INTERNATIONAL PACIFIC HALIBUT COMMISSION

HARVEST STRATEGY POLICY

(2025)

INTERNATIONAL PACIFIC HALIBUT COMMISSION

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ACRONYMS

DEP	Depleted
EC	Exceptional Circumstance
HCR	Harvest Control Rule
HSP	Harvest Strategy Policy
IPHC	International Pacific Halibut Commission
LIM	Limit
MEY	Maximum Economic Yield
MP	Management Procedure
MSAB	Management Strategy Advisory Board
MSE	Management Strategy Evaluation
NER	Net Economic Returns
NPUE	Numbers-per-unit-effort
OM	Operating Model
RSB	Relative Spawning Biomass
SB	Spawning Biomass (female)
SPR	Spawning Potential Ratio
SRB	Scientific Review Board
TCEY	Total Constant Exploitable Yield
THRESH	Threshold
U.S.A.	United States of America
WPUE	Weight-per-unit-effort

DEFINITIONS

A set of working definitions are provided in the IPHC Glossary of Terms, Acronyms and Abbreviations: https://www.iphc.int/the-commission/glossary-of-terms-and-abbreviations

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EXECUTIVE SUMMARY

The *IPHC Harvest Strategy Policy* (HSP) provides a framework for applying a consistent and transparent science-based approach to setting mortality limits for Pacific halibut (*Hippoglossus stenolepis*) fisheries throughout the Convention Area while ensuring sustainability of the Pacific halibut population. It defines biological, fishery, and economic objectives that apply to the development of a harvest strategy for Pacific halibut. It also identifies a management procedure and reference points for use in the harvest strategy to achieve the Commission's stated objectives. This policy, together with the *Protocol amending the Convention between Canada and the United States of America for the preservation of the [Pacific] halibut fishery of the northern Pacific Ocean and Bering Sea (1979)*, provides the basis to manage the risk to Pacific halibut fisheries and the Pacific halibut population.

The IPHC is responsible for determining the coastwide mortality limit and the allocation of this limit among eight (8) IPHC Regulatory Areas. The mortality limit in each IPHC Regulatory Area consists of all fishing mortality of all sizes and from all known sources, except for discard mortality of under 26-inch (U26) Pacific halibut from non-directed commercial (e.g. trawl) fisheries, which is accounted for at the coastwide level. The distribution of the mortality limit to each sector within an IPHC Regulatory Area is determined by Contracting Party domestic agencies. Therefore, this Harvest Strategy Policy is specific to the mortality limit in each IPHC Regulatory Area, across all sectors (i.e. TCEY).

Being a framework, the harvest strategy policy encompasses the entire process of the management procedure and decision-making process to determine mortality limits as well as other important considerations such as objectives, key principles, and responses to specific events. A harvest strategy, which may also be referred to as a management strategy, is the management framework necessary to achieve defined biological, fishery, and economic objectives for Pacific halibut.

Management Procedure (MP): A formulaic procedure to determine a management outcome (e.g. mortality limit) that produces a repeatable outcome and can be simulation tested.

Harvest Strategy: The framework for managing a fish stock, including the MP and objectives.

Harvest Strategy Policy (HSP): The harvest strategy and decision-making process that results in endpoint management outcomes.

A goal of the IPHC Harvest Strategy Policy is the long-term sustainable use (optimum yield) of Pacific halibut through the implementation of a harvest strategy that maintains the stock at sustainable levels while supporting healthy and accessible fisheries which includes maximising economic returns in directed commercial fisheries. The Commission's current priority objectives to achieve this goal are:

1. Maintain the long-term coastwide Pacific halibut female relative spawning biomass above a biomass limit reference point where the risk to the stock is regarded as unacceptable ($RSB_{20\%}$) at least 95% of the time;
2. Maintain the long-term coastwide Pacific halibut female relative spawning biomass at or above a threshold reference point that optimises fishing activities ($RSB_{36\%}$) at least 50% of the time;
3. Maximize the short-term coastwide yield while minimising annual changes in the short-term coastwide mortality limit, given the constraints above to ensure a sustainable fishery.

The harvest strategy will ensure fishing is conducted in a manner that does not lead to *overfishing*. Overfishing is defined as where the stock is subject to a level of fishing that would likely be greater than the level associated with maximum sustainable yield.

Overfished: when the estimated probability that coastwide female relative spawning stock biomass is below the limit reference point ($RSB_{20\%}$) is greater than 50%.

Overfishing: when the annual fishing intensity is higher than the level required to sustain maximum sustainable yield (MSY). The MSY fishing intensity is currently $F_{SPR=35\%}$ based on current understanding of Pacific halibut population dynamics and fishery characteristics. The MSY fishing intensity may be revised as new information becomes available.

A transparent and systematic approach to meet the objectives of the Harvest Strategy Policy is supported by a number of requirements. These include accounting for all mortality of all sizes and from all known sources; accounting for multiple sources of uncertainty including environmental and biological; balancing risk, cost, and catch; developing threshold and limit reference points as indicators for managing Pacific halibut; robust simulation testing of management procedures; and identifying circumstances when the harvest strategy may be reconsidered and possibly updated. One threshold reference point and one limit reference point are currently defined.

Reference point	Definition	Proxy
Threshold reference point SB_{THRESH}	The female dynamic spawning biomass level supporting maximum economic yield (SB_{MEY}) and healthy fisheries.	36% of the unfished female spawning biomass ($RSB_{36\%}$).
Overfished limit reference point SB_{LIM}	The female dynamic spawning biomass level where the ecological risk to the population and the risk to the health of the fisheries is regarded as unacceptable.	20% of the unfished female spawning biomass ($RSB_{20\%}$).
Depleted limit reference point SB_{DEP}	The female absolute spawning biomass level below which the potential for recovery is uncertain.	In development

The coastwide reference mortality limit from the management procedure is currently determined using the stock assessment and a fishing intensity (F_{SPR}). The reference SPR (43%) is linearly reduced when the stock status is estimated below 30% and is set to 100% (no fishing for directed fisheries) when the stock status (RSB) is estimated at or below 20% (SB_{LIM}). A rebuilding strategy must be developed if the stock is estimated to be below SB_{LIM}.

The management of Pacific halibut is an annual process with a coastwide mortality limit and allocation to each IPHC Regulatory Area decided upon by the Commission at each Session of the IPHC Annual Meeting with the input of management supporting information including mortality tables, the harvest decision table, stakeholder input, and any other requests by the Commission. A mortality table shows the resulting allocation of mortality limits to each sector within each IPHC Regulatory Area. The harvest decision table is a stock assessment output that provides an estimate of risk relative to stock trend, stock status, fishery trends, and fishery status for a range of short-term coastwide mortality levels including the coastwide reference fishing mortality.

Chapter 1 INTRODUCTION

The *IPHC Harvest Strategy Policy* (HSP) provides a framework for applying a consistent and transparent science-based approach to setting mortality limits for Pacific halibut (*Hippoglossus stenolepis*) fisheries throughout the Convention Area while ensuring sustainability of the Pacific halibut population.

It defines biological, fishery, and economic objectives that apply to the development of a harvest strategy for Pacific halibut. It also identifies a management procedure and reference points for use in the harvest strategy to achieve the Commission's stated objectives. This policy, together with the *Protocol amending the Convention between Canada and the United States of America for the preservation of the [Pacific] halibut fishery of the northern Pacific Ocean and Bering Sea (1979)*[1], provides the basis to manage the risk to Pacific halibut fisheries and the Pacific halibut population.

A harvest strategy developed under this policy will take available information about the Pacific halibut resource and apply a consistent and transparent science-based approach to setting mortality limits. A harvest strategy consistent with this policy will provide all interested sectors with confidence that the Pacific halibut fisheries are being managed for long-term economic viability, opportunity, and accessibility while ensuring long-term ecological sustainability of the Pacific halibut population. The implementation of a clearly specified harvest strategy will also provide the fishing industry with a more certain operating environment.

1.1 SCOPE

The IPHC Harvest Strategy Policy applies to the Pacific halibut population managed by the IPHC, and where overlap with domestic jurisdictional management exists (e.g. coordinated management between the IPHC and Contracting Party domestic agencies) the IPHC will seek to apply and encourage the adoption of this policy in negotiating and implementing cooperative management arrangements.

The IPHC is responsible for determining the coastwide mortality limit and the allocation of this limit among eight (8) IPHC Regulatory Areas (Figure 1). The mortality limit in each IPHC Regulatory Area consists of all fishing mortality of all sizes and from all known sources, except for discard mortality of under 26-inch (U26) Pacific halibut from non-directed commercial (e.g. trawl) fisheries, which is accounted for at the coastwide level. This mortality limit without U26 non-directed commercial discard mortality has been termed the Total Constant Exploitation Yield, or the TCEY, but mortality limit is used here.

The distribution of the mortality limit to each sector within an IPHC Regulatory Area is determined by Contracting Party domestic agencies. Therefore, this Harvest Strategy Policy is specific to the mortality limit in each IPHC Regulatory Area, across all sectors (i.e. TCEY).

[1] https://www.iphc.int/uploads/pdf/basic-texts/iphc-1979-pacific-halibut-convention.pdf

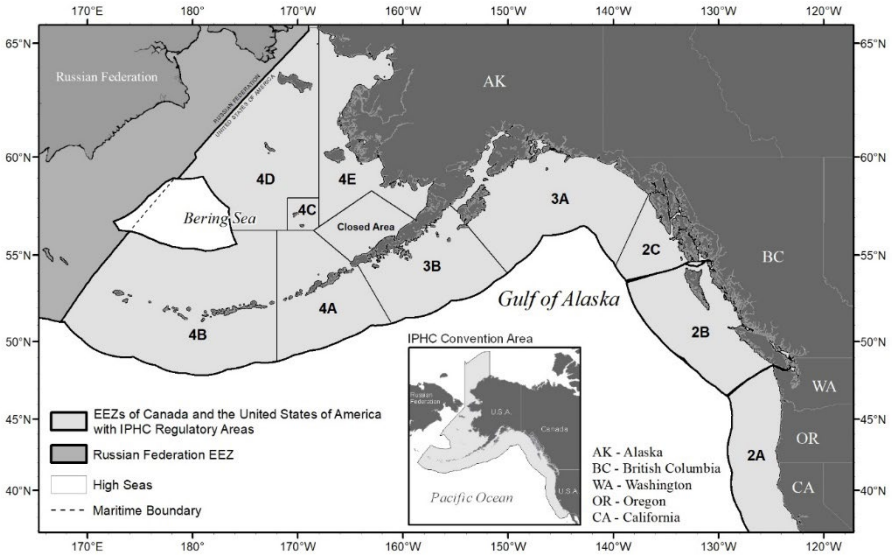

Figure 1. IPHC Regulatory Areas, where 4C, 4D, 4E, and the closed area are considered one IPHC Regulatory Area (4CDE). The IPHC Convention Area is shown in the inset.

1.2 WHAT IS A HARVEST STRATEGY POLICY (HSP)?

Being a framework, the harvest strategy policy encompasses the entire process of the management procedure and decision-making process to determine mortality limits (Figure 2) as well as other important considerations such as objectives, key principles, and responses to specific events. To determine mortality limits, the process begins with determining the coastwide scale of fishing mortality (the Management Procedure or MP). The decision-making process then occurs at the Annual Meeting of the IPHC where various forms of management supporting information are used by subsidiary bodies to provide a recommendation to the Commission of the coastwide mortality limit and allocation to each IPHC Regulatory Area. The Commission uses all this information to arrive at a final decision defining mortality limits for that year. Due to many considerations in this decision-making process, the final coastwide mortality limit may deviate from the coastwide reference mortality limit determined from the management procedure.

1.3 WHAT IS A HARVEST STRATEGY?

A harvest strategy, which may also be referred to as a management strategy, is the management framework necessary to achieve defined biological, fishery, and economic objectives for Pacific halibut. A harvest strategy will outline:

Objectives and key principles promoting sustainable, healthy, and accessible Pacific halibut fisheries.

Reference points and other quantities used when applying the harvest strategy.

Processes for monitoring and assessing the biological conditions of the Pacific halibut population and conditions of Pacific halibut fisheries in relation to biological and fishery reference levels (reference points).

Pre-determined procedures that adjust fishing mortality according to the biological status of the Pacific halibut stock and conditions of the Pacific halibut fisheries (as defined by monitoring and/or assessment). These procedures are referred to as harvest control rules or decision rules, and apply to the determination of a reference mortality limit before the decision-making process.

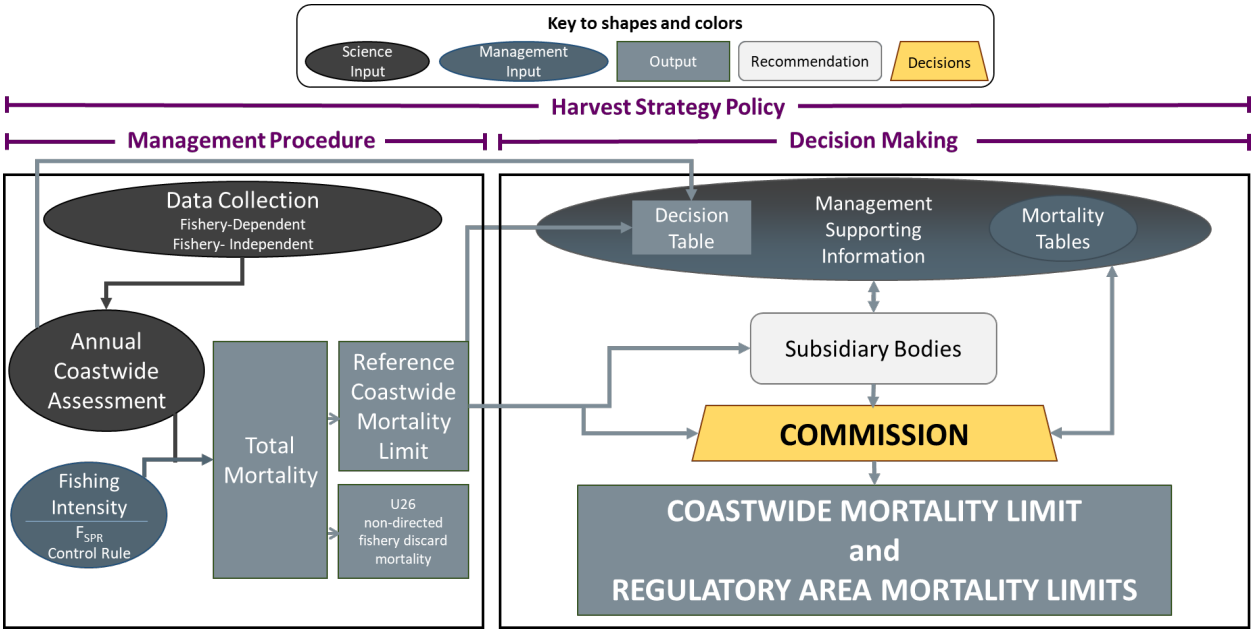

Figure 2. Illustration of the IPHC harvest strategy policy process to determine mortality limits showing the management procedure affecting the coastwide scale and the decision-making component, that considers inputs from many sources to distribute the coastwide mortality limit to IPHC Regulatory Areas and may result in the coastwide mortality limit deviating from the reference coastwide mortality limit determined from the management procedure.

A management procedure (MP) contains many of the components of a harvest strategy and is sometimes synonymous with harvest strategy. Here, we define an MP as the formulaic procedure that defines data collection, assessment, and harvest rules to determine the coastwide reference mortality limit. The MP has been shown to meet the objectives through simulation testing while also being robust to uncertainty and variability. Harvest strategy is a more general concept containing the MP as well as objectives. Simulation testing of MPs is done using Management Strategy Evaluation (MSE) operating models (OMs) with decision-making variability to ensure that a harvest strategy policy is robust to this uncertainty as well as other sources of uncertainty.

Management Procedure (MP): A formulaic procedure to determine a management outcome (e.g. mortality limit) that produces a repeatable outcome and can be simulation tested.

Harvest Strategy: The framework for managing a fish stock, including the MP and objectives.

Harvest Strategy Policy (HSP): The harvest strategy and decision-making process that results in endpoint management outcomes.

Chapter 2 OBJECTIVES AND KEY PRINCIPLES

A goal of the IPHC Harvest Strategy Policy is the long-term sustainable use (optimum yield) of Pacific halibut through the implementation of a harvest strategy that maintains the stock at sustainable levels while supporting healthy and accessible fisheries which includes maximising economic returns in directed commercial fisheries.

To achieve this goal the IPHC will implement a harvest strategy that minimises risk to the stock and pursues maximum economic yield (MEY) for the directed Pacific halibut fisheries. Maximising the net economic returns (NER) from the fishery may not always equate with maximising the profitability of the fishery. Net economic returns may consider interannual stability to maintain markets, and economic activity may also arise from opportunity for recreational and Indigenous fishing. The need to share the resources appropriately will also be considered where necessary.

The Commission's current priority objectives to achieve this goal are:

1. Maintain the long-term coastwide Pacific halibut female relative spawning biomass above a biomass limit reference point where the risk to the stock is regarded as unacceptable ($RSB_{20\%}$) at least 95% of the time;
2. Maintain the long-term coastwide Pacific halibut female relative spawning biomass at or above a threshold reference point that optimises fishing activities ($RSB_{36\%}$) at least 50% of the time;
3. Maximize the short-term coastwide yield while minimising annual changes in the short-term coastwide mortality limit, given the constraints above to ensure a sustainable fishery.

The first objective is a sustainability or biological objective, and the latter two objectives are fishery objectives. The objectives are hierarchical such that the previous objective must be met before considering the next, which is shown in Figure 3. This is especially important when evaluating MPs and leads to the first two objectives defining the acceptable MPs that ensure a sustainable population and fishery, and the last objective, balancing yield and variability in yield, helping to determine a reference MP that meets short-term goals within the sustainable set of MPs.

Performance metrics developed from measurable objectives are used to aid in the selection of an MP that best meets the objectives. At a minimum, a measurable objective must define a time-period over which the performance metric is calculated. Furthermore, a measurable objective may contain a threshold or limit and a tolerance for meeting that threshold or limit. For the Commission priority objectives, short-term refers to the next 4-13 years while the long-term refers to many generations in the future such that the stock and fishery would be fluctuating around an equilibrium when managed consistently. The first two objectives contain a limit or threshold and a tolerance allowing for a probabilistic performance metric to be calculated indicating a pass or fail for that objective (i.e. it either meets or does not meet the tolerance). The performance metrics for the final objective are calculated over a ten-year period from 4-13 years into the future and reported as the average yield and average variability. The trade-offs between these two can then be evaluated, requiring a decision to be made because there is typically no clear solution as one commonly improves while the other becomes less desirable. These performance metrics are used to determine the reference MP (see Section 3.7), although may be considered during the annual decision-making process.

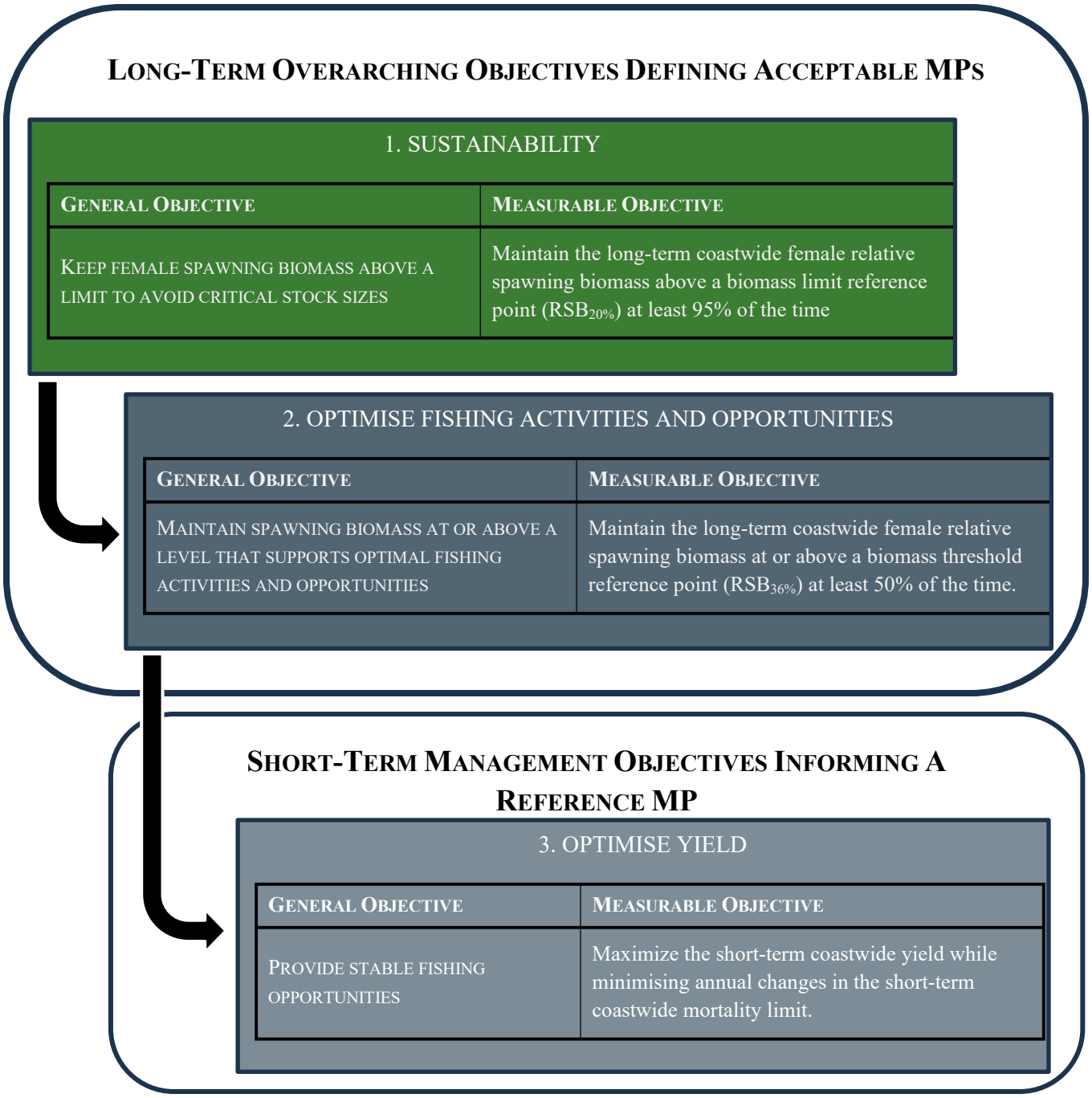

Figure 3. Priority objectives for the long-term sustainable management of Pacific halibut that support optimal yield and fisheries opportunities. The hierarchy of the objectives is shown by the arrows. The green colour indicates a sustainability or biological goal while the blue colours indicate fishery goals.

The harvest strategy will ensure fishing is conducted in a manner that does not lead to *overfishing*. Overfishing is defined as where the stock is subject to a level of fishing that would likely be greater than the level associated with maximum sustainable yield. Where it is identified that overfishing of the stock is occurring, action will be taken immediately to cease that overfishing to ensure long-term sustainability and productivity to maximise NER and other benefits.

The harvest strategy will also ensure that if the stock is overfished, the fishery must be managed such that, with regard to fishing impacts, there is a high degree of probability the stock will recover. In this case, a stock rebuilding strategy will be developed to rebuild the stock, with high certainty, to the limit female relative spawning biomass level, whereby the harvest control rules would then take effect to build the stock further to the threshold reference female relative spawning biomass level.

Overfished: when the estimated probability that coastwide female relative spawning stock biomass is below the limit reference point ($RSB_{20\%}$) is greater than 50%.

Overfishing: when the annual fishing intensity is higher than the level required to sustain maximum sustainable yield (MSY). The MSY fishing intensity is currently $F_{SPR=35\%}$ based on current understanding of Pacific halibut population dynamics and fishery characteristics. The MSY fishing intensity may be revised as new information becomes available.

Chapter 3 DEVELOPMENT OF THE HARVEST STRATEGY

The following requirements provide the basis for a transparent and systematic approach used when developing the Harvest Strategy Policy to assist in meeting the objectives defined in Chapter 2.

3.1 ACCOUNTING FOR FISHING MORTALITY ON ALL SIZES AND FROM ALL KNOWN SOURCES

The Harvest Strategy Policy accounts for all known sources of fishing mortality on the stock and all sizes of Pacific halibut mortality, including directed commercial, recreational, subsistence, and fishing mortality from fisheries targeting species other than Pacific halibut and may be under the management of another jurisdiction, such as non-directed fishing mortality. Discard mortality of released fish is accounted for using best available knowledge. Some sources of mortality, such as whale depredation and unreported catches, may be of unknown magnitude. These should be acknowledged as an uncertainty.

3.2 VARIABILITY IN THE ENVIRONMENT AND BIOLOGICAL CHARACTERISTICS

The productivity of Pacific halibut is affected by variability in the environment and by changes in biological characteristics. The environment fluctuates naturally and is altered due to climate change and other factors, which may affect biological characteristics such as size-at-age and recruitment of age-0 fish. The following types of variability were considered when developing the Harvest Strategy Policy for Pacific halibut:

- Variability in recruitment of age-0 Pacific halibut due to unknown causes
- Variability in average recruitment of age-0 Pacific halibut due to the environment (e.g. indexed by the Pacific Decadal Oscillation, PDO).
- Variability in the geographical distribution of age-0 recruits linked to the PDO.
- Changes in weight-at-age due to unknown causes
- Variability in movement throughout the Convention Area due to the environment (e.g. linked to the PDO).

Changes in the environment were taken into account when developing the Harvest Strategy Policy and future research on additional effects of climate change on Pacific halibut fisheries and stocks will be incorporated as knowledge improves.

3.3 MONITORING

The harvest strategy includes best practices for monitoring the stock and fisheries and the collection of fishery-dependent and fishery-independent data on the distribution, abundance, and demographics of Pacific halibut, as well as other key biological data. These observations are used in the stock assessment and inform other management supporting information. Fisheries-dependent data include observations from the fisheries and should be collected across the entire geographical range and across all sectors, including landed catch and discards. Fishery-independent data include observations collected from scientifically designed surveys providing standardised biological and ecological data that are independent of the fishing fleet.

3.4 ESTABLISHING AND APPLYING MANAGEMENT ACTIONS

The harvest strategy developed under this policy specifies all required management actions or considerations for Pacific halibut, at the stock or IPHC Regulatory Area level, necessary to achieve the conservation and fishery

objectives. Harvest rules are specified in the management procedure to determine a reference coastwide mortality limit (Chapter 4). This reference mortality limit is used along with management supporting information in a decision-making framework to determine mortality limits for each IPHC Regulatory Area, which may sum to a different coastwide mortality limit than the reference coastwide mortality limit. The decision-making process considers additional objectives that may be relevant at that time, and is included as a source of uncertainty in the MSE framework used to determine the reference management procedure.

3.5 BALANCING RISK, COST AND CATCH

This policy establishes a risk-based management approach, which provides for an increased level of caution when establishing harvest rules in association with increasing levels of uncertainty about stock status.

In the context of this policy, the risk, cost, and catch trade-off, refers to a trade-off between the amount of resources invested in data collection, analysis and management of Pacific halibut, and the level of catch (or fishing mortality) applied. Fishing mortality should always be constrained to levels at which scientific assessment indicates the Pacific halibut stock is not exposed to an 'unacceptable ecological risk' (that is the risk that stocks will fall below the limit reference point). The stock assessment and MSE provide analyses of this risk given recent levels of monitoring.

The management decision to be taken in this context is to account for the amount of information available about the Pacific halibut stock. The Commission may consider whether investment of more resources in data collection and analyses and/or additional management will increase the understanding of the risk to the stock from fishing and provide confidence in the sustainability of a higher level of fishing pressure or catch. Alternatively, if resources for data collection and analysis are limited to levels less than desired, the Commission may choose to set mortality limits lower to account for added uncertainty (i.e. it may be necessary to reduce the fishing intensity to manage the risk). Decisions about the trade-offs between the investment in managing risk versus the economic return of the catch taken will be transparently made, clearly documented and publicly available.

3.6 REFERENCE POINTS AND PROXIES

A reference point is a specified level of an indicator used as a basis for managing Pacific halibut. A reference point will often be based on indicators of the female spawning stock size (relative or absolute spawning biomass), the amount of harvest (fishing mortality), or on other factors such as economic return from the fishery.

A harvest strategy for Pacific halibut shall be based on 'threshold' reference points and 'limit' reference points. A threshold reference point is a level that achieves the policy objectives (e.g. acceptable levels of biological impact on the stock and desired health of the fisheries) if the indicator is at or above that level. When the stock is at or above a threshold reference point, optimal yield is possible. A limit reference point indicates a point beyond which the long-term biological health of the stock or the health of the fisheries is considered unacceptable and should be avoided. Fishing when the Pacific halibut population is below the biological limit reference point places the Pacific halibut stock at a range of biological risks, including an unacceptable risk to recruitment and productivity, and an increased risk that the stock will fail to maintain its ecological function, although risk of extinction is not a major concern. A fishery limit reference point indicates a stock level below which the directed commercial fishery is unlikely to remain profitable and opportunities for all fisheries would be severely diminished. Proxy reference points are described in Table 1.

Overfished is a relative limit reference point defining an unacceptably low ratio of spawning biomass to dynamic unfished spawning biomass that results from fishing alone rather than the combined effects of fishing and the environment. The dynamic unfished spawning biomass is that which would have occurred without any fishing given natural variability (e.g. recruitment deviations, changes in size-at-age, etc). Therefore, an overfished state may be fully mitigated by management actions.

Depleted is an absolute limit reference point defined by a spawning biomass below which the potential for recovery is uncertain. Natural variability affects stock size resulting in fluctuations of the spawning biomass, which along with fishing, may result in a '*depleted*' stock where reductions in fishing mortality may not lead to recovery without a change in the environmental conditions affecting the stock. Therefore, a depleted state may be only partially mitigated by management actions. [1]

Because overfished and depleted represent 'limit' reference points, the Commission may choose additional precautionary actions whenever needed, including when at, or approaching, either of these states.

Table 1. Proxy reference points

Reference point	Definition	Proxy
Threshold reference point SB_{THRESH}	The female dynamic spawning biomass level supporting maximum economic yield (SB_{MEY}) and healthy fisheries.	36% of the unfished female spawning biomass ($RSB_{36\%}$).
Overfished limit reference point SB_{LIM}	The female dynamic spawning biomass level where the ecological risk to the population and the risk to the health of the fisheries is regarded as unacceptable.	20% of the unfished female spawning biomass ($RSB_{20\%}$).
Depleted limit reference point SB_{DEP}	The female absolute spawning biomass level below which the potential for recovery is uncertain.	In development

3.7 TECHNICAL EVALUATION OF THE HARVEST STRATEGY

This harvest strategy has been formally tested to demonstrate that it is highly likely to meet the objectives and key principles of this policy. Management strategy evaluation (MSE), a procedure where alternative management strategies are tested and compared using simulations of stock and fishery dynamics, is one of the best options to test harvest strategies and is recommended for future development of the HSP. MSE involves determining objectives, identifying MPs to evaluate, simulating those MPs with a closed-loop simulation framework, evaluating the MPs to determine which one best meets the objectives (Chapter 2), and finally adopting that MP as part of the harvest strategy. This process receives input from stakeholders throughout the annual meeting cycle and is reviewed by the IPHC Scientific Review Board (SRB). Outcomes of the evaluations are made publicly available and communicated at meetings throughout the IPHC annual process.

[1] The concept of depleted has been added to the Harvest Strategy Policy to recognize it as important while research continues to identify an appropriate threshold and develop management procedures for when the stock approaches or surpasses a depleted state. This research will be considered when updating the HSP following the schedule in Table 2.

The MSE supporting this HSP incorporates variability and uncertainty, such as described in Section 3.2, structural uncertainty in an operating model (OM), and implementation variability from decision-making and realized fishing mortality. The MSE also represents all fishing sectors as necessary to appropriately remove different cohorts from the population and to determine if objectives are met for each sector. An important component to this HSP is the decision-making component (Figure 2) where the Commission considers management inputs and additional relevant factors when deciding on the coastwide TCEY and distribution of the TCEY to IPHC Regulatory Areas to balance risk, cost, and catch (Section 3.5), and account for current conditions. The MSE simulations use historical decisions to determine how to simulate decision-making variability, ensuring that an MP is robust to that variability as well as other sources of uncertainty.

3.8 RE-EVALUATING THE HARVEST STRATEGY AND MANAGEMENT PROCEDURE

A harvest strategy is a transparent and science-based approach to determining mortality limits and is meant to remain in place for many years. Frequent modifications or departures from the harvest strategy reduce the transparency and science-based approach. However, infrequent updates are necessary as more knowledge is gained. Therefore, it is important to specify, as part of the harvest strategy, time periods for re-evaluation of management procedures and to identify exceptional circumstances that would trigger a re-evaluation before that time period.

The IPHC currently operates off a schedule of three-years for full stock assessments, with update stock assessments in the intervening two years, and the MSE OM is updated following each full stock assessment to maintain consistent approaches and paradigms. Therefore, MPs may be re-evaluated three years after implementation, and shall not exceed two cycles (six years as shown in Table 2). The HSP may be updated on a three-year cycle corresponding to the regular re-evaluation of the MP, or as needed. An exceptional circumstance may trigger a re-evaluation of the MP sooner than three-years, which may be subsequently reflected in an update to the HSP.

An exceptional circumstance may trigger a re-evaluation before then and two exceptional circumstances to check for are defined as follows.

- The coastwide all-sizes FISS WPUE or NPUE from the space-time model is above the 97.5th percentile or below the 2.5th percentile of the simulated FISS index for two or more consecutive years.
- The realised coastwide mortality is above the 97.5th percentile or below the 2.5th percentile of the simulated realised coastwide mortality for two or more consecutive years.

Exceptional circumstances would be reviewed by the SRB to determine if one should be declared. In the event that an exceptional circumstance is declared, the following actions are to be completed (also see Table 2).

- Review the MSE simulations to determine if the OM can be improved and MPs should be re-evaluated.
- Consult with the SRB and MSAB to identify why the exceptional circumstance occurred, what can be done to resolve it, and determine a set of MPs to evaluate with an updated OM.
- Present these recommendations to the Commission for a Commission decision whether to update the OM and re-evaluate the reference MP and alternative MPs.
- Further consult with the SRB and MSAB after simulations are complete to recommend a new MP to the Commission.
- Present these results to the Commission to identify whether a new MP is appropriate and the HSP should be updated.

The Commission may depart from the reference MP and reference TCEY in any year to account for other objectives and risk, including if an exceptional circumstance has occurred.

Table 2. Stock assessment, MSE, exceptional circumstances check, review, and decision processes on an annual basis. Year 1 could correspond to 2025, 2028, 2031, and so on. Upper case 'Y' indicates that the task is done, a lower case 'x' indicates that the task may be done. 'EC' refers to Exceptional Circumstance and 'FISS' to Fishery-Independent Setline Survey.

Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Example Year	2025	2026	2027	2028	2029	2030	2031	2032
FISS coastwide index	Y	Y	Y	Y	Y	Y	Y	Y
Full stock assessment	Y			Y			Y	
Update stock assessment		Y	Y		Y	Y		Y
Commission TCEY decision	Y	Y	Y	Y	Y	Y	Y	Y
MSE OM updated		Y			x			Y
MP re-evaluated		Y			x			Y
Exceptional circumstances checked	Y		Y	Y	x[1]	Y	Y	
- Consult with SRB and MSAB			x	x	x	x	x	
- Present to Commission			x	x	x	x	x	
- Re-evaluate MP due to EC			*	*	Y[2]	x*	x*	
Update HSP			x			x		

[1] The exceptional circumstance would be checked only if a new MSE OM was not updated.

[2] The MP would be re-evaluated as part of the normal three-year cycle due to an exceptional circumstance occurring in two sequential years.

* An exceptional circumstance can be declared after two sequential instances, thus re-evaluation of an MP would have a delay, unless recommended by the Commission outside of the normal process.

Chapter 4 APPLYING THE HARVEST STRATEGY

4.1 COORDINATED MANAGEMENT OF DOMESTIC STOCKS

Consistent with the *Protocol amending the Convention between Canada and the United States of America for the preservation of the [Pacific] halibut fishery of the northern Pacific Ocean and Bering Sea* (1979), the IPHC will pursue the sustainable use of Pacific halibut within fisheries managed by other jurisdictions.

4.2 COORDINATED MANAGEMENT OF INTERNATIONAL STOCKS

The IPHC Harvest Strategy Policy does not prescribe management arrangements in the case of fisheries that are managed by a Party external to the IPHC Convention. This includes management arrangements for commercial and traditional fishing in the US Treaty Tribes and Canadian First Nations, that are governed by provisions within relevant Treaties. However, it does articulate the IPHC preferred approach.

4.3 STOCK ASSESSMENT

A full stock assessment occurs triennially and incorporates all available data through the current year, investigates all data and modelling aspects, and potentially makes changes to any of these components as needed. In the intervening years, an update stock assessment is completed to include all available data through the most current year. The stock assessment includes a summary of the data available for analysis, estimates of current stock size, recent trends of stock size relative to reference points, and uncertainty in the estimates of stock size.

Decision table: The stock assessment also produces a harvest decision table containing short-term projections of various risk metrics (rows) under different levels of future harvest (columns input as a specific amount of fishing mortality, e.g. TCEY). Risk metrics include the probability of a decline in spawning biomass for the next 1 to 3 years, the probability of a decline in spawning biomass that is greater than 5% for the next 1 to 3 years, the probability that the spawning biomass is less than 20% or 30% of unfished spawning biomass in the next 1 to 3 years, the probability that the reference TCEY is less than the selected TCEY in the next 1 to 3 years, the probability that the reference TCEY is at least 10% less than the selected TCEY in the next 1 to 3 years, and the probability that the fishing intensity in the upcoming year is greater than the reference fishing intensity as specified in the MP (currently $F_{SPR=43\%}$). The harvest levels include the reference fishing mortality (i.e. TCEY determined from the MP), a range less than and greater than the reference fishing mortality, no fishing mortality (to assess short-term maximum biological productivity), various levels based on status quo (e.g. the previous year's coastwide mortality), a 3-year surplus that would maintain the spawning biomass at the same level in three years with a 50% probability, fishing mortality based on the SPR proxy for MEY (40%), and the fishing mortality based on the SPR proxy for MSY (35%). The decision table is one component of management supporting information and is used by the Commission to assess the risk for various mortality limits when deciding on the coastwide mortality limit for the upcoming year.

4.4 COASTWIDE REFERENCE MORTALITY LIMIT

The coastwide reference mortality limit is determined using the stock assessment and a fishing intensity (i.e. F_{SPR}) defined by a harvest control rule (Figure 4). The stock assessment estimates the stock status (dynamic RSB) which is used in the harvest control rule to determine if the fishing intensity should be reduced from the reference SPR (43%). The reference SPR is linearly reduced when the stock status (RSB) is estimated below 30% and is

theoretically set to 100% (no fishing for directed fisheries) when the stock status is estimated at or below 20% (SB_{LIM}), although this would trigger the development of a rebuilding plan which may allow for some directed fishing.

This management procedure determining the coastwide reference mortality limit is brought into the decision-making step as a reference value from which the Commission uses additional management supporting information to account for other relevant factors during the annual decision-making process on the coastwide TCEY and the distribution of the coastwide TCEY to IPHC Regulatory Areas. The MP provides a reference value in the decision table (see Sections 4.3 and 4.7). The MSE simulations account for this decision-making variability (see Section 3.7).

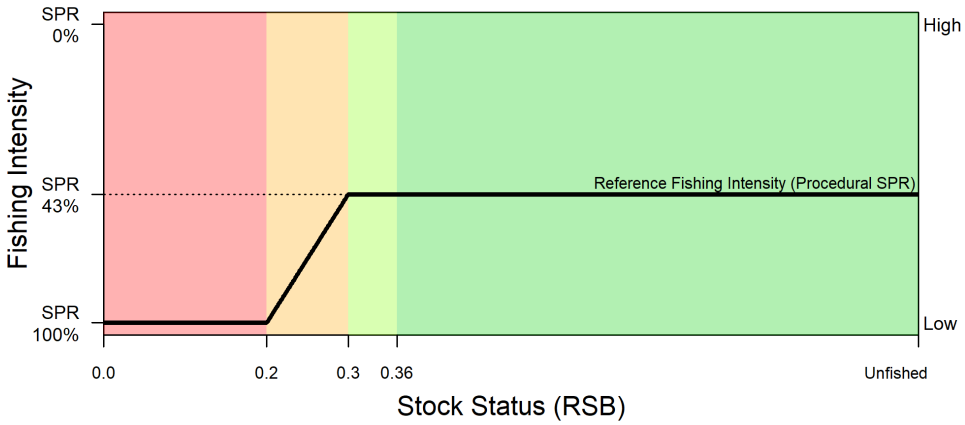

Figure 4. Harvest control rule for the fishing intensity (i.e. F_{SPR}) to determine the coastwide total mortality limit. The stock status is the dynamic relative spawning biomass (RSB) determined from the stock assessment. The reference fishing intensity is $F_{SPR=43\%}$, and is applied when stock status is above the trigger of 30%. SPR is linearly reduced between a stock status of 30% and 20%, and set to 100% when at or below a stock status of 20% (i.e. the limit reference point RSB_{LIM}). The threshold RSB, 0.36, is related to an objective to maintain the relative spawning biomass at or above $RSB_{36\%}$ at least 50 percent of the time. Colours show the area below RSB_{LIM} (red), the area 'on the ramp' (orange), the area above the trigger and below RSB_{THRESH} (light green), and the area above RSB_{THRESH} (green).

4.5 REBUILDING IF THE STOCK BECOMES OVERFISHED

If Pacific halibut is determined to be overfished (when the probability that female spawning stock biomass is below the limit reference point, RSB_{LIM}, is greater than 50%), immediate action is required to constrain directed fishing and rebuild the stock to levels that will ensure long-term sustainability and productivity, i.e. at or above RSB_{LIM}. A rebuilding strategy must be developed to rebuild the stock to above its limit reference point, for agreement by the Commission. A rebuilding strategy will be required until the stock is above the limit reference point with a reasonable level of certainty (at least a 70% probability that the stock has rebuilt to or above the limit reference point). It must ensure adequate monitoring and data collection is in place to assess the status of the stock and rebuilding progress.

Directed fishing and incidental mortality of Pacific halibut, if determined to be overfished, should be constrained as much as possible to levels that allow rebuilding to the limit reference point (RSB_{LIM}) within the specified timeframe. Once a stock has been rebuilt to above the limit reference point with a reasonable level of certainty, it may be appropriate to increase directed fishing, and increase incidental mortality in line with the harvest strategy, noting that the usual harvest strategy requirements regarding the application of the harvest control rule and risk of breaching the limit reference point will apply.

The rebuilding strategy should note where sources of mortality exist that cannot be constrained by the IPHC, and must take this mortality into account. Where practical and appropriate, the IPHC will coordinate with other jurisdictions to ensure other sources of mortality from fishing are reasonably constrained consistent with any catch sharing arrangement.

When a rebuilding strategy is being developed, it must include performance measures and details on how and when these measures will be reported. Where there is no evidence that a stock is rebuilding, or is going to rebuild in the required timeframe and probability, the IPHC will review the rebuilding strategy and make the result of the review public. If changes to the rebuilding strategy are considered necessary, such changes should be made in a timely manner.

Rebuilding plan

If the stock is determined to be overfished, a rebuilding plan should be developed as soon as possible. Requiring agreement by the Commission, a rebuilding plan could be developed at the Annual Meeting immediately following the overfished determination, assuming that the overfished determination is presented at the Interim Meeting, but shall be developed within two years after the stock is determined to be overfished (e.g. by the second Annual Meeting following the overfished determination). Guidelines for a rebuilding plan are provided in a separate IPHC document.

Rebuilding timeframes

Rebuilding timeframes are explicitly related to the minimum timeframe for rebuilding in the absence of fishing. Rebuilding timeframes should take into account Pacific halibut productivity and recruitment; the relationship between spawning biomass and recruitment; and the stock's current level of depletion.

4.6 MORTALITY LIMITS FOR EACH IPHC REGULATORY AREA

The final outputs of the harvest strategy policy before domestic management is applied are mortality limits for each IPHC Regulatory Area. These are decided upon by the Commission at the Annual Meeting with the input of management supporting information (Section 4.7) requested by the Commission including mortality tables and the harvest decision table (see Section 4.3).

Mortality table: A mortality table shows the resulting allocation of mortality limits to each sector within each IPHC Regulatory Area. Domestic catch-sharing plans and Commission agreements on projecting non-directed discard mortality are used to fill out the details. This table can be produced for any projected year but is commonly presented for only the first projected year.

4.7 MANAGEMENT SUPPORTING INFORMATION

The Commission may use many sources of information during the decision-making process to assess risk to the stock and fisheries. Annually produced products are the harvest decision table (Section 4.3) and mortality tables

(Section 4.6). These show a range of fishing mortality and allocation options that portray the risks in various ways. The harvest decision table represents short-term projections produced from the stock assessment that are useful for tactical decision-making and is an important item in the management supporting information. Longer-term strategic implications of the choices in the harvest decision table are determined from the MSE simulations. If available, performance metrics associated with the three priority objectives (Chapter 2) determined from the most recent MSE simulations should be presented for, at a minimum, some F_{SPR} values associated with the fishing mortality options presented in the decision table.

Additional management supporting information may include, but is not limited to, socioeconomic considerations, community development, political constraints, and operational limitations. This information along with stakeholder and scientific input is used by the Commission to decide on mortality limits for each IPHC Regulatory Area distributed from a coastwide mortality limit that takes into account short-term and long-term risk to the stock and supports optimal yield from the fisheries.

4.8 STAKEHOLDER AND SCIENTIFIC INPUT

Stakeholder and scientific input into the development and application of the harvest strategy is an important process to support the sustainable management of healthy Pacific halibut fisheries. Input from both sources occurs at meetings throughout the year.

Stakeholder input

Stakeholder input can occur via public testimony at any public IPHC meeting or at meetings of various IPHC subsidiary bodies, which are populated by individuals representing various interests related to Pacific halibut. This may include processors, commercial harvesters, recreational interests, subsistence fishing, and tribal or First Nations representatives. Subsidiary bodies may provide advice on management decisions, potential research topics, or guide updates to the Harvest Strategy Policy through MSE analyses.

Scientific input

Scientific input occurs through independent, external reviews, including, but not limited to, semi-annual meetings of the SRB. The SRB reviews science/research proposals, programs, products, strategy, progress, and overall performance.

4.9 ANNUAL PROCESS

A series of meetings occurs throughout the year, leading up the Annual Meeting in January when mortality limit decisions are made. The SRB meets in June and September to peer review IPHC science products, including the stock assessment and MSE. Subsidiary bodies may meet any time during the year and provide recommendations to the Commission and may meet during the week of the Annual Meeting to advise the Commission on issues related to the management of the Pacific halibut resource in the Convention Area.

An Interim Meeting, typically late November, precedes the Annual Meeting and is when the stock assessment, stock projections, and harvest decision table are first publicly presented. The final stock assessment, stock projections, and harvest decision table are presented at the Annual Meeting, typically in late January, to support mortality limit decisions.

4.10 UPDATING THE HARVEST STRATEGY POLICY

This Harvest Strategy Policy represents a stable framework that should be updated infrequently and only when warranted, at the discretion of the Commission. The HSP may be updated on a three-year cycle corresponding to the MSE process schedule such that changes to the HSP occur following a full MSE analysis of the harvest strategy. Table 2 in Section 3.8 shows an example schedule over a six-year period.