This presentation was prepared for the 2024 NZ Salmon Anglers Association AGM by North Canterbury Fish & Game, building on the talks given by Fish & Game at the 2023 NZSAA AGM, as a recap of salmon management and an overview of the current season.

Vision for the salmon fishery

From the Adaptive Management Strategy 2021…

- "*Manage the wild Chinook salmon fishery at sustainable levels using a transparent, adaptive management approach to ensure adequate salmon spawn each year and to provide a healthy recreational sports fishery".*
- The goal is to be able to fish wild sea-run salmon in Canterbury for generations to come

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Overview of the Adaptive Salmon Management Strategy adopted in 2021 by both the NC and CSI Fish & Game Councils, which enabled the establishment of a season bag limit regulation as a salmon harvest management tool.

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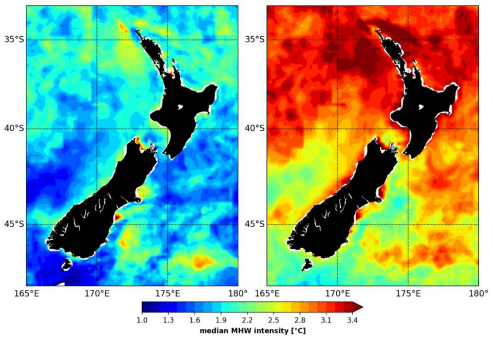
Salmon 'crisis' causes catch limit to be halved in Canterbury rivers

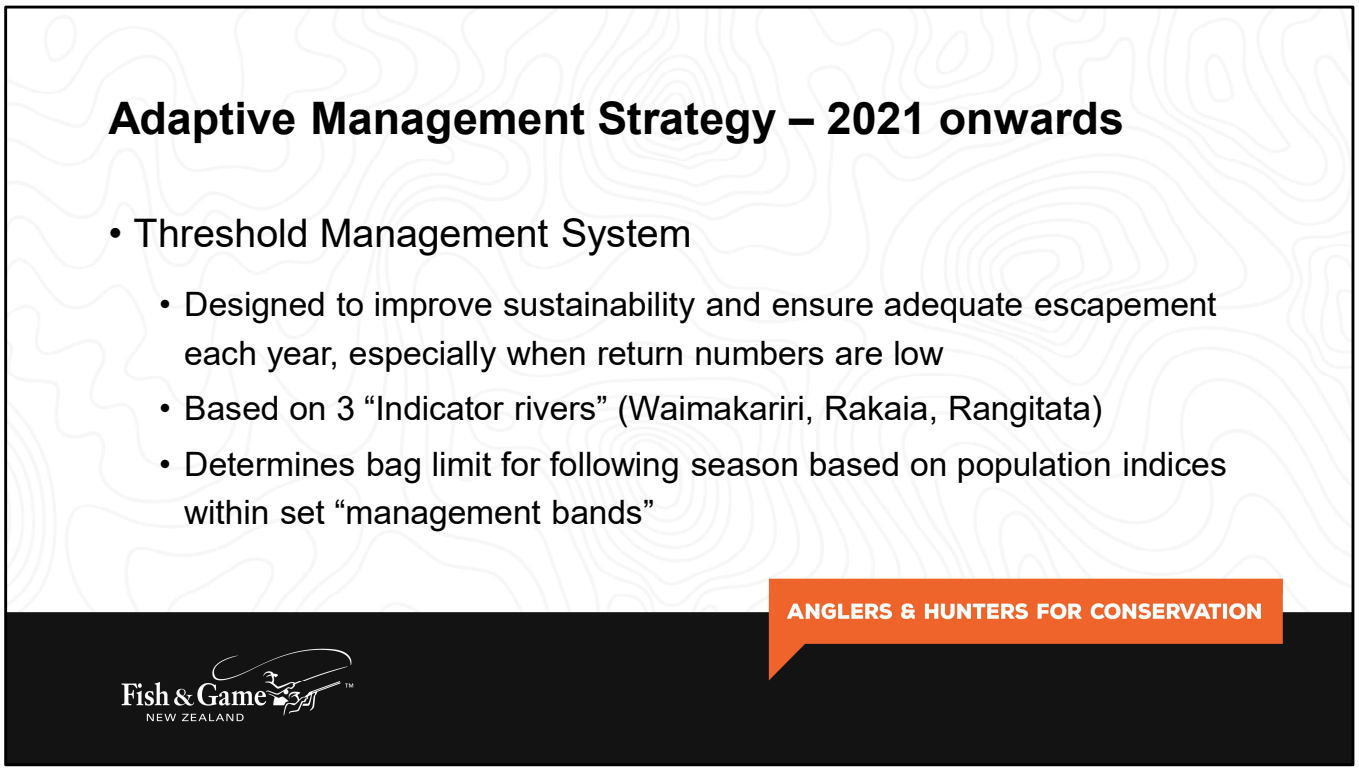
11:51 am on 22 June 2019 Share this

A fall in salmon populations means anglers will be allowed to bag just one fish a day in Canterbury rivers.



In the last 25+ years, like many other salmon fisheries, Chinook salmon in NZ have been struggling.

The causes behind the observed decline are many, including (1) ocean warming, (2) habitat degradation, (3) large agricultural water demands and poorly functioning fish screens, (4) high harvest by anglers, AND (5) poor salmon hatchery practices.



In 2021 North Canterbury and Central South Island Fish & Game regions adopted an Adaptive Management Strategy for sea-run salmon.

The main component of the strategy included the Threshold Management system, which sets the basis for setting season bag limits based on current and previous years’ escapement population indices (spawning run estimates) in the 3 “indicator rivers”.

Together these three rivers account for approximately 75% of all sea-run salmon harvested by anglers across the wider Canterbury area each year.

Adaptive Management Strategy – 2021 onwards

Management Band	Spawning population size	Season Bag Limit	Harvest reduction	Increased spawning
Healthy	> 7,800	8	4%	3%
Moderate	5,101 to 7,800	4	16%	11%
Low	1,200 to 5,100	2	35%	23%
Severe	< 1,200	1 + possible season and area restrictions	56% +	37% +

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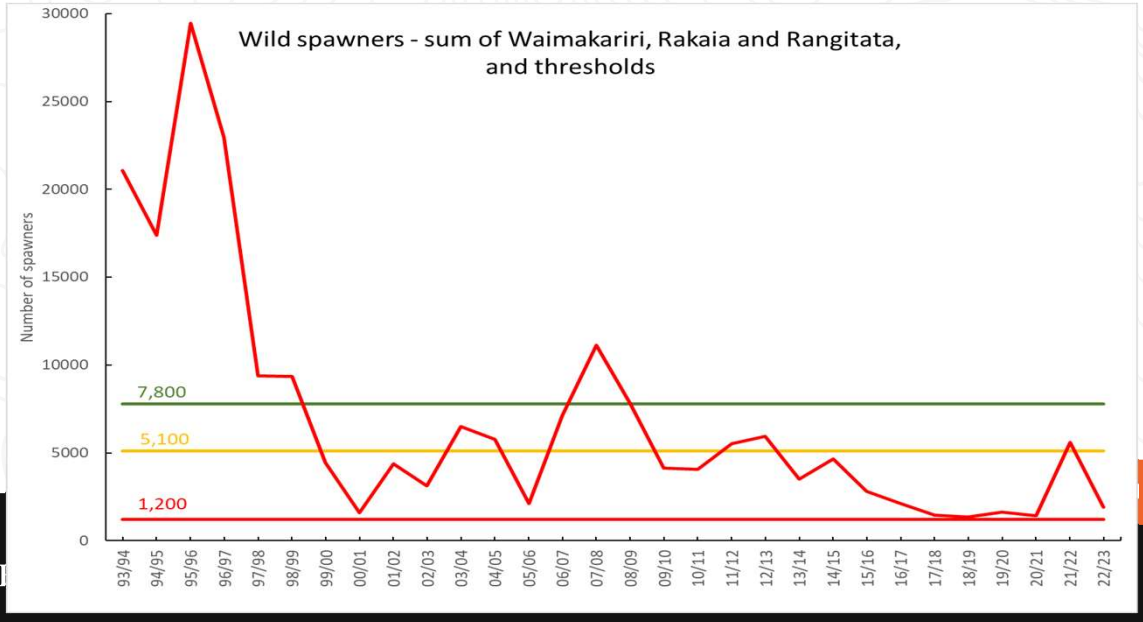
Modelling of previous harvest and spawning population data helped establish the likely reductions in harvest and the potential increases in the spawning populations at differing season bag limits.

Based on this work four “management bands” were created to categorise the health of the spawning populations each season.

Briefly, the next season’s season bag limit is determined by which management band the spawning population sits in, after also taking into consideration the management bands from the previous two years (covering the average salmon life-cycle of 3 years).

Adaptive Management Strategy Strategy – 2021 onwards



This graph shows a visual of which bands previous spawning counts have sat in over the 30 years from 1993 – 2023. With the exception of 2021/22, we have been sitting in the “low” band since 2013/14 season.

This “adaptive harvest management” system aims to increase the number of fish that survive to spawn when the population is in the lower management bands by reducing angler harvest to sustainable levels. When the population is sustained within a higher management band for 3 years, season bags can increase to allow more harvest.

Why a 2-fish season bag limit?

- Different control methods originally explored including season length, reach restrictions, and a season bag limit
- Modelling indicated season bag was the best method of achieving harvest reduction while also impacting on the least number of anglers

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Different options were originally considered alongside a season bag limit to help reduce harvest. Modelling based on previous harvest data estimated harvest reductions based on different closure periods and closed areas (e.g. shortening the season, closing specific months, or closing areas to fishing e.g. river mouths).

Why a 2-fish season bag limit?

- Season bag modelling based on 18/19 season

Table 3. Impact of various season bag limits on 879 successful salmon anglers who caught 1,979 sea-run salmon across all NC and CSI F&G regions salmon fisheries in the 2018/19 season and potential stock saved that could have improved spawning in the Waimakariri, Rakaia and Rangitata rivers in 2019.

Season bag size	Successful anglers achieving bag size	Number of salmon saved	Proportion of total harvest saved	Potential increase in Waimakariri, Rakaia, Rangitata spawning
20	0%	0	0	0
10	2%	37	2%	1.6%
5	12%	211	11%	10%
4	17%	313	16%	14%
3	26%	460	23%	21%
2	47%	689	35%	32%
1	100%	1,100	56%	50%

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When comparing the options, a season bag limit was determined to be the option which impacted the least anglers while still being able to achieve sufficient harvest reductions.

Harvest analysis showed that the introduction of a season bag limit only affected a small fraction (about 5%) of salmon anglers.

Why a 2-fish season bag limit?

- Developed into management bands for setting season bag limits

Management Band	Spawning population size	Season Bag Limit	Harvest reduction	Increased spawning
Healthy	> 7,800	8	4%	3%
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Low	1,200 to 5,100	2	35%	23%
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Current band

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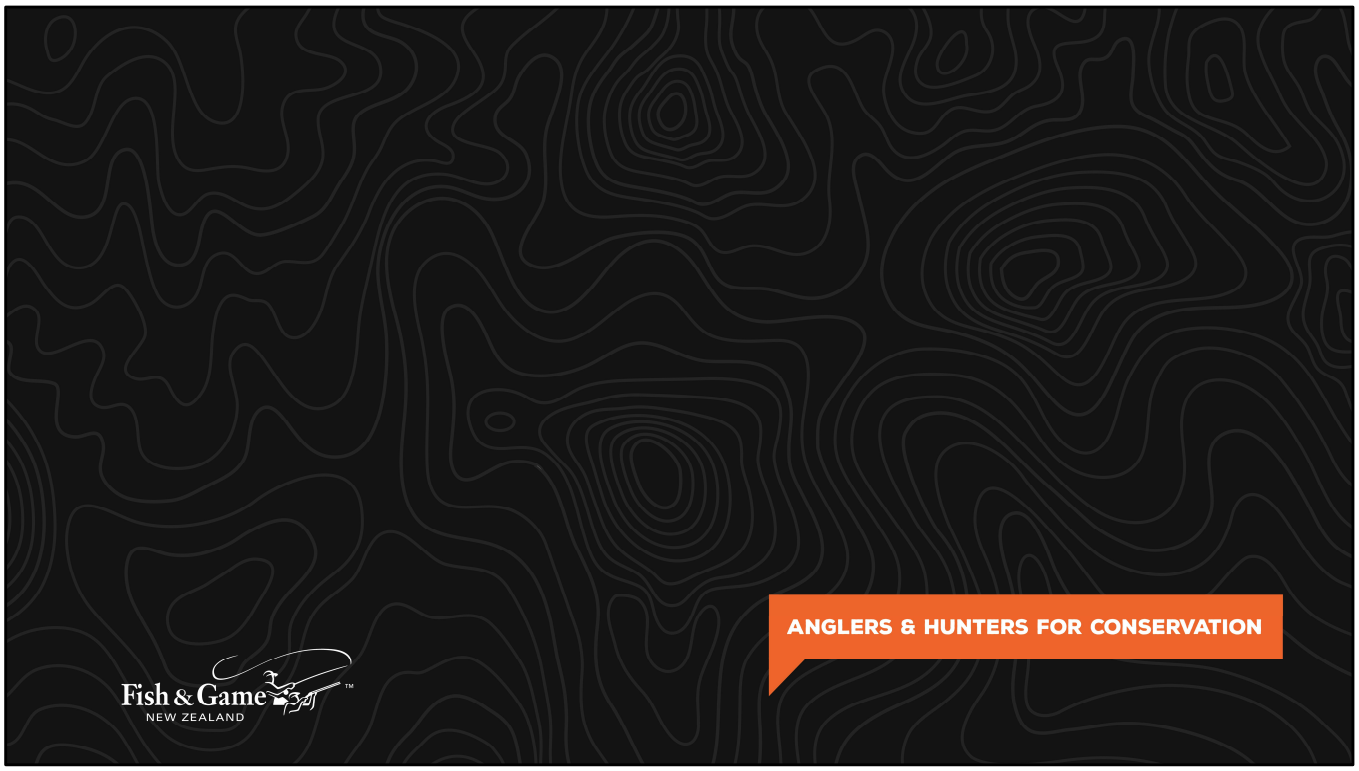
Based on previous year's spawning counts we entered into the threshold management system in the "low" band, corresponding to a season bag limit of 2 fish for the 2021/22 season. Without 3 years of being sustained in a higher management band, we have stayed with a season bag of 2.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Key Milestones

- Major reduction in the proportion of the total run harvested by anglers

  (total run = est. harvest + population index)

- Historical estimates of harvest proportions by anglers (1993-2021)
  - Rakaia River - averaged **43%**
  - Waimakariri River - averaged **56%**

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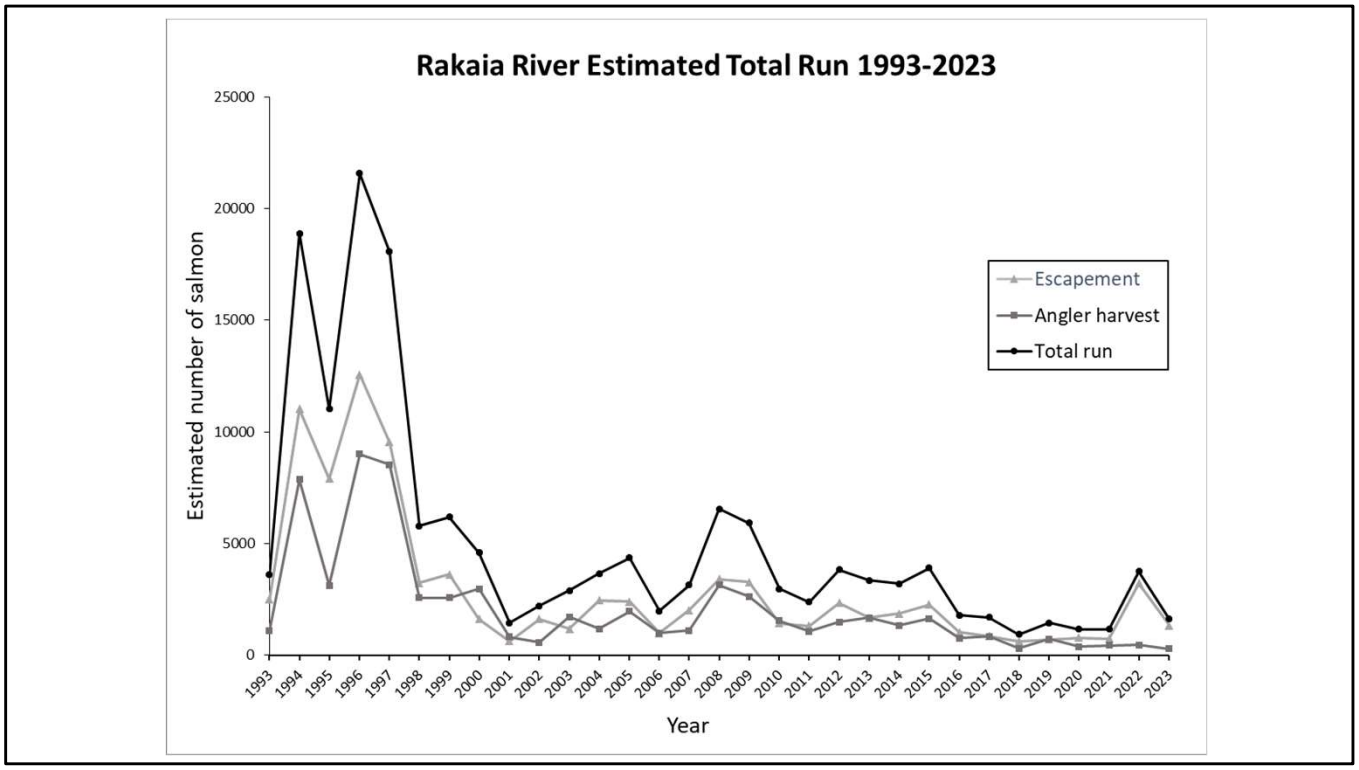
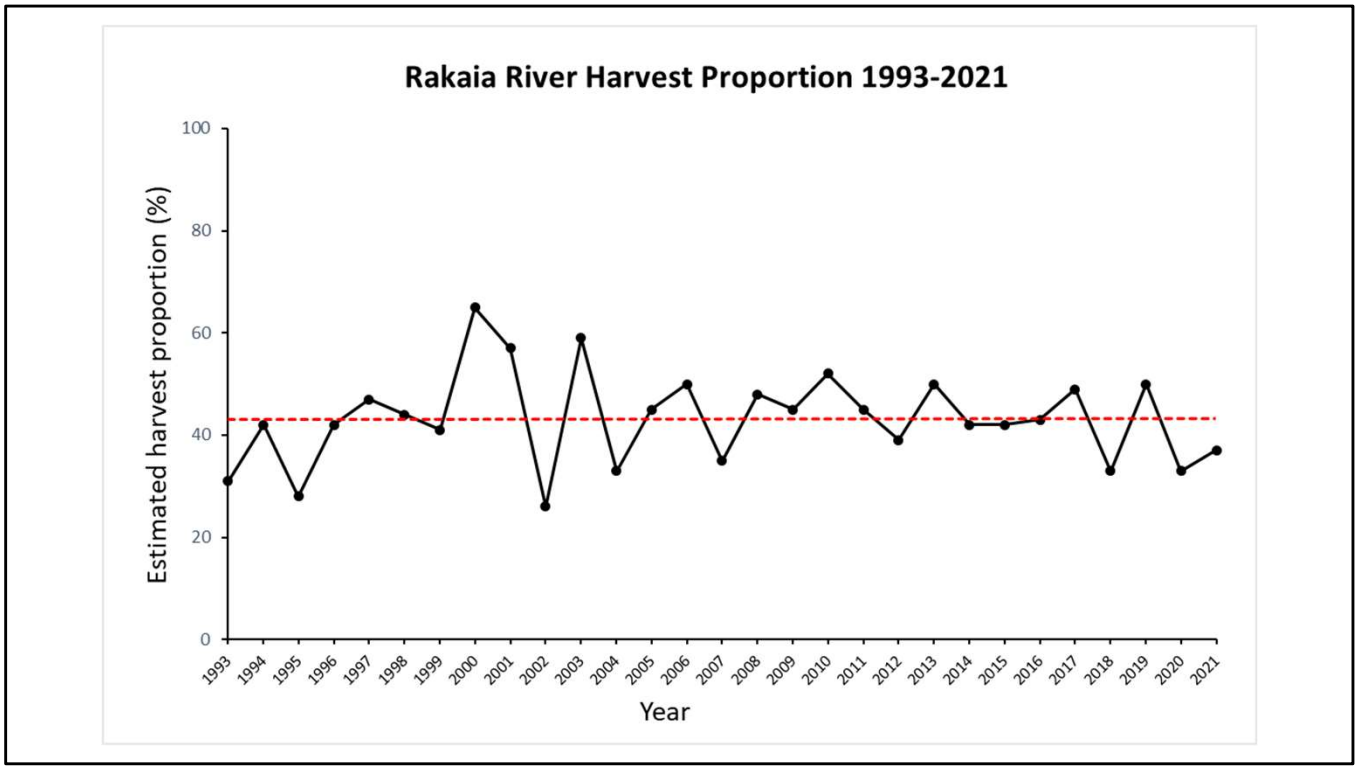
The main key milestone of the strategy so far is the reduction in harvest. We calculate this as a percentage of the 'total run'.

Historically, anglers have harvested large percentage of the overall salmon run.

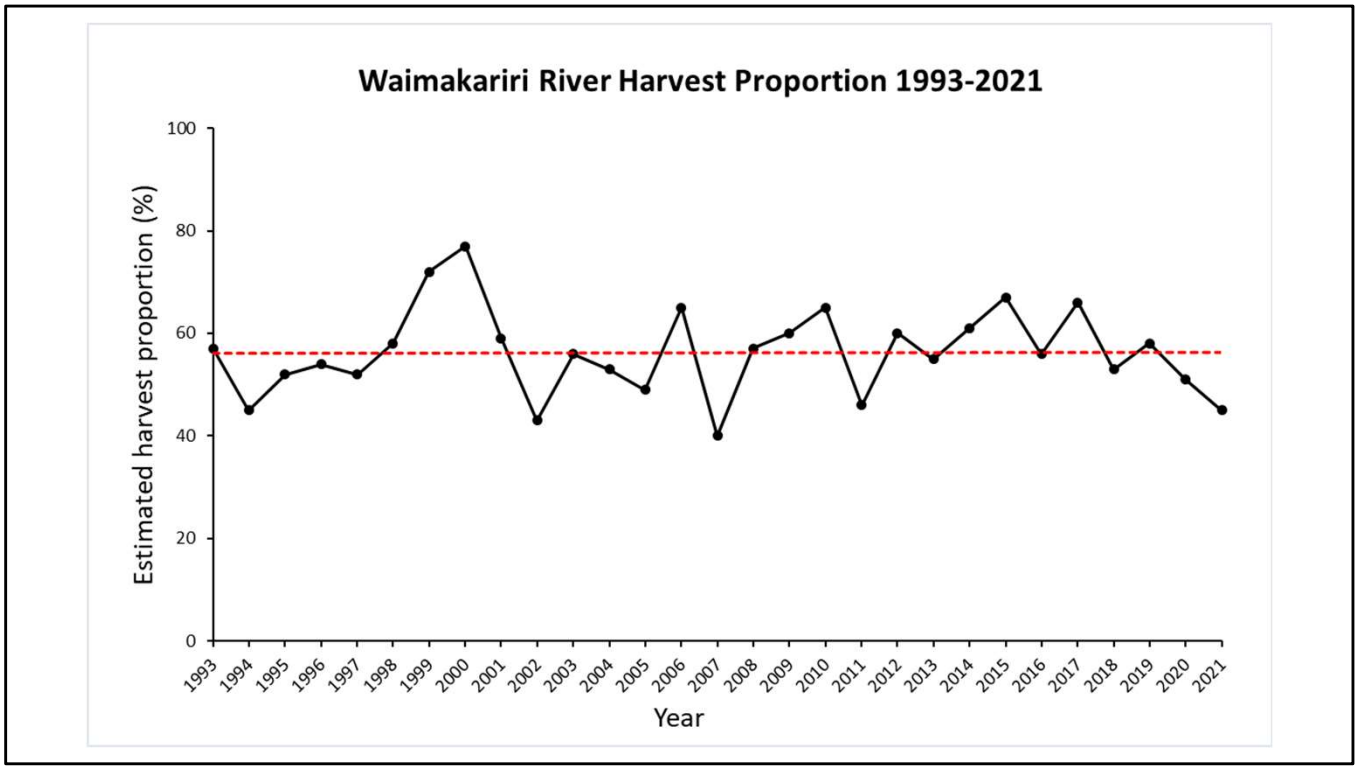


This graph for the Rakaia shows the historic trend of the total run (black line). The total run is the sum of angler harvest (dark grey line) and escapement/spawning population (light grey line). You can see in some years overall angler harvest was higher than the spawning population.



This graph shows the historic harvest percentages for the Rakaia River before the season bag was put in place. While there is some variation year-to-year, harvest percentages have remained fairly stable.

On average from 1993-2021, anglers harvested 43% of the total run of sea-run salmon in the Rakaia River. Notably, harvest percentages had only dropped below 30% of the total run twice since 1993 !



This graph shows the historic harvest percentages for the Waimakariri River before the season bag was put in place. While there is some variation year-to-year, harvest percentages have remained fairly stable.

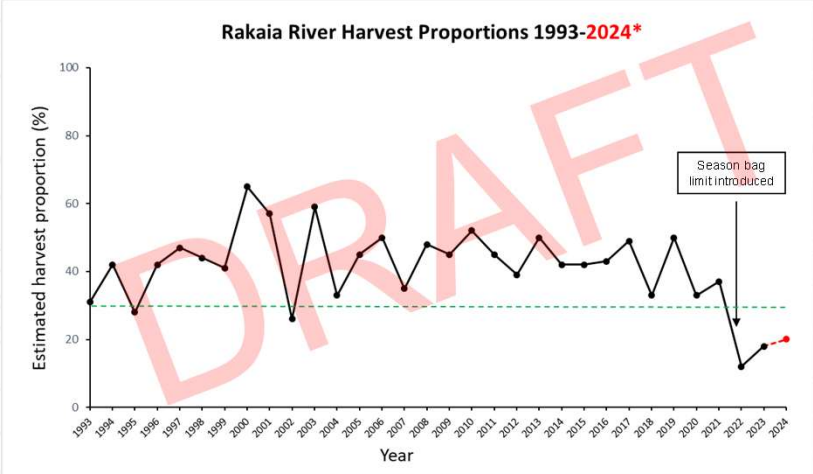
On average from 1993-2021, anglers harvested 56% of the total run of sea-run salmon in the Waimakariri River.

Notably, the harvest percentage on the Waimakariri River had never dropped below 40% since 1993 !

DISCLAIMER: ALL 2023/24 SEASON DATA ARE NOT FINAL AND ARE SUBJECT TO CHANGE BY FINAL REPORTING

Key Milestones

- Rakaia River harvest proportions from 2022 – 2024 between 12-20% with SBL-2 in place



With the season bag in place, we achieved drastic reductions in the angler harvest proportions.

In the first year, harvest percentage on the Rakaia River dropped to 12% of the total run, which represents a thirty percent reduction on the historical average.

It has increased slightly in subsequent years, but harvest has remained under ~20% of the total run.

The green line is placed at a 30% harvest percentage.

Note: 2023/24 data is still in draft and not finalised and is subject to change.

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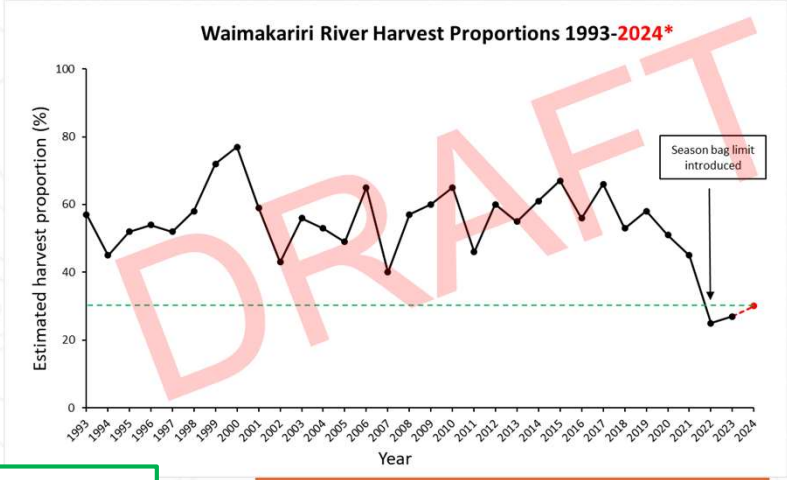
Key Milestones

- Waimakariri River harvest proportions from 2022 – 2024 between 25-30% with SBL-2 in place



→ Harvest proportion targets?

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Similar reductions were seen on the Waimakariri River.

In the first year, the angler harvest percentage on the Waimakariri River dropped to 25% of the total run, which represents a twenty-one percent reduction on the historical average. It has increased slightly in subsequent years but has remained under ~30% of the total run.

The green line is placed at a 30% harvest percentage.

When reviewing the adaptive management strategy, it may be helpful to consider introducing new sustainability targets for harvest percentages with the goal of keeping them below a certain threshold and integrate this into our decision-making.

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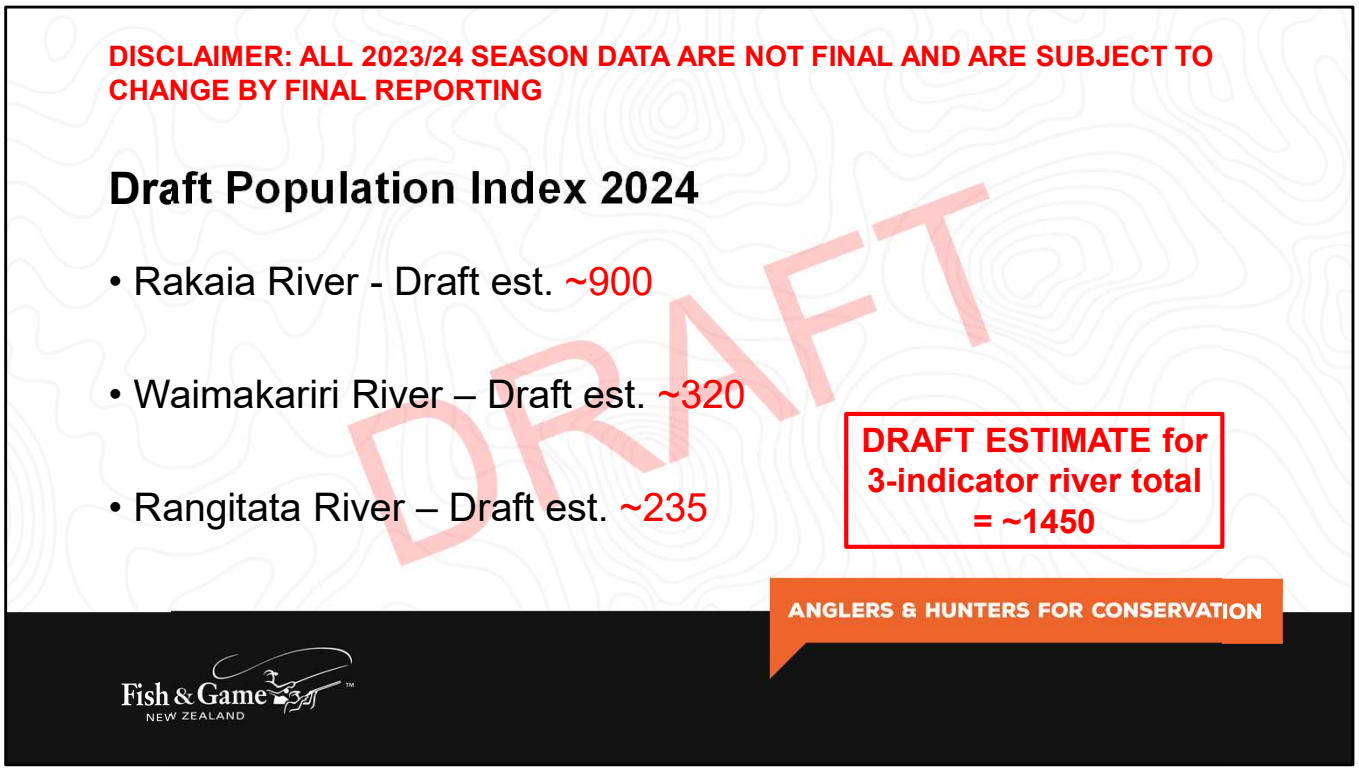

At the time of this presentation, not all salmon spawning counts have been completed. The figures presented here are still draft estimates based on the counts already completed and are only to give an indication on the season so far.

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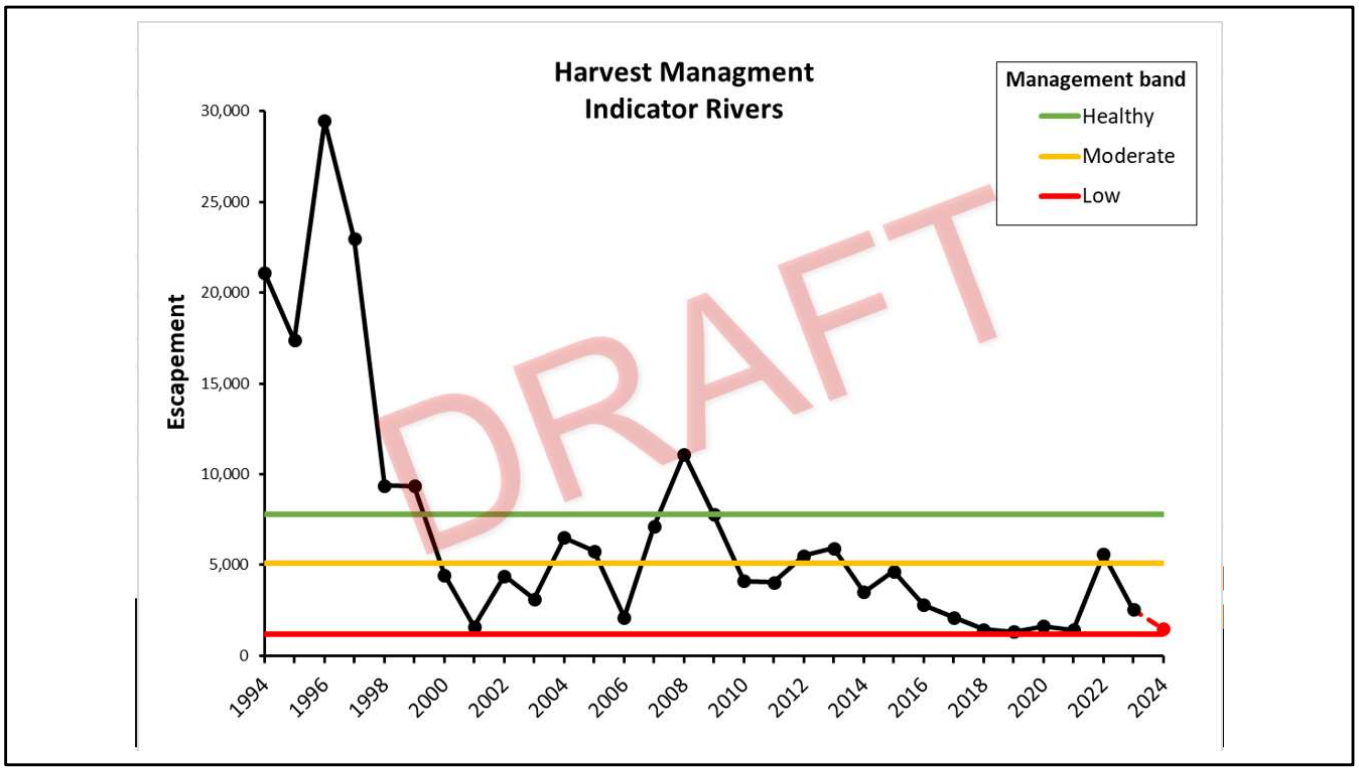

The draft estimate of ~1450 fish across the 3 indicator rivers would theoretically still place the 2023/24 run in the "low" management band, meaning we could maintain a season bag limit of 2 fish for the following season.

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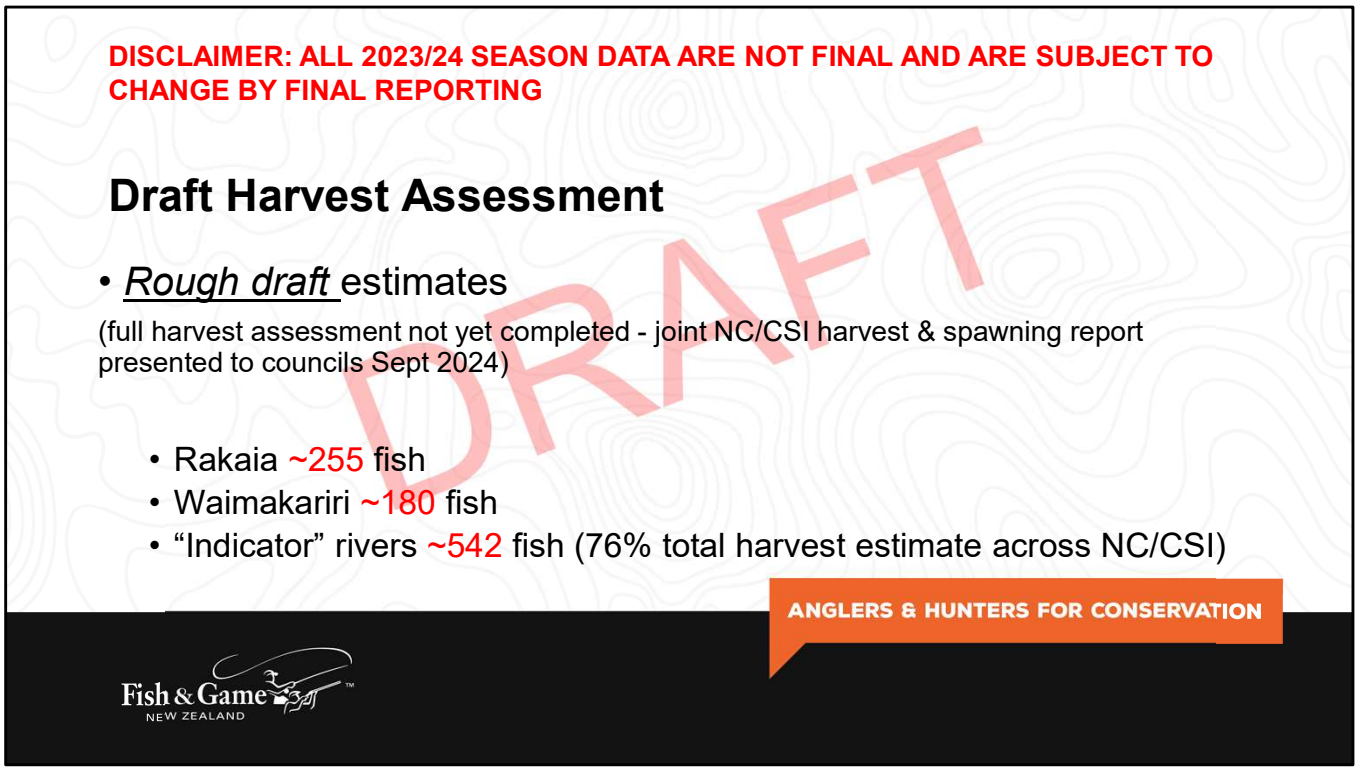

At the time of this presentation, harvest data is still being compiled, but a quick analysis of fish data from voluntary bag limit card returns and additional phone surveys has allowed a rough draft estimate for the purpose of this presentation to give an indication of the season.

It is important to note here that these estimates rely on obtaining accurate harvest data from anglers (even if you harvested 0 fish). It is critical that anglers return their information by handing in their season bag card at the end of the season so we can make the most accurate estimates of harvest.

Note: 2023/24 data is still in draft and not finalised and is subject to change.

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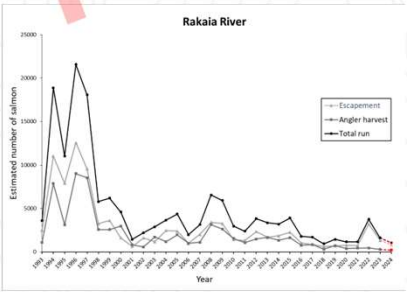
Without the bag limit..

- Using average historical angler harvest proportions before season bag limit…
  - 43% Rakaia River

• 2021/22	+ 1164 fish "saved" with SBL-2
• 2022/23	+ 402 fish "saved" with SBL-2
• 2023/24	+ 228 fish "saved" with SBL-2



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Theoretically, what would harvest have looked like on the Rakaia River if the season bag limit *wasn't* introduced?

Combining spawning populations numbers with the average harvest percentage for each river, we can roughly calculate how many fish the 2-fish season bag limit "saved" (fish making it to the spawning streams that otherwise would have been harvested) over the previous 3 seasons.

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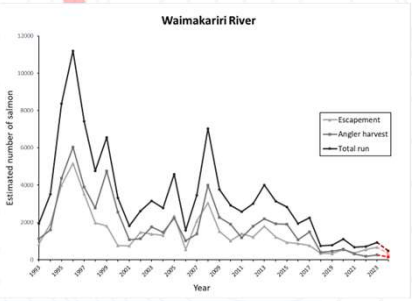
Without the bag limit..

- Using average historical angler harvest proportions before season bag limit…
  - 56% Waimakariri River

  - 2021/22 + 213 fish "saved" with SBL-2
  - 2022/23 + 268 fish "saved" with SBL-2
  - 2023/24 + 116 fish "saved" with SBL-2



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Similarly, what would the theoretical harvest have looked like on the Waimakariri River if the season bag limit *wasn't* introduced?

With the low spawning numbers in the Waimakariri River this year so far, potentially anglers could have harvested a higher percentage of the run than the average of 56%. Historically, harvest percentages on the Waimakariri River have reached almost as high as 80% of the total run.

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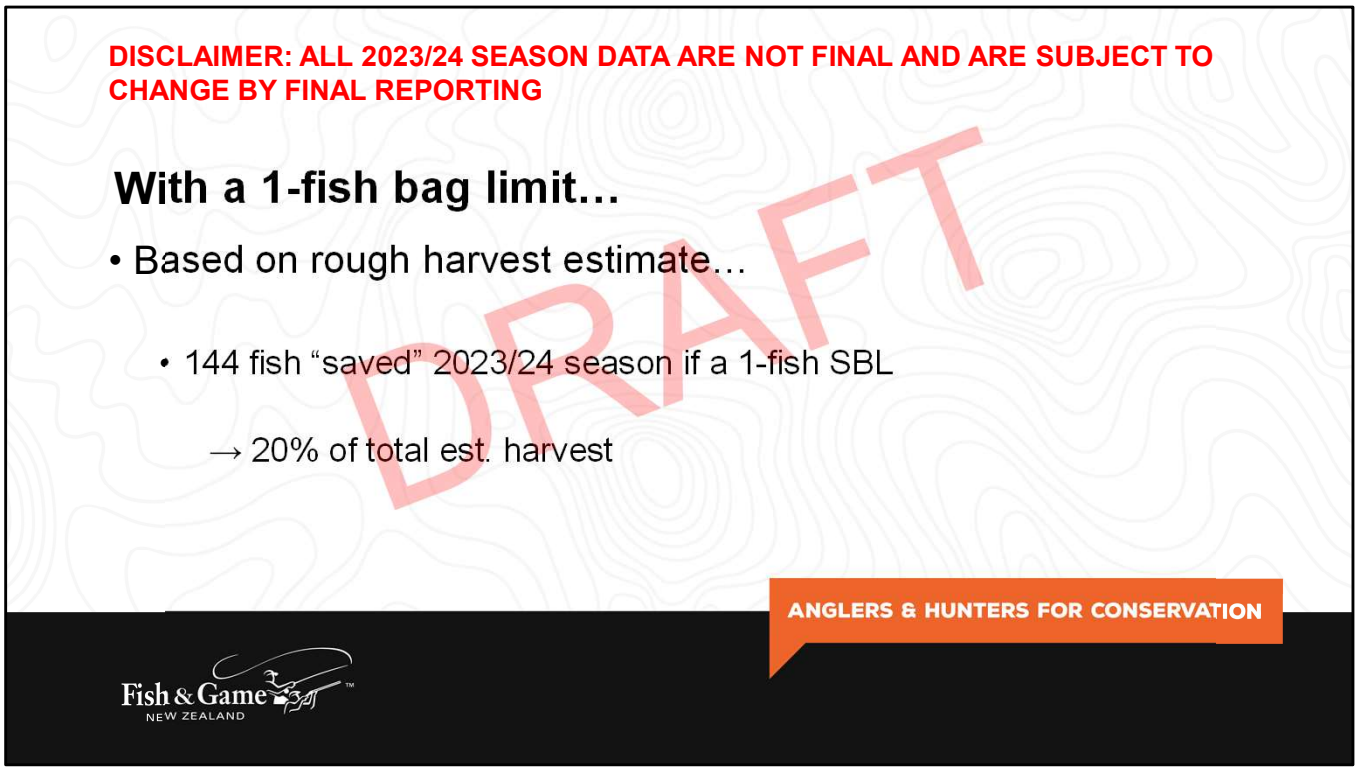

Another theoretical exercise – using this year's draft estimates, what would harvest have looked like if there was a one fish season bag limit?

Across *all* rivers in NC and CSI regions, we theoretically *could* have added an additional 144 fish to the spawning population with a one fish bag limit.

Considering ~75% of sea-run salmon are harvested on the 3 indicator rivers, this equates to ~110 salmon across the Rakaia, Waimakariri and Rangitata rivers.

But these savings would not take us up to the next management threshold, and would impact a higher number of anglers - so would it be worth it?

Note: 2023/24 data is still in draft and not finalised and is subject to change.

News/info from CSI…

- **Rangitata River**
  - Est. population index 235 fish
  - Continuing with habitat enhancements in the spawning streams
  - Deep Stream proportion rising (suggests positive impacts of habitat work)
  - RDR – confidence smolt are now safely excluded (NIWA report to be published)
  - Quiet year for the hatchery returns (expected as only 5,000 released three years ago)

- **Waitaki River**
  - Low redd counts but est. more fish caught than Rangitata
  - Hakataramea River ran dry early season

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We received some updates from Central South Island regions to keep you informed.

If you have further questions for CSI region around their rivers, you are welcome to contact them.

Other information

- **MPI Fisheries regulation change for Chinook Salmon**
  - **Reduced to 1 fish per day across New Zealand**

Finfish species	Maximum daily limit per active fisher	Min fish length (cm)
Quinnat salmon	1	–
Quinnat salmon (Otago Harbour)	1	45

- **Kaikoura Salmon**
  - **Salmon heads collected from Kaikoura salmon anglers previous 2 years**
  - **Determine origins of Kaikoura salmon**

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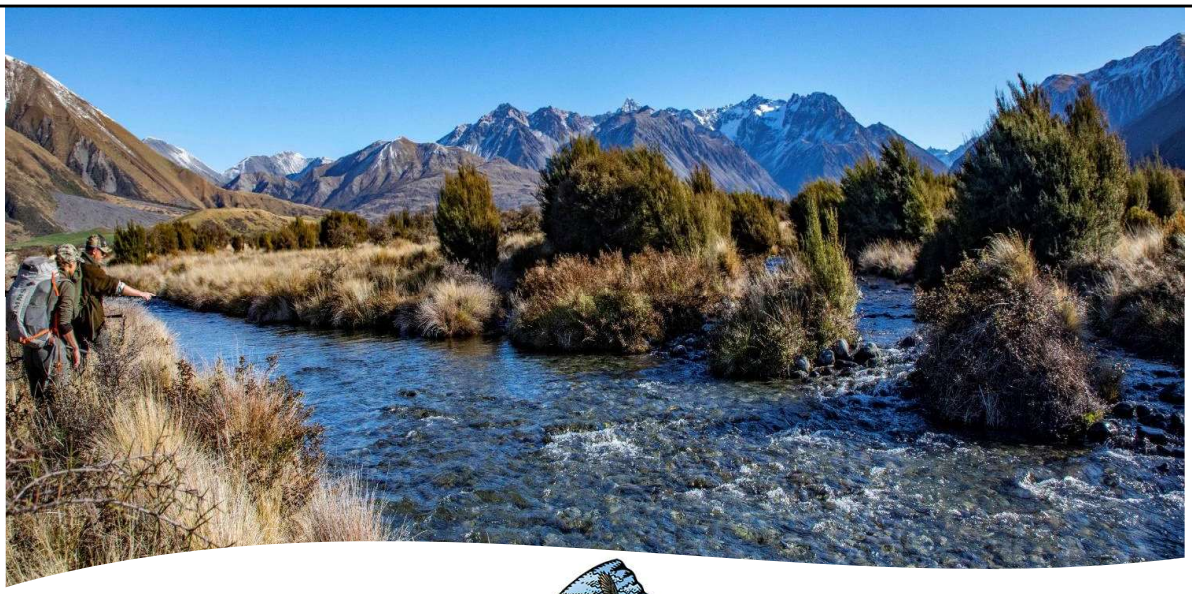
MPI have reduced their daily limit for ocean 1 Chinook Salmon down to one fish (was previously two). Fish & Game had some involvement in helping to make this change.

Samples from Kaikoura salmon have been collected over the last few years to determine the origins of the population that sits in the bay north of Kaikoura township. We're going to one more round of collection in 2024 to ensure we have enough samples to obtain an meaningful result.



The Science behind the salmon (youtube.com)

The key message is to focus on looking after locally adapted wild salmon populations and their habitats going forward.

Great help from Ray Troll's fantastic "*Salmonscape*" fine art posters.

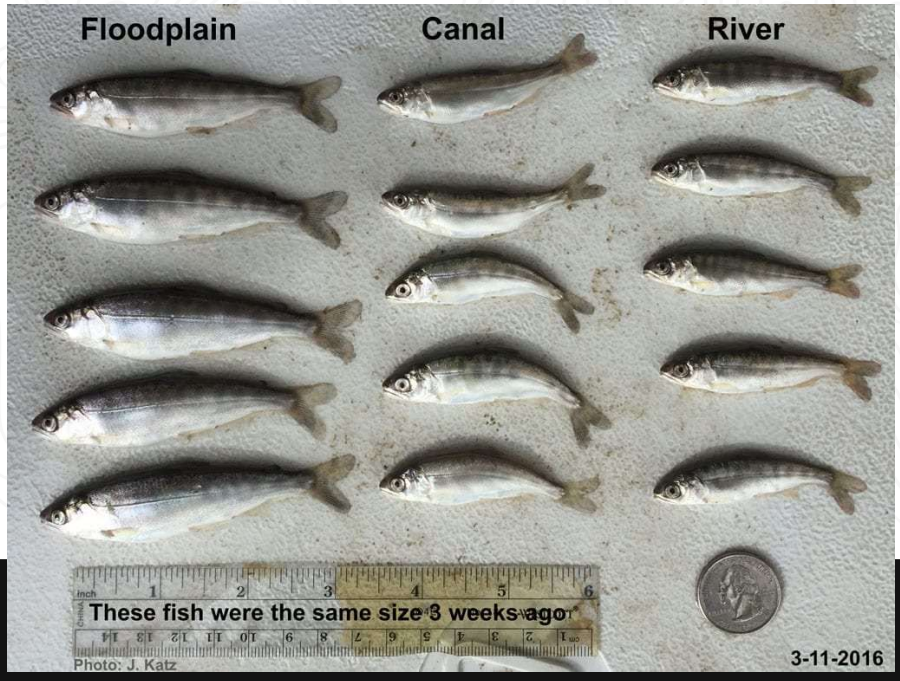
This image is a great example of illustrating how important the relationship between salmon and their habitats is.

This leads us into the importance of key rearing habitats such as connecting streams with their floodplains to improve fry/smolt carrying capacity, growth and survival.

Steve Terry's presentation will follow on from this and show some of the great work he has achieved with the High Country Wetland & Waterway Protection project, which has been funded by the Ministry For the Environments Freshwater Improvement Fund.

Growth rates

- Study by Jacob Katz (CalTrout)
- Rearing on inundated floodplain vs canal and river systems



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Similar work overseas has show promising results.

For example, the above results from a recent study by CalTrout shows the importance of these habitats on juvenile growth rates – fish reared in floodplain habitats grew at a much higher rate over a 3-week period compared to fish reared in riverine or canal systems.