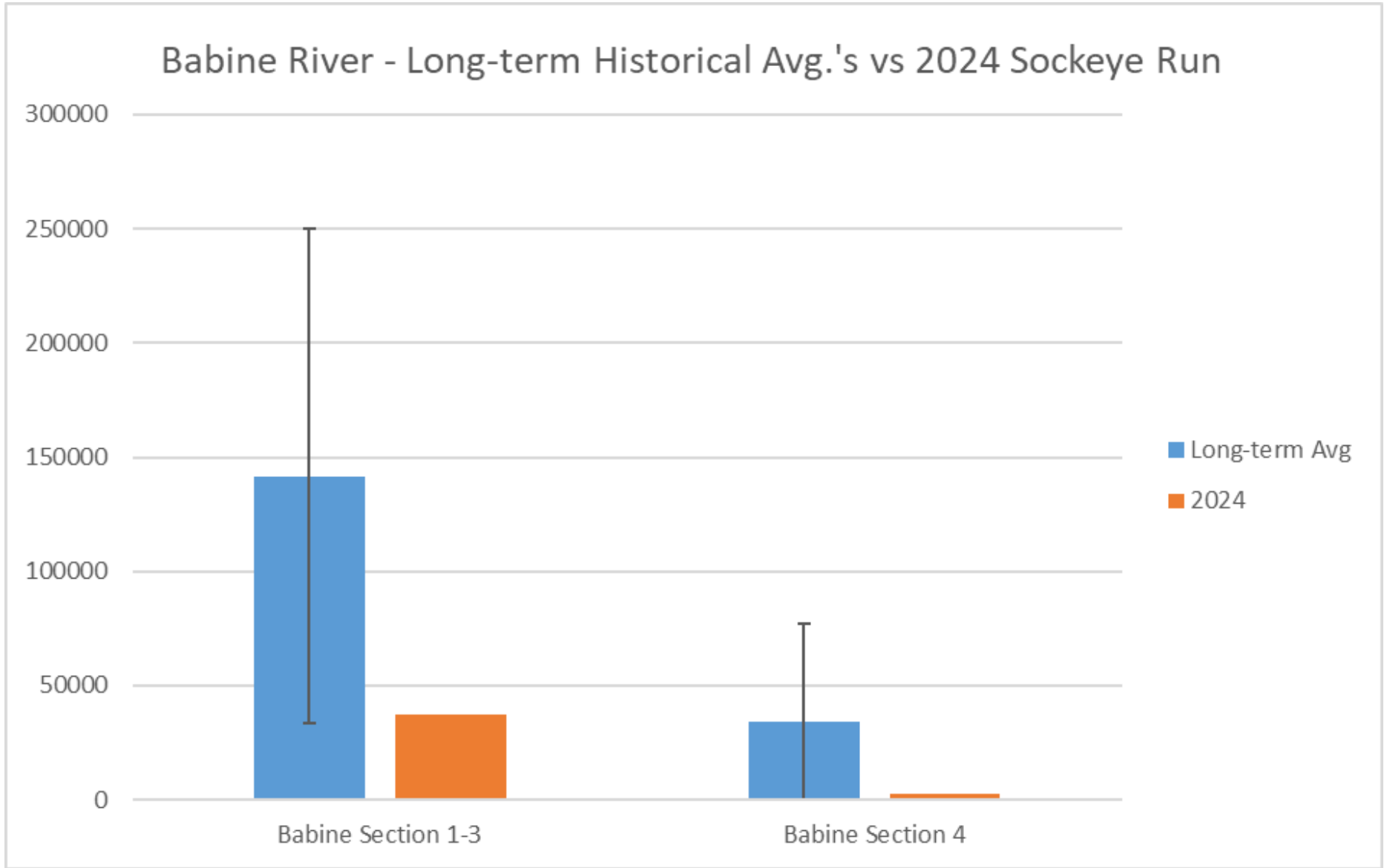
LAKE BABINE NATION FISHERIES

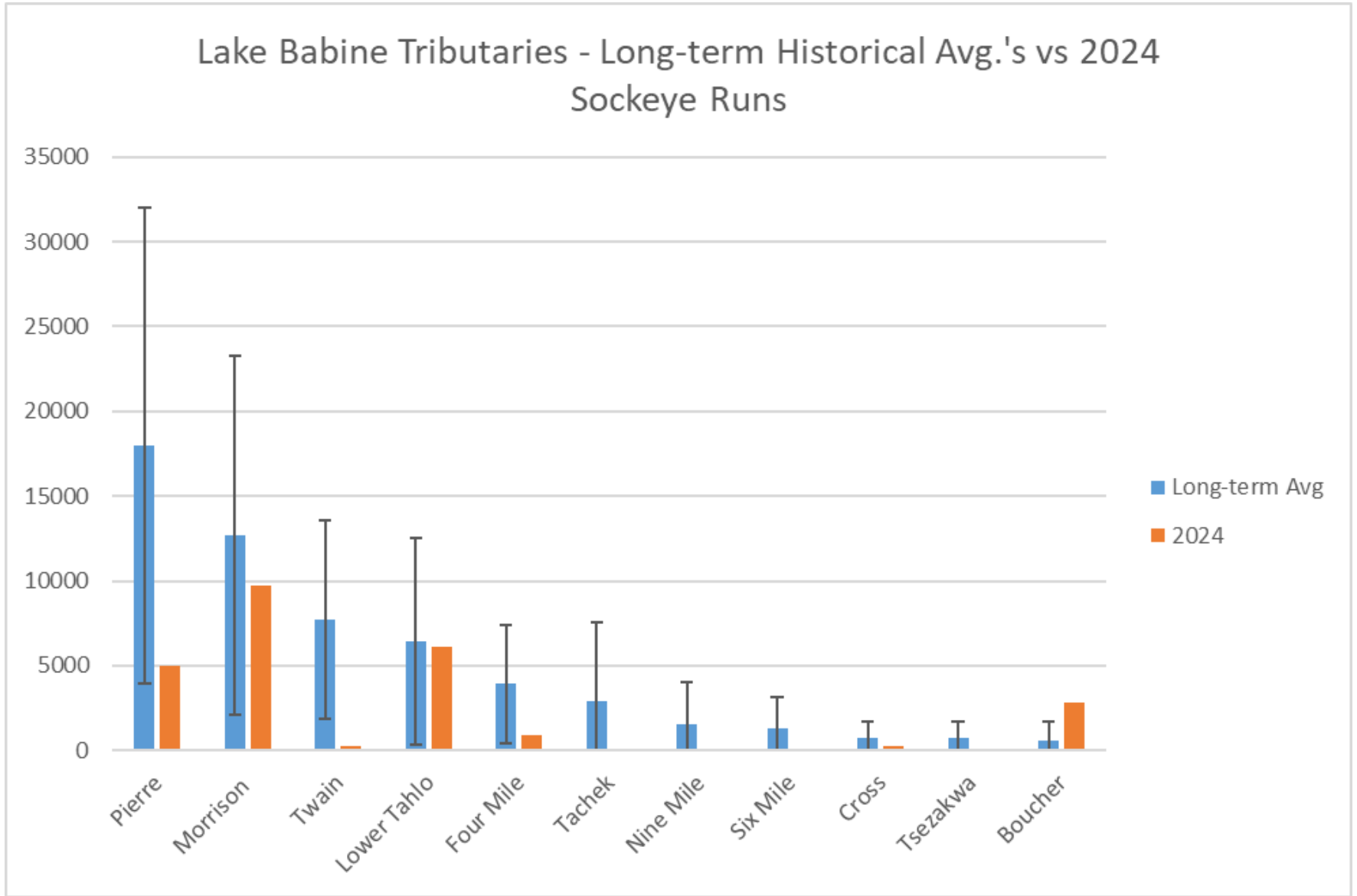
Post Season Review

Dec 5 - 6, 2024

Presentation Outline

- Historical Analysis - Wild Sockeye Streams
  - Returns
  - Timing
- Babine River Co-Management Plan - Year 1 review
  - Temperature
  - Discharge
  - Management


Babine River - Long-term Historical Avg.'s vs 2024 Sockeye Run
300000
250000
200000
150000
100000
50000
0
Babine Section 1-3
Babine Section 4
Long-term Avg
2024


Lake Babine Tributaries - Long-term Historical Avg.'s vs 2024 Sockeye Runs
35000
30000
25000
20000
15000
10000
5000
0
Pierre
Morrison
Twain
Lower Tahlo
Four Mile
Tachek
Nine Mile
Six Mile
Cross
Tsezakwa
Boucher
Long-term Avg
2024

Historical Benchmarks

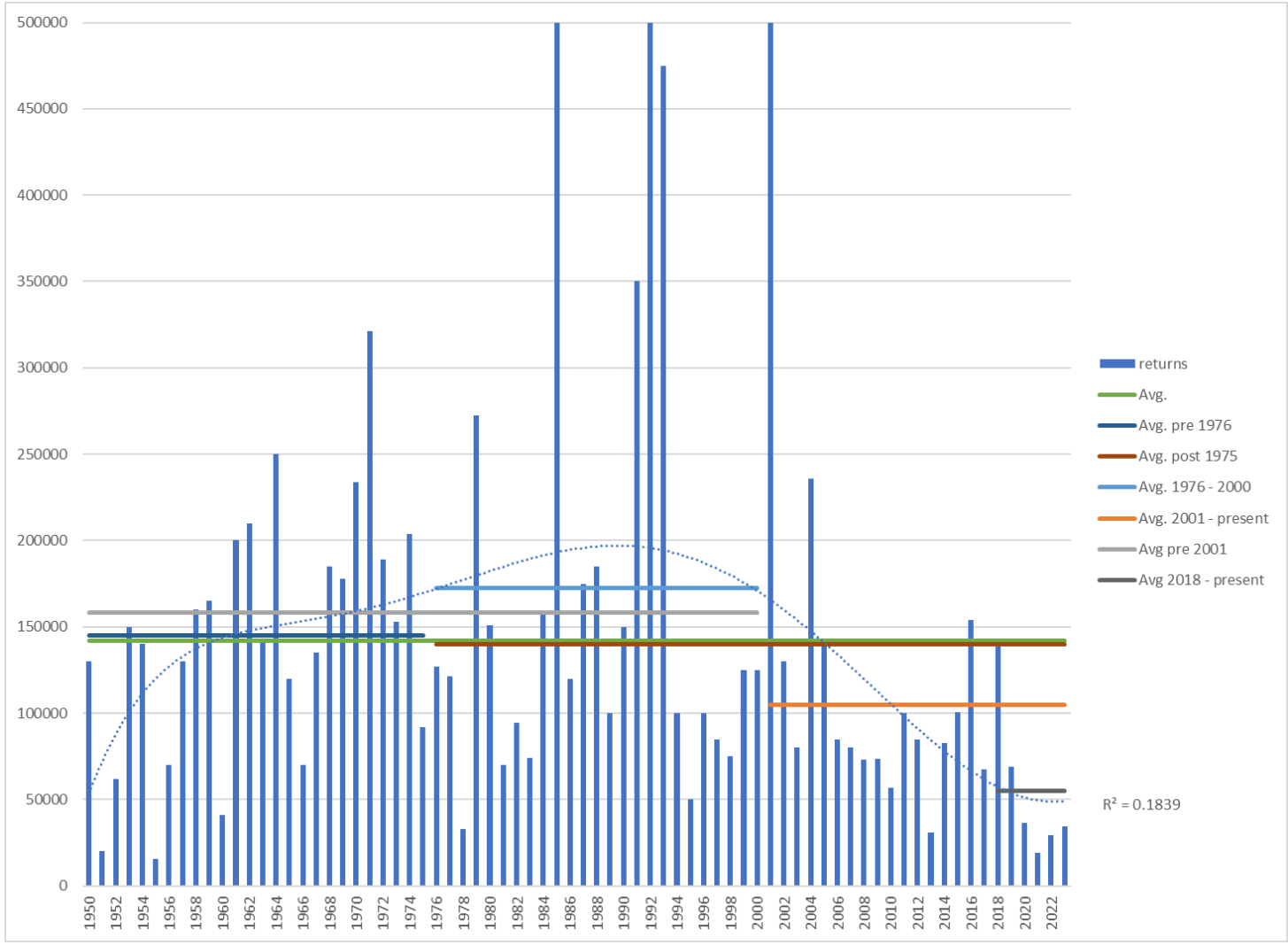
- 1976 – Start of returns from sockeye enhancement channels
- 2000 – Declines in total sockeye returns past the counting fence
- 2018 – On-set of inconsistent drought to present

Historical Benchmarks

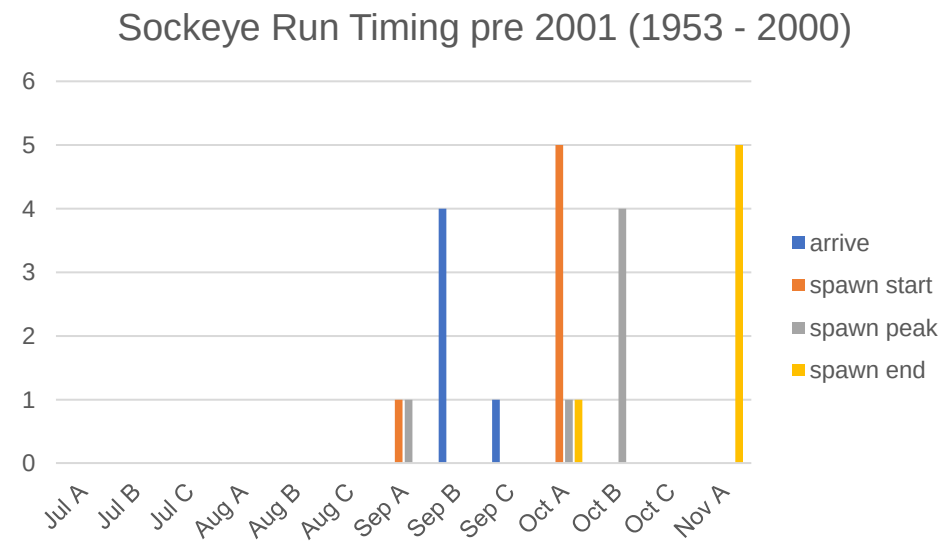
- For future analysis:
  - Pulse (episodic) – logging, fire, landslides, fence modifications (fry migration), channel-forming high flow events
  - Push (chronic): sediment inputs via roads; climate change (drought, higher temperatures, change in fire regime, annual and decadal ocean productivity change), removal of LWD and beaver dams

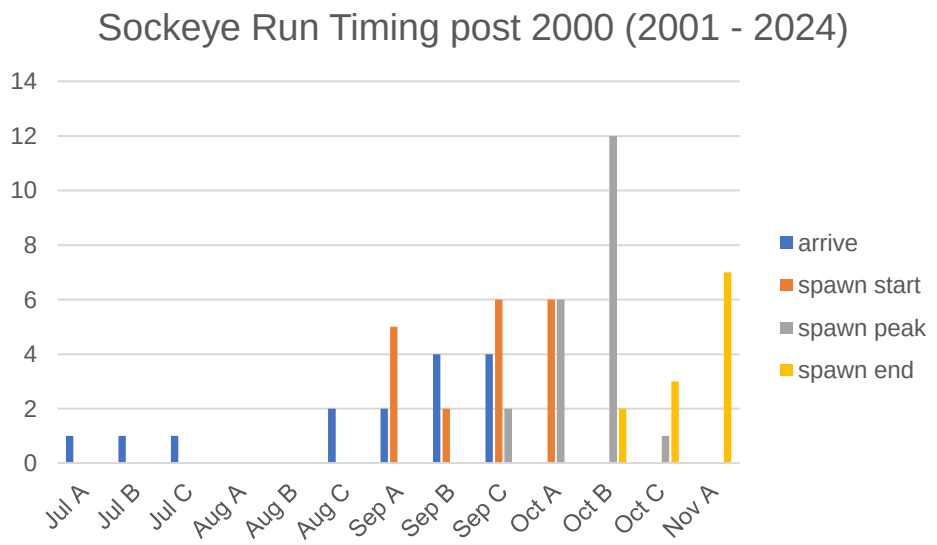
Babine River – Rainbow Alley

- Late-wild run
- Increased returns following spawning enhancement channels
- Declines from 2000 to present, most notably from 2018 to present



Babine River – Rainbow Alley (Sec. 1-3)

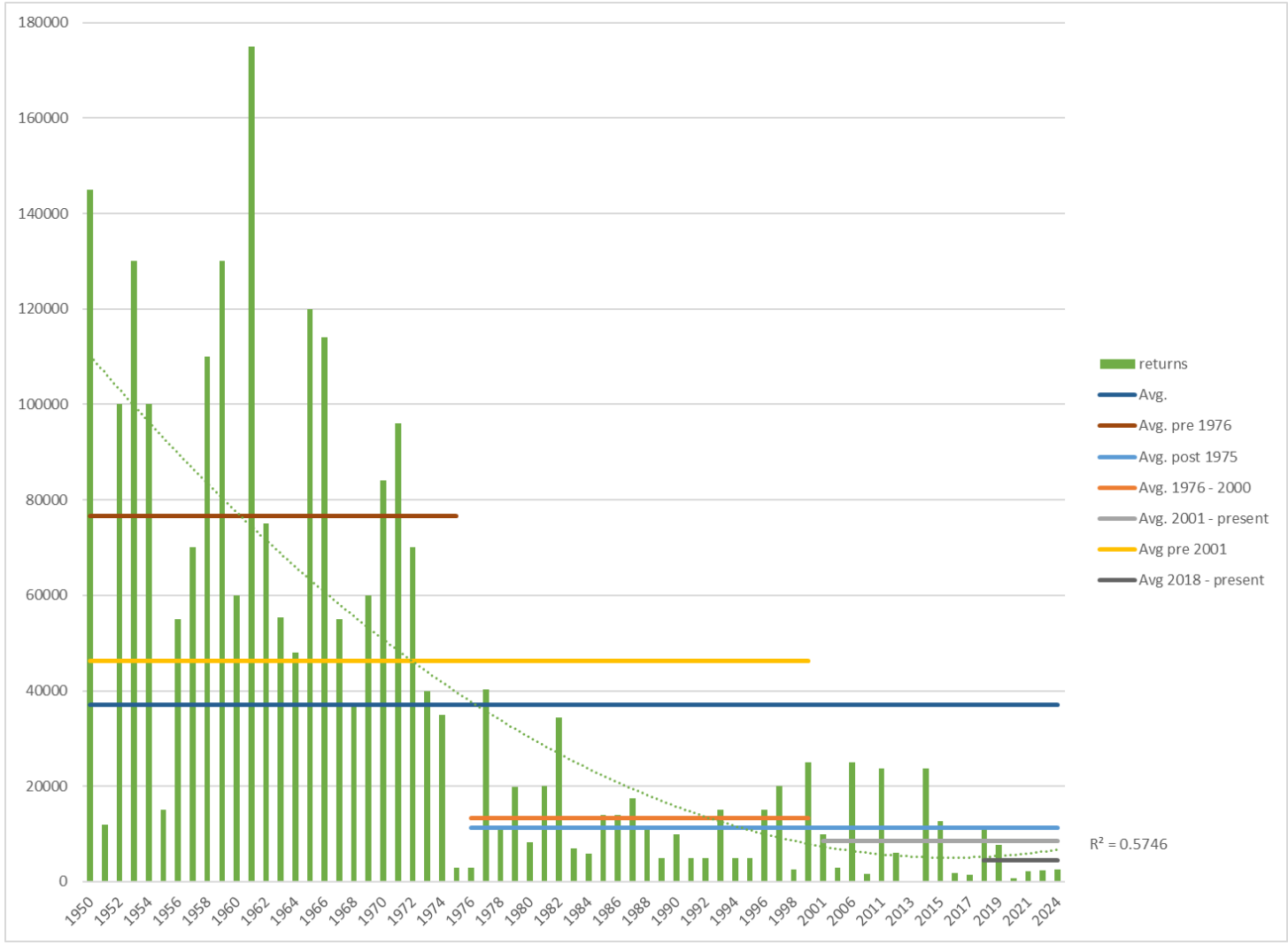




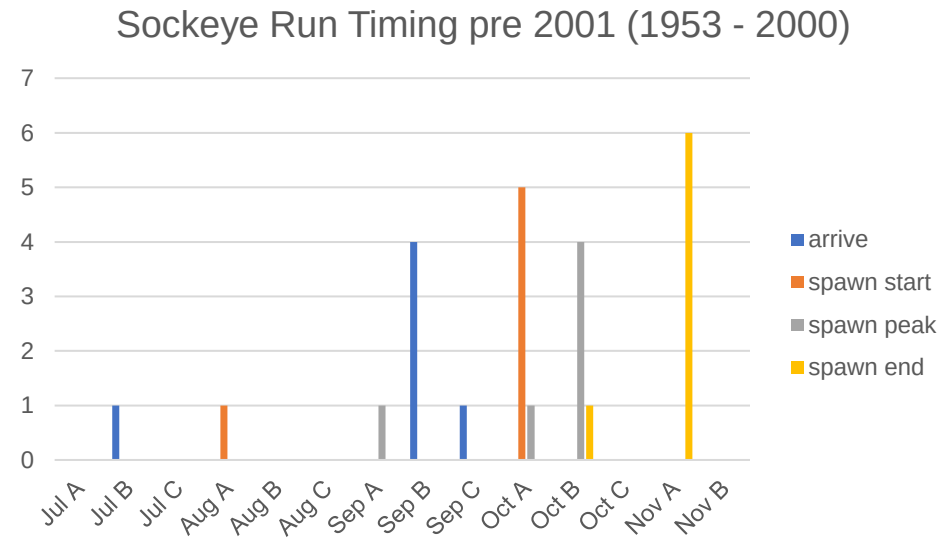
- Relatively similar – no obvious shifts

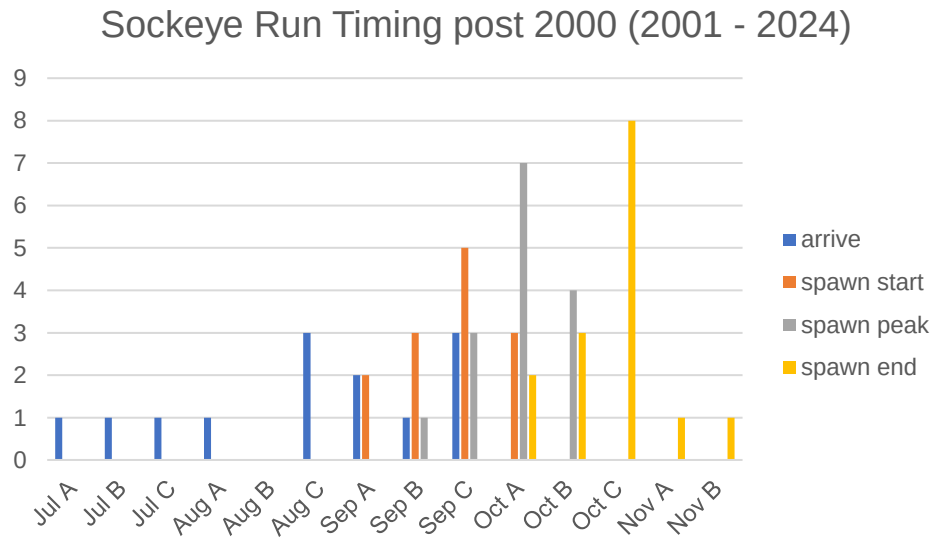
Babine River – Fence to Nilkitkwa Lake

- Late-wild run
- Pronounced decline in returns following spawning enhancement channels
- Modest decline thereafter with greatest decline from 2018 to present



Babine River – Fence to Nilkitkwa Lake (Sec. 4)



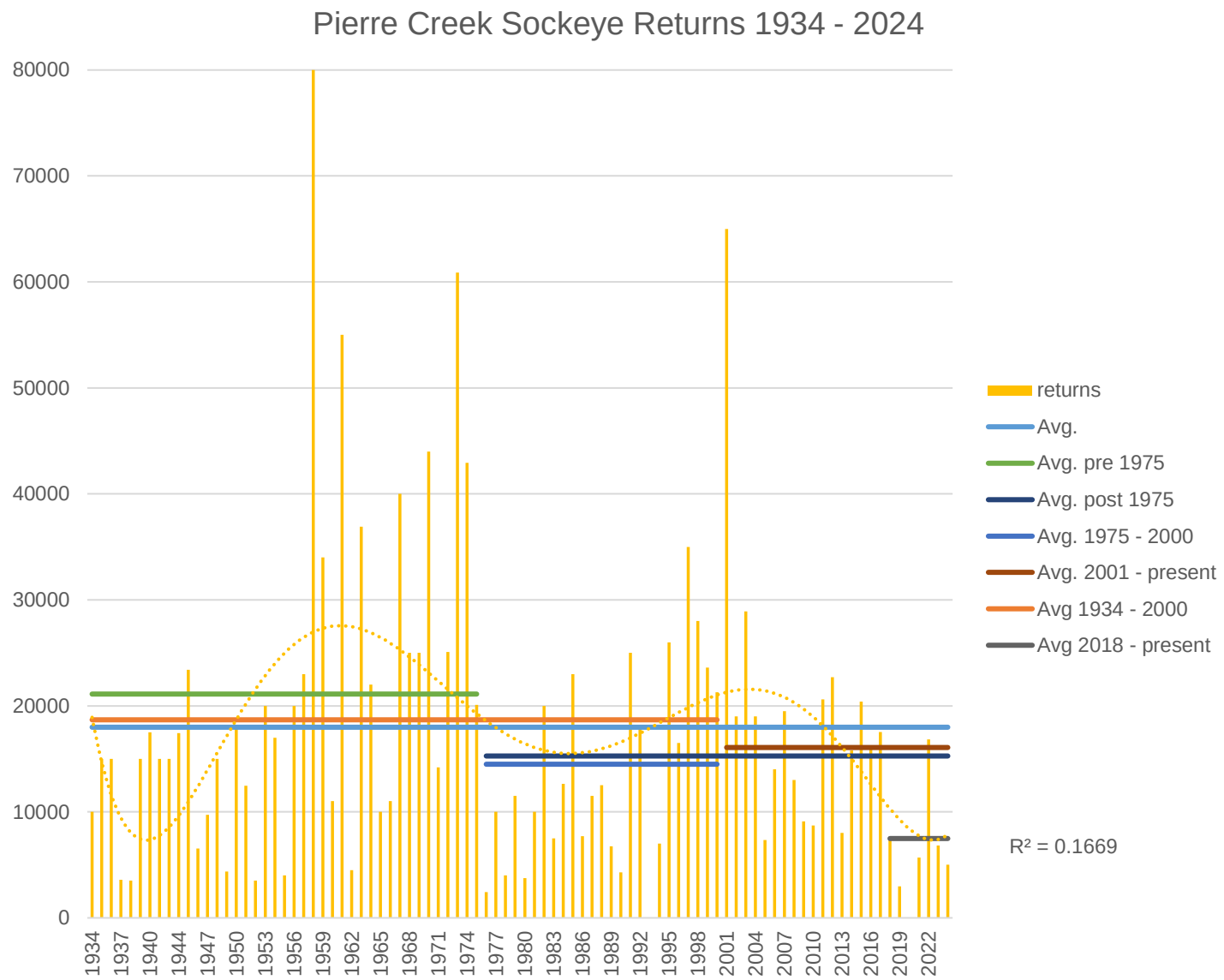


Comparison

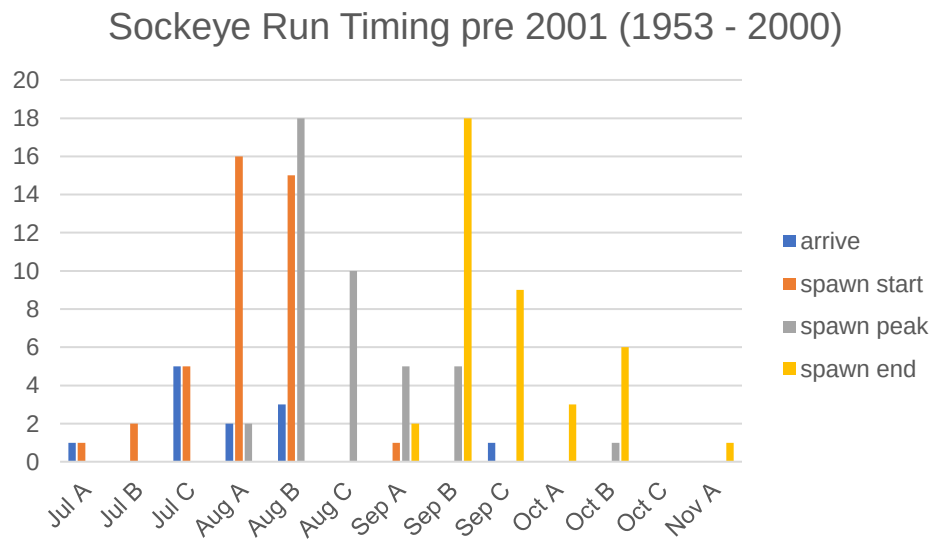
- Arrival time more variable
- Spawning start earlier
- Peak spawning earlier
- Spawning end earlier

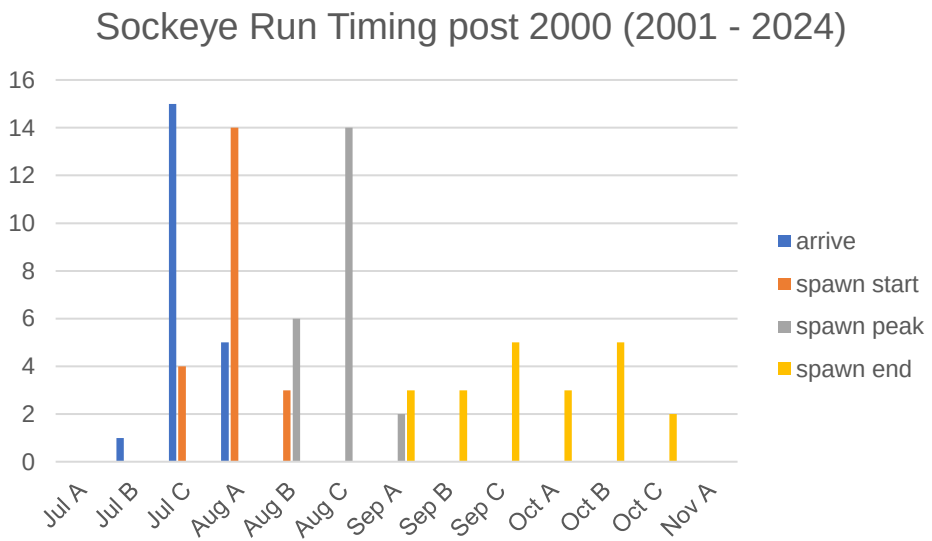
Pierre Creek

- Early/Mid-wild run, overlapping Pinkut/Fulton
- Groundwater-fed
- Pronounced decline in returns following spawning enhancement channels
- Modest decline thereafter with greatest decline from 2018 to present



Pierre Creek



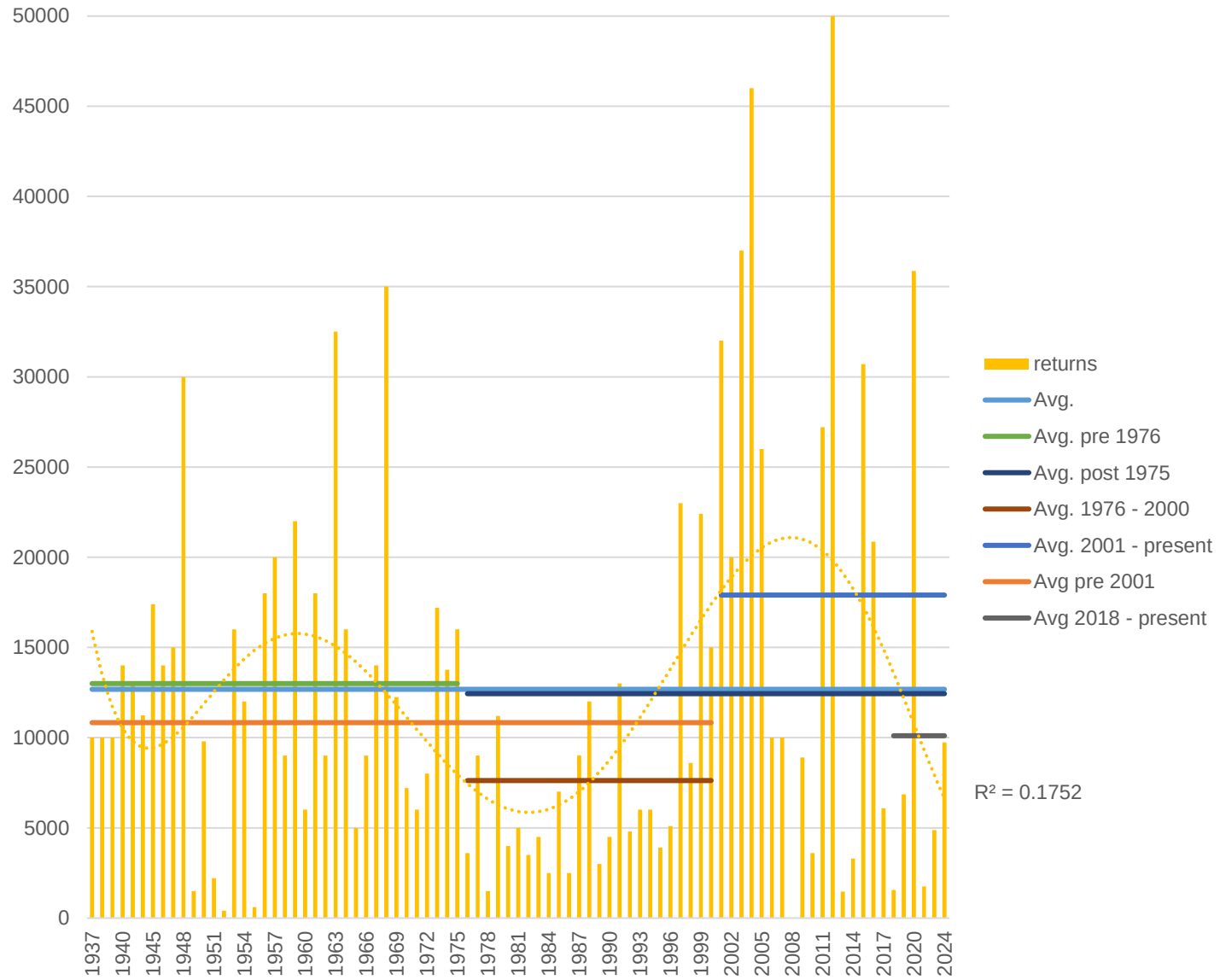


Comparison

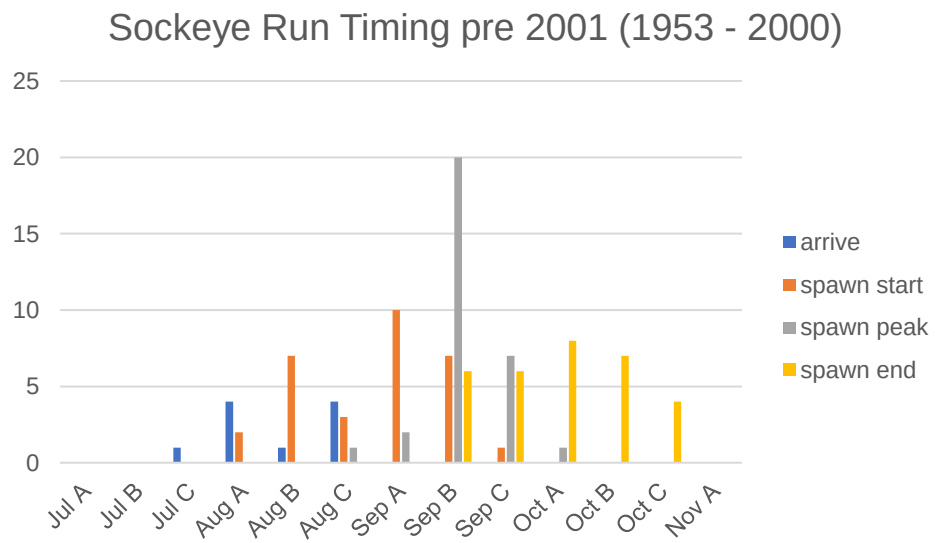
- Arrival time – no obvious, less variability
- Spawning start slightly earlier
- Peak spawning shifted later
- Spawning end shifting later

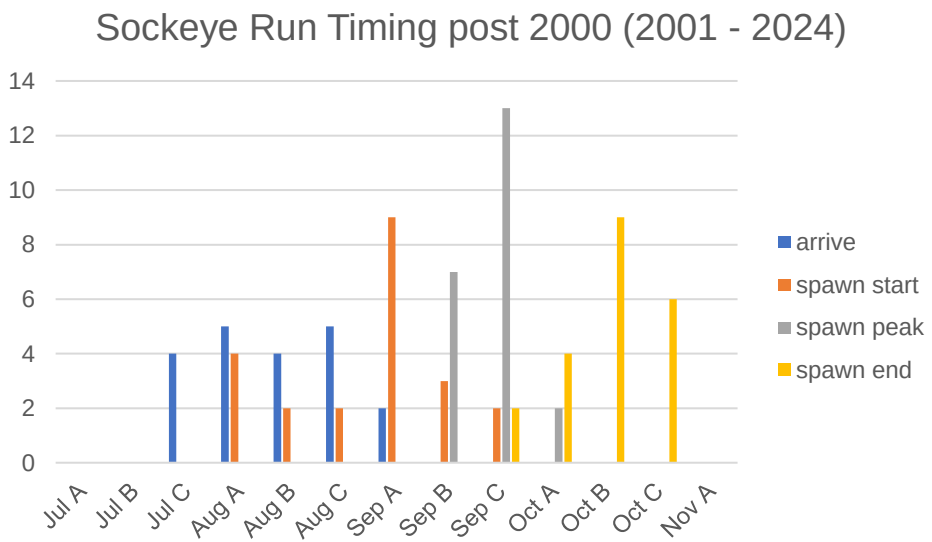
Morrison River

- Late-wild
- Lake-headed river
- Pronounced decline in returns following spawning enhancement channels to 2000
- Pronounced increase in returns post-2000 – marked decline 2018 – present (strong return in 2021)



Morrison River



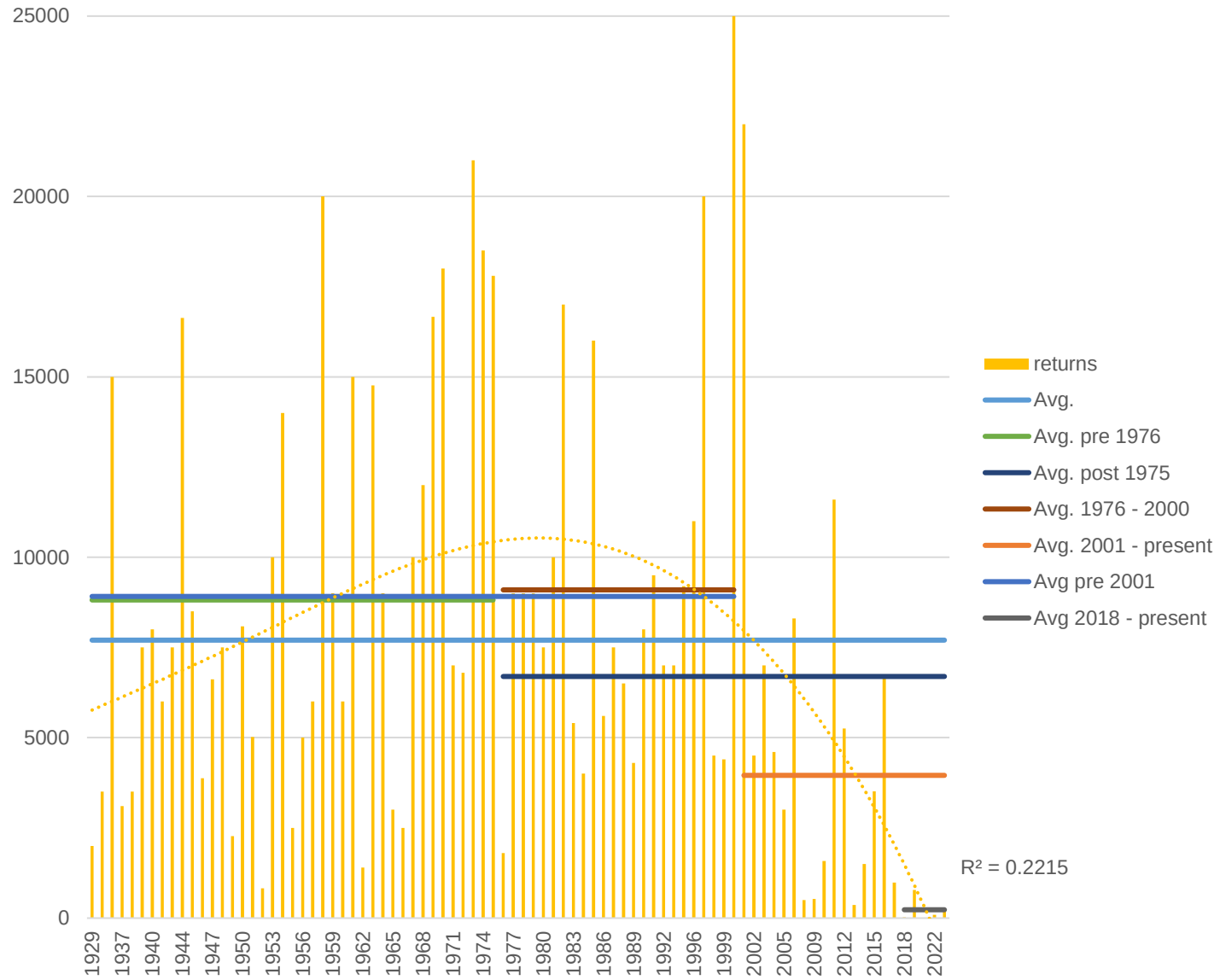


Comparison

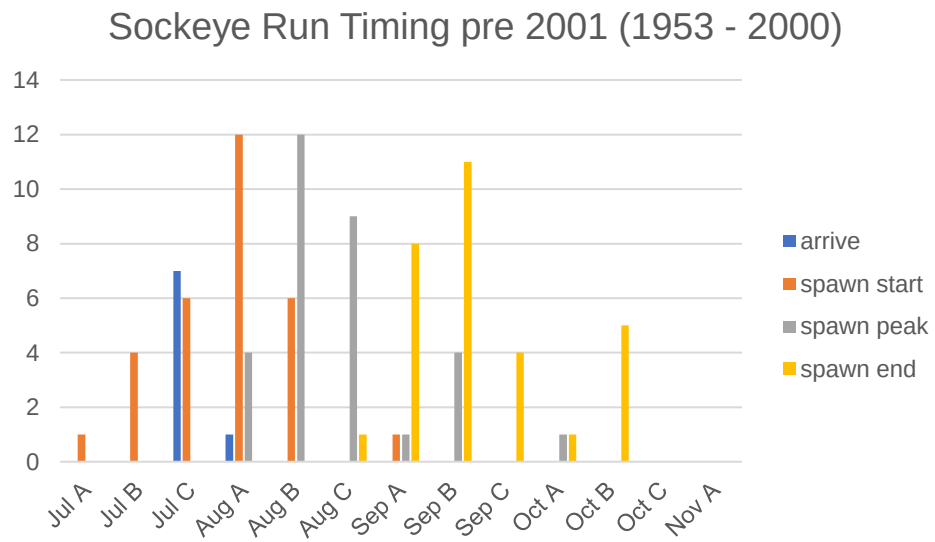
- Arrival time – similar
- Spawning start - similar
- Peak spawning shifted later
- Spawning end shifting later

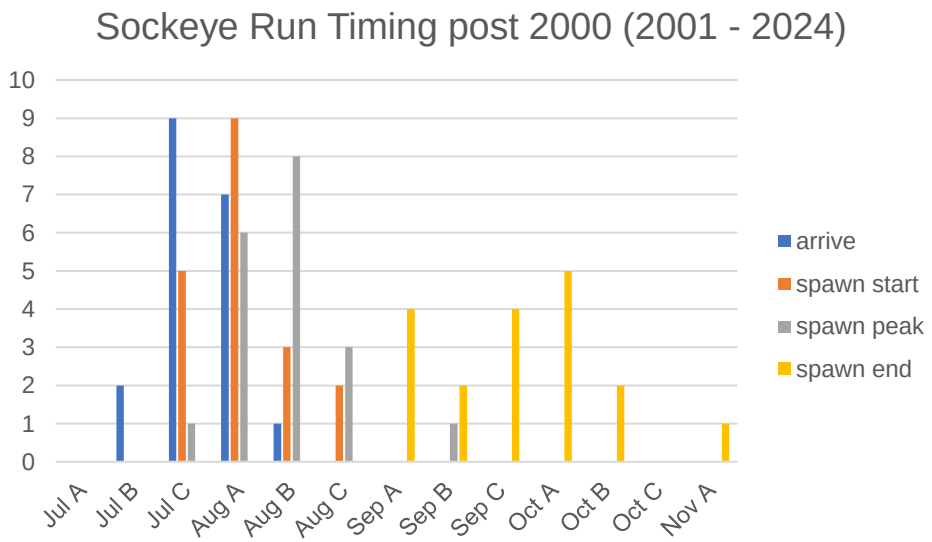
Twain Creek

- Early-wild
- Relatively large watershed - Heavily logged
- No decline following enhanced spawning channels
- Pronounced decline post-2000, including precipitous decline from 2018 to present
- Flow dried up earlier than other creeks in 2024



Twain Creek



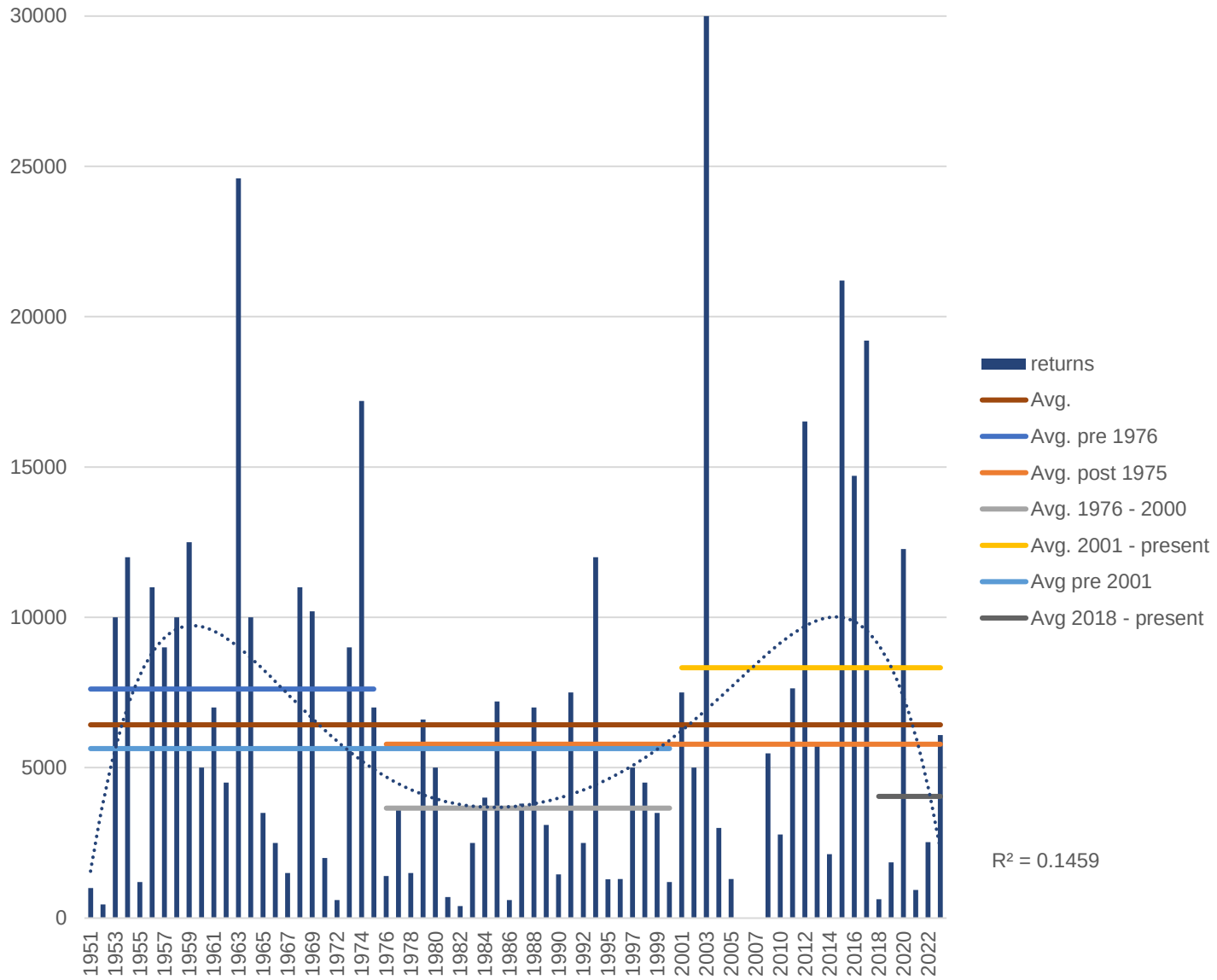


Comparison

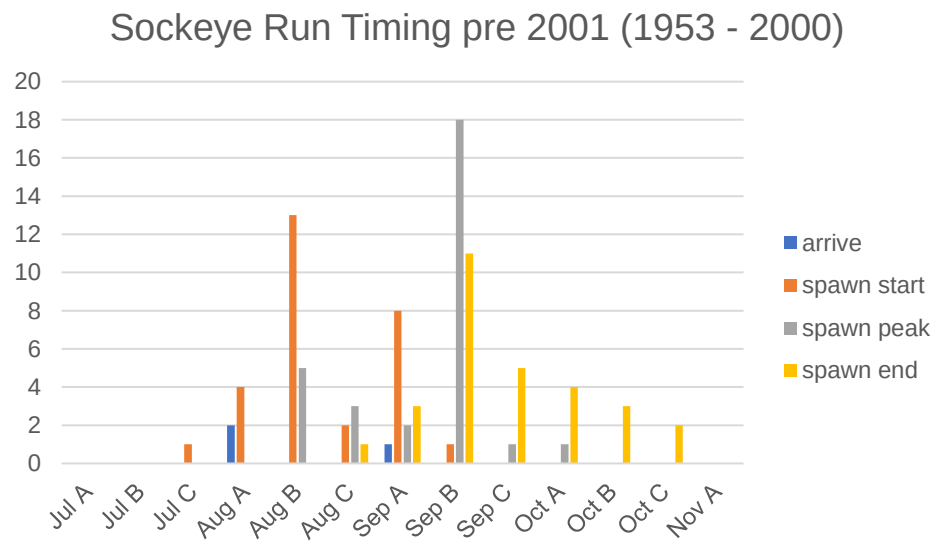
- Arrival time – similar
- Spawning start - similar
- Peak spawning shifting earlier
- Spawning end shifting later

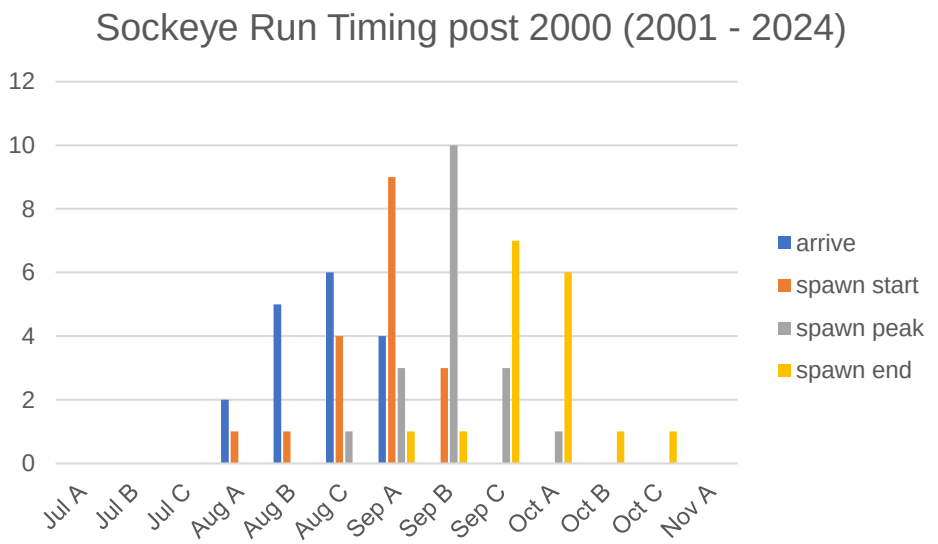
Lower Tahlo

- Late-wilds
- Lake-headed creek
- Pronounced decline following enhanced spawning channels
- Pronounced increased post-2000, despite pronounced decline from 2018 - present



Lower Tahlo



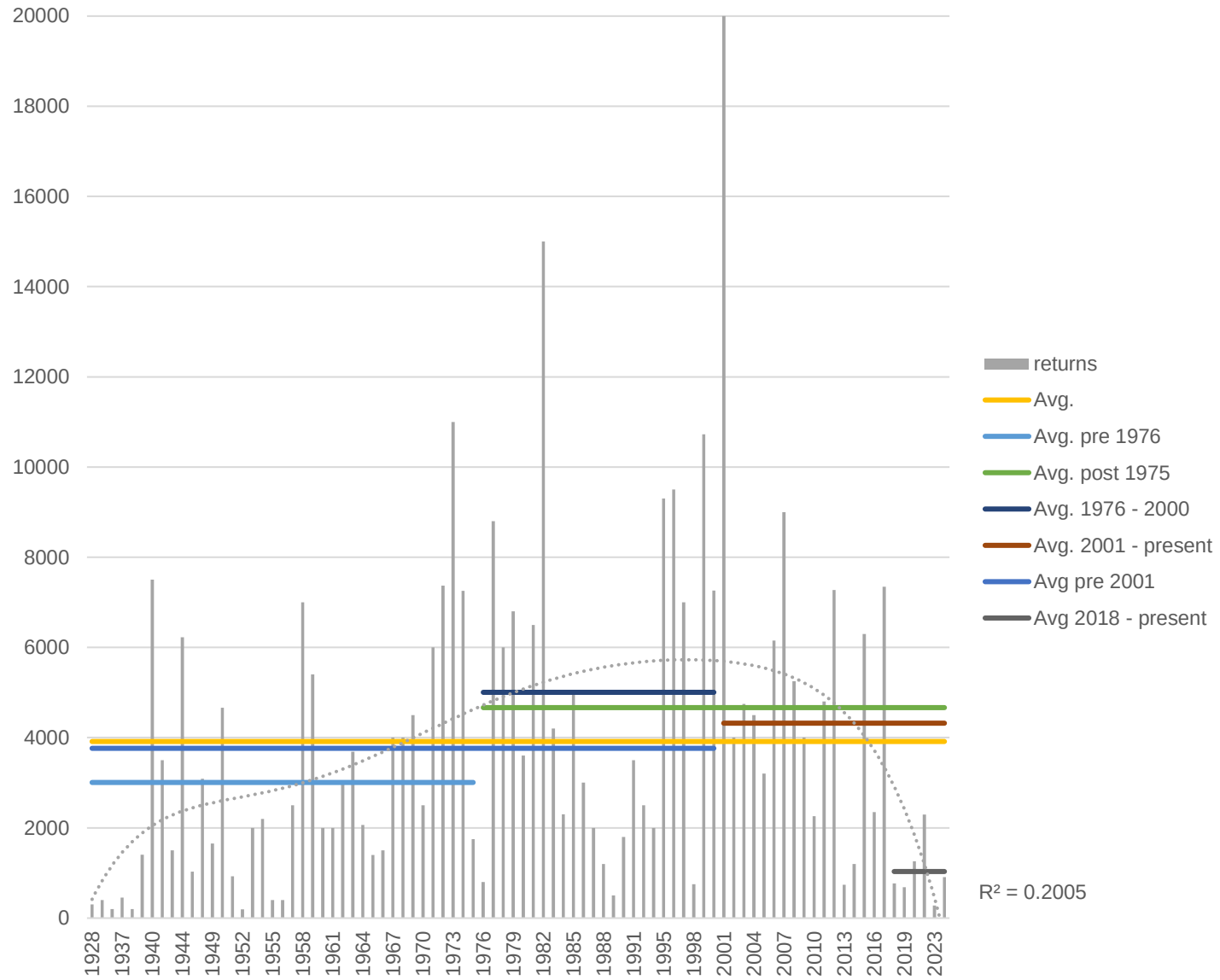


Comparison

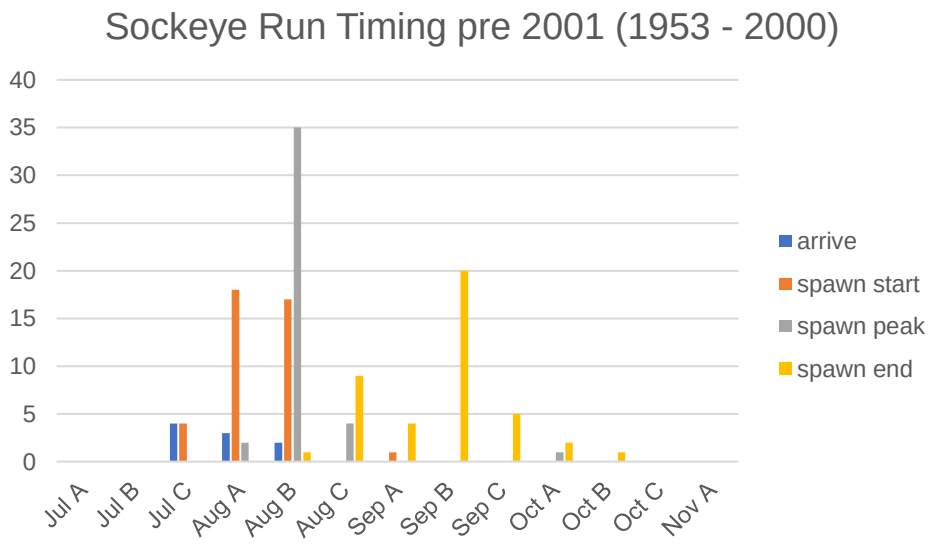
- Arrival time – insufficient data pre-2001 for comparison
- Spawning start – shifting later
- Peak spawning - similar
- Spawning end shifting later

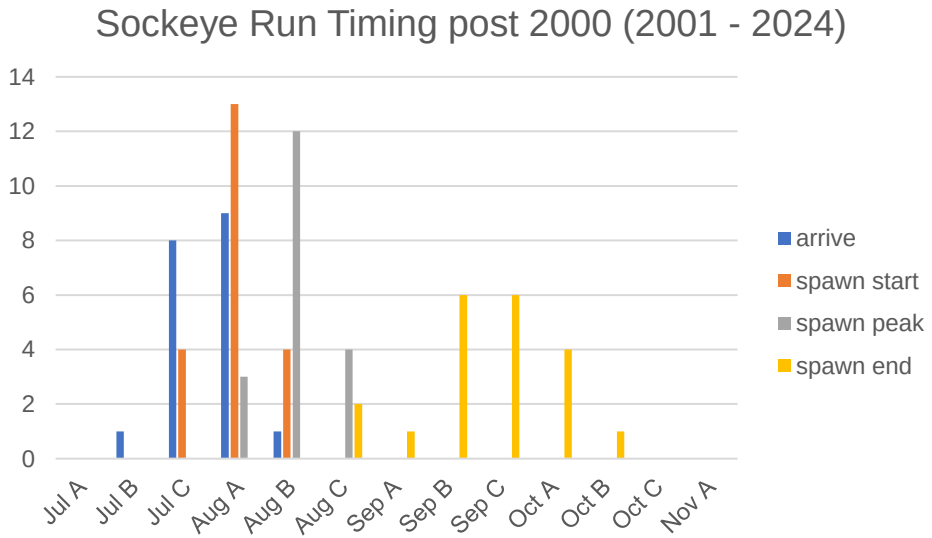
4-Mile Creek

- Early/Mid-wilds
- Presumably groundwater-fed – lack of lakes/wetlands
- Heavily logged
- Extreme low flow by Aug 19, 2024
- Pronounced increase following enhanced spawning channels
- Pronounced decrease from 2018 - present



4-Mile Creek



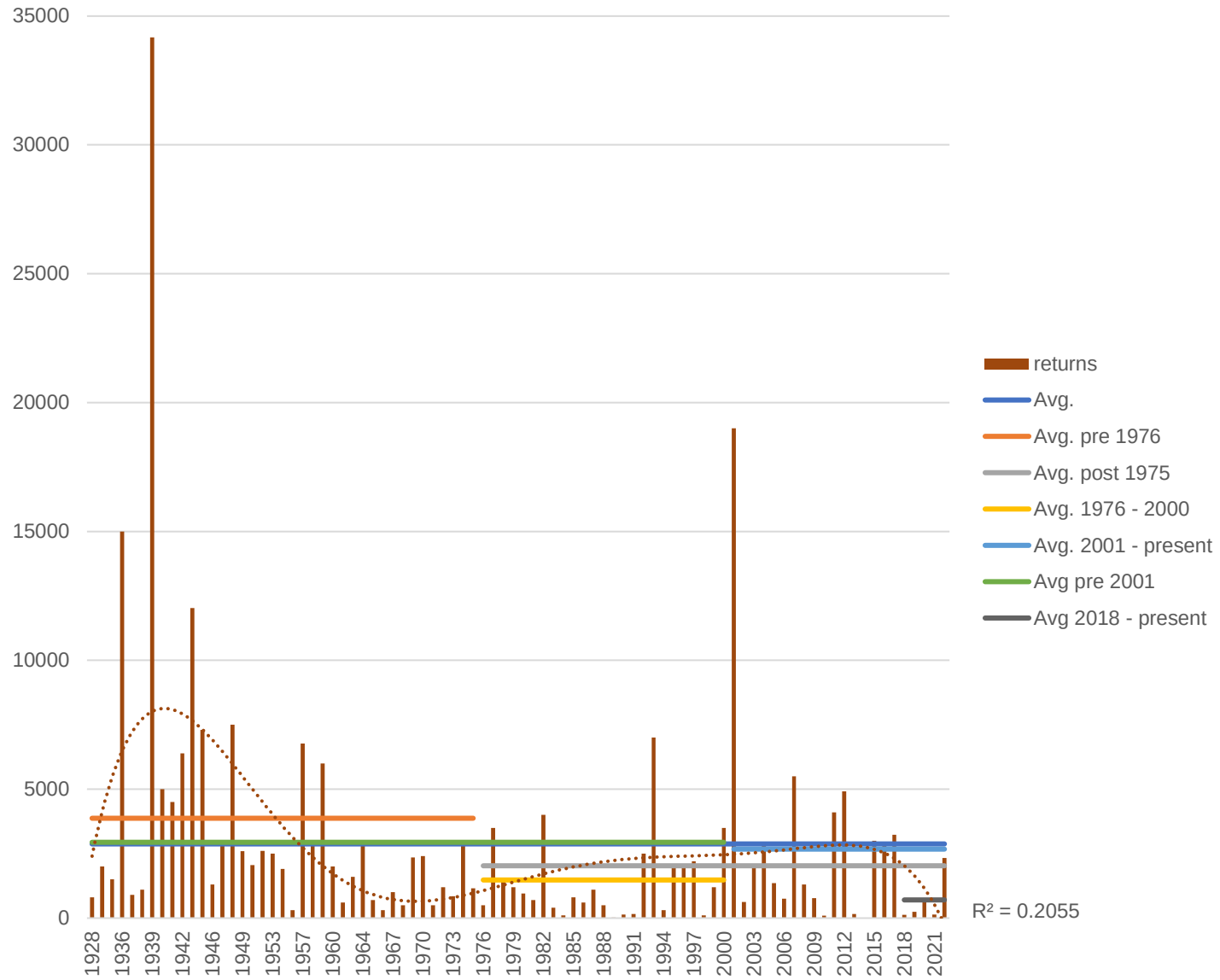


Comparison

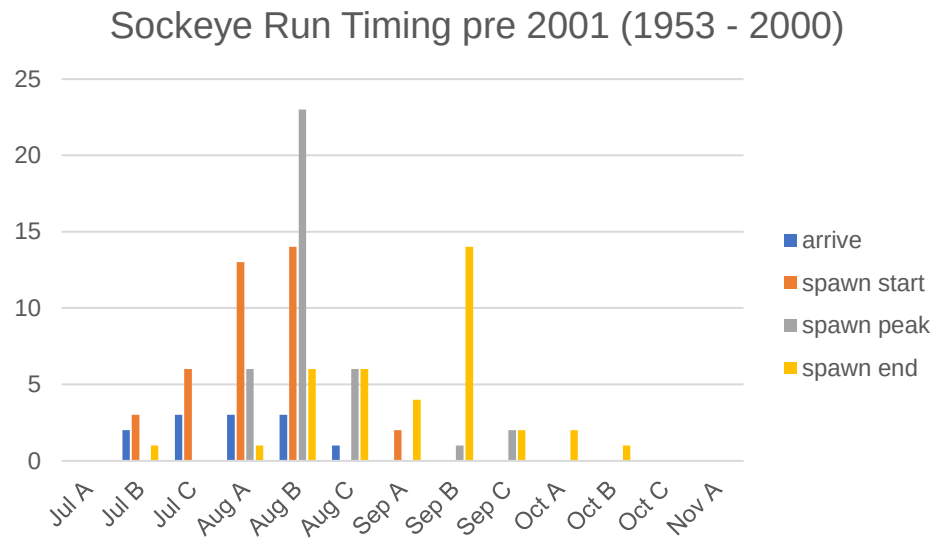
- Arrival time – insufficient data for comparison
- Spawning start – similar
- Peak spawning - similar
- Spawning end shifting later

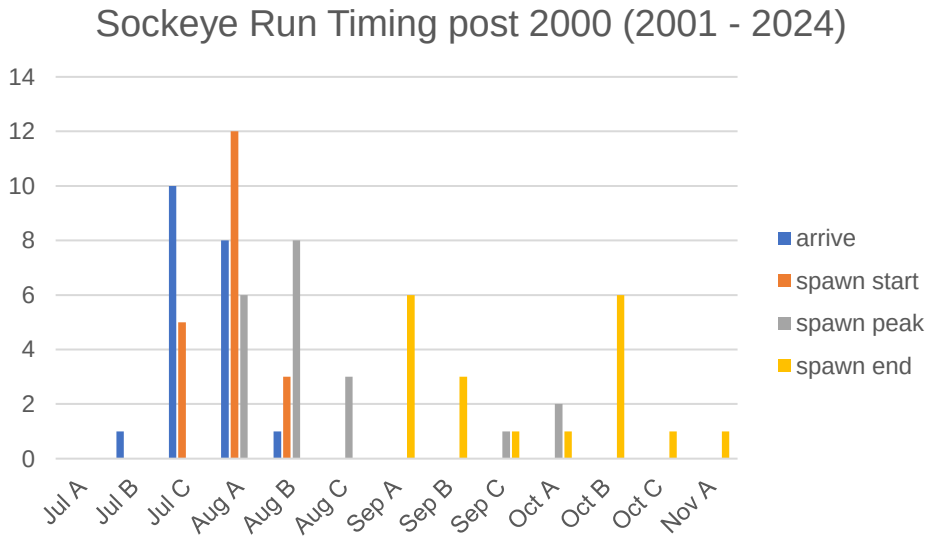
Tachek Creek

- Early/mid-wilds
- Lack of lakes/wetlands
- Heavily logged
- Pronounced decline following enhanced spawning channels
- Pronounced increased post-2000, despite decline from 2018 – present



Tachek Creek



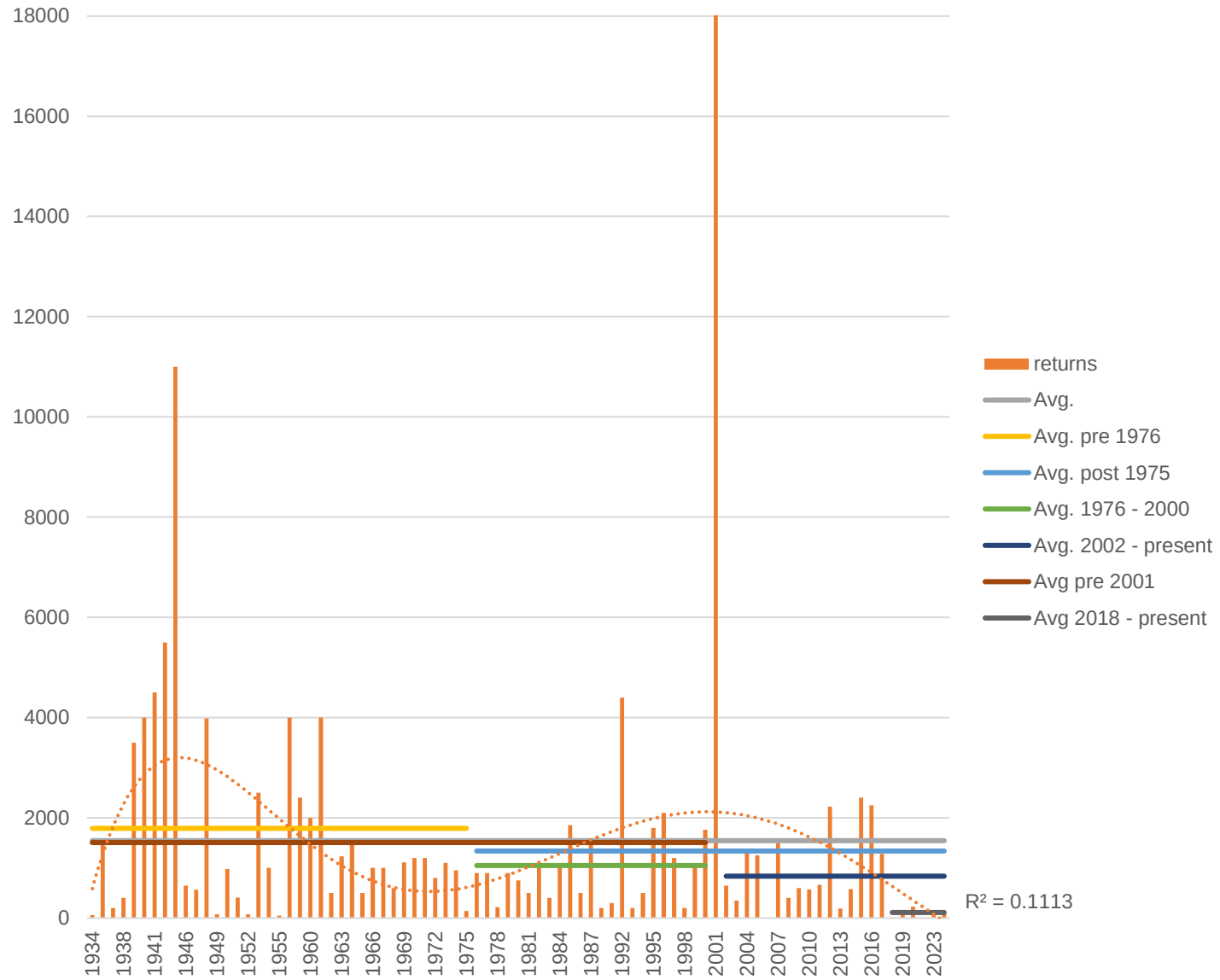


Comparison

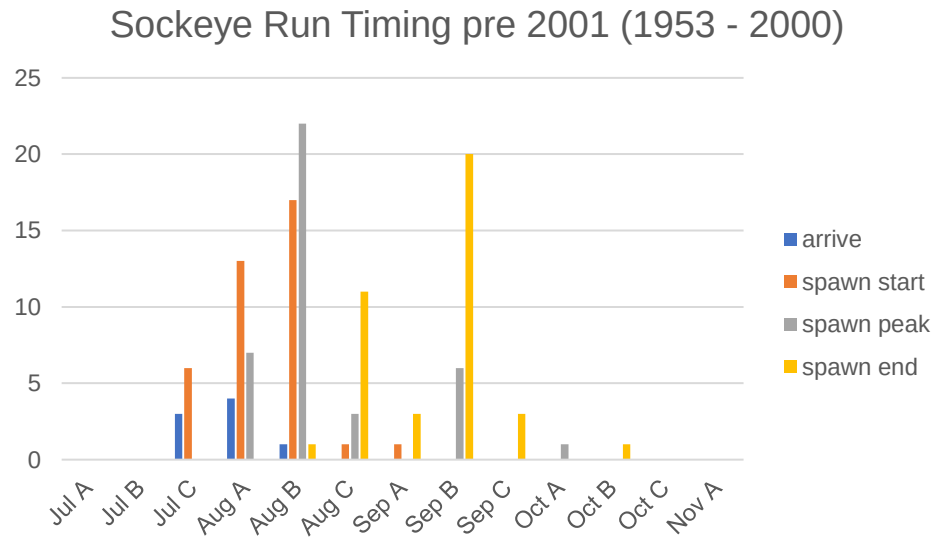
- Arrival time – similar
- Spawning start – shifting earlier
- Peak spawning - similar
- Spawning end - shifting to bi-modal with early and late peaks

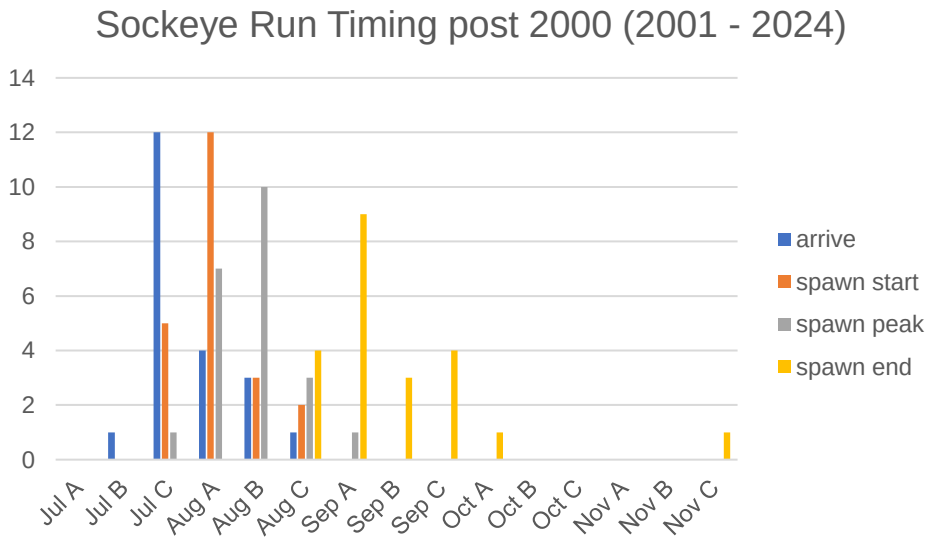
9-Mile Creek

- Early/Mid-wilds
- Modest headwater wetlands
- Heavily logged
- Extreme low/no flow by Aug 19, 2024
- Pronounced decline following enhanced spawning channels
- Slight decline post-2000, excluding 2001, but precipitous decline from 2018 – present



9-Mile Creek



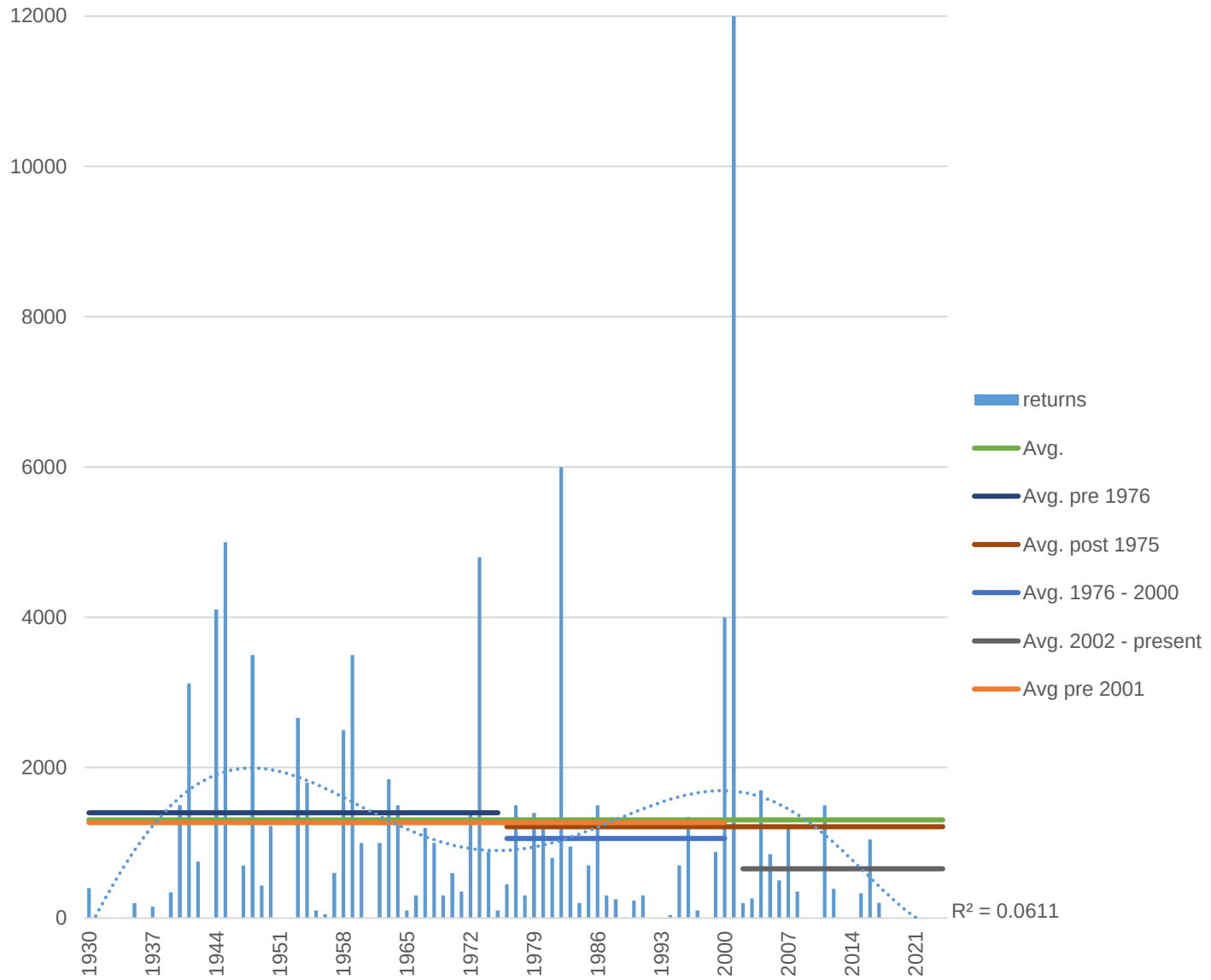


Comparison

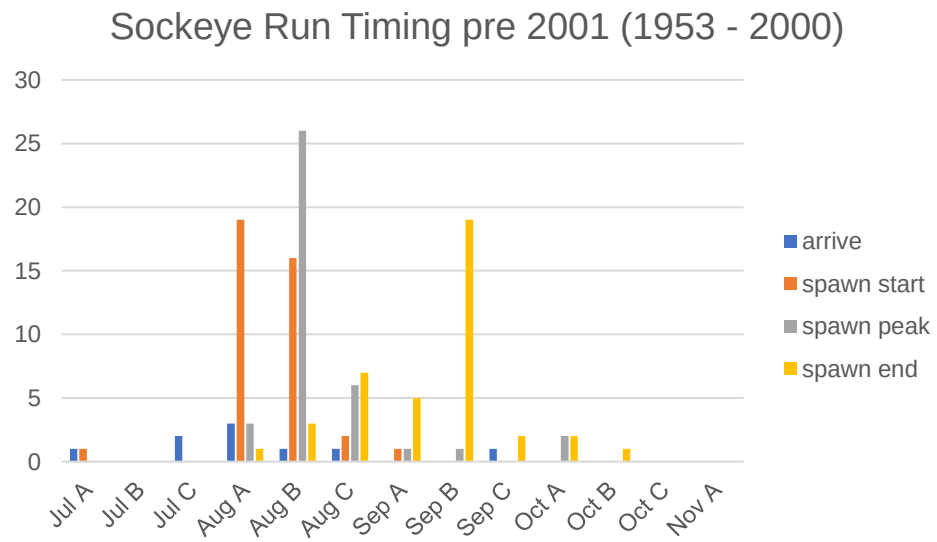
- Arrival time – peak shifted earlier
- Spawning start – shifting earlier
- Peak spawning – loss of mid-timed peak
- Spawning end – peak shifted earlier

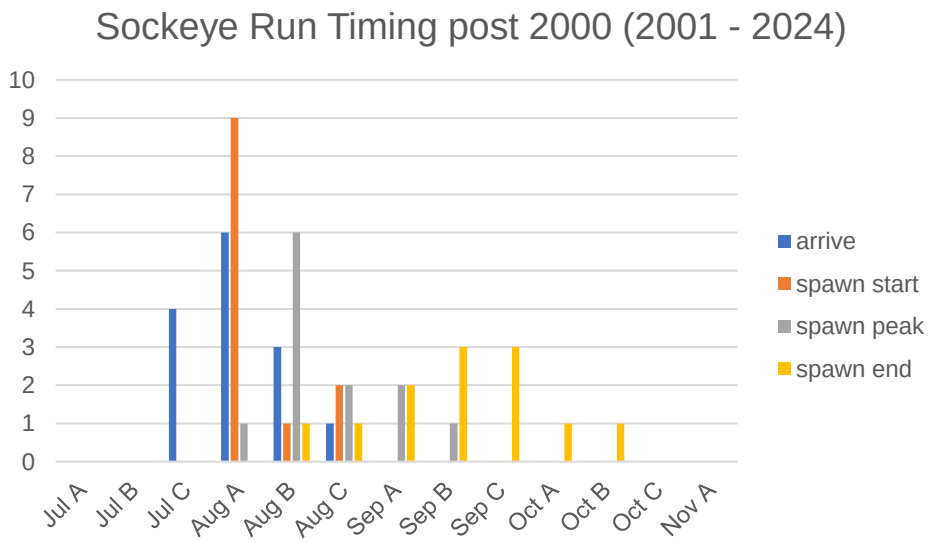
6-Mile Creek

- Early/Mid-wilds
- Small lake and modest sized wetland headed
- Extreme low flow by Aug 6, 2024
- Decline following enhanced spawning channels
- Pronounced decline post-2000, excluding 2001
- Run of zero in 2024



6-Mile Creek



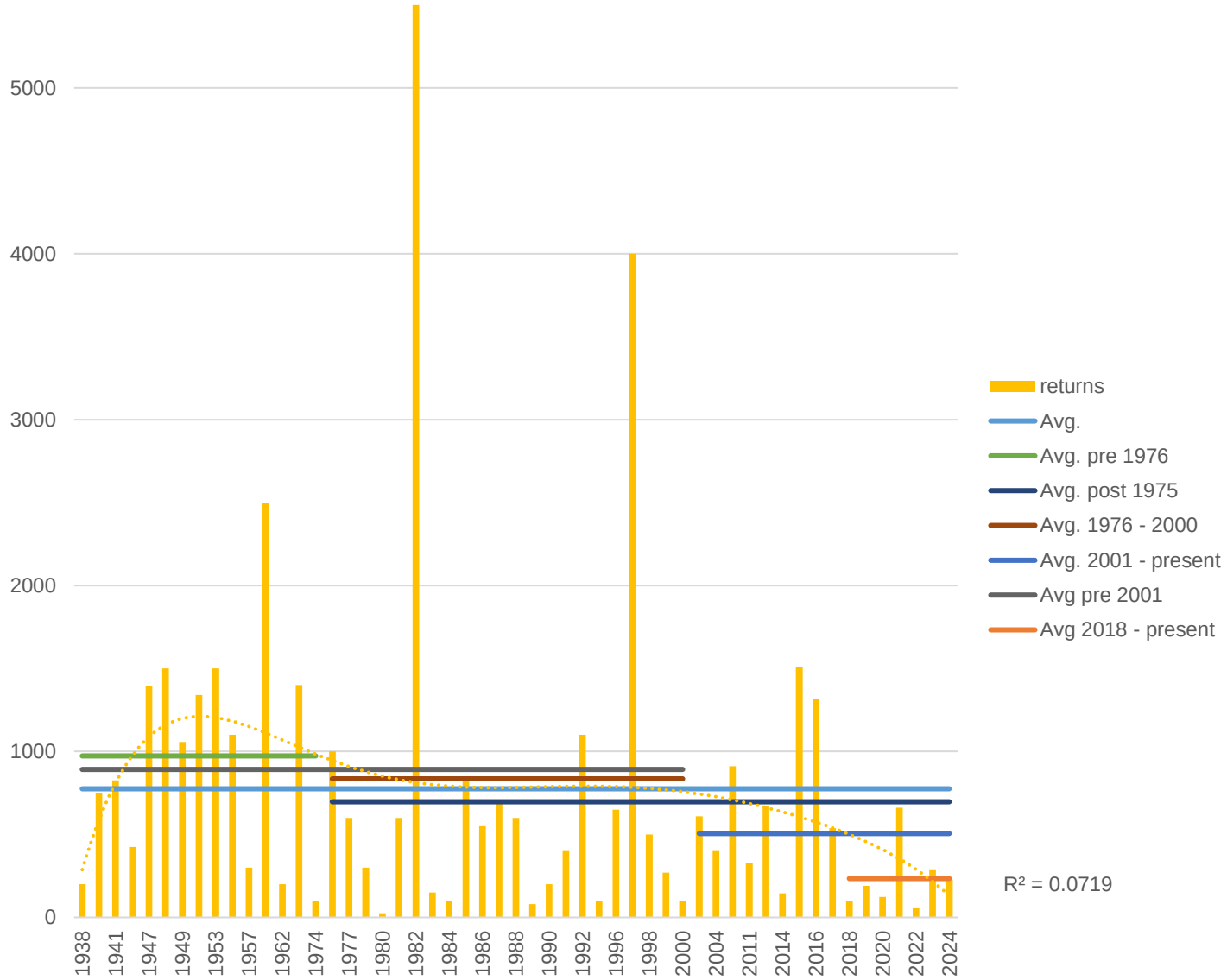


Comparison

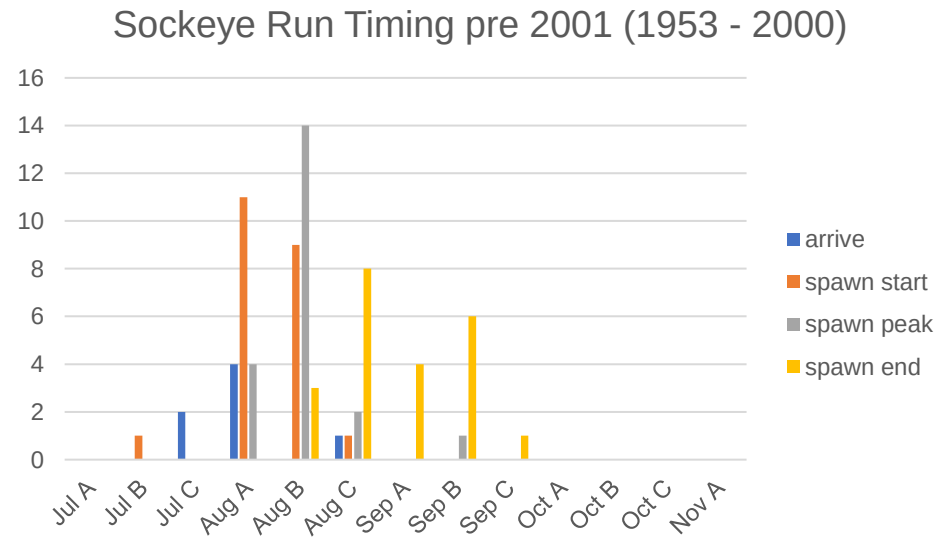
- Arrival time – lack of pre-2001 data for comparison
- Spawning start – shifting earlier, but peak is the same
- Peak spawning – similar
- Spawning end – similar

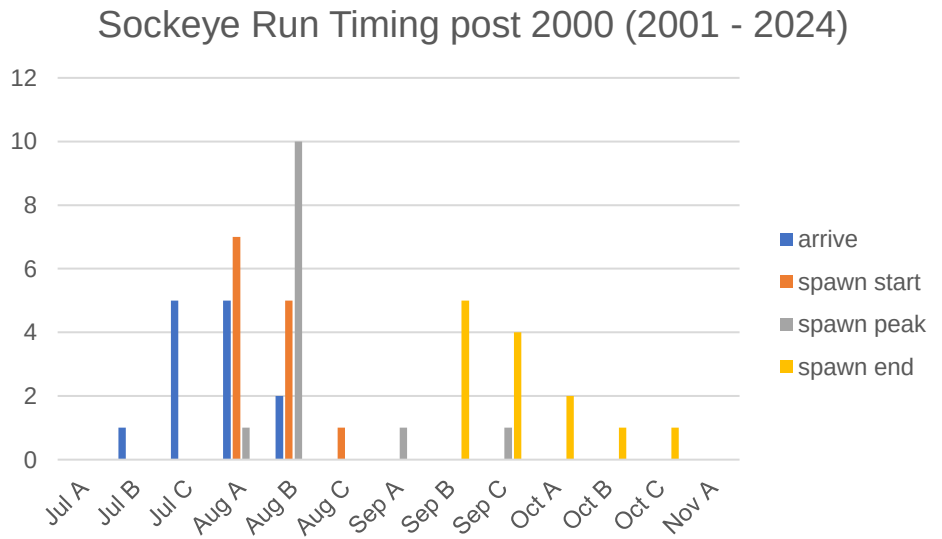
Cross Creek

- Early/Mid-wilds
- Small watershed – 4 lake/wetland features
- Lots of in-stream LWD removal in lower end
- Extremely low flow by Aug 1, 2024
- Modest decline following enhanced spawning channels
- Pronounced decline post-2000, most apparent from 2018 - present



Cross Creek



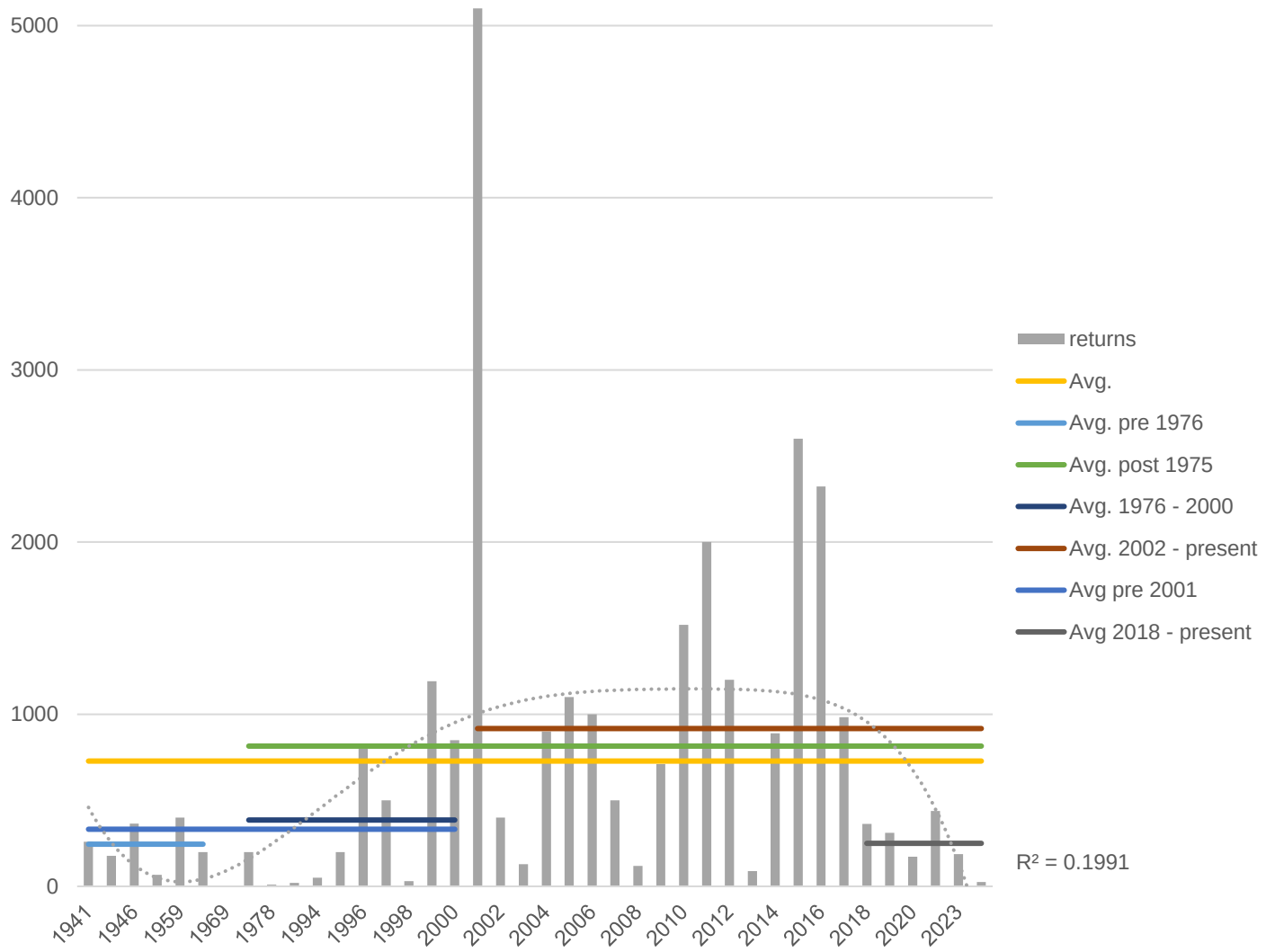


Comparison

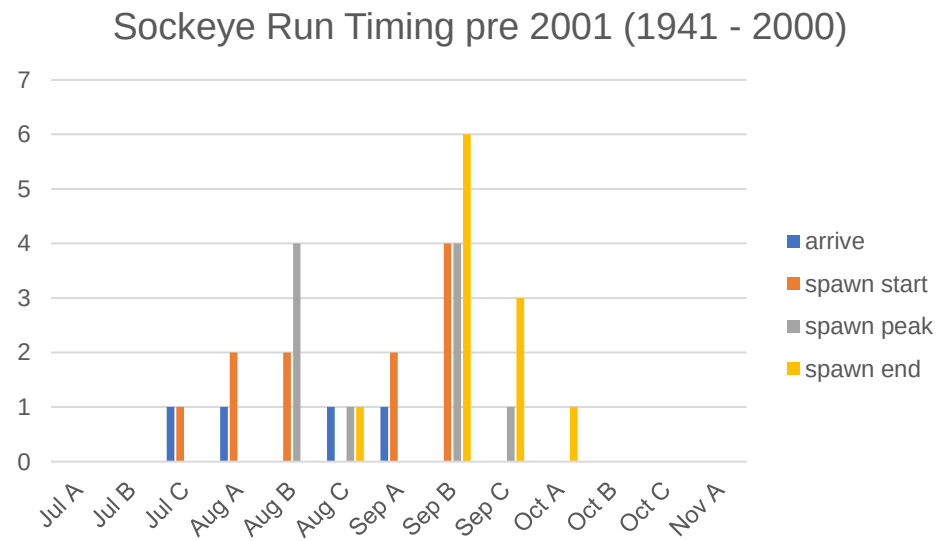
- Arrival time – shifting earlier
- Spawning start – similar
- Peak spawning – similar
- Spawning end – shifting later

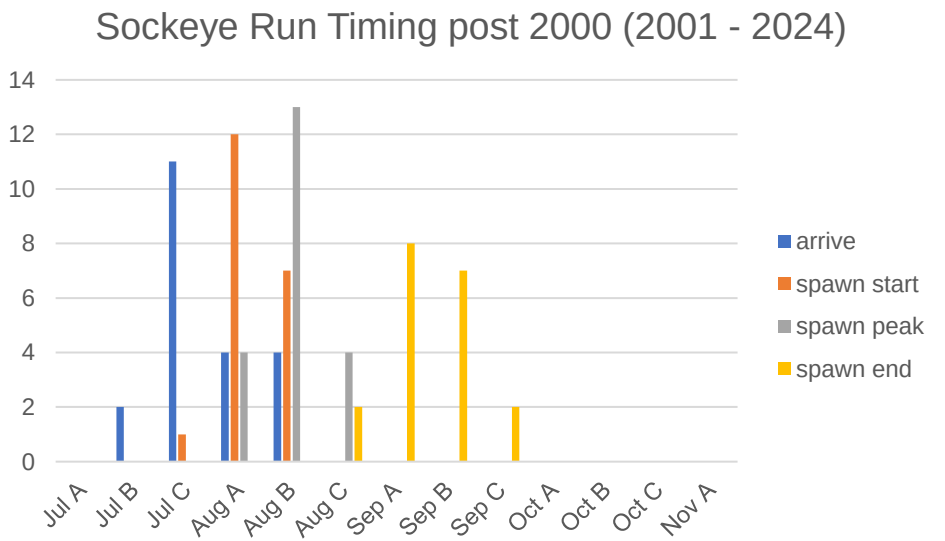
Tsezakwa Creek

- Early/Mid-wilds, despite discharging to Rainbow Alley (late wilds)
- Mountainous drainage and some headwater wetlands – high energy
- Extensive beaver dam complexes extending 500 linear meters from mouth
- Below normal flow becoming closer to extremely low by early Sept 19,2024
- Modest increase following enhanced spawning channels
- Pronounced increased post-2000, despite pronounced declines from 2018 - present
- Run of 25 sockeye in 2024



Tsezakwa Creek



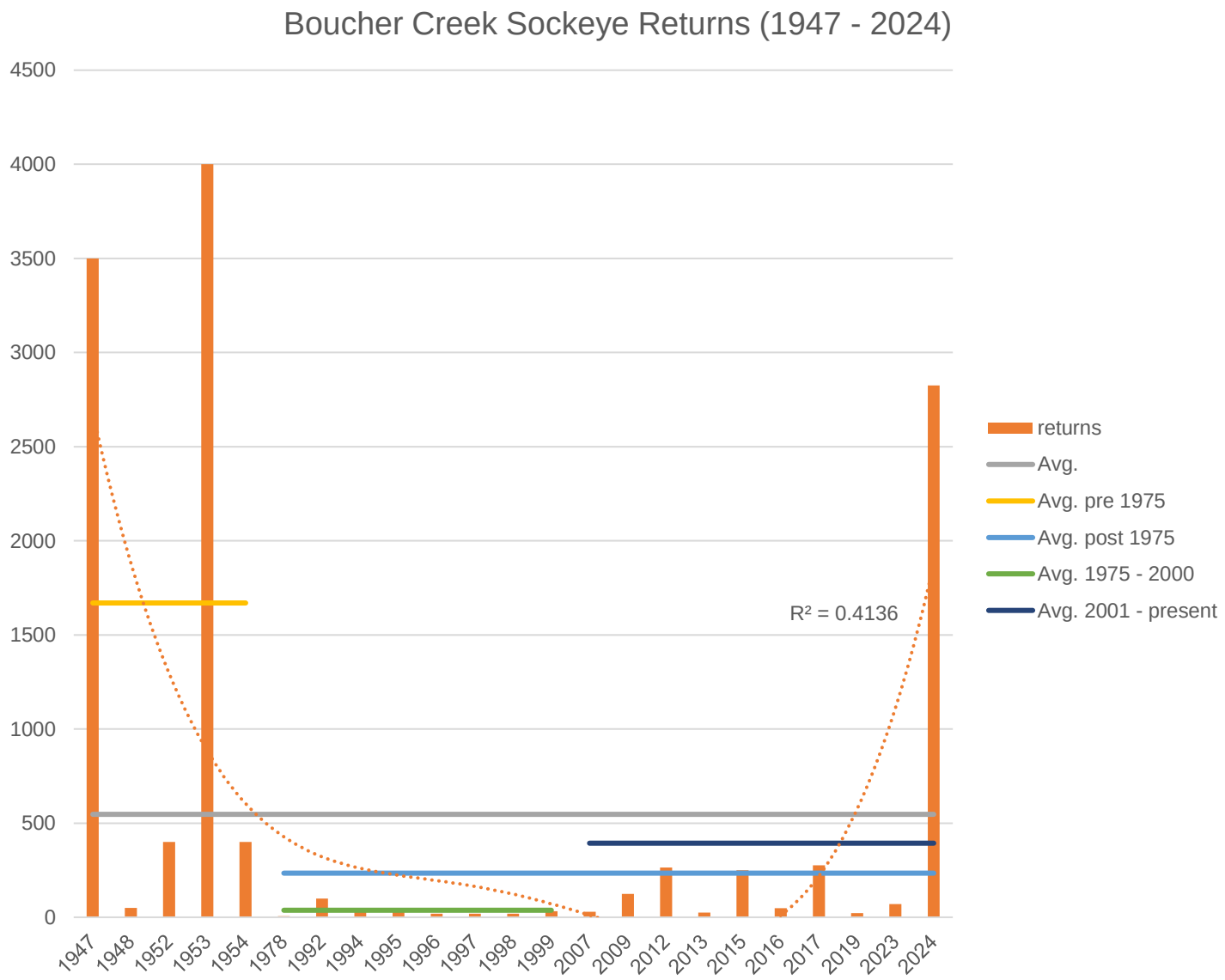


Comparison

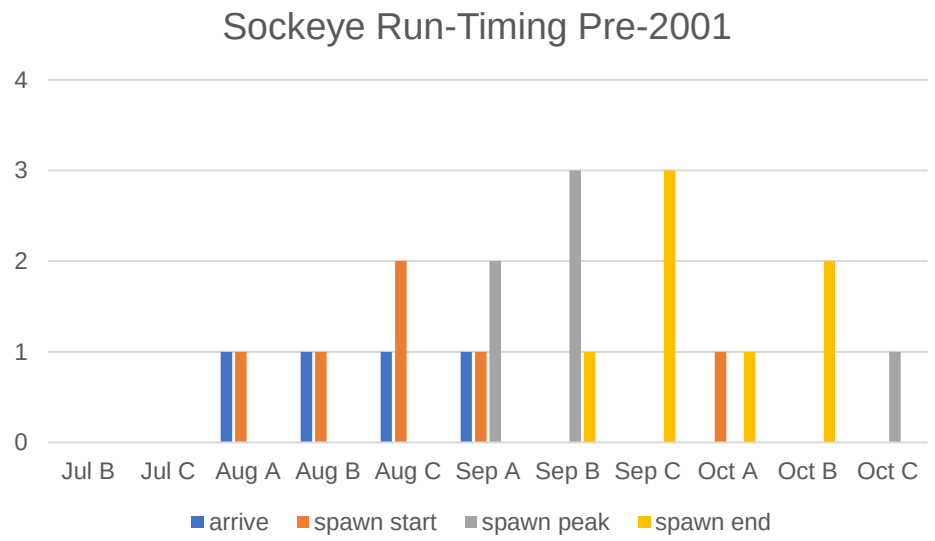
- Arrival time – shifting earlier
- Spawning start – shifting earlier
- Peak spawning – shifting earlier, loss of later peak
- Spawning end – shifting earlier

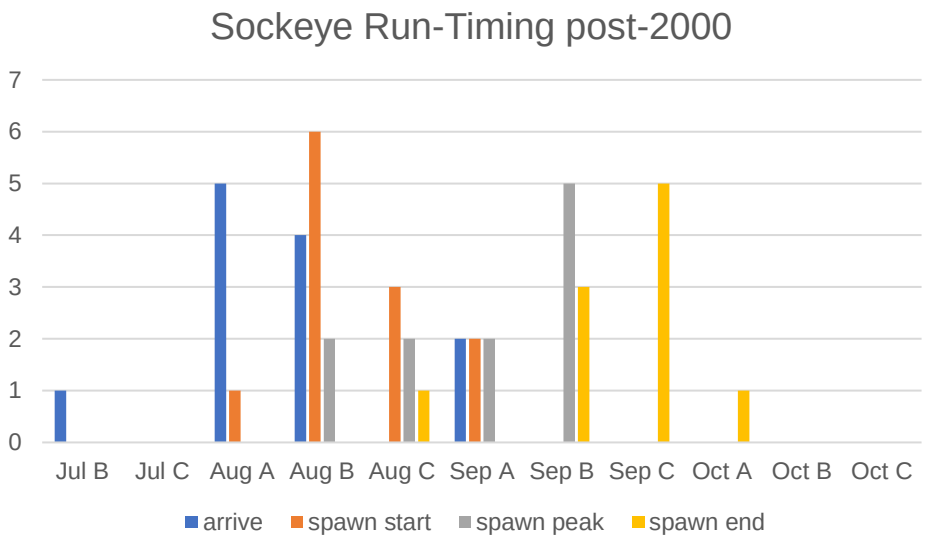
Boucher Creek

- Mid-wilds, despite discharging to Babine below Nilkitkwa (late wilds)
- Lake and wetland headed
- Sediment discharges observed in 2018 (logging?)
- Below normal flow by Aug 20, 2024, but did not get to extreme levels
- Pronounced and consistent decrease following enhanced spawning channels
- Pronounced increased post-2000, with very good run in 2024…where did this run come from???



Boucher Creek





Comparison

- Arrival time – lack of pre-2001 data for comparison
- Spawning start – shifting earlier
- Peak spawning – same peak
- Spawning end – shifting earlier

Patterns – 2024 runs - Source-water

Lake/Wetland headed

Morrison, lower Tahlo, and Boucher had good 2024 runs despite drought conditions

Exception was the Babine River itself…lake level very low

Non lake/wetland headed

- All experienced extreme low flow and relatively low runs

Patterns – Historical - Post spawning channel effect

Late wilds

- Decreased
- Exception is rainbow alley, which increased

Early/Mid wilds

- Decreased
- Exception is 4-Mile, and a modest increase at Tsezakwa

Patterns – Drought (2018 – present)

Decrease in all wild tribs, excluding the 2024 Boucher run

Patterns – Climate Change (2001 – present)

Increases

- Morrison
- lower Tahlo
- 4-Mile
- Tachek
- Tsezakwa
- Boucher

Decreases

- Babine River (both)
- Twain
- 9-Mile
- 6-Mile
- Cross

NO change

- Pierre

Patterns – Historical – Run-Timing Shifts

Shifting **Earlier**

North geographically

- Babine (fence to Nilkitkwa)
- 9-Mile
- Tsezakwa
- Boucher

Shifting both **Earlier and Later**

Early/Mid wilds

- Twain
- Tachek
- Cross

Shifting **Later**

Relatively large runs

- Pierre
- Morrison
- Lower Tahlo
- 4-Mile

NO obvious shift

No grouping connection

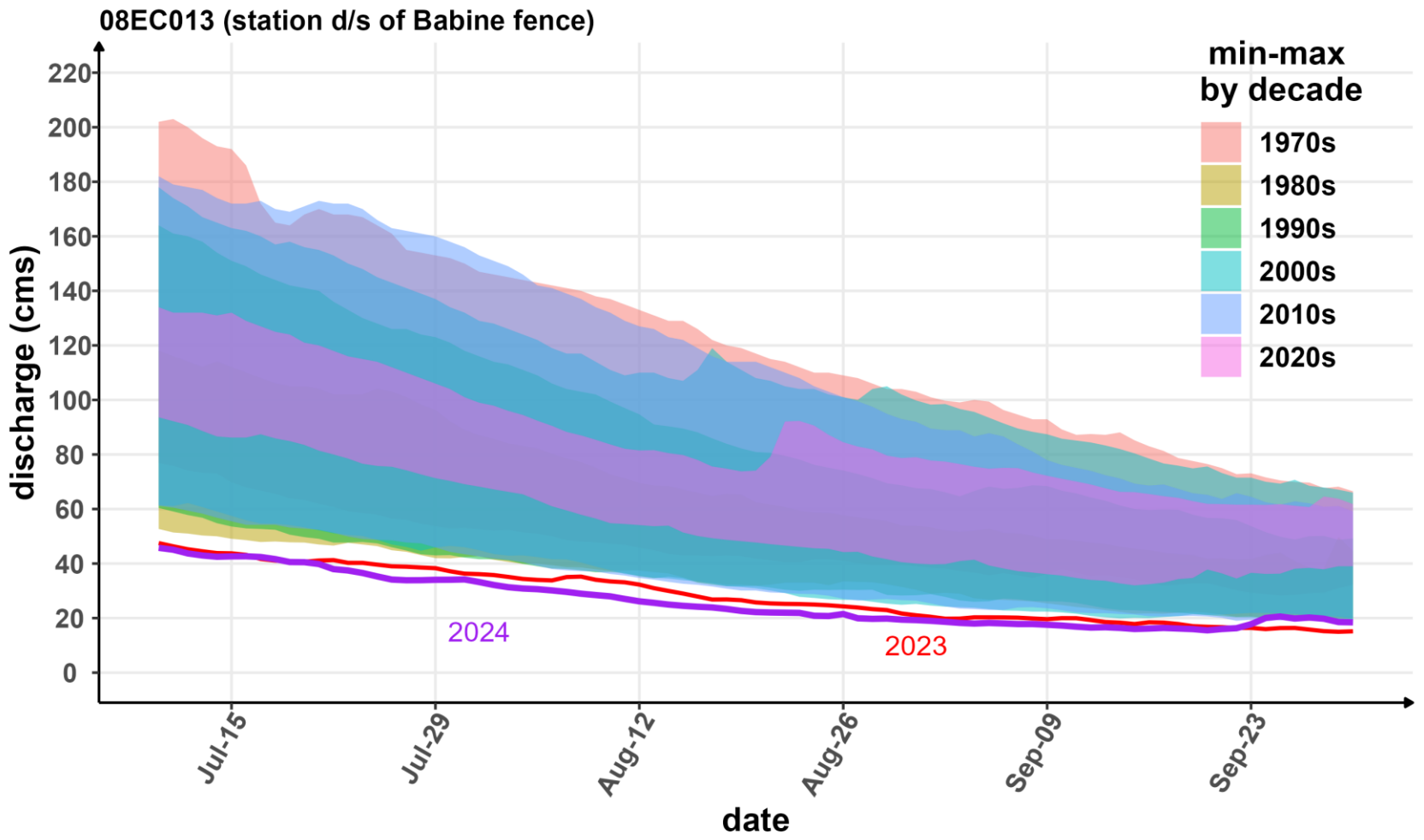
- Babine River – rainbow alley
- 6-Mile

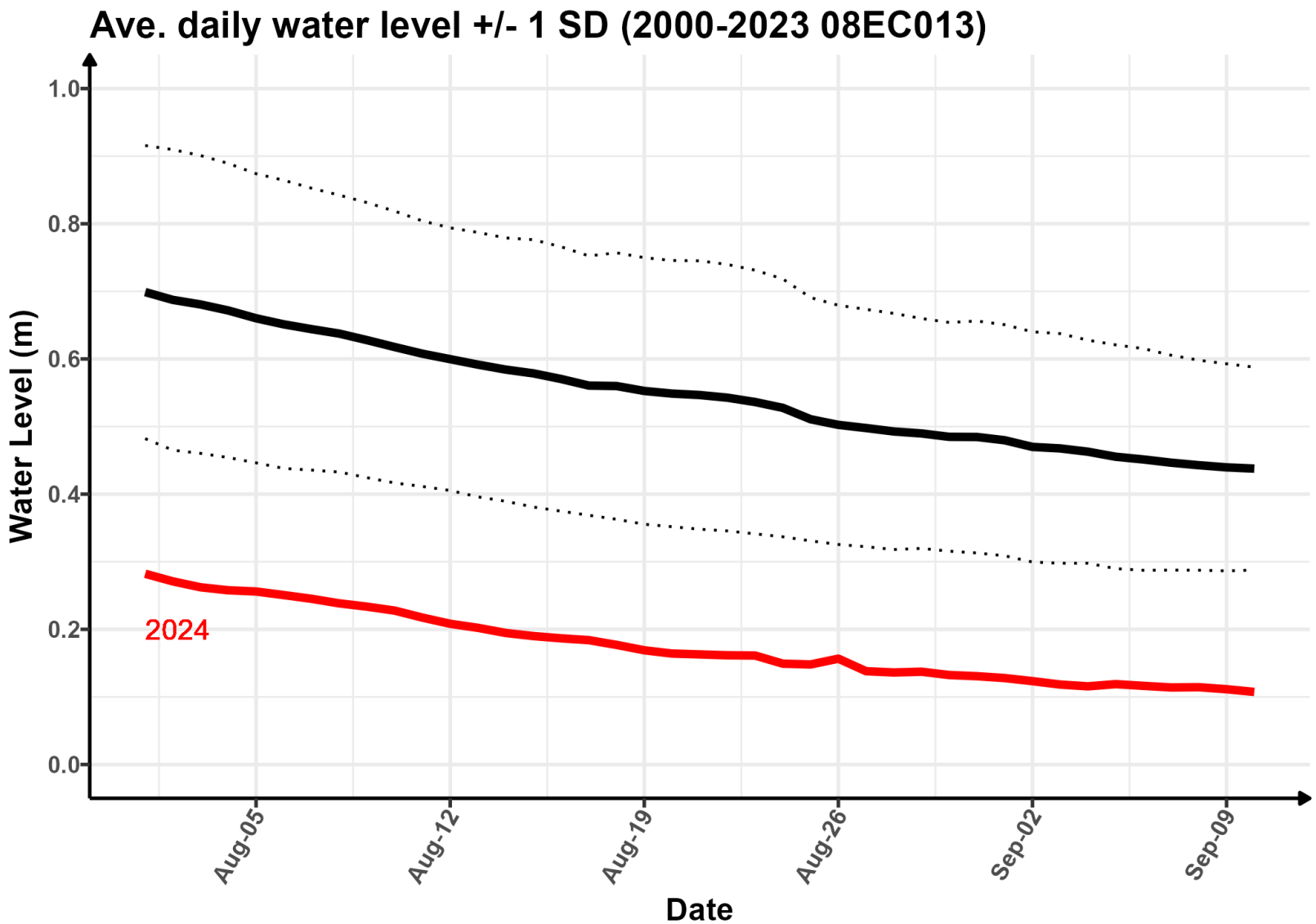
Babine River Collaborative Mgmt. Plan

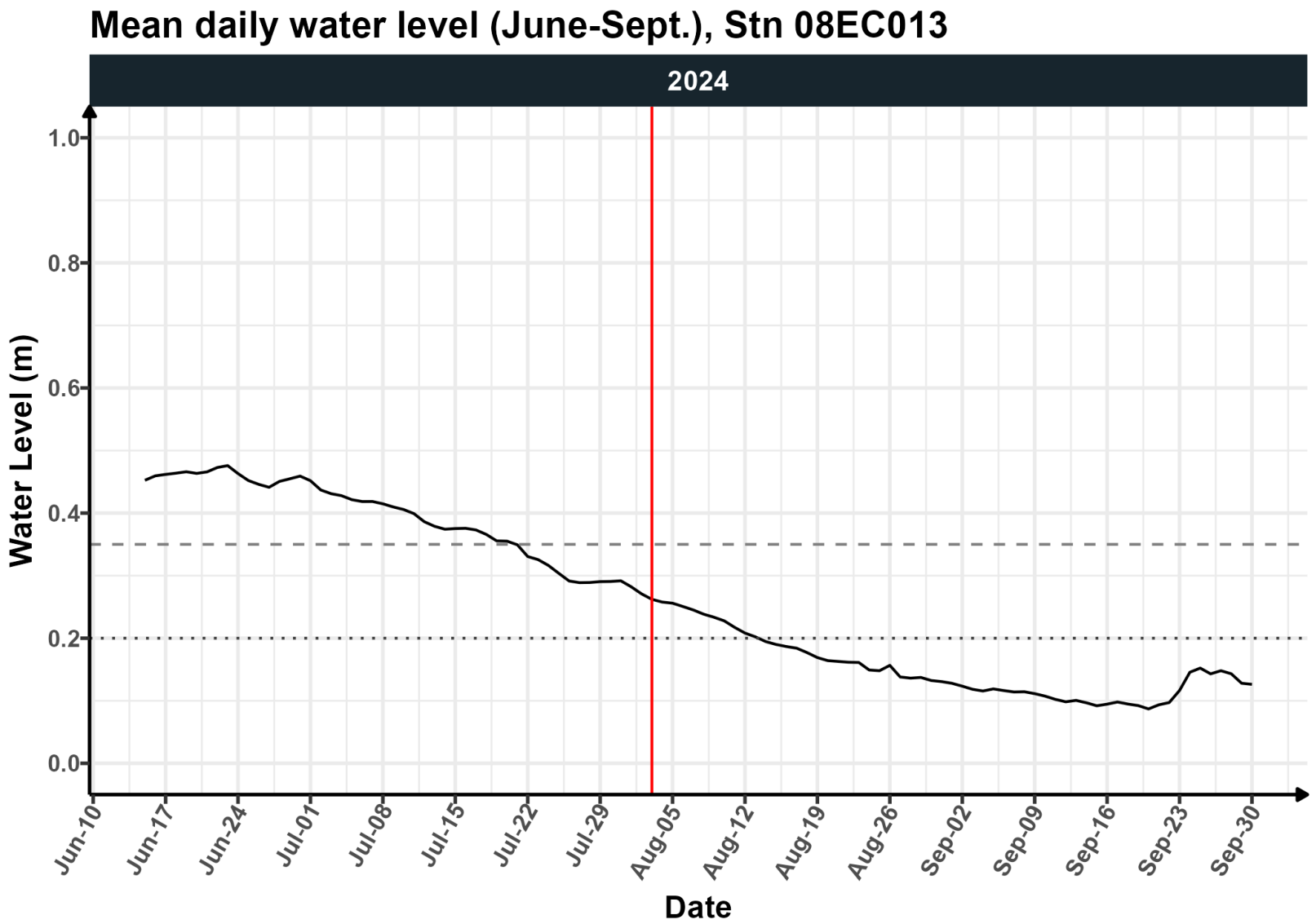
- Purpose - Intended to monitor water conditions to facilitate in-season management intended to minimize fish-stress to maximize fitness and spawning escapement

How did we get here?

- Decrease in river discharge

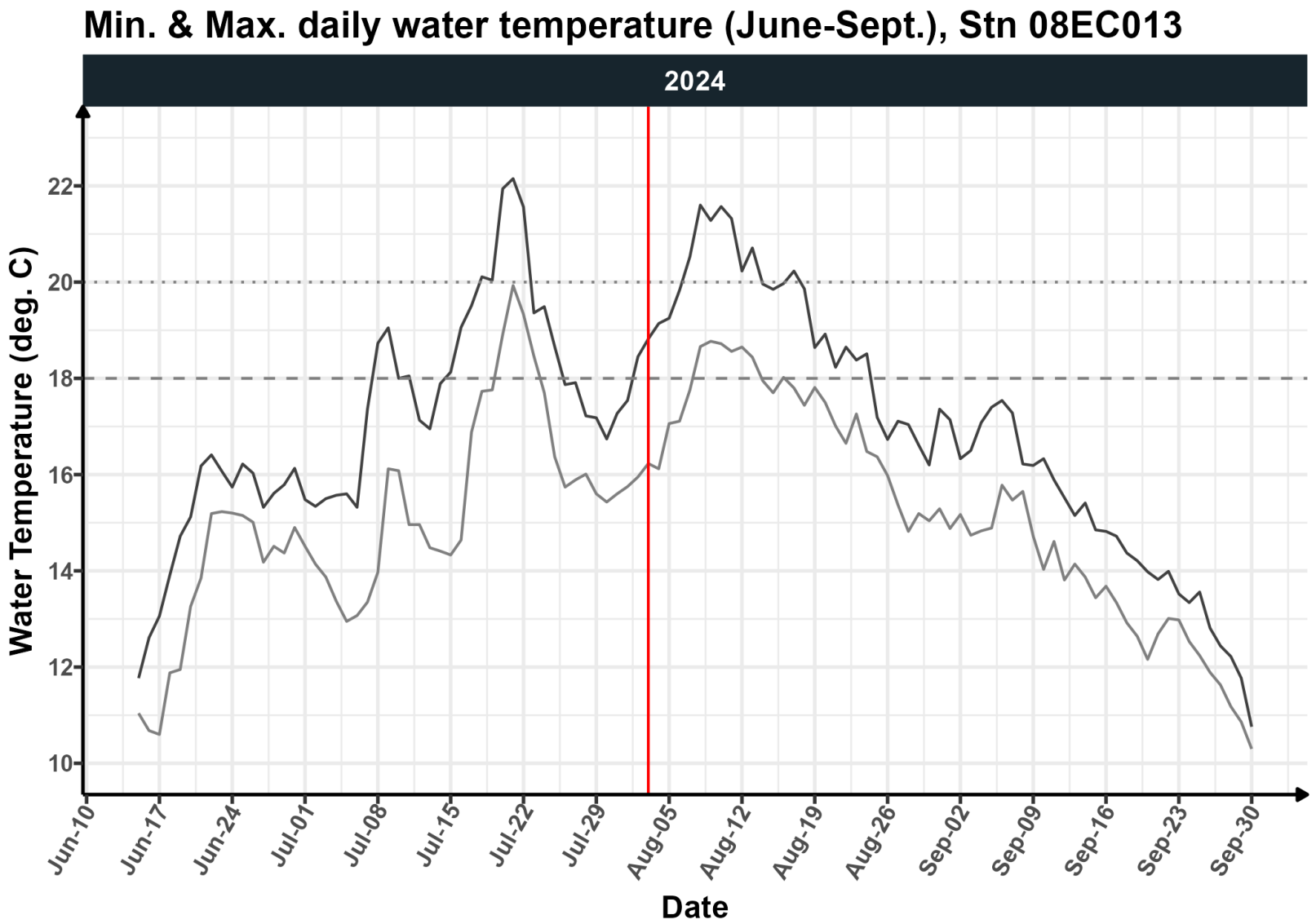



Ave. daily water level +/- 1 SD (2000-2023 08EC013)
Water Level (m)
1.0
0.8
0.6
0.4
0.2
0.0
2024
Aug-05
Aug-12
Aug-19
Aug-26
Sep-02
Sep-09
Date


Mean daily water level (June-Sept.), Stn 08EC013
2024
Water Level (m)
1.0
0.8
0.6
0.4
0.2
0.0
Jun-10
Jun-17
Jun-24
Jul-01
Jul-08
Jul-15
Jul-22
Jul-29
Aug-05
Aug-12
Aug-19
Aug-26
Sep-02
Sep-09
Sep-16
Sep-23
Sep-30
Date

Impact of Low Discharge?

- Less water = less heat capacity = less moderation to water temperatures from heat input (air, sun)
- Higher water temperatures = reduces capacity to hold dissolved oxygen
- Both low water and high temperature combined with a high number of fish can result in impaired fitness and mortalities


Min. & Max. daily water temperature (June-Sept.), Stn 08EC013
2024
Water Temperature (deg. C)
22
20
18
16
14
12
10
Jun-10
Jun-17
Jun-24
Jul-01
Jul-08
Jul-15
Jul-22
Jul-29
Aug-05
Aug-12
Aug-19
Aug-26
Sep-02
Sep-09
Sep-16
Sep-23
Sep-30
Date

Chronology of Events

- July 16 – Tmin >16°C (Risk level 2)
- July 19 – Tmin >18°C (Risk level 3)
- July 21 – Tmin = 20°C; water level <0.35m (Risk level 3)
- July 23 – Tmin <18°C (Risk level 2)
- Aug 3 – Recreational fishing closure on Babine “Segment 1” (to Nilkitkwa R)
- Aug 8-14 – Tmin >18°C (Risk level 3)
- Aug 8-9 – first big ‘bump’ of sockeye
- Aug 11 – 1272 pre-spawn sockeye mortalities at fence; first camera trap installed
- Aug 12 – Water level <0.2m (Risk level 4)
- Aug 12-14 – huge ‘bump’ of sockeye
- Aug 16 – 2nd camera trap installed
- Aug 16-22 – another huge ‘bump’ of sockeye

Considerations for Improvement

- Have the province mirror the closure as other species may still be ‘targeted’
- Extend closure to upstream of fence
- Quicker closure-response – July 19th to 22nd warranted closure
- Aug 12 water levels <0.2m warranted closure of “segment 2” downstream of Nilkitkwa River, but did not occur
- Develop protocol for measuring dissolved oxygen upstream, within, and downstream of fence traps
- Develop protocol to measure fish density downstream of the fence using drone images
- Camera traps to be pre-installed and ready-to-go for emergency situations