the special permit is approved, the effect of the trial on the PAU 5D stocks will need to be determined, and the results reviewed by the MFish stock assessment working group, prior to reliance being placed on this approach being used as a sustainability measure.
- A major aspect of the special permit proposal is the use of scuba to take paua. This is a significant departure from the current practice of free diving only and will necessitate MFish undertaking significant consultation with tangata whenua and other stakeholders.
- MFish notes that there is not universal support for the special permit proposal amongst commercial quota holders. One submission from a commercial quota holder does not agree with the NZPMC proposals, and consultation meetings held in Invercargill and Dunedin during July 2002 revealed varying support. It is unlikely that MFish can undertake full consultation and consideration of the special permit application for a decision to be made in time for your decisions for PAU 5D for 2002-03. For the special permit to have met these deadlines it would need to have been lodged early in 2002.
- The current stock assessment and submissions accept that the fishery has declined. A new stock assessment in 2003, using any additional information, is unlikely to deliver a significantly different outcome. Delaying the introduction of the proposed sustainability measures may mean that a greater reduction in TACC is required in the future to ensure a halt in the decline and to provide for a rebuild of the PAU 5D stocks. MFish considers that the decline in the PAU 5D stock is sufficiently serious that remedial action needs to commence in the 2002-03 fishing year.
- The options presented in the IPP involve a staged TACC reduction over two years, so the TACC reduction proposed for the second year (2003-04) can be reviewed if additional information becomes available. However, the timing of the proposed special permit survey and the MFish stock assessment process means that it is not certain any new information from the special permit research will be available for next year's process.
- In summary, the proposed special permit, if approved, will not reduce total catch in PAU 5D, nor will it result in an increase in the abundance of the stock. It is unlikely that MFish can undertake full consultation and consideration of the special permit application for a decision to be made in time for your decisions for PAU 5D for 2002-03. The special permit would transfer fishing effort to less fished areas, and lead to new stock assessment information. If available, this information can be taken into account during the review of the PAU 5D TAC/TACC next year.
- MFish was not able to take the NZPMC special permit application into account when developing the IPP because MFish had not received it. The IPP and your



preliminary views were sent out for consultation on the 9 July 2002. MFish received the special permit application on 19 July 2002.

### *Shelving*

- NZPMC has proposed a shelving mechanism that they have asked you to consider for PAU 5B and PAU 7, but not for PAU 5D. Some individual quota owners support the use of shelving, while others oppose it for PAU 5D. One quota owner recommends that MFish has a role in organising the shelving. The NZPMC does not propose shelving for PAU 5D. In the absence of development and consideration of a robust agreement for a shelving arrangement in this fishery, including the mechanism by which ACE would be shelved, quantities and timeframes of the agreement, MFish does not believe that shelving is a relevant factor to take into account when determining management options for this fishery at this time. However, MFish note that stakeholders could develop a shelving arrangement in future to compliment any measures you may impose for the coming fishing year.
- SeaFIC requested an update on the status of the shelving policy. The MFish shelving policy is currently subject to internal discussion, and is yet to be finalised. The shelving policy will be consulted on, externally, this year.

### *TAC/TACC*

- If you decide to reduce the TACC for 2002-03 NZPMC submit that it should be at the level of Option 1 but that the size of the cut should be reduced by the 20 tonnes of transferred catch in the special permit. AP Musson also supports Option 1.
- The other commercial stakeholders making submissions on TACC setting options support Option 2:
- Option 2 supported as proposed in the IPP with the TACC reduction staged over two years; SJ Stanley, Andrew Parker, Lynda White
- Option 2 supported but with the TACC reduction over one year; Paul Young, Jason Lovell, Theo White
- Option 2 supported as it offers the largest catch reduction, but considers that the reduction is still not large enough; Dr Jeremy Prince
- Te Runanga o Ngai Tahu and the New Zealand Recreational Fishing Council both support Option 2.

### *TACC Setting Options*

- The stock is clearly well below the ideal target level. All submissions generally accept that the PAU 5D fishstock is in a depleted state and that a reduction in total catch is required.
- Projections show that at the current levels of catch and minimum legal size, in 2007 there is a 37.2% probability that recruited biomass will be greater than current biomass, and a 7.7% probability that it will be greater than the recruited biomass estimated for the period between 1985–87. Similarly, in 2007 there is a

41.8% probability that spawning biomass will be greater than current spawning biomass, and a 16.1% probability that it will be greater than the spawning biomass estimated for the period between 1985–87. Projections also indicate that the exploitation rate will increase to around 79% by the end of 2007.

- At the current catch levels and minimum legal size, the biomass is likely to decrease further and is unlikely to move toward the reference levels. These results suggest that the current catch level is not sustainable and will likely cause the stock to decrease further from reference levels of biomass in the next five years.
- MFish considers the need for rebuilding the PAU 5D stock to be sufficiently urgent that the TACC reductions need to commence in the 2002-03 fishing year. There is considerable stakeholder support for Option 2, and several stakeholders propose more stringent measures. Option 2 provides the best chance to reduce catches to a level that will halt the decline and optimise the potential for a rebuild of the stock. MFish is, therefore, recommending that the first stage of option 2 be implemented for the 2002-03 fishing year.
- Without prejudging the NZPMC special permit application in any way, the permit will not provide any information to assist in your decision for the 2002-03 fishing year.
- Option two proposes the TAC be reduced to 134 tonnes over the next two years. At a TAC of 134 tonnes, there is a 77.5 % probability that the recruited biomass will increase by 2007, similarly there is a 68.2 % probability that spawning biomass will increase by 2007. (MFish notes that the model estimates these probabilities assuming a constant catch of 134 tonnes.) Under the two year phased reduction proposal for PAU 5D set out in Table 2, the probabilities of halting declines in recruited and spawning biomass could be expected to be slightly lower than those projected as a single reduction by the model.
- A “stepped down” approach, as proposed in the IPP, will mitigate the social and economic consequences on the industry of a significant reduction to the TACC, and will allow for any new information (whether from the NZPMC special permit proposal, or from any other source) to be considered when setting the TAC and TACC for 2003-04.
- The proposed TAC/TACC options are presented in Table 2.

**Table 2: Proposed options for setting a TAC for 2002- 04**

<b>Fishing Year</b>	<b>TAC (tonnes)</b>	<b>TACC (tonnes)</b>
<b>2002- 03</b>	159.0	114.0
<b>2003- 04</b>	134.0	89.0

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**Probability of recruited biomass increasing by 2007**      At a TAC of 134 tonnes = 77.5%

**Probability of spawning biomass increasing by 2007**      At a TAC of 134 tonnes = 68.2%

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## Customary allowance

### *Submissions*

- **Te Runanga o Ngai Tahu** states that they will exercise caution in managing the customary harvest until there is a marked improvement in the paua stocks.
- **SJ Stanley** considers that the customary allowance of three tonnes has been set at a realistic level.

### *MFish Discussion*

- Paua is a highly valued kaimoana species for tangata whenua. No issues were raised in the submissions that alter the proposed setting of a three tonne allowance for Maori non-commercial interests as recommended in paragraph 51 of the PAU 5D section of the IPP.

## Recreational allowance

### *Submissions*

- **NZRFC** accept 22 tonnes as being the recreational allowance, but they wish it to be noted that they do not accept this tonnage as being an on-going cap on recreational harvest. They contend that there is no evidence of increasing recreational fishing pressure in the PAU 5D fishery.
- **Option4** reject the philosophy of setting an allowance for recreational fishing. They also contend that there is no evidence of the recreational catch increasing based on the evidence from the recreational surveys. They express concern that the recreational, customary and commercial harvest information used is for different years as it does not take into account paua population fluctuations or the influence of weather conditions. They do not accept 22 tonnes as a recreational allowance as it is based on the lowest harvest estimate from the 1996 survey, the harvest estimate was higher for the 1991-92 survey. They express concern as to why the latest harvest estimate from the 1999-2000 survey has not been used.
- **Southcoast Underwater Club** also contend there is no evidence of increasing harvest of paua. They note that while there are more divers being trained to use scuba, few are trained to use snorkel. Thus, there has been little impact on paua stocks due to the inability of these new divers to use snorkel, and because most are not confident enough to dive in the conditions encountered on paua beds.
- **SJ Stanley** contends that the recreational allowance has been over-estimated in the IPP. He asks that the recreational harvest in the non-commercial areas be subtracted from the recreational allowance.

## ***MFish Discussion***

- **Option4** reject the philosophy of setting an allowance for recreational fishing. However, under section 21 of the Fisheries Act 1996, in setting or varying any TACC, you are required to allow for Maori non-commercial interests and recreational interests.
- Currently, there is no TAC set for PAU 5D. In setting the TAC, MFish recommends you set a recreational allowance of 22 tonnes. This proposal is based on the best information available, the 1996 national diary survey of recreational fishers.
- Each of the recreational harvest surveys 1991-92, 1996, and 1999-2000 have incorporated improvements in the scientific methods and analysis from earlier surveys. An independent review of the research programme for the 1999-2000 is currently being undertaken, with the research provider's harvest estimate reports and the reviewer's report to be considered by the Recreational Research Planning Group in September. MFish has used the most recent of the available harvest estimates, the 22 tonnes from the 1996 survey. Once the 1999-2000 harvest estimate review process has been completed the estimate will be able to be taken into account in considering a revised allowance for recreational fishing in the sustainability round next year (2003-04).
- MFish notes that SJ Stanley is incorrect in his statement that recreational catches within the non-commercial areas should be excluded from the recreational allowance. You are required by section 21 of the Fisheries Act to make an allowance for recreational fishing in the quota management area. The PAU 5D fishstock area includes the non-commercial areas and the yield estimate relates to the entire QMA. The customary and recreational allowances within the TAC therefore need to include catches taken within the non-commercial areas.

## **Daily Bag Limit and Closed Area Considerations**

### ***Submissions***

- Several submissions received from commercial quota holders requested that the same percent reduction be applied to the recreational sector (and in one submission to customary as well) as is applied to commercial.
- The **New Zealand Recreational Fishing Council (NZRFC)**, **Option4**, and all other submissions from recreational fishers, apart from one, oppose any bag limit reduction. NZRFC also report, from the limited consultation they have had with their sector because of time constraints, that rotational closing of areas would be more acceptable than reducing the bag limit.
- NZRFC, and **Southcoast Underwater Club (SCUC)** report that the majority of recreational fishers are getting their paua from the non-commercial areas, and that the paua stocks in those areas are healthy. Similar views were also expressed at consultation meetings MFish undertook with recreational fishers at Invercargill on 1 July, at Dunedin on 2 July, and with the South Recreational Fisheries Advisory

Committee on 3 August 2002. MFish Compliance staff based in the southern area concur with these views about the state of the stocks in the non-commercial areas.

### ***MFish Discussion***

- The submissions received and the consultation with recreational fishers point towards a significant proportion of the recreational harvest being taken from the non-commercial areas. These sources reported that the stocks of paua in these areas are in a healthy state at present, and that some are in an extremely healthy state. Recreational fishers report that they preferentially harvest in the non-commercial areas as that is where they can most easily fish – both because of availability of paua and ease of access. Recreational fishers report that they have no problem obtaining their daily bag limits in the non-commercial areas, in a relatively short time, but that when fishing in the open areas, this is not possible. This anecdotal information is supported by information from MFish compliance staff.
- MFish undertook to consult with recreational fishers about management measures that would ensure that the recreational harvest remained within the recreational allowance. NZRFC, Option4, and SCUC contend that there is no evidence of increasing recreational harvest of paua in PAU 5D, or that the harvest is exceeding the proposed allowance. Numbers of recreational paua fishers in Southland and Otago are believed to be static. Although diving is becoming an increasingly popular leisure activity, paua may only be taken by snorkel. Recreational fishers point out that most new divers are trained in the use of scuba, but are not confident with snorkelling, especially in the conditions where most paua are available. Dive schools do not appear to be training divers to snorkel or encouraging the use of snorkel gear. Therefore, the increasing number of recreational divers appears to be having little impact on paua stocks.
- Having considered this information, MFish agrees that the recreational paua catch in PAU5D has probably remained stable over recent years.
- Paua are sedentary in nature, with a larval phase of only a few days. This means that paua do not recruit over large distances. These factors lead to localised depletion, but can also lead to areas of very healthy stocks where harvesting pressure is lighter.

Areas in PAU 5D closed to commercial fishing by regulation are:

- Waipapa Point to Howells Point
- Waikouaiti Bay
- Seacliff
- Otago Harbour
- Otago Peninsula
- Taieri River Mouth
- Tokomairiro River Mouth
- Clutha River

Voluntary non-commercial areas

are:

- Mahaka Point
  - Picnic Point
  - Long Point
  - Catlins River
  - Shag Point
- MFish considers that, because of the nature of paua stocks, and the size and location of most of the non-commercial areas, it is likely that most of the non-commercial areas contain discrete paua stocks. If most recreational harvest were from these areas, then alterations to the daily bag limits in these areas would probably not contribute significantly, in the short term, to the rebuild of PAU 5D outside of these areas. An analysis of the probability of recruitment from the non-commercial areas to the remainder of the fishery shows:
    - Waipapa **Point to Howells Point, Otago Harbour, and Otago Peninsula** are large lengths of coastline where paua are unlikely to recruit to the open areas because of the distance involved (except from the outer margins).
    - The **Taieri, Tokomairiro, and Clutha River** mouths, and **Waikouaiti Bay** are separated from other suitable paua habitat by sandy beaches, as are the south end of **Long Point**, north of **Catlins River**, north of **Picnic Point**, south of **Mahaka Point**.
    - The northerly current flow up the east coast of the South Island makes it unlikely that paua will recruit from the non-commercial area on the south of the **Long Point** peninsula into paua habitat to the north, or from the **Catlins River** to the open area to the south.
    - In summary, MFish considers that the level of recreational harvest in PAU 5D is most likely stable, that paua stocks in the non-commercial areas are healthy, and that a significant proportion of the recreational catch is being taken from the non-commercial areas. Because of the nature of paua stocks, and the size and location of most of the non-commercial areas, alterations to the daily bag limits in these areas would probably not contribute significantly, in the short term, to the rebuild of PAU 5D outside of these areas.
    - The recreational harvest has been estimated at 22 tonnes for PAU 5D, around 15% of the total harvest. If most of the non-commercial catch were being taken from the non-commercial areas, the benefit of lowering the daily bag limit in the open areas would be low.
    - MFish, therefore, does not consider that changes to management measures for recreational fishers (such as bag limits, rotational area closures) are required at present. MFish will re-assess whether the paua stocks in the non-commercial areas are remaining healthy, and whether any significant shift of recreational harvest pressure into the open areas occurs, as the stock rebuilds.

## Other sources of mortality

### *Submissions*

- **Option4** criticise the proposal in the IPP as it does not include an estimate of mortality associated with the return of undersize paua in the commercial fishery in the allowance made for other sources of mortality.
- **SJ Stanley** does not agree with the estimated level of illegal harvest. He contends that paua taken with scuba, exceeding bag limits, and undersize catch are part of the recreational allowance and will have been picked up in the recreational harvest surveys. He also considers that poaching nearly always occurs in the non-commercial areas where the paua are more plentiful; therefore he contends that the allowance for illegal harvest should be reduced by 75 percent.

### *MFish Discussion*

- The IPP proposes to set an allowance of 20 tonnes for other sources of fishing-related mortality. This comprises the estimate of illegal take within the fishery but does not incorporate incidental handling mortality of sub-legal paua.
- MFish has no quantitative information on the level of handling mortality that has been reviewed by the Shellfish Fisheries Assessment Working Group. Research is being undertaken to further investigate and quantify this source of mortality. MFish also has no evidence on the level of illegal harvest picked up in the recreational harvest surveys, but by the very nature of this activity, it is unlikely that a large proportion of it is reported.
- MFish notes that SJ Stanley is incorrect in his statement that poaching within the non-commercial areas should be excluded from the allowance for other sources of mortality. You are required by section 21 of the Fisheries Act to make an allowance for all other mortality to the stock caused by fishing. The PAU 5D fishstock area includes the non-commercial areas. The customary and recreational allowances within the TAC include catches taken within the non-commercial areas.

## Environmental Considerations

- The purpose of the Fisheries Act is to provide for utilisation of fisheries resources while ensuring sustainability. In providing for utilisation, the Act requires that the adverse effects of fishing on the aquatic environment are avoided, remedied or mitigated.
- The Minister is also required to take into account the following three environmental principles, which specify an obligation to:
  - Maintain the long-term viability of associated or dependent species;
  - Maintain the biological diversity of the aquatic environment; and
  - Protect habitats of particular significance for fisheries management.
- Associated or dependent species are defined by the Act as any non-harvested species taken or otherwise affected by the taking of any harvested species. The



method for commercial harvest of paua in PAU 5D is hand-gathering while free-diving. Catch Effort Landing Return data indicates that there is no bycatch of any associated or dependent species in this fishery. There is limited information to provide an assessment of the effects of harvesting paua on either biological diversity or associated and dependent species. While interactions between paua, kina (sea urchins), and seaweeds have been identified, there is no evidence that these interactions are of significant magnitude to impact on associated and dependent species, or on biological diversity.

- No habitats of particular significance for fisheries management have been identified within PAU 5D. It is considered unlikely that the method of hand-gathering would have a demonstrable adverse effect on the environment.
- Stakeholders have raised no relevant environmental considerations in their submissions on the IPP.

## **Social, Cultural, and Economic Factors**

### ***Submissions***

- **Jason Lovett** supports having the 40% reduction in the TACC in one year. He acknowledges that the reduction was staged over two years to minimise the social and economic costs. But he considers that having all of the reduction in one year will only have short-term effects that are out-weighed by the long-term benefits from having a shorter recovery period.
- **Theo White** also supports having the 40% reduction in the TACC in one year as it will allow a greater chance of the paua stocks recovering. He discounts the economic impact of the reduction, as he claims that everyone who has been in the PAU 5D fishery for the last few years will have known that a large TACC reduction was required. The reduction in the TACC will simply provide him with extra time to seek alternative income if he needs it.
- **Option4** is concerned that this section in the IPP does not consider the social and cultural impact on recreational and customary fishers of the mis-management of this fishery, and the inability of these sectors to access this food fishery. Option4 are concerned that the IPP focuses exclusively on the socio-economic impacts on the commercial sector.

### ***MFish Discussion***

- In the IPP, MFish identified that it was seeking detailed information from commercial fishers, through their submissions, on the economic impact of the two proposed options of TAC/ TACC reductions. This information has not been provided.
- Despite a lack of detailed information from stakeholders, MFish considers that a reduced TACC will have a significant adverse economic impact on the PAU 5D industry through decreased revenue from the sale of paua. A decrease in export earnings will also result as a significant quantity of the PAU 5D catch is exported. This has the potential to lead to adverse employment and downstream economic

implications to the fishing industry. There may be some effect on port prices, with a reduction having an obvious adverse effect on commercial paua fishers.

- A further consequence of a reduced TACC may be an increase in quota trade prices. The economic impact on owners of large parcels of quota may be lessened if there was an increase in the capital value of quota.
- Although it is appropriate to take into account these social and economic implications of a reduction in TACC, MFish believes there is an urgent need to halt the decline in stock biomass of the PAU 5D fishery and commence stock rebuilding. If measures are not taken, there is a high risk that the stock will continue to decline. This will have serious long-term social and economic implications. A phased reduction in the TACC will help to mitigate the full economic and social consequences for fishers of a significant reduction of the TACC. It will also provide an opportunity to adjust business activities to take into account the measures required to halt further decline in the fishery.
- MFish notes that some quota owners support a TACC reduction. Some also support a 40% reduction in the first year as they consider the benefit to the fish stocks, and the long-term advantages would outweigh the short-term economic impacts.
- The stock assessment indicates that a substantial cut in the TACC is required. The reduction in the TACC is not likely to be short-term or of a temporary nature. Having regard to the submissions, the status of this fishery, the timeframe for rebuild, and that no major industry organisation has volunteered to organise shelving for PAU 5D, MFish considers that a TAC/TACC reduction is required.
- Option4 did not provide any socio-economic information on the impacts on recreational fishers. MFish recognises that paua are very important to recreational and customary fishers. MFish recognises that the decline in the paua stocks has resulted in non-commercial fishers having to undertake a large proportion of their fishing in the non-commercial areas. Most of these non-commercial areas are accessible to the public, and MFish understands that non-commercial fishers are still able to easily obtain their bag limits within these areas.

## Compliance Information

### *Submissions*

- **Southcoast Underwater Club** expresses concern about the level of illegal take from the fishery. They request that this issue is addressed in order to reduce the illegal take.
- **Jason Lovett** contends that paua taken from poachers should be subtracted from the commercial quota, the offenders should be fined the port price for each kg of paua they are apprehended with, and the revenue generated should be returned to the quota holders in the area on a pro-rata basis.

## ***MFish Discussion***

- MFish notes that paua poaching is affecting the interests of all sectors; customary, recreational, commercial, and environmental. MFish has paua poaching as one of its higher priorities for compliance operations. Recent operations have resulted in the disruption of a number of major black market operations. The high value of paua on overseas markets is one factor in why paua poaching will continue to be a nationwide problem.
- The proposal to return the proceeds of paua busts to the commercial sector is not in accordance with the existing legislation, and MFish does not recommend this approach.

## **Other Issues Raised in Submissions**

### ***PAU 5D Fisheries Plan***

- **SJ Stanley** requests that an effective fisheries plan is developed and implemented in the coming year.
- **New Zealand Recreational Fishing Council (NZRFC)**, and **Option4** recommend that non-commercial stakeholders should develop fisheries plans for the non-commercial areas. NZRFC request that these plans should be managed by a committee that reflects the local community and recreational interests.

### ***Sub-division of PAU 5D***

- **Southcoast Underwater Club** contend that PAU 5D is too large an area to manage, and they request that the area be sub-divided; with a northern area from the Waitaki River to Nugget Point, and a southern area from Nugget Point to Waiu River. **SJ Stanley** requests that there be a sub-division of PAU 5D to achieve a spread of fishing effort.

### ***Minimum Legal Size***

- **Paul Young** requests that the Minimum Legal Size (MLS) for paua be increased from 125 to 130 mm to allow them longer to breed.
- **Te Whitinga Harris** requests that Maori fishing practices be adopted, and that the takeable size be restricted to paua between 40 and 120 mm supported by rāhui (temporary closure of areas). He contends that taking smaller paua when they are tender makes sense, and protecting the large paua allows them to mature to ensure the survival and sustainability of the species.

### ***Non-commercial Areas***

- **SJ Stanley** requests MFish to get all stakeholders together to rationalise the closed areas. He contends that there are some commercially fished areas that are important to recreational and customary fishers that should be exchanged for some non-commercial areas, which are relatively inaccessible to non-commercial fishers.

- **AP Musson** requests that a review be undertaken of the closed areas, in order to make them available for commercial harvesting and reseeded.

### ***Stock Assessment***

- **Theo White** submits that MFish should undertake a stock assessment in both the 2003-04 and the 2004-05 fishing years, as he considers assessments need to be made in those years to assess the effectiveness of the 40% reduction in 2002-03 in the rebuilding of the stock.
- **SJ Stanley** considers that it is more important to have more frequent stock assessments in PAU 5D than PAU 5B. He submits that the stock assessment should be undertaken every two years
- **Lynda Young** submits that the stock assessment should be undertaken every three years.

### ***MFish Discussion***

- MFish recommended in the IPP that PAU 5D fishers should collaborate in the development of a fisheries plan that includes a fishery rebuild strategy, prior to 2005. However, in the submissions received, there has been limited interest expressed in developing a fisheries plan.
- Most of the other issues raised in the submissions; sub-division of PAU 5D, changes in the legal size of paua, and rationalisation of the non-commercial areas, MFish considers would be best dealt with by development of a fisheries plan for PAU 5D by all stakeholder groups. MFish recognises that the development of a management plan for PAU 5D would be of significant value. MFish encourages stakeholders to develop a plan, and include a rebuild strategy for the stock and other options for stock management. MFish is able to provide advice and assistance in developing and implementing such a plan.
- MFish agrees that PAU 5D is a large area to manage. However, fine-scale reporting areas were introduced for PAU 5D in 2001. This provides the necessary information for stakeholders to manage and spread their fishing effort.
- MFish has a research strategy to provide fishery-independent information on abundance and size, size frequency distributions of commercial catches, and growth data to underpin stock assessments and estimate yield for all major paua fishstocks. The most recent stock assessment for PAU 5D was carried out in March 2002. In the IPP, MFish indicated that the PAU 5D stock assessment would be reviewed in 2005. MFish does not believe that a new stock assessment in 2004, as requested in two submissions, would be cost effective. Little new information would be available to assess the effects of the management measures being undertaken and any rebuilding of the stock one year after the proposed TACC reduction in 2002-03.

### **Conclusions**

- The current PAU 5D biomass is less than the size that will support the MSY. Under current catch levels, both the recruited biomass and spawning biomass are

expected to decline further by 2007. Measures are therefore required to halt the decline in stock biomass in the 2002–03 fishing year, with the intention of taking future measures to rebuild the stock to a level that will support the MSY.

- MFish proposes to set a TAC for the 2002–03 fishing year. The 2002 stock assessment model is used as a basis on which to set this TAC. MFish proposes to set a non-commercial allowance of 25 tonnes; with a 3 tonne allowance for customary interests, a 22 tonne allowance for recreational interests, and to allow 20 tonnes for other sources of mortality.
- Two options were presented to set a TAC and TACC for the 2002–03 fishing year. Each option has an associated probability (risk) of achieving the required management objectives of halting the decline in recruited and spawning biomass, and reducing the exploitation rate. The greater the reduction in TAC, the greater the probability of achieving these objectives. However, a reduction in TAC has social and economic implications that must be taken into account.
- Your initial position letter of July 2002 signalled that you supported Option 2 as the larger TAC and TACC reductions had a better chance of halting the decline in the stocks.
- From the submissions, there is general acceptance amongst stakeholders that PAU 5D stocks have declined and that a reduction in removals is required. However, there are differing views on the rate and the mechanism to achieve these reductions.
- The New Zealand Paua Management Company (NZPMC) has lodged a special permit application in order to provide additional stock assessment information. NZPMC have requested that you defer any TACC reduction for the 2002-03 year until this additional information is available for consideration for the 2003-04 sustainability round. SeaFIC, TOKM, and Ngai Tahu Seafood support the NZPMC proposals.
- The current stock assessment and submissions accept that the fishery has declined. A new stock assessment in 2003, using any additional information, is unlikely to deliver a totally different outcome. Delaying the introduction of the proposed sustainability measures may mean that a greater reduction in TACC is required in the future to ensure a halt in the decline and to provide for a rebuild of the PAU 5D stocks. MFish believes it is important to commence that process now. Additional information in future will support future decisions. Further, the timing of the proposed special permit survey and the MFish stock assessment process means that any new information from the special permit may not be available for next year's process.
- It is unlikely that MFish can undertake full consultation and consideration of the special permit application for a decision to be made in time for the proposed survey to commence on 1 November 2002, and certainly not in time for your decisions for PAU 5D for 2002-03. For the special permit to have met these deadlines it would need to have been lodged early in 2002.

- Shelving has been approved in some other paua fisheries as a short-term measure to mitigate the socio-economic effects of a significant TACC reduction. NZPMC has proposed a shelving mechanism that they have asked you to consider for PAU 5B and PAU 7, but not for PAU 5D. SeaFIC and TOKM wish you to consider the NZPMC shelving proposal for PAU 5D. Some individual quota owners support the use of shelving, while others oppose it for PAU 5D.
- No major industry organisation has indicated that it is prepared to organise shelving in PAU 5D. The stock assessment also indicates that a substantial reduction in catch is required. The reduction in the TACC is not likely to be short-term or of a temporary nature. MFish notes that there is no shelving proposal for you to take into account in making your decision.
- In the event you proceed with a TACC reduction for 2002-03, NZPMC request that you use Option 1 as your starting point, with the size of the cut reduced by the 20 tonnes of catch transferred to less fished PAU5D under their proposed special permit. This would mean a reduction in the TACC of only 4.81 tonnes for the 2002-03 fishing year. One individual quota holder also supports Option 1. Three individual quota holders support Option 2. Another four quota holders support Option 2 but consider that it does not go far enough; they request that the 40% reduction be made in the first year, 2002-03. One of these latter quota holders considers that this reduction is still not sufficient.
- MFish considers that the decline in the PAU 5D stock is sufficiently serious that remedial action needs to commence in the 2002-03 fishing year. Option 2 provides the best chance to reduce catches to a level that will halt the decline in the biomass of the PAU5D stock and optimise the potential for a rebuild. MFish is, therefore, recommending that the first stage of option 2 be implemented for the 2002-03 fishing year with the TACC reduced from 148.9 tonnes to 114 tonnes. The options presented in the IPP involve a staged TACC reduction over two years, so the TACC reduction proposed for the second year (2003-04) can be reviewed if additional information becomes available.
- In the IPP, MFish identified that it was seeking detailed information from commercial fishers, through their submissions, on the socio-economic impact of the two proposed options of TAC and TACC reductions. This information has not been provided. There is no additional information to that contained in paragraphs 57-62 of the PAU 5D section of the IPP. Although it is appropriate to take into account the social and economic implications of a reduction in TACC, MFish believes there is an urgent need to halt the decline in stock biomass of the PAU 5D fishery and commence stock rebuilding. If measures are not taken, there is a high risk that the stock will continue to decline. This will have more serious long-term social and economic implications.
- No substantive information was received in submissions to cause an amendment be made to the allowances proposed in the IPP for recreational, customary, and other sources of fishing mortality. Option4 expressed concern that recreational harvest used to set the recreational allowance was based on the lowest estimated harvest from the 1996 recreational fishing survey, rather than a higher estimate from the 1991-92 survey or the most recent 1999-2000 survey. MFish has used

the most recent available survey estimate from 1996. The 1999-2000 survey has yet to be reviewed and considered by the MFish Recreational Research Planning Group. The options presented in the IPP involve a staged TACC reduction over two years, so the recreational harvest from 1999-2000 can be considered for any adjustment of the recreational allowance for the second year (2003-04).

- The recreational catch makes up a significant proportion of the current total catch with 22 tonnes estimated as having been harvested by recreational fishers in 1996. MFish undertook to consult with recreational fishers about management measures that would ensure that the recreational harvest remained within the recreational allowance. Based on the information available from submissions and consultation, there is no evidence that the harvest is increasing or exceeding the proposed allowance. The evidence also points to the majority of the recreational harvest being taken from the non-commercial areas. Because of the nature of paua stocks, and the size and location of most of the non-commercial areas, alterations to the daily bag limits in these areas would probably not contribute significantly, in the short term, to the rebuild of PAU 5D outside of these areas. MFish, therefore, does not consider that any additional management measures (such as bag limits, rotational area closures) are required at present.
- MFish proposes to reassess whether the paua stocks in the non-commercial areas are remaining healthy, and whether any significant shift of recreational harvest pressure into the open areas occurs as the stock rebuilds and as new information (for example from recreational surveys) comes to hand.
- MFish does not have any socio-economic information on the impacts on recreational and customary fishers, but MFish recognises that paua are very important to these stakeholders. MFish recognises that the decline in the paua stocks has resulted in non-commercial fishers having to undertake a large proportion of their fishing in the non-commercial areas. Most of these non-commercial areas are accessible to the public, and MFish understands that non-commercial fishers are still able to obtain their bag limits within these areas.
- MFish recommended, in the IPP, that PAU 5D fishers should collaborate in the development of a fisheries plan that includes a fishery rebuild strategy, prior to 2005. MFish considers most of the other issues raised in the submissions (sub-division of PAU 5D, changes in the legal size of paua, and rationalisation of the non-commercial areas) would be best dealt with by development of a fisheries plan for PAU 5D by all stakeholder groups. However, in the submissions received, there has been limited interest expressed in developing a fisheries plan.
- MFish has a research strategy to provide fishery-independent information on abundance and size, size frequency distributions of commercial catches, and growth data to underpin stock assessments and estimate yield for all major paua fishstocks. The most recent stock assessment for PAU 5D was carried out in March 2002. In the IPP, MFish indicated that the PAU 5D stock assessment would be reviewed in 2005. MFish does not believe that a new stock assessment in 2004, as requested in two submissions, would be cost effective as little new information would be available to assess any rebuilding of the stock one year after the proposed TACC reduction in 2002-03.

- The current stock assessment and submissions accept that the fishery has declined. Projections show that at the current levels of catch and minimum legal size, the biomass is likely to decrease further and is unlikely to move toward the reference levels. These results suggest that the current catch level is not sustainable and will likely cause the stock to decrease further from reference levels of biomass in the next five years.
- A new stock assessment in 2003, using any additional information, is unlikely to deliver a significantly different outcome. Delaying the introduction of the proposed sustainability measures may mean that a greater reduction in TACC is required in the future to ensure a halt in the decline and to provide for a rebuild of the PAU 5D stocks. MFish considers that the decline in the PAU 5D stock is sufficiently serious that remedial action needs to commence in the 2002-03 fishing year. A phased reduction in the TACC will help to mitigate the full economic and social consequences for fishers of a significant reduction of the TACC.
- Based on the information provided in the IPP, the 2002 stock assessment, and the submissions received, MFish considers that the first stage of Option 2 setting the TAC, reducing the TACC, and setting of allowances should be implemented for the 2002-03 fishing year.

## **Final Recommendations**

- MFish recommends that you:
  - a) agree to set a TAC for PAU 5D of 159 tonnes for the 2002-03 fishing year. Within this TAC set:
    - i) an allowance for customary Maori interests of 3 tonnes;
    - ii) an allowance for recreational fishing interests of 22 tonnes;
    - iii) an allowance for other sources of fishing mortality of 20 tonnes;
    - iv) a TACC of 114 tonnes