

## ORH Harvest Control Rules

### *Standard Ministry HCR Procedures*

The process followed by the Ministry has a long-established history.

The TACC-setting process must conform to section 13 (2) of the 1996 Fisheries Act, which states:

The Minister shall set a total allowable catch that -

- (a) maintains the stock at or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks; or
- (b) enables the level of any stock whose current level is below that which can produce the maximum sustainable yield to be altered -
  - i. in a way and at a rate that will result in the stock being restored to or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks; and
  - ii. within a period appropriate to the stock, having regard to the biological characteristics of the stock and any environmental conditions affecting the stock; or
- (c) enables the level of any stock whose current level is above that which can produce the maximum sustainable yield to be altered in a way and at a rate that will result in the stock moving towards or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks.

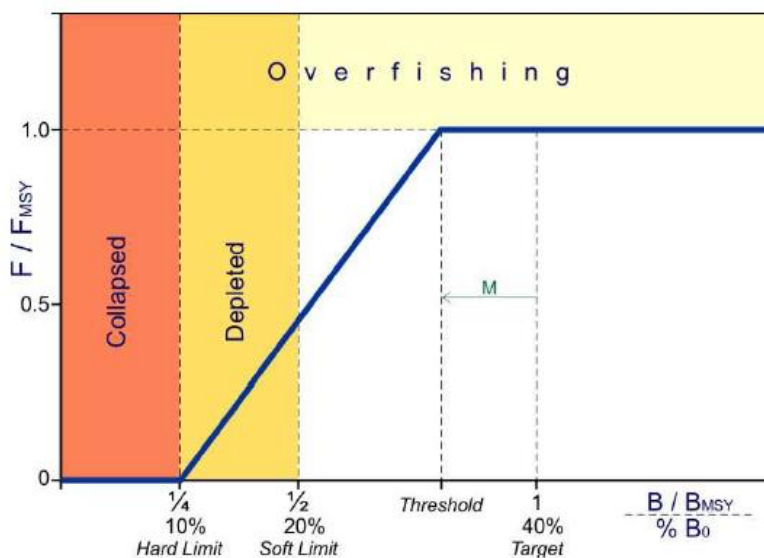
The Harvest Strategy Standard for New Zealand Fisheries (MPI 2008), outlines the form of the Harvest Control Rule (HCR) which, by default, is used to inform sustainable harvesting of all New Zealand fisheries. It consists of three core elements:

- A specified target based upon MSY-compatible reference points (e.g.  $B_{MSY}$  and  $F_{MSY}$ ), or better, about which a stock should fluctuate with at least a 50% probability of achieving the target.
- Soft limit (default of 50%  $B_{MSY}$  or 20%  $B_0$  whichever is higher) that triggers a requirement for a formal, time-constrained rebuilding plan when the probability that stock biomass is below this soft limit is greater than 50%.
- Hard limit (default of 25%  $B_{MSY}$  or 10%  $B_0$  whichever is higher) below which fisheries should be considered for closure when the probability that stock biomass is below this hard limit is greater than 50%.

The status of fisheries and stocks is characterised according to these reference points (RPs):

- If the MSY-compatible fishing mortality rate,  $F_{MSY}$ , or an appropriate proxy, is exceeded on average (over 3 to 5 years), **overfishing** is deemed to have been occurring, as stocks fished at rates exceeding  $F_{MSY}$  will ultimately be depleted below  $B_{MSY}$ .
- A stock that is determined to be below the soft limit will be designated as **depleted** and in need of time-constrained rebuilding.
- A stock that is determined to be below the hard limit is designated as **collapsed**.
- The relationship amongst these various RPs and the management actions that should be invoked are illustrated (Figure 1) in the HCR outlined in the Operational Guidelines (MPI,

2011). The example is applicable only for high information stocks, such as the orange roughy stocks under assessment, where it is possible to estimate biomass relative to  $B_{MSY}$  and fishing mortality relative to  $F_{MSY}$  (or some other measure of fishing intensity). However, MPI (2011) notes that it can also be adapted to other, lower information situations. When biomass is between the target and the soft limit, management actions to reduce catch are to be taken to prevent stocks declining to the level of the soft limit. Besides TACCs, these could consist of measures such as changes in minimum legal sizes of fish caught (through, for example, increases in the minimum allowable mesh size of fishing nets), and closures of areas with high levels of catches of juveniles. MPI (2011) emphasizes that Figure 1 is primarily for illustrative purposes, to provide an example of one type of control rule that is likely to achieve the requirements of the HSS.



**Figure 1. Illustrative example of a harvest strategy control rule that would be in conformance with the Harvest Strategy Standard;  $M$  is natural mortality (from MPI, 2011)**

The requirements of the HSS are outlined in its Implementation Guidelines (MPI, 2011). These outline the MSY-compatible target and limit RPs as noted above, and the actions to be taken if and when stock biomass declines below the target. The latter include formal rebuilding plans when biomass is below 20%  $B_0$  and actions when current biomass is likely to be above soft and hard limits but below targets: Rebuilding Plans:

1. Science Working Groups (SWGs) will estimate the probability that current and/or projected biomass is below 50%  $B_{MSY}$  or 20%  $B_0$ , whichever is higher. If this probability is greater than or equal to 50%, SWGs should calculate  $T_{MIN}$  where  $T_{MIN}$  is the number of years required to rebuild in the absence of fishing.
2. SWGs will work with fisheries managers to define and evaluate alternative rebuilding plans that will rebuild the stock back to the target with a 70% probability within a timeframe ranging from  $T_{MIN}$  to  $2 * T_{MIN}$ .
3. The Ministry will provide advice to the Minister on a range of rebuilding plans that satisfy the  $T_{MIN}$  to  $2 * T_{MIN}$  time constraint (or an alternative that can be adequately justified), and the specified probability levels.
4. Once a rebuilding plan has been implemented, SWGs will regularly evaluate and report on the performance of the rebuilding plan.

5. The Ministry will provide advice to the Minister on appropriate TACCs to achieve the rebuilding plan.

Actions when current biomass is likely to be above soft and hard limits but below targets (or thresholds):

1. SWGs will provide best estimates and confidence intervals for current biomass and/or fishing mortality (or related biological reference points).
2. If current biomass is estimated to be between the target (or the threshold) and the soft limit, SWGs should work with fisheries managers to define and evaluate the TACC consequences of:
  - a. reducing fishing mortality proportionately to the estimated decrease in biomass below the target or threshold (or taking steps to approximate this for low information stocks), in order to avoid breaching either the soft or hard limits, and/or
  - b. reducing catch super-proportionately to the estimated decrease in biomass below the target or threshold (or taking steps to approximate this for low information stocks), in order to avoid breaching either the soft or hard limits.
3. If current biomass is estimated to be above some threshold, SWGs will work with fisheries managers to define and evaluate the TACC consequences of:
  - a. maintaining a constant  $F$  that will achieve the target biomass on average (or taking steps to approximate this for low information stocks), and/or
  - b. reducing catch proportionately to the estimated decrease in biomass towards the threshold (or taking steps to approximate this for low information stocks), and/or
  - c. increasing catch proportionately to the estimated increase in biomass above the threshold (or taking steps to approximate this for low information stocks).

Stocks will be considered to have been fully rebuilt when it can be demonstrated that there is at least a 70% probability that the target has been achieved and there is at least a 50% probability that the stock is above the soft limit.

In its consideration of TACC options, the Ministry follows the HSS.

The HCRs for the orange roughy fisheries seeking MSC re-certification are consistent with the HSS and associated Operational Guidelines and consist of the following:

- A stock assessment developed about every 4 years, with peer review provided by the Deepwater Fisheries Assessment Working Group (DWFAWG), to estimate the probability of current biomass and/or fishing mortality relative to limit and target reference points or ranges.
- Conduct of multi-year projections and to evaluate in a probabilistic manner, where the stock is and will be in future years in relation to the RPs. This is typically done for a base case model and for models which explore the main uncertainties in the assessment.
- The decision by the New Zealand Minister of Oceans and Fisheries on the setting of the TAC (and associated TACC) is consistent with HSS and informed by DWFAWG and stakeholder engagement; consultation during this step can result in additional projections undertaken by the Ministry.
- There is monitoring of the fishery and stock performance during projection period to ensure that stock status is not being compromised by the management actions.

### ***Management Strategy Evaluation***

The HSS and its associated Operational Guidelines describe the role of Management Strategy Evaluation (MSE) in the management system. MSE, rather than focusing solely on biological RPs, seeks to take into account the robustness of alternative management procedures and socio-economic implications of management decisions. MSE attempts to model and simulate the whole management process. It makes projections about the state of the fishery resources and other ecosystem parameters for a number of years into the future under a variety of decision-rule options. The management measures and rules that achieve the best results in terms of specified objectives can then be selected and applied. This procedure greatly assists in identifying management strategies that are resilient to uncertainties in scientific understanding. The HSS provides minimum performance standards, or minimum performance measures, for MSEs and does not restrict alternative management objectives, or innovative management strategies, or additional performance measures beyond this. It states that MSEs should be designed to ensure that:

- the probability of achieving the MSY-compatible target or better is at least 50%
- the probability of breaching the soft limit does not exceed 10%, and
- the probability of breaching the hard limit does not exceed 2%

The MSE developed by Cordue (2014) had higher performance characteristics than those required as a minimum by the HSS, with, for example, a zero probability of breaching the soft limit. This MSE, and the HCR developed at the same time, were reviewed by the DWFAWG (Reeve, 2014) and applied from 2015 (MPI, 2016, footnote on page 685). The MSE and HCR were reviewed and found to still be fit for purpose (Cordue, 2019), however, this review has not as yet been peer reviewed.

### ***Application of the HCR***

DWG Ltd will continue to apply the HCR to provide guidance on the setting of catch limits for these orange roughy fisheries. The output results from running the HCR will be provided to the Ministry to assist them in formulating the options and advice to the Minister.

DWG Ltd will ensure that, if there is a difference between the HCR recommended catch limits and those selected by the Minister, the lower limit of the two will be implemented and observed as a precautionary measure.

### ***Implementation Tools***

The tools to control fishing to achieve the objectives of the harvest strategy have not changed since the previous full certification assessment. To summarize, since 1986, fish stocks harvested by the major commercial fisheries in New Zealand fisheries waters, have been managed through a quota management system (QMS) using individual transferable quotas (ITQs). Each fish stock has 100,000,000 quota shares issued in perpetuity. The quota shares are a property right. This system is

fully described on MPI's website ([QMS link](#)) Within the QMS, fisheries sustainability objectives are achieved by setting an overall annual total allowable catch (TAC) that is consistent with the productivity of each stock. The TAC is apportioned amongst user groups such as the TACC for the commercial fishery, allocations for the customary and recreational sectors and an allocation to address other fishing-related mortality such as illegal fishing or accidental loss of fish from nets. Note, however, that there is no allowance for customary or recreational fisheries for orange roughy.

Regarding other fishing-related mortality, in its consideration of TACC options, the Ministry explicitly addresses whether or not illegal catch and misreporting are issues. Determination on whether or not adjustment to the TACC is required is based upon risk analyses undertaken by the Ministry as part of its advice to the Minister when he sets the TAC and TACC.

## References

- Cordue P.L., (2014). A Management Strategy Evaluation for orange roughy. ISL client report prepared for Deepwater Group Ltd. 42p. <https://deepwatergroup.org/wp-content/uploads/2021/11/Cordue-2014.-Management-Strategy-Evaluation-for-Orange-Roughy.pdf>
- Cordue (2019). Review of the Harvest Control Rule for orange roughy fisheries in New Zealand. ISL client report for DWG, August 2019. 28p. <https://deepwatergroup.org/wp-content/uploads/2021/04/09-Cordue-2019-HCR-Review-Final.pdf>
- MPI (2008). Harvest Strategy Standard for New Zealand Fisheries. October 2008. Ministry of Primary Industries. 30 pp.
- MPI (2011). Operational Guidelines for New Zealand's Harvest Strategy Standard. Revision 1. June 2011. Ministry of Fisheries. 80 pp.
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- MPI (2016). Fisheries Assessment Plenary, May 2016: stock assessments and stock status. Volume 2. Compiled by the Fisheries Science Group, Ministry for Primary Industries, Wellington, New Zealand. 1556 p.