Fisheries and Oceans Canada / Pêches et Océans Canada
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Pacific Region

Canadian Science Advisory Secretariat
Science Advisory Report 2022/030

METHODOLOGIES AND GUIDELINES FOR DEFINING LIMIT REFERENCE POINTS FOR PACIFIC SALMON

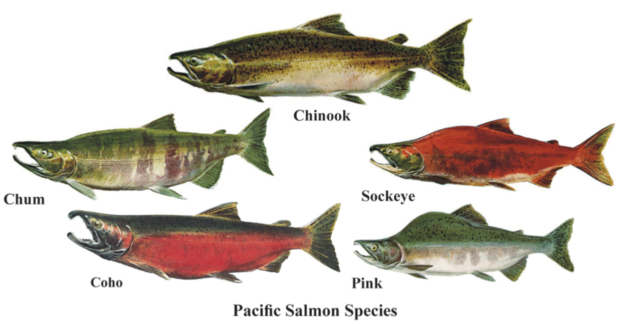

Photo: Adult male morphologies of the five Pacific salmon species. (Source: [Georgia Strait Alliance](#)).

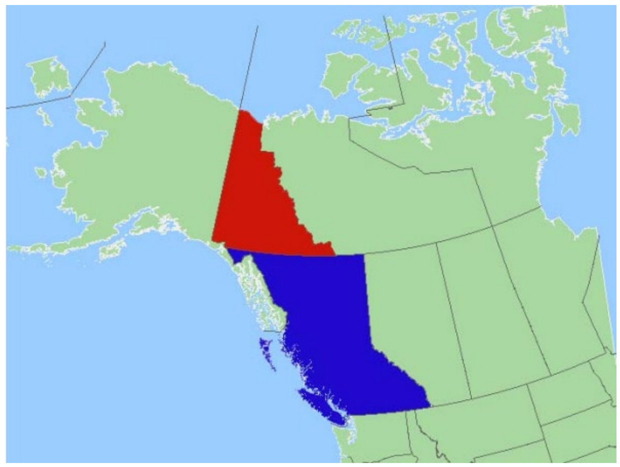

Figure 1. The Pacific-Yukon Region of Western Canada consists of the Yukon Territory (red) and the province of British Columbia (blue) (Source: DFO 2009). This document pertains to those portions of the Region inhabited by anadromous Pacific salmon.

Context:

The amended Fisheries Act *(2019) includes new Fish Stocks provisions that introduced legal obligations to identify limit reference points (LRPs) for 'major fish stocks' prescribed under regulation. For Pacific Salmon, Stock Management Units (SMUs, DFO 2022) consisting of one or more Wild Salmon Policy Conservation Units (CUs) are proposed as 'major fish stocks' under the* Fisheries Act*. These provisions create the need for methodologies to estimate LRPs and status at the SMU level, while considering the Wild Salmon Policy (DFO 2005) goal to maintain component CUs above their lower benchmarks in part to conserve adaptive diversity.*

Fisheries and Oceans Canada (DFO) Science has requested that Science Branch provide analytical methods for developing Limit Reference Points (LRPs) for Pacific salmon SMUs, including guidelines for when they are or are not appropriate given data availability and characteristics of the population. The assessment and advice arising from this Canadian Science Advisory Secretariat (CSAS) Regional Peer Review (RPR) will be used to inform the development of LRPs for Stock Management Units of Pacific salmon across Pacific region to meet national obligations under the Fish Stocks provisions of the amended Fisheries Act*.*

This Science Advisory Report is from the March 2-4, 2022 regional peer review on Methodologies and guidelines for developing Limit Reference Points for Pacific Salmon in British Columbia. Additional publications from this meeting will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.

July 2022 (Erratum: December 2022)

SUMMARY

- The amended *Fisheries Act* (2019) includes new Fish Stocks provisions that introduce legal obligations to identify limit reference points (LRPs) for major fish stocks prescribed under regulation. For Pacific Salmon, Stock Management Units (SMUs, DFO 2022) consisting of one or more Wild Salmon Policy Conservation Units (CUs) are proposed as 'major fish stocks'.
- These provisions create the demand for methods to estimate LRPs and status at the SMU level, while considering the Wild Salmon Policy (DFO 2005) goal to maintain component CUs above their lower benchmarks in part to conserve adaptive diversity.
- LRPs are also required under DFO's Precautionary Approach (DFO 2009) and other domestic and international commitments.
- Candidate LRP methods were applied to three case study SMUs. Lessons learned from case studies were used to inform the development of guidance for implementing LRPs, which is presented in the form of a stepwise process.
- SMU-level LRPs that are based on the status of component CUs are recommended to meet requirements of the Fisheries Act, called 'CU status-based LRPs'. Under this approach, it is recommended that an SMU be considered below the LRP if at least one CU within the SMU is in the Red zone, as assessed under the WSP (i.e. below its lower benchmark[1]). Lower benchmarks are identified at levels to allow a substantial buffer against extinction risk and are proposed to represent levels above serious harm.
- CU status is derived from a composite of metrics, as recommended for assessments under the Wild Salmon Policy (Holt et al. 2009).
- Under the amended Fisheries Act, a rebuilding plan will be required for prescribed SMUs that are below their LRP, though the assessment of an SMU below its LRP does not necessarily trigger specific fishery management measures. Actions to support rebuilding may occur at a variety of spatial scales using a range of management measures relevant to Pacific salmon, which may include habitat restoration and hatchery enhancement at watershed and sub-watershed scales.
- When estimating 'CU status-based LRPs', the status of data-deficient CUs can potentially be inferred from data-rich CUs within an SMU when there is sufficient evidence that the CUs have similar threats, environmental conditions, life-history characteristics, and carrying capacities. In the absence of such evidence, the default assumption is that the status of data-deficient CUs cannot be inferred from other CUs in the SMU.
- When status is inferred for data-deficient CUs within an SMU and status of all data-rich CUs have statuses above the Red zone, it is recommended that SMU status be above the LRP but considered more uncertain than if there were no data-deficient CUs. When at least one data-rich CU is Red, then SMU status is below the LRP regardless of the presence of data-deficient CUs.
- Uncertainty in 'CU status-based LRPs' can arise from uncertainties in CU benchmarks, the choice of metrics, and associated CU statuses.

[1] Erratum December 2022: The previous version of the document read "above their lower benchmarks" in error.

- ‘Aggregate abundance LRPs’ based on SMU-level abundances were identified to approximate 'CU status-based LRPs’. However, case study analyses showed that these methods had numerous assumptions and uncertainties and did not necessarily represent CU status. As a result, aggregate abundance LRPs are not recommended to address Fisheries Act requirements. However, they may be considered for specific fisheries management contexts where aggregate abundance reference points are required, and are included as supplemental approaches in the stepwise guidance procedure described here.
- The LRP methods presented here do not explicitly account for serious harm to ecosystems and associated species, or the role of ecosystems and habitats on the sustainability of wild Pacific salmon. Future research is needed to fill these gaps and better align the proposed methods with DFO’s Precautionary Approach Framework (DFO 2009) and the Wild Salmon Policy (DFO 2005).
- Engagement and collaboration with Indigenous Peoples is recommended to pair Indigenous Knowledge with the guidance presented here when establishing LRPs.
- Additional next steps on defining LRPs include research on time-varying parameters and impacts on LRPs, and the development of guidance on metrics and benchmarks of distribution of spawning among populations within CUs.

INTRODUCTION

Amendments to the Federal *Fisheries Act* (2019) include new Fish Stocks provisions that introduce legal obligations to identify limit reference points (LRPs) for ‘major fish stocks’ prescribed under regulation. These new provisions are in line with previously established DFO policies to manage stocks consistent with the precautionary approach. These policies include The Fishery Decision Making Framework Incorporating the Precautionary Approach (DFO 2009), and Canada’s Wild Salmon Policy (WSP, DFO 2005). The amended *Fisheries Act* further requires that a rebuilding plan be developed and implemented for prescribed ‘major fish stocks’ that fall below their LRP, though the assessment of a major fish stock dropping below its LRP does not necessarily trigger specific fisheries measures. For Pacific salmon, actions to support rebuilding may occur at a variety of spatial scales using a range of management measures, which may include habitat restoration and hatchery enhancement at watershed and sub-watershed scales.

For Pacific Salmon, Stock Management Units (SMUs, DFO 2022) consisting of one or more WSP Conservation Units (CUs) are proposed as ‘major fish stocks’. The amended *Fisheries Act* created the need for new methods to estimate LRPs and status at the SMU level, while considering the WSP goal to maintain component CUs above their lower benchmarks to conserve adaptive diversity. Lower benchmarks are identified at levels to allow a substantial buffer against extinction risk and are proposed to represent levels above that at which serious harm is occurring. The work presented in this report addresses this need by:

- Presenting candidate methods for identifying SMU-level LRPs for Pacific salmon that are consistent with the WSP objective of conserving biodiversity by maintaining CUs above lower biological benchmarks. These candidate methods include LRPs based on the status of component CUs and aggregate abundance over multiple CUs, where CU assessments can be developed using single-metric or composite metric (i.e., multidimensional) approaches, as appropriate.

- Documenting candidate methods for developing LRPs at the SMU-level, including data requirements and assumptions, in addition to key uncertainties including those arising from missing or limited CU-level data.
- Providing guidance and recommendations on the application of candidate methods over a range of data types and availability.

Principles for LRP Development

The principles for identifying Pacific salmon LRPs are intended to guide the development of LRPs while providing flexibility due to differences in biological characteristics, data qualities and data quantities, among salmon species and stocks. These principles (Table 1) are adapted from national guidance on LRPs[2].

Table 1. List of principles for identifying Pacific salmon LRPs.

Principle	Description
Principle 1	LRPs should be selected based on the best available information.
Principle 2	LRPs should be consistent with the goal of avoiding serious harm.
Principle 3	LRPs should be operational, i.e., feasible to calculate and relevant to policy and management.
Principle 4	LRPs should be reliably estimable.
Principle 5	When selecting among multiple methods for determining LRPs, the choice should take into account uncertainty.
Principle 6	Pacific salmon LRPs should be consistent with the goals and objectives of the WSP.

ANALYSIS

LRP Estimation

'CU status-based LRPs' are recommended for assessing the status of Pacific Salmon SMUs in support of the *Fisheries Act*. Under this approach, an SMU is below the LRP when one or more CUs within the SMU are in the Red zone, as assessed under the WSP (Holt et al. 2009) (Figure 2).

[2] Marentette, J.R., Barrett, T., Cogliati, K.M., Ings, D., Ladell, J., Thiess, M. Operationalizing Serious Harm: Existing Guidance and Contemporary Canadian Practices. Can. Sci Avis. Secr. Working Paper In prep.

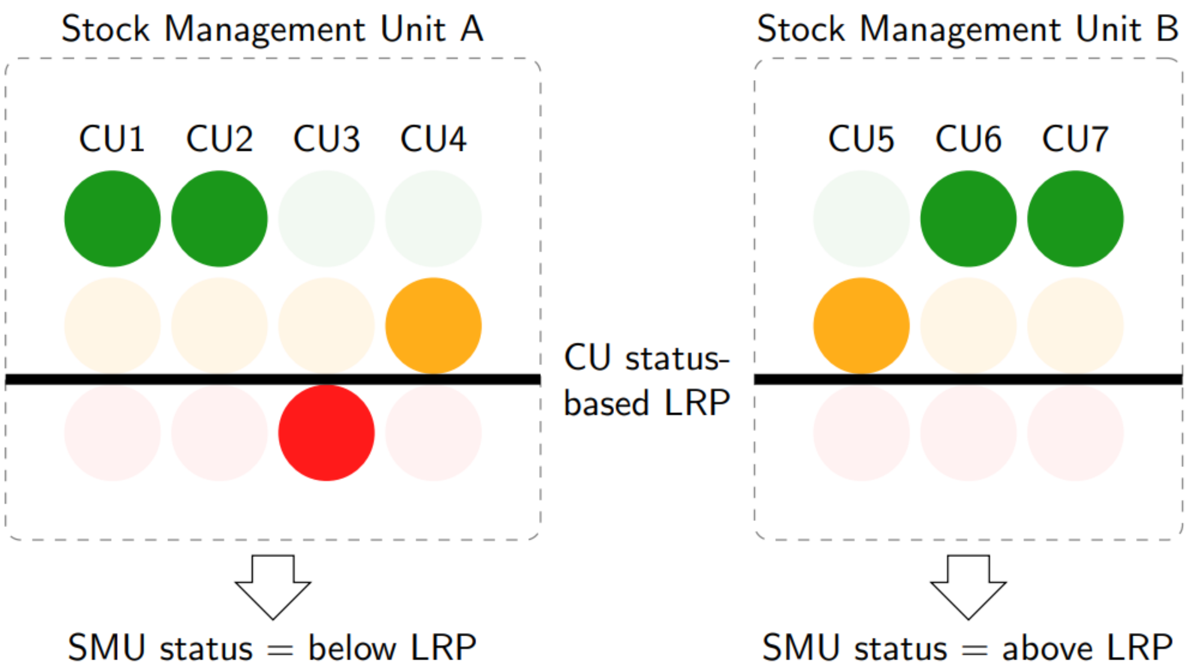

Figure 2. Schematic of 'CU status-based LRP' applied two example SMUs. 'Stock Management Unit A' (left) consists of four component CUs, of which two are Green status, one is Amber status, and one is Red status. 'Stock Management Unit B' (right) consists of three component CUs of which two are Green status and one is Amber status. 'Stock Management Unit A' would be assessed as below the LRP while 'Stock Management Unit B' would be assessed as above the LRP.

'CU status-based LRPs' are implemented using approaches developed to assess CU status under DFO's WSP (DFO 2005, Holt et al. 2009). These approaches use a composite of metrics to evaluate status including abundance metrics and temporal trends in abundance. An expert-driven integration approach is then used to combine statuses across metrics into a single composite status for each CU (i.e., Green, Amber, Red). SMUs are assessed as being below their 'CU-status based LRP' if one or more CUs are assessed as Red status. In our case study applications, we apply the recently developed Pacific Salmon Status Scanner tool as an example approach to rapidly approximate more detailed, expert-driven WSP status assessment methods (Pestal et al. in prep.)[3]. The Pacific Salmon Scanner uses a set of decision rules to assign a composite CU status (Red, Amber, or Green) based on multiple metrics. The decision rules used within the tool have been developed from previously peer-reviewed assessments under the WSP (DFO 2015, DFO 2016, Grant et al. 2020).

Supplemental Methods

For SMUs in which an abundance-based LRP is required to support management at an aggregate scale, 'aggregate abundance LRPs' may also be developed that are aligned with the CU-based approach. 'Aggregate abundance LRPs' use the total SMU-level spawning abundance as the metric upon which LRPs are based. The candidate 'abundance-based LRPs' presented here rely on a relationship between aggregate abundance and the status of component CUs, making them approximations of 'CU status-based LRPs'. Abundance-based

[3] Pestal, G., MacDonald, B, Grant, S, and Holt, C. Rapid Status Approximations from Integrated Expert Assessments Under Canada's Wild Salmon Policy. Can. Tech. Rep. Fish. Aquat. Sci. In prep.

LRPs are supplemental in that they can be used in addition to CU status-based LRPs when there is a desire to have an abundance-based reference point that aligns with the CU status-based LRP used under the *Fisheries Act*. Aggregate abundance LRPs are not intended as an alternative to the CU-based approach.

Two methods of developing aggregate abundance LRPs are applied: (i) Logistic Regression LRPs and (ii) Projection LRPs. Both methods maintain consistency with the WSP by defining LRPs as aggregate abundance levels that have a high probability of all CUs being above their Red status zone, and are based on the assumption that there is a predictable relationship between SMU-level abundance and the probability that all CUs will be above Red status. When estimating aggregate abundance LRPs, status relative to a single lower benchmark (LBM) is used as a proxy for status above the Red zone. Aggregate abundance LRPs are then estimated by using the predicted relationship to find the SMU-level abundance at which there is a prescribed probability that all CUs will be above the LBM.

Projection and logistic regression LRPs differ in the approach taken to estimate the underlying relationship between SMU-level aggregate abundance and the probability that all CUs will be above their LBMs. Logistic regression LRPs are estimated by fitting statistical models to historical data to estimate this relationship (Figure 3). In this case, LRPs are based on previously observed covariation in CU status, and thus implicitly assume the past is a reasonable approximation of the future. In comparison, projection LRPs combine historical data and other sources of information to quantify population dynamics, and then project population dynamics using stochastic simulations to identify an equilibrium state. Simulation outputs are then used to characterize the underlying relationship between aggregate abundance and the probability that all CUs will be above their LBMs (Figure 4). Projection LRPs can integrate plausible ranges of parameter uncertainties that may differ from those observed historically, unlike logistic regression LRPs.

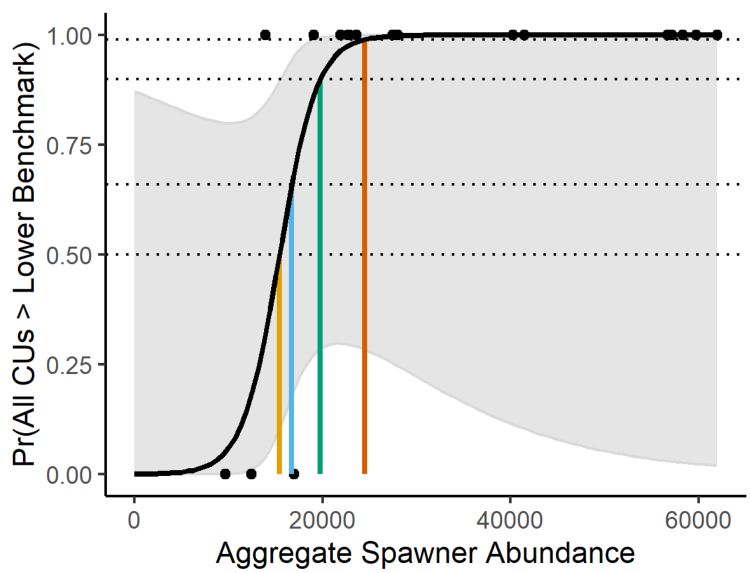

Figure 3. Logistic regression fit to aggregate abundance data to predict the probability of all CUs being above their lower benchmark (LBM) as a function of aggregate SMU abundance. Each black dot represents a year in the observed time series showing whether the requirement of all CUs above their LBM was met (success = 1) or not (failure = 0) as a function of aggregate spawning abundance to the SMU. Vertical coloured lines illustrate the identification of aggregate abundance LRPs for four different probability thresholds denoted by dotted horizontal lines. For example, the LRP associated with a 50% of all CUs being above their lower benchmark is ~19,500 spawners, as shown by the yellow line.

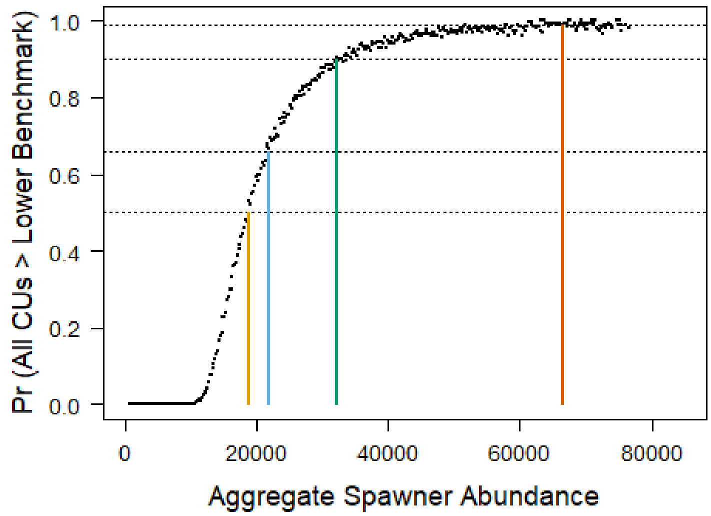

Figure 4. Example of projected probability curve derived from stochastic projections. The curve shows the projected probability of all CUs being above their lower benchmark as a function of aggregate SMU abundance. Vertical coloured lines illustrate the identification of aggregate abundance LRPs based on four different probability thresholds, as described for Figure 2.

Application to Case Studies

Proposed LRP estimation methods were applied to three case study SMUs: Interior Fraser Coho (*Oncorhynchus kisutch*), West Coast Vancouver Island (WCVI) Chinook (*O. tshawytscha*), and Inside South Coast (ISC) Chum (*O. keta*) - excluding Fraser River. Each of these SMUs consists of 3-7 CUs and was selected to represent a different level of data availability ranging from data-rich (Interior Fraser Coho) to data-limited (ISC Chum and WCVI Chinook).

In our case study applications, we included only populations where natural-origin spawners predominated over hatchery-origin spawners, as indicated by Proportionate Hatchery Influence (PNI) values ≥ 0.5, as recommended by Withler et al. (2018) for assessments under the WSP. In addition, for our case study on Interior Fraser Coho, the proportions of hatchery marked fish on the spawning grounds were removed to develop time series of natural-origin spawners for status assessment against CU benchmarks.

Within each case study, we evaluated proposed methods using a combination of sensitivity analyses to key parameters, assumptions, and data availability, and where possible, retrospective analyses. The set of CU assessment and LRP estimation methods considered for each case study was a function of available data and previously developed assessment methods for the SMU (Table 2).

Table 2 Overview of CU assessment methods and SMU assessment methods applied for each case study. Cells marked with '-' at the CU-Level Assessment level indicate that a method was not applied to CUs in that case study.

CU-Level Assessment

Type of Metric	**Benchmark Method**	**Interior Fraser Coho**	**WCVI Chinook**	**ISC Chum**
Composite Metric	(Salmon Scanner)	Applied	Applied	Applied
Single Metric: Abundance relative to lower benchmark	Spawner-recruitment benchmark	Applied	-	-
	Habitat-based benchmark	-	Applied	-
	Percentile benchmark	-	-	Applied
Single Metric: Distributional		Applied	-	-

SMU-Assessment

Type of LRP	**LRP Method**	**Interior Fraser Coho**	**WCVI Chinook**	**ISC Chum**
CU status-based LRP (To meet requirements for *Fisheries Act*)		Applied	Applied	Applied
Aggregate Abundance LRP (Supplemental)	Logistic Regression	Applied	*Attempted, data-deficient*	*Attempted, unreliable*
	Projection	Applied	Applied	*Not attempted, deemed unreliable*

A summary of key lessons learned when looking across all three SMU case studies, which were used to inform the development of guidelines for defining Pacific Salmon LRPs, are as follows:

- **Lesson 1:** 'CU status-based LRPs' using rapid status assessment methods could be readily estimated for all SMUs over a wide range of data availability. This was not the case for the supplemental 'aggregate abundance LRPs'.
- **Lesson 2:** The development of metrics and benchmarks on the distribution of spawning among sites within a CU is a high priority to support WSP status assessments, which in turn will support the development of 'CU status-based LRPs' at the SMU-level.
- **Lesson 3:** Annual status estimates from 'CU status-based LRPs' and supplemental 'aggregate abundance LRPs' were generally consistent with each other at the SMU-scale; however, there were cases in which they differed.
- **Lesson 4:** Data from all component CUs within an SMU should be used whenever possible. When data are missing from one or more CUs, careful consideration should be given to the question of whether status can be inferred from other CUs within the SMU. While there may be cases where inference is possible, uncertainty in resulting status estimates will increase, and this uncertainty should be clearly communicated in status assessments.

- **Lesson 5:** ‘Logistic regression LRPs’ have several limitations and should only be used when (i) supplemental aggregate abundance LRPs are required and (ii) all assumptions of the logistic regression model can be met.
- **Lesson 6:** Stochastic projections can be used to estimate supplemental ‘aggregate abundance LRPs’ under various assumptions about population dynamics at the CU-scale and covariance in dynamics among CUs. This approach allows uncertainties in our understanding of population dynamics to be represented in a more comprehensive way than other LRP methods; however, they are sensitive to model specification, including management procedures.

Ecosystem Considerations

The Wild Salmon Policy acknowledges the key role that ecosystems and habitats play in the sustainability of wild Pacific salmon. The implementation of these components of the WSP are ongoing (DFO 2018) and represent a gap in the LRPs proposed here. In addition, DFO’s Precautionary Approach Framework (DFO 2009) acknowledges when a stock drops below an LRP, there may also be resultant impacts to the ecosystem, associated species and long-term loss of fishing opportunities. Therefore, we recommend future research into LRPs that explicitly incorporates both the role of ecosystems and habitats in determining serious harm to Pacific salmon as well as the contributions of salmon to ecosystems, the loss or depletion of which may result in negative impacts to ecosystems when SMUs are below their LRP.

Sources of Uncertainty

There are several sources of uncertainty that affect both CU status-based and supplemental aggregate abundance LRPs, including those related to CU-level assessments. Uncertainties in CU-level benchmarks can arise because of: (1) observation errors in underlying data, (2) estimation uncertainty in benchmarks arising from statistical model fitting and time-varying parameters, and (3) structural uncertainties in model forms. The status of CUs also depends on the choice of metrics (single or a composite of metrics). The distribution of spawning among populations within a CU can be important for the viability of the CU and SMU. Ignoring or misidentifying this stock structure may increase uncertainty in assessed status. The exclusion of data-limited CUs from analyses (when these CUs are poorly represented by the data-rich CUs) is another source of uncertainty.

The influence of hatcheries on biological status is a key source of uncertainty in CU assessments and has not been accounted for consistently, in part due to data limitations. We recommend flexibility in addressing hatchery-influenced populations in assessments, recognizing that methods and guidance on accounting for hatchery influence will evolve over time.

For the logistic regression LRPs, estimation of stock-recruitment and logistic regression models can introduce uncertainties, as can changes in population parameters and covariance among CUs over time.

Uncertainties in projection LRPs can arise from mis-specifying models used in the projections. With this method, uncertainties in underlying parameters and CU-level benchmarks are integrated into the probability of all CUs being above their lower benchmarks, and the LRP itself does not have statistical estimation uncertainty. Projection LRPs explicitly account for underlying uncertainties in population parameters, such as CU-level productivity.

CONCLUSIONS AND ADVICE

We propose a stepwise process as guidance for implementing LRPs (Figure 5). These steps inform the choice and implementation of candidate LRP methods. Steps 1-6 pertain to CU assessments and assessing SMU status relative to a CU status-based LRP.

‘CU status-based LRPs’ are recommended as the default approach for estimating LRPs and triggering rebuilding plans under the *Fisheries Act*. An SMU is considered below the LRP when one or more component CUs have Red status as assessed under the WSP (DFO 2005; Holt et al. 2009). When implementing these guidelines for specific SMUs under the *Fisheries Act*, it is recommended that the development of CU status estimates under the WSP (i.e., Steps 1 – 5 in Figure 5) be peer-reviewed and documented (Step 6) as part of the development of a ‘CU status-based LRP’ for the larger SMU.

When estimating ‘CU status-based LRPs’, the status of data-deficient CUs can potentially be inferred from data-rich CUs within an SMU when there is sufficient evidence that the CUs have similar threats, environmental conditions, life-history characteristics, and carrying capacities. In the absence of such evidence, the default assumption is that the status of data-deficient CUs cannot be inferred from other CUs in the SMU.

SMU status is considered more uncertain when status is inferred for data-deficient CUs, and status of all data-rich CUs are above the Red zone. When at least one CU has Red status, then SMU status is below the LRP regardless of data-deficient CUs since inclusion of more data and CUs in analyses will not change SMU status to above the LRP of all CUs above Red status (Table 3).

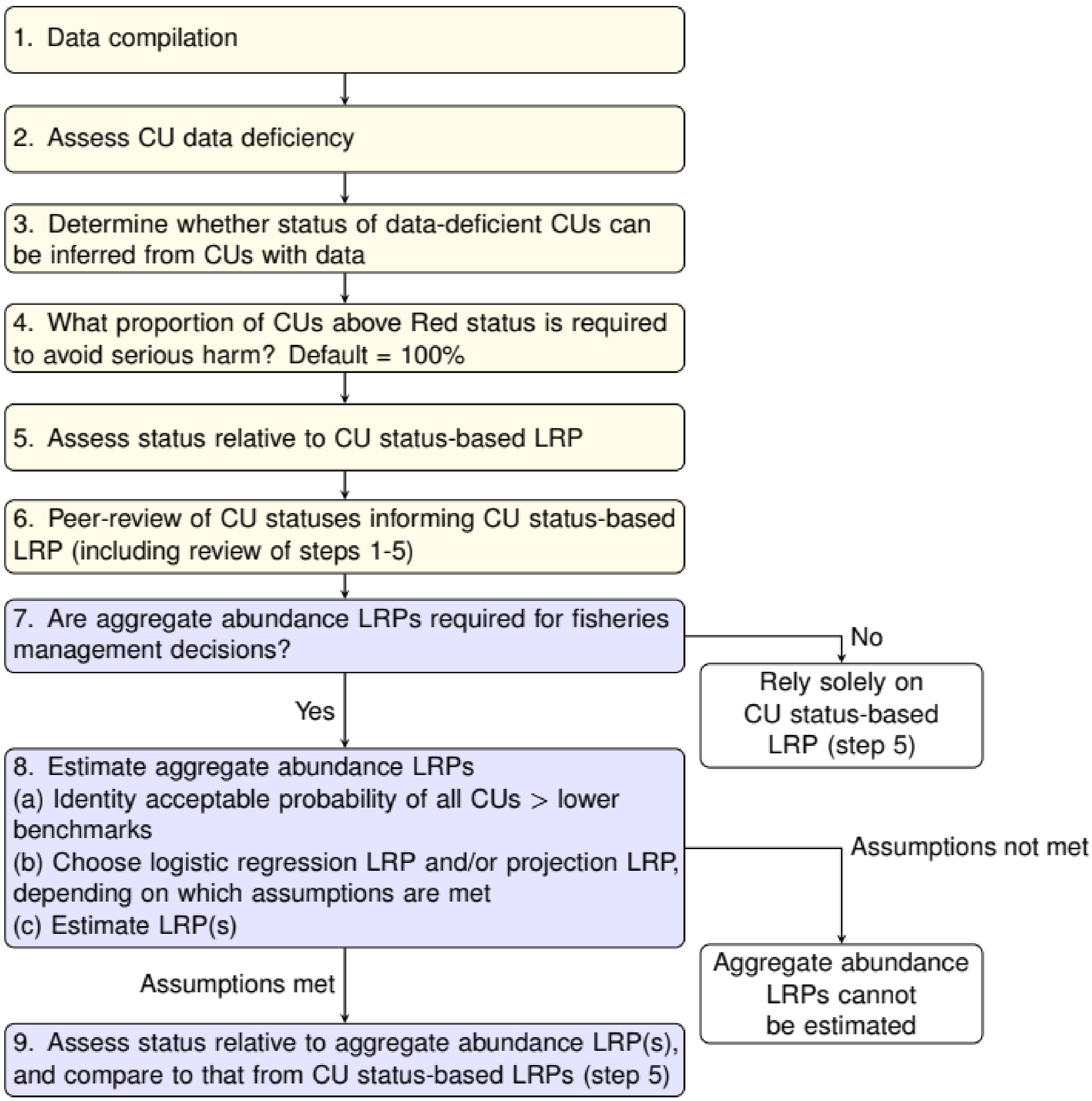

Figure 5. Steps for setting LRPs and assessing SMU status. Yellow boxes refer primarily to 'CU-status based LRPs', blue boxes refer to 'Aggregate abundance LRPs', and white boxes indicate when specific LRPs are not appropriate.

Table 3. Guidelines on assessing status for CU status-based LRPs of 100% of CUs being above Red status, given CU data deficiencies.

Data category	Status of data-rich CUs: *None in* Red status	Status of data-rich CUs: *at least one* Red status
No data-deficient CUs	SMU status = above LRP	SMU status = below LRP
Status of data-deficient CUs can be inferred from data-rich CUs	SMU status = above LRP*	SMU status = below LRP
Status of data-deficient CUs *cannot* be inferred from data-rich CUs	SMU status = data deficient	SMU status = below LRP

* denotes higher uncertainty

When a ‘CU-status based LRP’ is breached, management actions on CUs with Red status can be prioritized based on the probability of rebuilding and given trade-offs among biological and socio-economic objectives. For SMUs in which some CUs are data-deficient, and one or more CUs are assessed as Red status, rebuilding plans may also consider prioritizing data collection for data-deficient CUs.

In some cases, ‘aggregate abundance LRPs’ may be required supplementally following the estimation of CU status-based LRPs for local or international fisheries management requirements. However, these LRPs have numerous assumptions which limits their applicability in relation to a management objective to avoid serious harm. As a result, these methods are not recommended to address *Fisheries Act* requirements for SMU LRPs. However, they may be considered for specific fisheries management contexts where ‘aggregate abundance LRPs’ are required, and are included as supplemental approaches in the stepwise guidance procedure (Steps 7-9, Figure 5).

When applied supplementally, aggregate abundance methods require specifying a probability of all CUs being above lower benchmarks, which is a risk level that requires input from fisheries management. We recommend that this probability be at least 50%.

These LRP methods may be adaptable to other species and assessment management contexts, as well as to different spatial scales of aggregation for Pacific Salmon. For example, a composite approach for assessing status, sometimes called a “traffic light” approach (Shelton and Rice 2002), is particularly useful for species where theoretical or historical abundance-based metrics are not estimable or applicable, or where data are limited (Dowling et al. 2015).

Indigenous Knowledge

The guidance presented here is based on Western science and was not informed by Indigenous Knowledge or perspectives from Indigenous Peoples. Engagement and collaboration with Indigenous Peoples are recommended to pair Indigenous Knowledge with the LRP methods presented here when identifying levels above where ‘serious harm’ occurs and when triggering rebuilding plans under the *Fisheries Act*. This may include situations where data are limited, CU status assessments are not available, and proposed LRPs methods are not applicable; or where population attributes should be considered at a finer scale than CUs (e.g. stream level).

Next Steps

Time-varying parameters can have significant impact on benchmarks and LRPs, and should be a high priority for future research. In addition, guidance on metrics and benchmarks of the distribution of spawning among populations within CUs that reflect levels above serious harm are currently lacking and is recommended as a priority for future research. Furthermore, simulation evaluation of supplemental ‘aggregate abundance LRPs’ is recommended to evaluate their sensitivity to key assumptions prior to their implementation.

The further development and application of habitat-based methods for deriving abundance-based benchmarks is recommended as a priority area of research to address data-limitations for numerous CUs. In addition, further work is need to better understand and represent the role of hatchery-influenced populations when determining CU and SMU status.

CLIMATE CHANGE CONSIDERATIONS

The LRPs proposed here are sensitive to climate-driven changes in population parameters, such as productivity and capacity. We recommend that SMUs be assessed approximately once every salmon generation to account for recent climate impacts, among other anthropogenic threats and changing environmental conditions. We also recommend future research evaluating methods for accounting for time-varying population parameters when developing LRPs.

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SOURCES OF INFORMATION

This Science Advisory Report is from the March 2-4, 2022 regional peer review on the Methodologies and guidelines for developing Limit Reference Points for Pacific Salmon in British Columbia. Additional publications from this meeting will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.

DFO 2005. Canada's Policy for Conservation of Wild Pacific Salmon.

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DFO. 2015. Wild salmon policy biological status assessment for conservation units of interior Fraser River Coho Salmon (*Oncorhynchus kisutch*). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2015/022.

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