Southern Resident Killer Whales and Chinook Salmon

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Outline

1. **Southern Resident Killer Whales and the *Species at Risk Act***

2. **Chinook Salmon 101 and Trends in BC**

3. **Work Underway and Steps Ahead**

Southern Resident Killer Whales

Canada's Species at Risk Program
Lisa Jones, PhD
SARA Species Recovery Planner

Lake Laberge, Yukon Territory, Canada. Shutterstock

Background

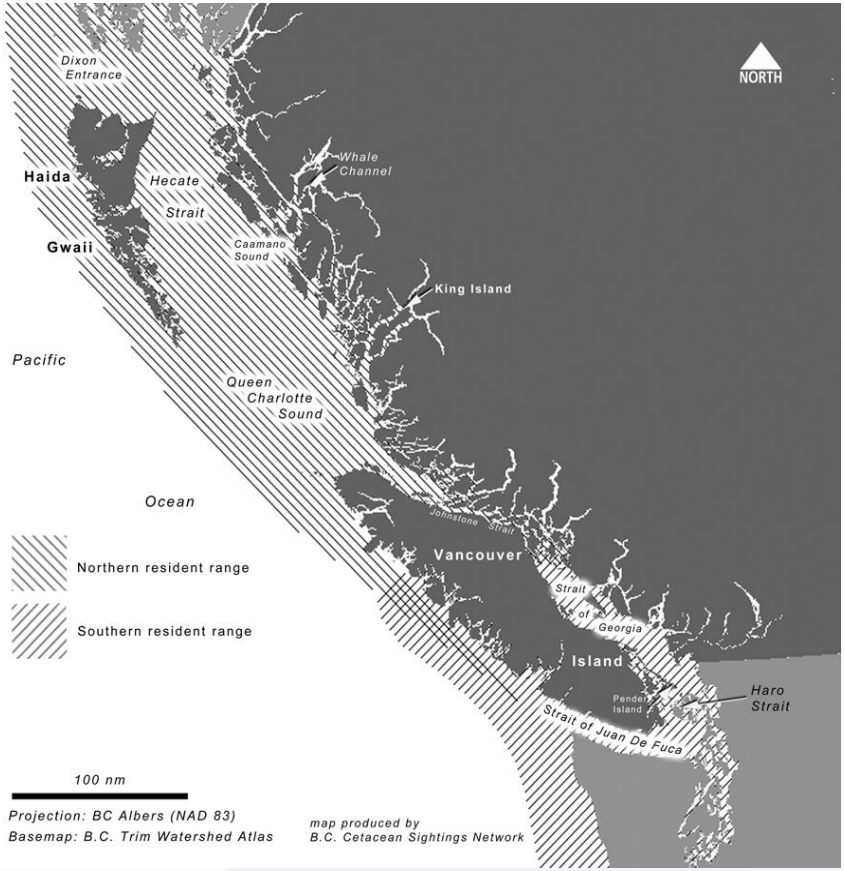
Northern Resident Killer Whale (NRKW)

- Threatened
- Current Population: ~290

Southern Resident Killer Whale (SRKW)

- Endangered
- Current Population: 76

SRKW & NRKW Distribution



Understanding the RKW Issue


Photo credit: Christie McMillan, DFO

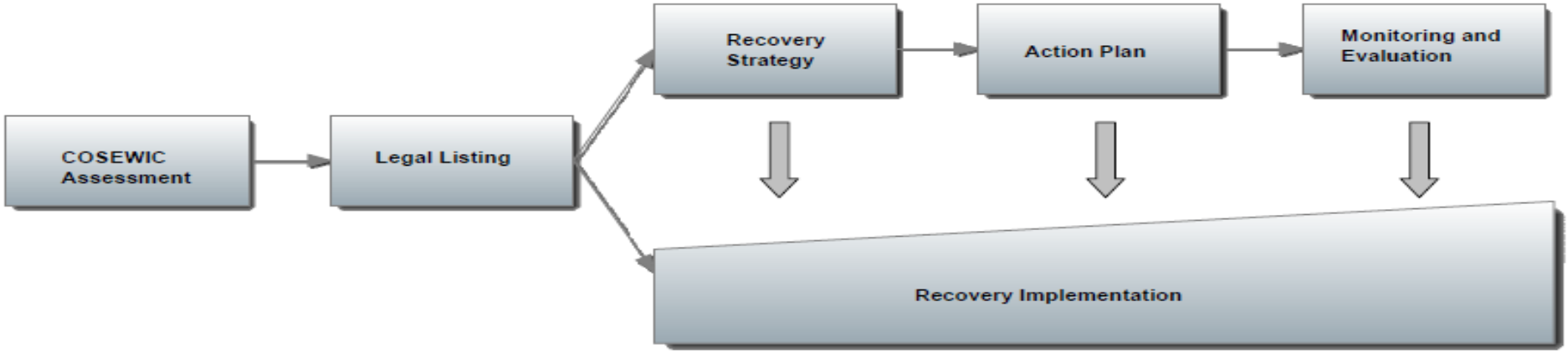
- Highly vulnerable:
  - Complex social structure
  - Long lived, late sexual maturity, & low reproductive rate
  - Narrow prey selection (primarily Chinook Salmon; Chum Salmon seasonally important)
  - Fixed range (competition and low food availability)
  - Close to large urban centers & high exposure to anthropogenic threats

The *Species at Risk Act* (SARA)

PURPOSE:

- Prevent wildlife from becoming extinct in Canada
- Secure the recovery of Extirpated, Endangered and Threatened species
- Manage species of Special Concern to prevent them from becoming further at risk

SARA and the Recovery Process



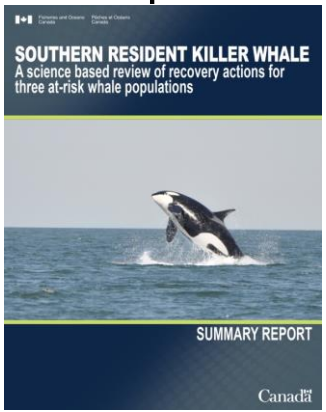
Species at Risk Act: SRKW Timeline

- 2003, under the *Species at Risk Act:*
  - SRKW listed as Endangered
  - NRKW listed as Threatened
- 2008, N/S RKW Recovery Strategy finalized
  - Identifies recovery goals (long term population viability), broad strategies for recovery & 3 major threats:
    - **reduced prey availability**, disturbance, environmental contaminants.
  - Amended in 2011 to further describe and protect Critical Habitat (CH).
  - CH protected by Order: habitat necessary for survival or recovery.

Species at Risk Act: SRKW & NRKW Timeline

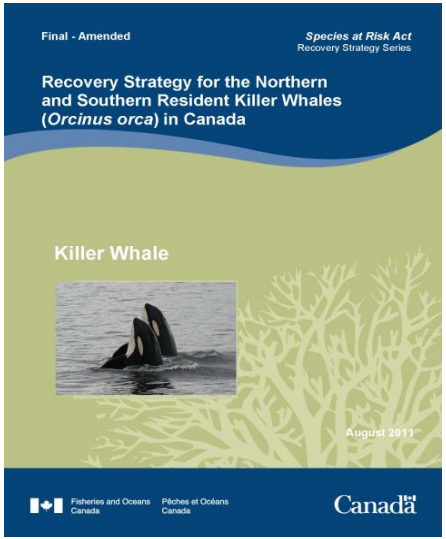
- In 2017, RKW Action Plan finalized:
  - Identifies 98 Recovery Measures under the 5 Broad Strategies to address threats and recover both populations.

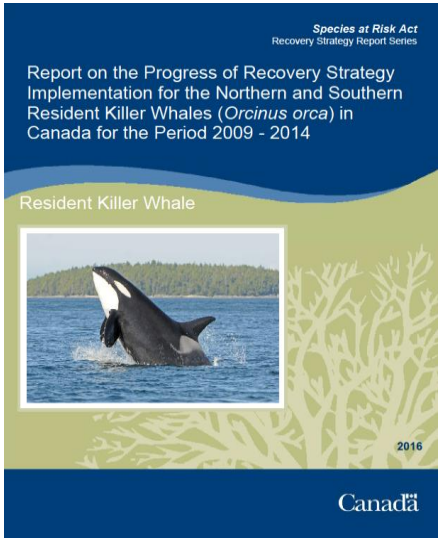
- In 2017, Science Based Whale Review & Symposium completed:

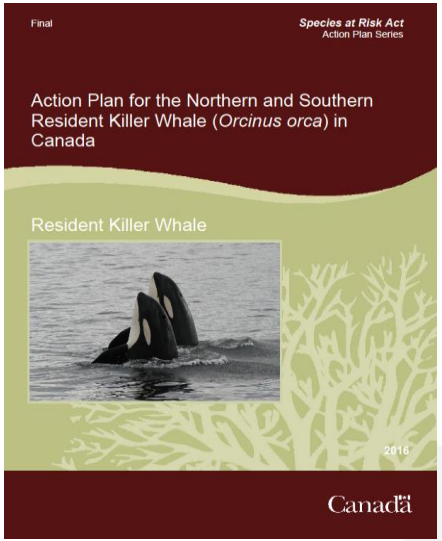


  - Science-based review of the efficacy of recovery measures to date.
  - Identified 5 additional recovery measures, plus additional threat of Vessel Strikes.

Resident Killer Whales: Recovery Documents

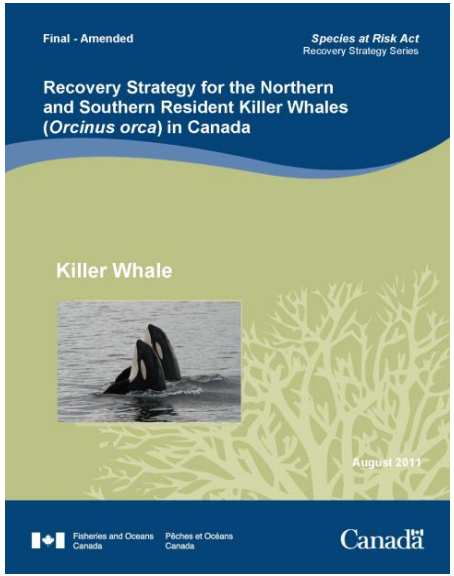






- Development and implementation of these documents are required by law (SARA) and their content developed by noted experts in the field from both Canada and the US.
- Forms the foundation of our approach to recovering the population.

Resident Killer Whales: Critical Habitat



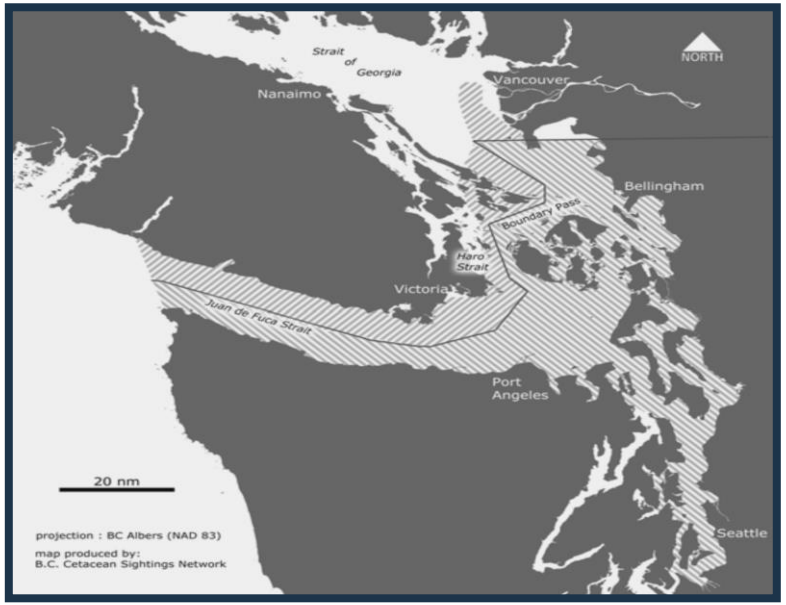
SRKW CH is protected from destruction by a SARA s.58 order

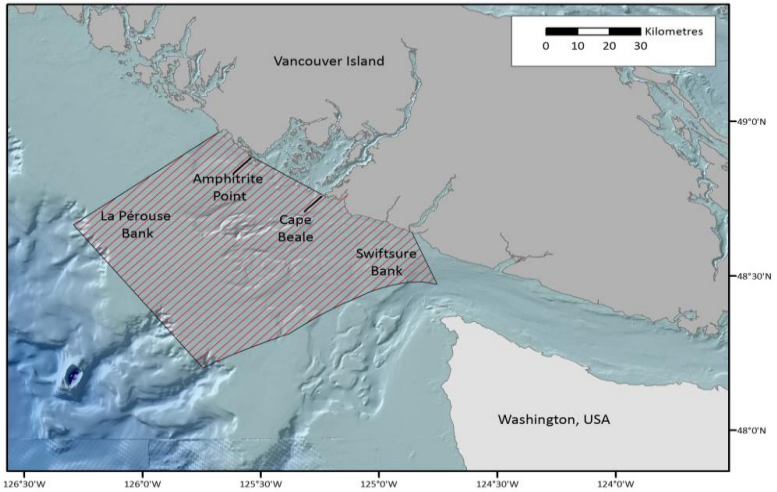
"Critical habitat" means the "habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species." (SARA s.2 (1))

Destruction would result if critical habitat were degraded, either permanently or temporarily, such that it would not serve its function when needed by the species.

SRKW: Critical Habitat

SRKW CH (existing) - Haro Strait and Boundary Pass and adjoining areas in the Strait of Georgia and the Strait of Juan de Fuca.





SRKW Habitat of Special Importance (proposed additional CH) - This area extends westward from the mouth of Juan de Fuca Strait to include various banks on the continental shelf from the southwestern Vancouver Island coastline to the shelf break (200 m isobath).

SRKW Recovery Measures: Action Plan & Whale Science Review

- Work planning and implementation phase of SAR recovery process.
- Prioritization and identification of activities to abate threats to RKW – research, management, education/outreach.
- 35 recovery measures for abating the threat of reduced prey availability (9 of which also address disturbance)
  - 24 identified as high priority

Prey availability: priority research & management recovery measures


Photo credit: Christie McMillan, DFO

RM #	Description
6	Take into account Both (SRKW & NRKW) the seasonal (acute) as well as the cumulative (chronic) effects of poor returns for Chinook and other important prey species on Resident Killer Whales when managing fisheries.
7	Investigate the benefits of strategic salmon fishery planning approaches and management actions to reduce Resident Killer Whale prey competition in specific feeding areas (e.g. modeling, retention limits, fishery area boundary adjustments or closures), and implement where appropriate.
10	Investigate the benefits of management actions (e.g. protected areas, fishery area boundary adjustments or closures) to protect important foraging and beach rubbing locations such as Robson Bight and other identified areas, and implement where appropriate.

THANK YOU

Lake Laberge, Yukon Territory, Canada. Shutterstock

Chinook Context

Chinook Salmon 101

- Chinook exhibit a complex range of life history strategies at all stages:
  - Juvenile rearing: ocean-type vs. stream-type
  - Ocean distribution: locally distributed, far-north or offshore migrating
  - Adult run timing: spring, summer, or fall
  - Variable age at maturity (2, 3, 4, 5, 6 or older)
- Often difficult to estimate absolute abundances of Chinook populations over time and space.

Juvenile Rearing Strategy

Ocean-type "Sub-yearling"	Stream-type "Yearling"
EX: Vancouver Island, Lower Fraser, south coastal populations	EX: Upper Fraser, Northern BC populations
Migrate to saltwater very soon after emergence (immediate migrant to 150 day smolt)	Spend one or more years rearing in freshwater before smolting
Coastal shelf distribution during ocean rearing, with variations: locally distributed near ocean entry point vs. far-north migrating	Offshore resident during ocean rearing phase

Stock-specific juvenile Chinook salmon migration patterns

1. Linked to life history type: yearling vs sub-yearling smolts

- yearling smolts from southern stocks (Fraser River, Puget Sound, coastal Washington and Oregon, Columbia River) move quickly into waters north of Vancouver Island, including southeast Alaska
- sub-yearling smolts from these stocks remain in waters of Salish Sea and off WCVI; northward migration is generally not initiated until the 2nd yr at sea

2. Migration patterns for all stocks remain consistent between years

- large variations in ocean conditions encountered by salmon over the time period of the study
- observed no response in terms of shifts in stock-specific distributions

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ARTICLE

Life History and Seasonal Stock-Specific Ocean Migration of Juvenile Chinook Salmon

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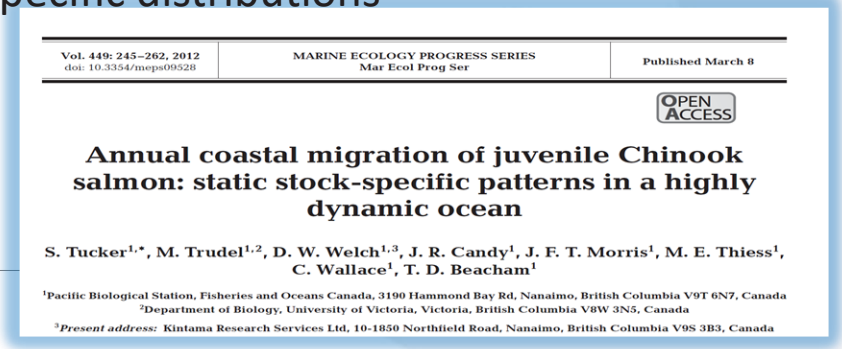

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Annual coastal migration of juvenile Chinook salmon: static stock-specific patterns in a highly dynamic ocean

S. Tucker[1,*], M. Trudel[1,2], D. W. Welch[1,3], J. R. Candy[1], J. F. T. Morris[1], M. E. Thiess[1], C. Wallace[1], T. D. Beacham[1]

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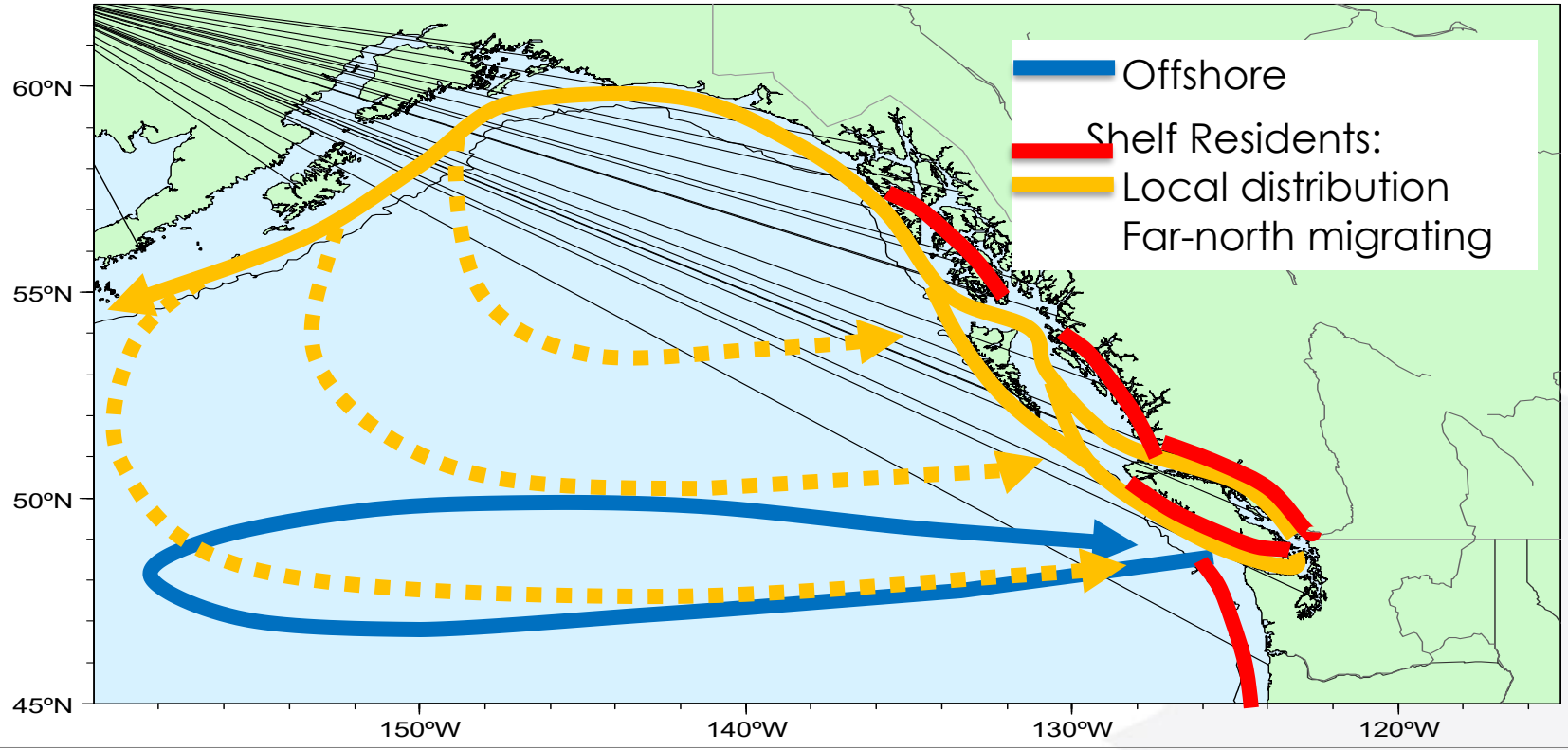
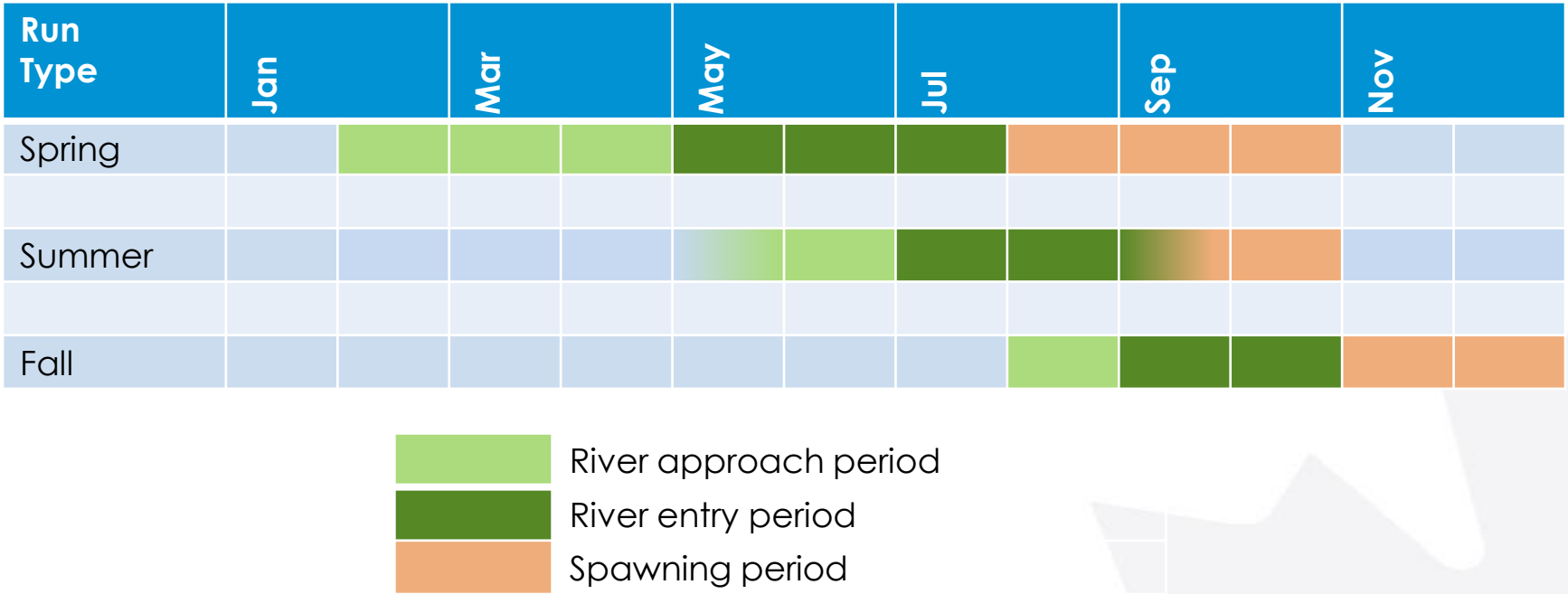
Ocean Distribution



Spawning Migration Timing



To SRKW, not all Chinook are equal

- There are over 900 Chinook populations in southern BC, but SRKW diet today is selectively comprised of a much smaller subset
- Historically, SRKWs likely relied upon a broader range of stocks.
- Key stocks today include:
  - Fraser River: South Thompson, Upper & Middle Fraser, and Lower Fraser
  - Southeast Vancouver Island
  - Puget Sound

Summary of Key Canadian Chinook Stocks

Stock Name	Juvenile Rearing Strategy	Ocean Distribution	Adult Run Timing
Middle/Upper Fraser (Fraser Spring)	Stream	Offshore	Spring
South Thompson (Fraser Summer)	Stream	Far-north migrating	Summer
Lower Fraser (Fraser Fall or Fraser Late)	Ocean	Locally distributed	Fall
Middle/Lower Georgia Strait	Ocean	Locally distributed	Fall

Relative Change 1979-2016

(general consistency in escapement, reduced marine survival)

	Average Abundance, x1000 (1979-1988)	Average Abundance, x1000 (2007-2016)	Change (%)
Fraser Spring 1.3 (5-2)	47.0	24.4	- 48%
Fraser Summer 1.3 (5-2)	40.5	27.7	- 32%
Fraser Summer 0.3 (4-1)	75.8	187.2	+ 147%
Fraser Spring 1.2 (4-2)	14.0	13.5	- 4%
Fraser Late	433.2	153.8	- 64%
Lower/Middle Georgia Strait	165.5	45.0	- 73%

Wild Salmon Policy Status Assessment (DFO 2016)

PST Stock Group	CU ID	CU Name	WSP Integrated Status	Current CWT Indicator
Fraser Spring 1.3	CK-10	Middle Fraser River SP 1.3	Red	None
	CK-12	Upper Fraser River SP 1.3	Red	
	CK-18	North Thompson SP 1.3	Red	
Fraser Summer 1.3	CK-11	Middle Fraser River SU 1.3	Amber	None
	CK-14	South Thompson SU 1.3	Red/ Amber	
	CK-19	North Thompson SU 1.3	Red	
	CK-09	Middle Fraser River-Portage FA 1.3	Red	
Fraser Spring 1.2	CK-17	Lower Thompson SP 1.2	Red	Nicola
	CK-16	South Thompson-Bessette Creek SU 1.2	Red	
Fraser Summer 0.3	CK-13	South Thompson SU 0.3	Green	Lower Shuswap
	CK-15	Shuswap SU 0.3	Undetermined	
Fraser Late	CK-03	Lower Fraser River FA 0.3	Green(Provisional)	Harrison
Lower & Middle Georgia Strait	CK-22	East Vancouver Island – Cowichan & Koksilah FA	Undetermined	Cowichan
	CK-25	East Vancouver Island-Nanaimo & Chemainus FA	Undetermined	Nanaimo

What is being done and where to from here?

- Work of Independent Science Panel 2011-2013
- Southern BC Chinook Strategic Plan co-developed
- Habitat Assessment Indices completed
- WSP Status Assessment of Southern BC Chinook stocks "Five-Year Review" of management approach for Fraser River Spring and Summer 5-2 stocks underway
- October 2017 SRKW Symposium (EC/TC/DFO)
  - Contaminants, Noise/disturbance
  - Prey availability

…where to from here cont'd

- November 2017, UBC Institute for Oceans and Fisheries held workshop on The Availability of Prey for SRKW (> 40 chinook & SRKW experts) - considered options for increasing prey availability/accessibility
- January – April 2018 – regular IFMP consultations
- Spring workshop on chinook "production" issues
- Fall 2018 – COSEWIC assessment of southern BC chinook stocks anticipated.

… where to from here cont'd.

- January 2018 – IFMP letters will be sent out (key issues, timelines, etc)
- Feb 5, 2018 - Deadline for preliminary input
- Feb 7/8 - NC and SC IHPC Meetings
- Feb 23, 2018 – Release of Draft IFMP
- March 7/8 – NC and SC IHPC Meetings
- April 6 – final day for input on draft IFMP
- April 25/26 – final IHPC meeting
- June 2018 – IFMP finalized and released

References

- DFO. 2016. Integrated Biological Status of Southern British Columbia Chinook Salmon (Oncorhynchus tshawytscha) Under the Wild Salmon Policy. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2016/042.
- Ford, J.K.B., Pilkington, J.F., Reira, A., Otsuki, M., Gisborne, B., Abernethy, R.M., Stredulinsky, E.H., Towers, J.R., and Ellis, G.M. 2017. Habitats of Special Importance to Resident Killer Whales (*Orcinus orca*) off the West Coast of Canada. DFO Can. Sci. Advis. Sec. Res. Doc. 2017/035. viii + 57 p.
- Ford, J.K.B., B.M. Wright, G.M. Ellis, and J.R. Candy. 2009. Chinook salmon predation by Killer Whales: seasonal and regional selectivity, stock identity of prey, and consumption rates. DFO Can. Sci. Advis. Sec. Res. Doc. 2009/101.
- Hanson, M.B., and 14 other authors. 2010. Species and stock identification of prey consumed by endangered southern resident Killer Whales in their summer range. Endangered Species Research 11:69-82.