Summary of OMP development for Inaccessible and Gough

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This document should be read in conjunction with MARAM/TRISTAN/2014/FEB/03 – a rather technical document that gives the full description of the OMPs developed for Inaccessible and Gough islands.

How healthy are the stocks?

Ideally one would want to manage a resource such that the maximum sustainable yield (MSY) could be taken. As there is always uncertainty about at exactly what abundance level the resource would provide this, a sound and cautionary management goal is to keep the biomass ABOVE the level that would provide the MSY. One also needs to realize that as one pushes the biomass closer to "*K*" – the biomass level before there was no exploitation – the sustainable yield of the resource will decline (due to factors such as overcrowding, competition for limited resource etc.) until it becomes zero. So pushing the resource close to *K* is not a sensible management goal. Maximum sustainable yield typically occurs at about 0.5 *K* or a little less.

Recent assessments of Inaccessible and Gough have indicated that for both islands:

- Current spawning biomass[1] is > 0.8 *K*.
- Current exploitable biomass[2] is > 0.7 *K*

The top two plots in Figure 1 show the sustainable yield (SY) curves estimates from the stock assessments for both islands, indicating the current biomass positions on each curve. Only the right sides of these curves are shown; they "turn over" towards the left and go through the origin (the zero point where the axes cross).

SY can also be shown in relation to catch rate (CR), and this is done in the bottom two plots in Figure 1. These plots also show the target CRs for the OMPs recommended below for each island as vertical dashed lines. Note that two lines are shown for Gough, as the OMP recommended there involves changing this target over time.

Conclusion: These stocks are healthy and could sustain higher catches which would reduce the biomass levels closer to the point at which the maximum sustainable yield could be achieved. However this would also reduce the catch rate so that fishing costs per lobster caught would rise.

[1] Spawning biomass is the mass of lobsters that are sufficiently large in size to reproduce.
[2] Exploitable biomass is the mass of lobsters that are above the minimum size limit for the fishery

OMP development – management goals

- As with the OMP developed for Tristan, the management targets for Inaccessible and Gough relate to target catch rates (CRs).
- There is a trade-off choice to be made between higher future TACs and higher future catch rates.
- Biological risk to the resource in the longer term is not a real concern at this time.
- If the resource declines in the future, TACs will be reduced under the formula proposed to facilitate the resource growing again.
- To address fishery stability, TACs are restricted to change (up or down) by no more than 5% each year. However if the resource declines sharply, this downward adjustment constraint is overridden.
- Although there was a recent sharp increase in catch rates at Gough (over 2003-2009), those catch rates appear to have been the result of a pulse of unusually good recruitment and are not expected to be sustained, so some reduction from the 2009 peak catch rate is to be expected even if there were no fishery.

Inaccessible

Figure 2 compares four candidate management procedures (CMPs) considered for Inaccessible. A constant catch of 70 MT each year is also shown.

- With regards to biological risk (the Bsp plot) – these CMPs are all very similar, indicating expected Bsp/K values which are very healthy at all times into the future for all four CMPs considered.
- Note that the impact of the OLIVA is taken into account in the models. The actual impact from the OLIVA on the juveniles, whatever its size, will become evident in the performance (catch rate) of the fishery only around the year 2015.
- There is a trade-off choice to be made between future higher TACs and higher CRs. All expected CRs remain above 4 kg/trap/day into the future.
- The top plot shows the TACs to be expected on average. The future reality will not be as certain. The bottom plot shows five possible TAC series which could eventuate in the future under the recommended OMP, which is CMP3+metarule2 described in MARAM/TRISTAN/2014/FEB/03.
- In MARAM/TRISTAN/2014/FEB/03 (see Figures 2d-f of that document) scenarios were considered where extreme events in the resource could occur in the future.
- If the resource declines drastically because of such events, the TAC will be appreciably reduced, so that in due course the resource returns to a healthy level. The “metarule” comes into play if catch rates drop below 4 kg/trap/day, and allows the TAC to be reduced by more than 5% (up to 20%) in one year to safeguard the resource.
- The top plot in Figure 2 shows what is expected to happen for the future TAC “on average”. This is not exactly what WILL happen, which is subject to a level of uncertainty within which predictions cannot be made. The bottom plot gives examples of what COULD happen for future TACs.

Gough

Figure 3 compares three CMPs considered for Gough. The constant catch of 95 MT is also shown.

- With regards to biological risk (the Bsp plot) – these CMPs are all very similar, indicating expected Bsp/K values which are very healthy at all times into the future for all CMPs considered.
- There is a trade-off choice to be made between future higher TACs and higher CRs. All expected CRs remain above 2.4 kg/trap/day into the future.
- The bottom plot shows five possible TAC series which could eventuate in the future under the recommended OMP, which is CMP20+metarule1 described in MARAM/TRISTAN/2014/FEB/03.
- In MARAM/TRISTAN/2014/FEB/03 (see Figures 5 of that document) an extreme scenario was considered where 75% of all lobster die.
- If the resource declines drastically because of such an event– the TAC will be appreciably reduced, so that in due course the resource returns to a healthy level. The "metarule" comes into play if catch rates drop below 1.5 kg/trap/day, and allows the TAC to be reduced by more than 5% (up to 20%) in one year to safeguard the resource.
- The top plot in Figure 3 shows what is expected to happen for the future TAC "on average". This is not exactly what WILL happen, which is subject to a level of uncertainty within which predictions cannot be made. The bottom plot gives examples of what COULD happen for future TACs.
- The target CPUE for Gough starts above that for Inaccessible, and then ends below it. The main reason for this "complication" is more stable longer term series of TACs (see Figure 3). In any case the two targets need not be identical. The bottom plots in Figure 1 indicate that on average the CR for Inaccessible would be more than that for Gough when both populations are hardly fished. Therefore an appropriate target CR for Gough is lower than that for Inaccessible, because one seeks roughly similar levels of reduction below the pre-exploitation abundance for optimal use.

CPUE performance in 2013 season and expected TACs for 2014

Figures 4a and b show the past CPUE trends for each resource – both for the commercial longline and the biomass survey series. The nominal CPUE values for the 2013 season are also indicated.

- CPUE at Inaccessible is very high – the TAC for Inaccessible is thus expected to increase in the near future.
- CPUE at Gough appear to be down slightly from previous years, but is still high compared to historic values.
- Note that under the CMPs, the TAC for 2014 is based on the average CPUE over the 2011, 2012 and 2013 seasons.
- **The TAC for Gough for 2014 is consequently expected to increase by 5% (to 100 MT).**

- **The TAC for Inaccessible for 2014 is consequently expected to increase by no more than 5% (~74 MT).**
- The final TAC calculation will be conducted once all the longline CPUE data have been verified and the GLM standardization model run on these data. The GLM CPUE values are unlikely to be very different from the nominal values already calculated.

Figure 1: The estimated relationship of sustainable yield (SY in MT) against either the spawning biomass (Bsp) or exploitable biomass (Bexp) relative to their unexploited values (*K*) is shown in the top two plots. The purple circles show current estimated biomass values in those plots. The bottom two plots show SY against catch rate (CR in kg/trap which is proportional to the exploitable biomass); the vertical dashed lines in the bottom plots mark the CR target for the recommended CMPs (the range in the case of Gough, where this target starts higher and is moved lower over time for a more stable longer term series of TACs).

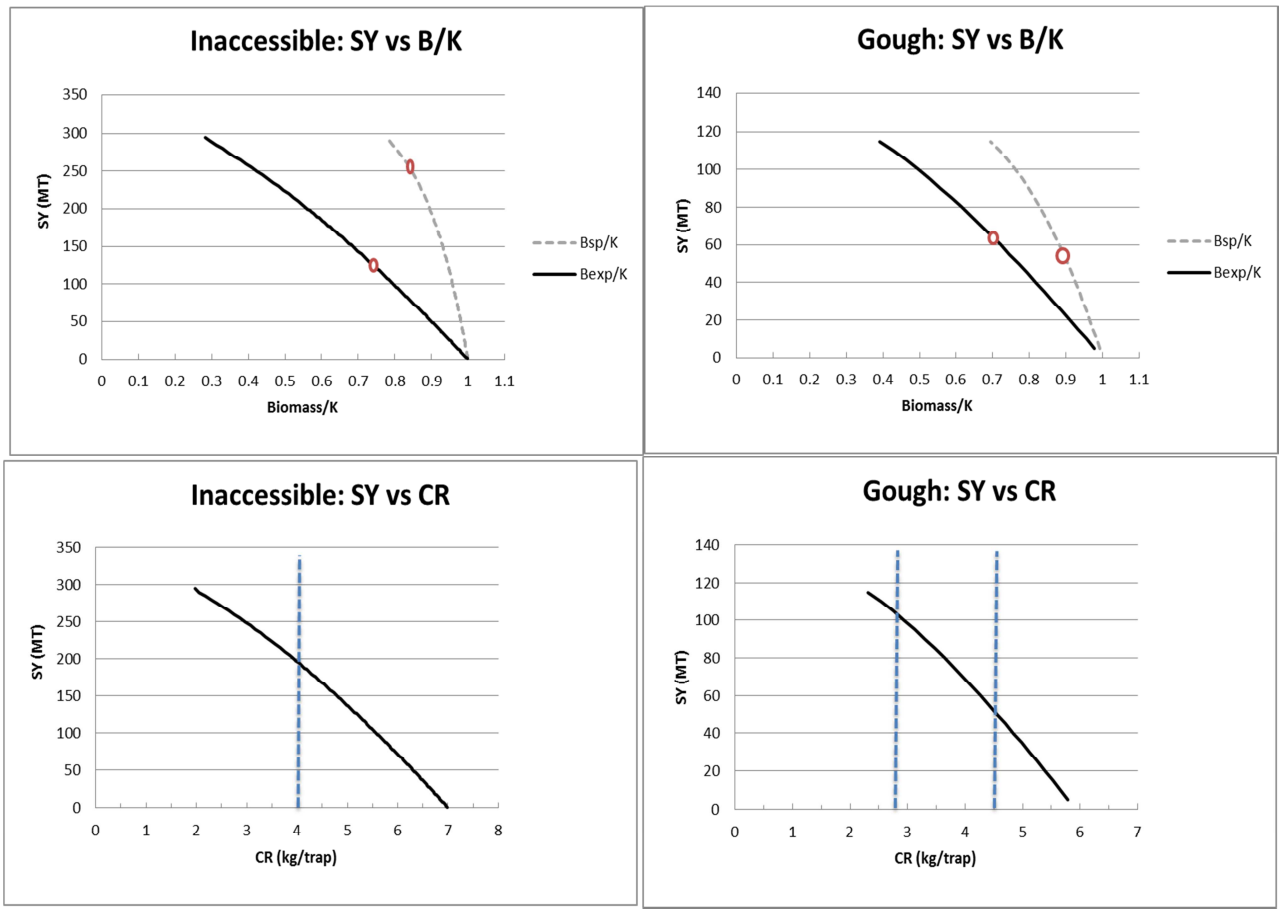
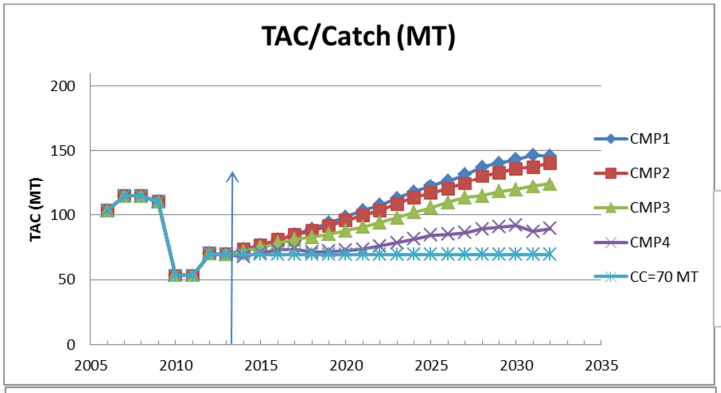
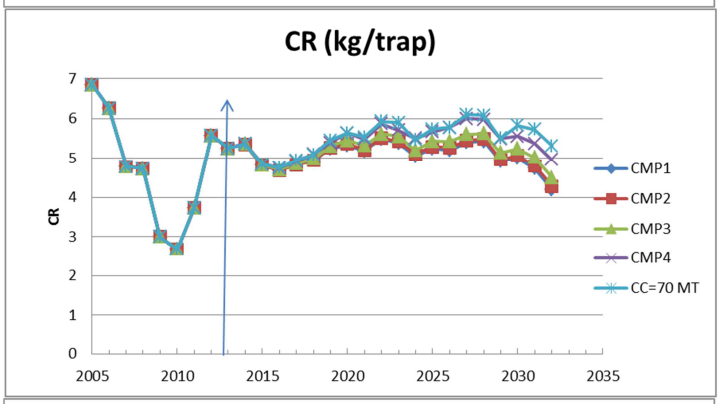
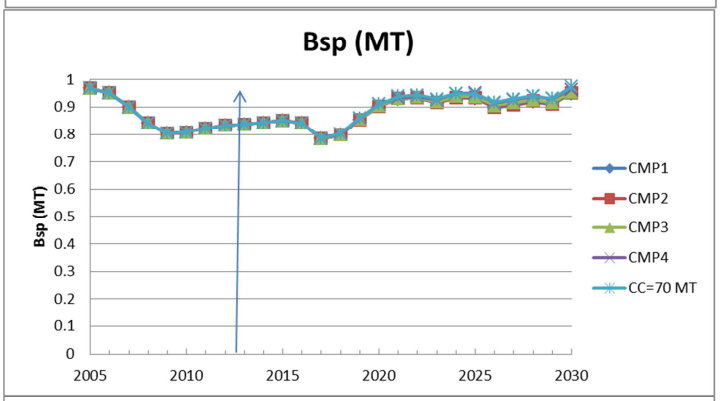


Figure 2: Predicted outcomes under CMPs considered for Inaccessible.



CMP1 = Itarg = 4.0; α=10; IACC=5%
CMP2 = Itarg = 4.0; α=**5**; IACC=5%
CMP3 = Itarg = 4.0; α=**2.5**; IACC=5%
CMP4 = Itarg = **5.0**; α=10; IACC=5%





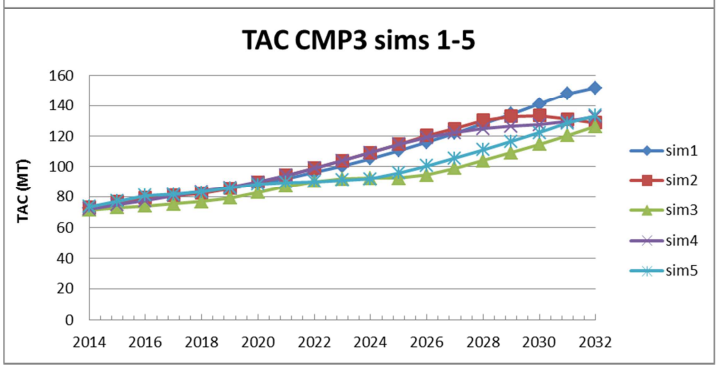
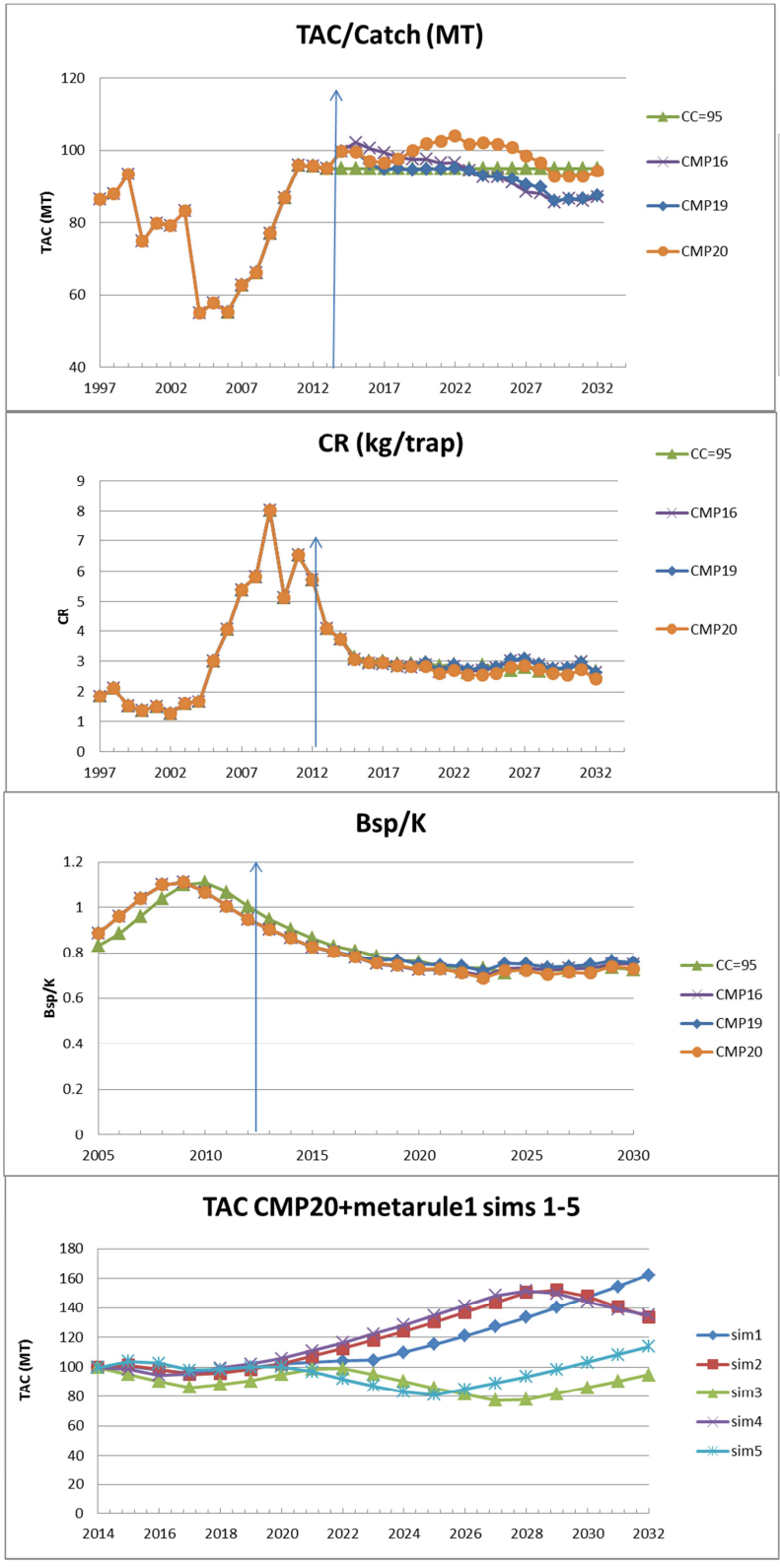


Figure 3: Predicted outcomes under theCMPs considered for Gough.



CC=95 (constant future catch of 95 MT)
CMP16= Itarg = 4.25-3.00 over first 4 years; α=10; IACC=**5%**
CMP19= Itarg = 4.50-3.00 over first 4 years; α=10; IACC=**5%**
CMP20= Itarg = 4.50-2.80 over first 4 years; α=10; IACC=**5%**

Figure 4a: Inaccessible CPUE trends showing the 2013 season nominal value.

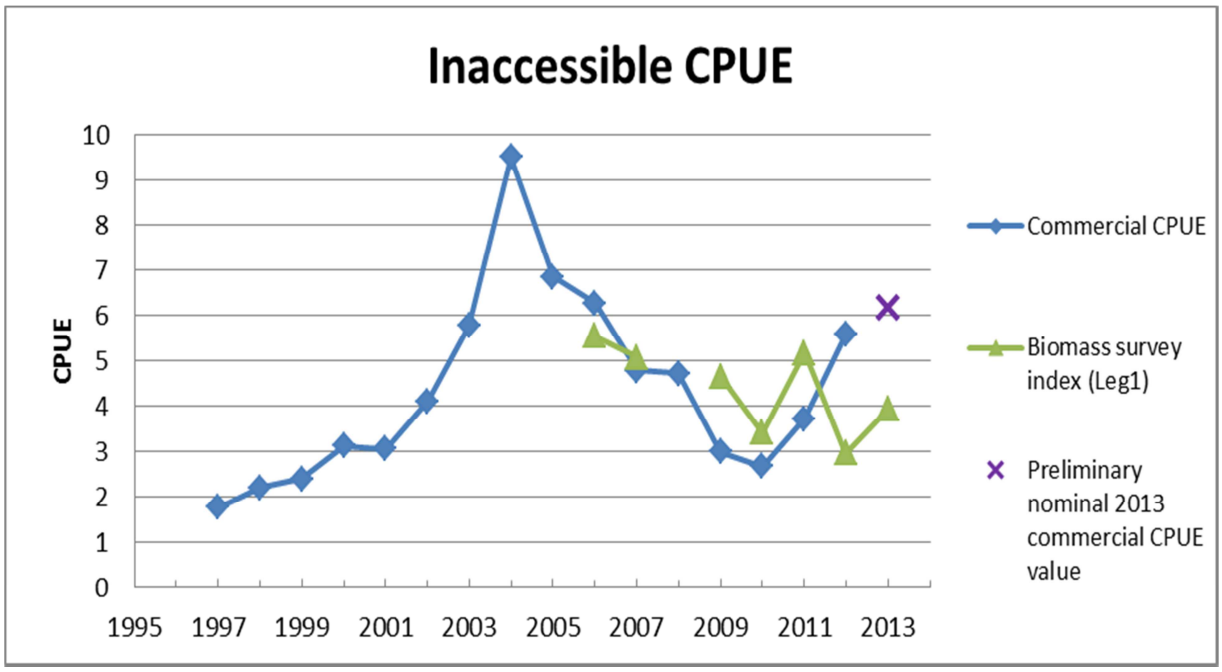


Figure 4b: Gough CPUE trends showing the 2013 season nominal value.