Appendix 10A

# Winter-Run Chinook Salmon Life Cycle Model Results for Proposed Action for the Long-Term Operation of the Central Valley Project and State Water Project

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# Winter-Run Chinook Salmon Life Cycle Model Results for Proposed Action for the Long-Term Operation of the Central Valley Project and State Water Project

This appendix is entirely new for the Final Environmental Impact Report and was not included as part of the Draft Environmental Impact Report. Therefore, it is not provided in strikethrough or underline format.

## 10A.1 Appendix Overview

This appendix provides summary results for the Sacramento River Winter-Run Chinook Salmon Life Cycle Model (WRLCM) for the Proposed Action for the Long-Term Operation of the Central Valley Project and State Water Project. The life cycle model is described by Hendrix et al. (2024.) The modeled scenario called ALT2v3_woTUCP provides the most relevant scenario in the context of the cumulative effects of the Proposed Project.

## 10A.2 References

Hendrix, N., A.-M. K. Osterback, S. John, M. Daniels, E. Dusek Jennings, E. Danner, and S. Lindley. 2024. Life cycle modeling framework for Chinook Salmon spawning in the Sacramento River. Technical Memorandum NOAA-TM-NMFS-SWFSC-696. April. National Marine Fisheries Service, Southwest Fisheries Science Center, Long Beach, CA.

# WRLCM Report, Multiscenario LTO DRAFT NAA Baseline

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Note: For the WRLCM figures that are broken out by WYT, results for some lifestages (e.g., egg survival) will be summarized by the Water Year that matches the broodyear, whereas other lifestages (e.g., fry survival, smolt survival) will be summarized by the following year, when fry rearing and smolt outmigration occurs (water year = broodyear + 1).

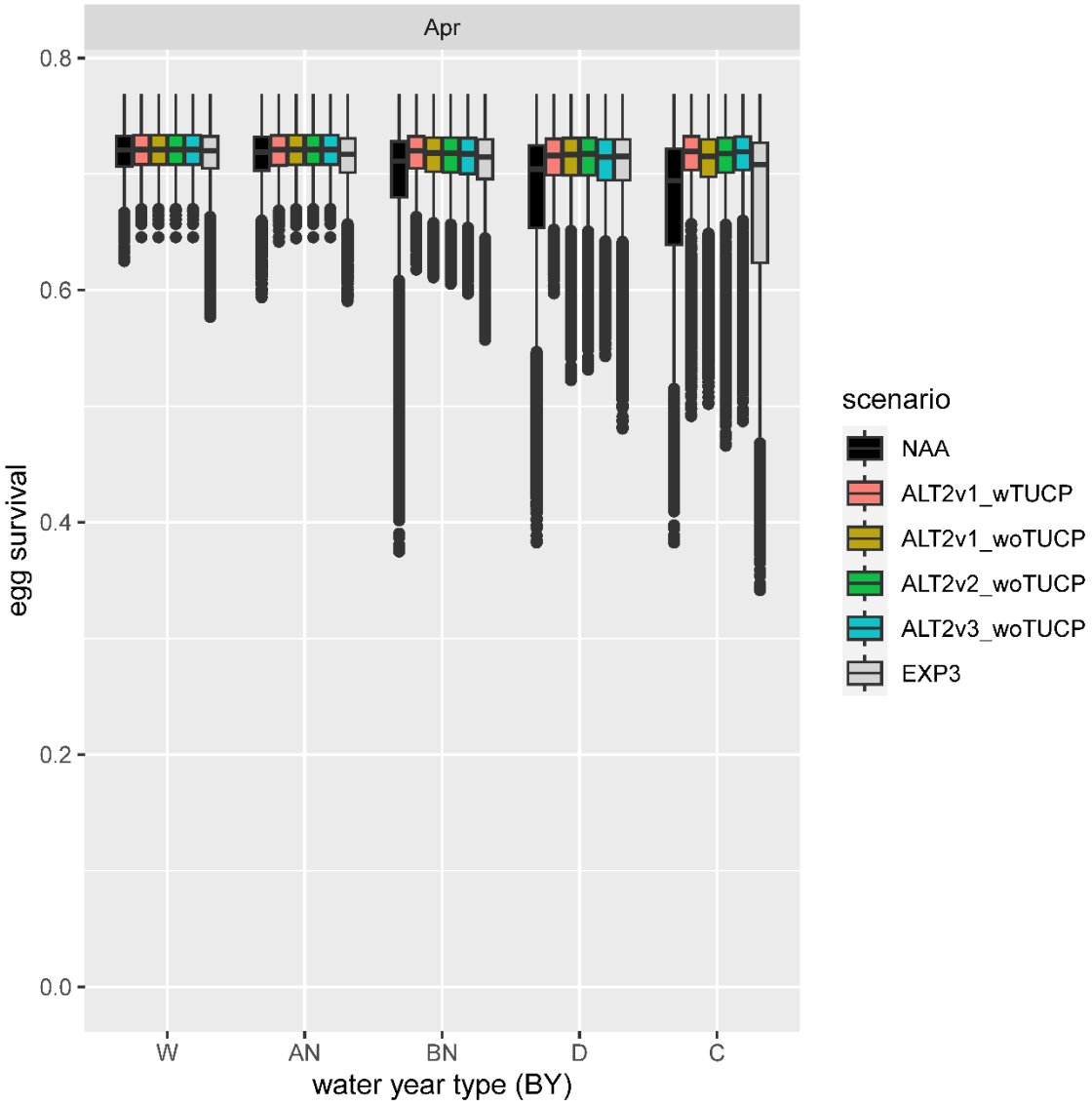


Figure 1: Apr egg survival by water year type.

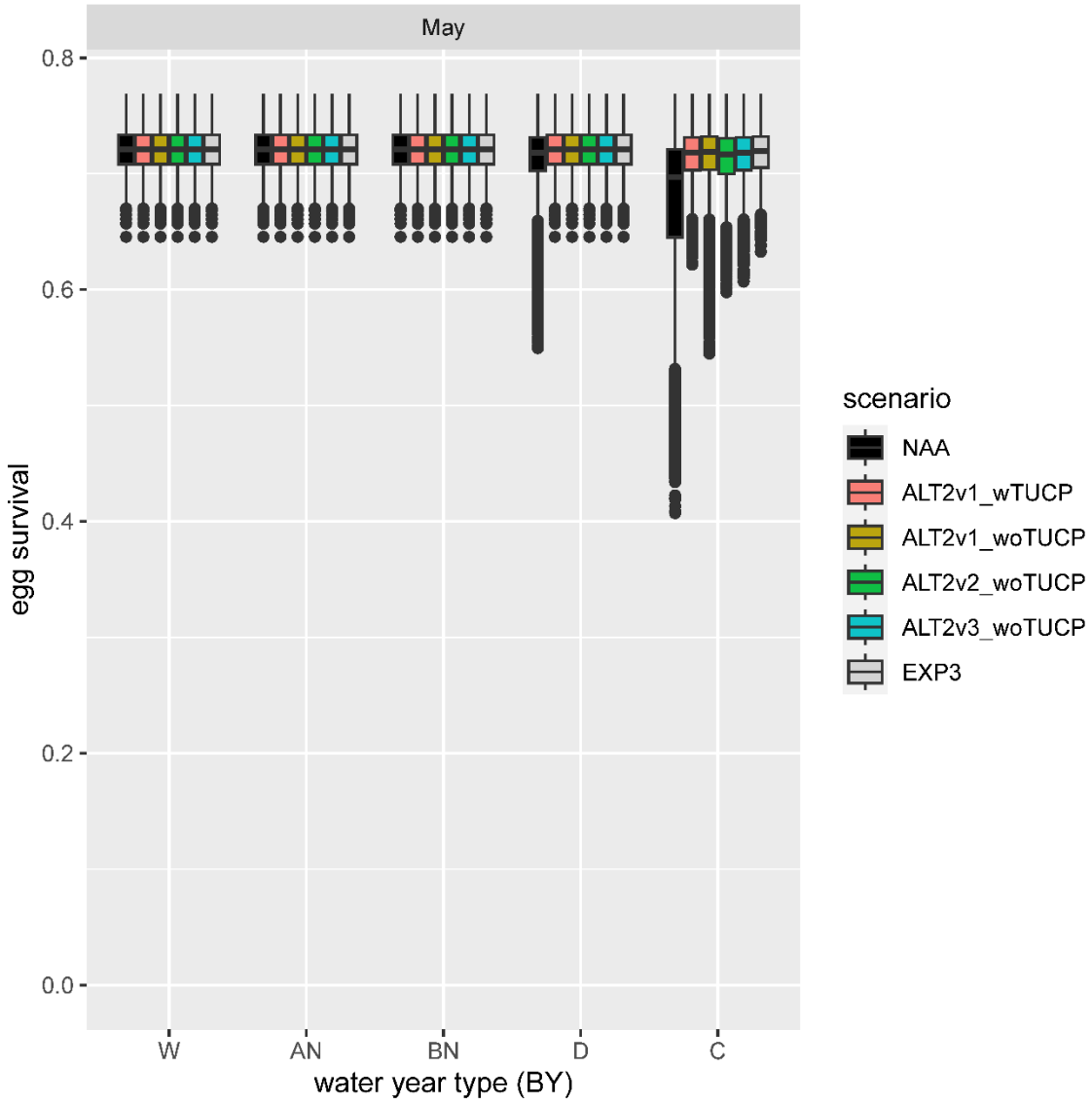


Figure 2: May egg survival by water year type.

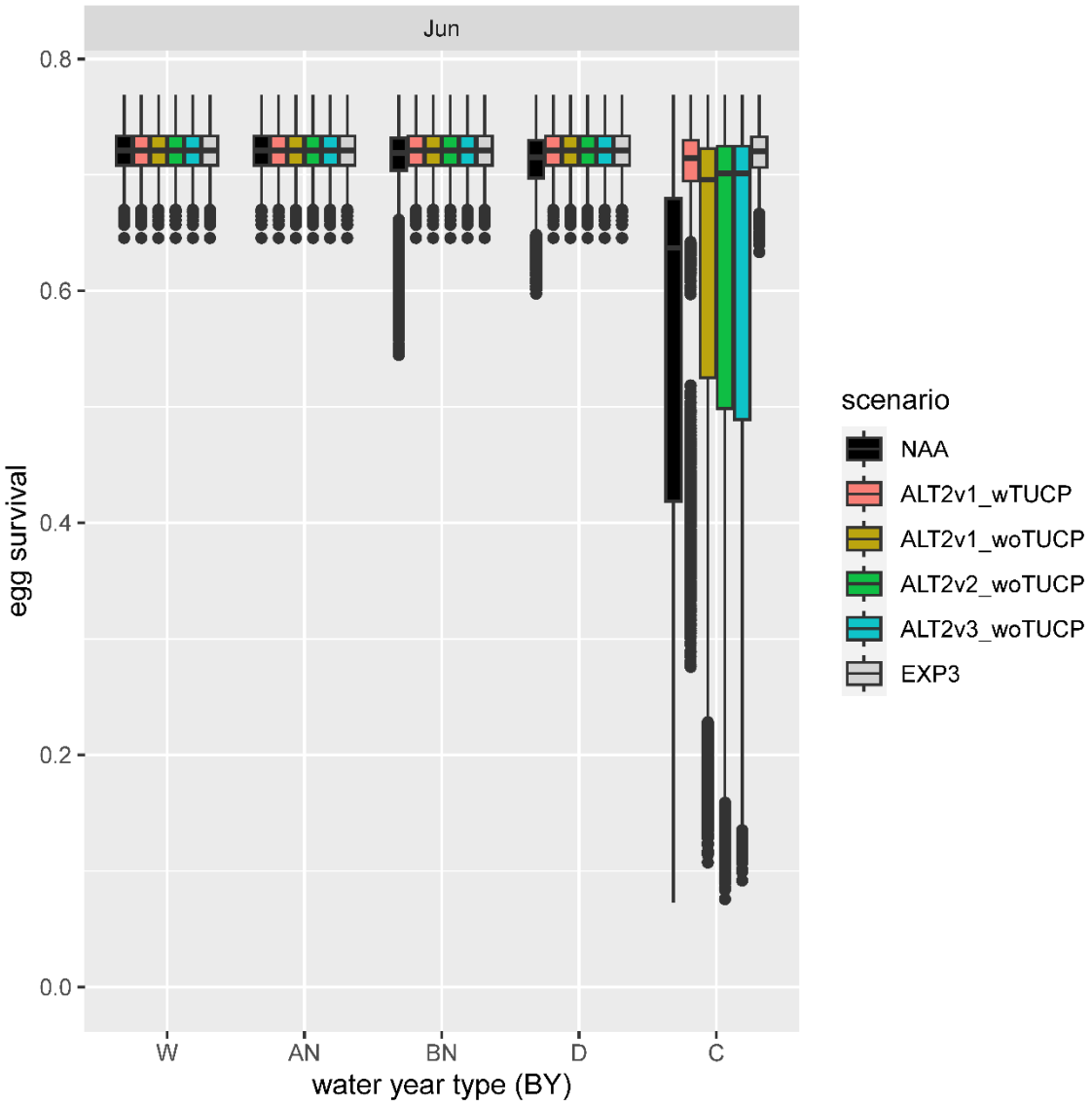


Figure 3: Jun egg survival by water year type.

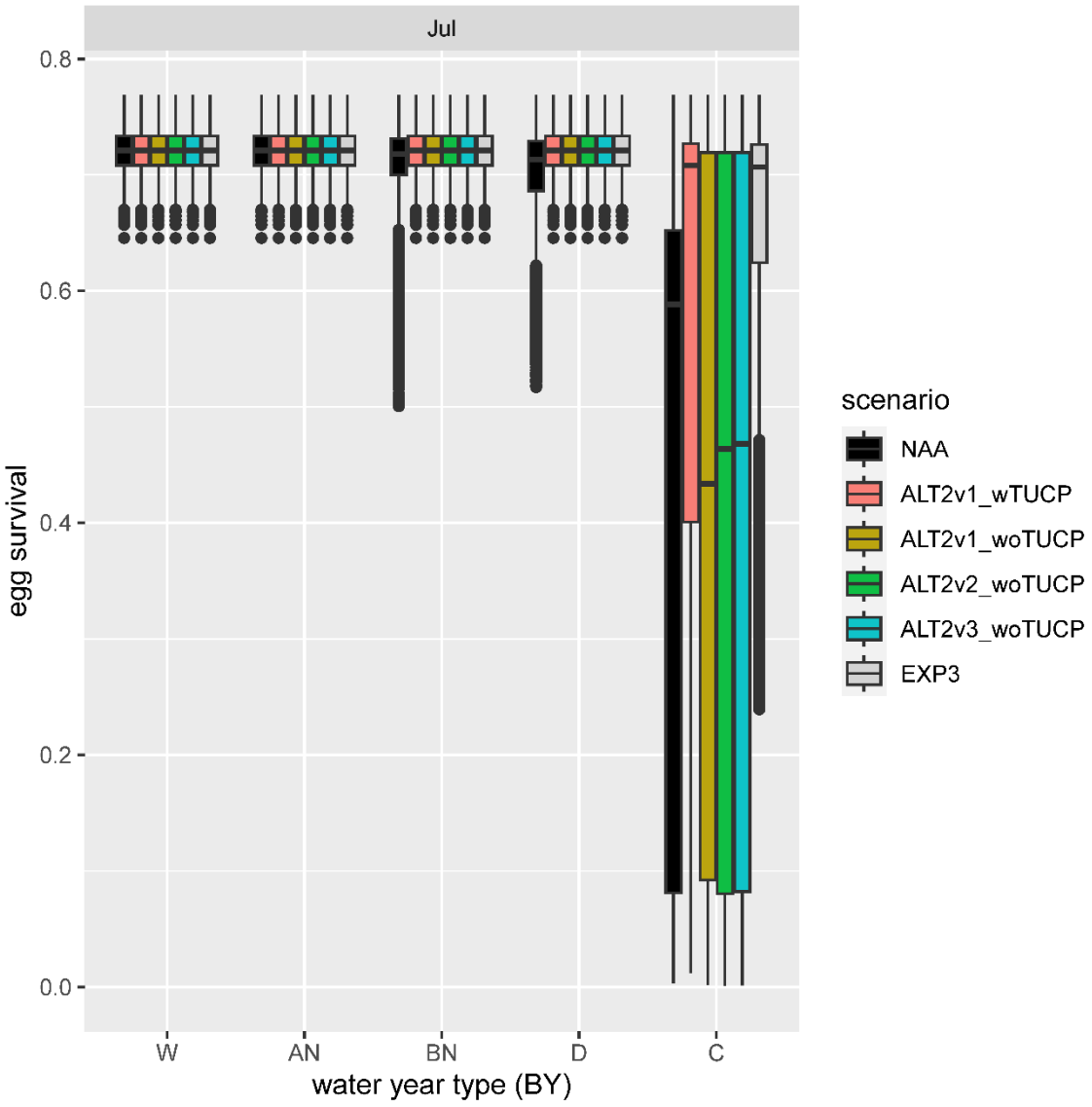


Figure 4: Jul egg survival by water year type.

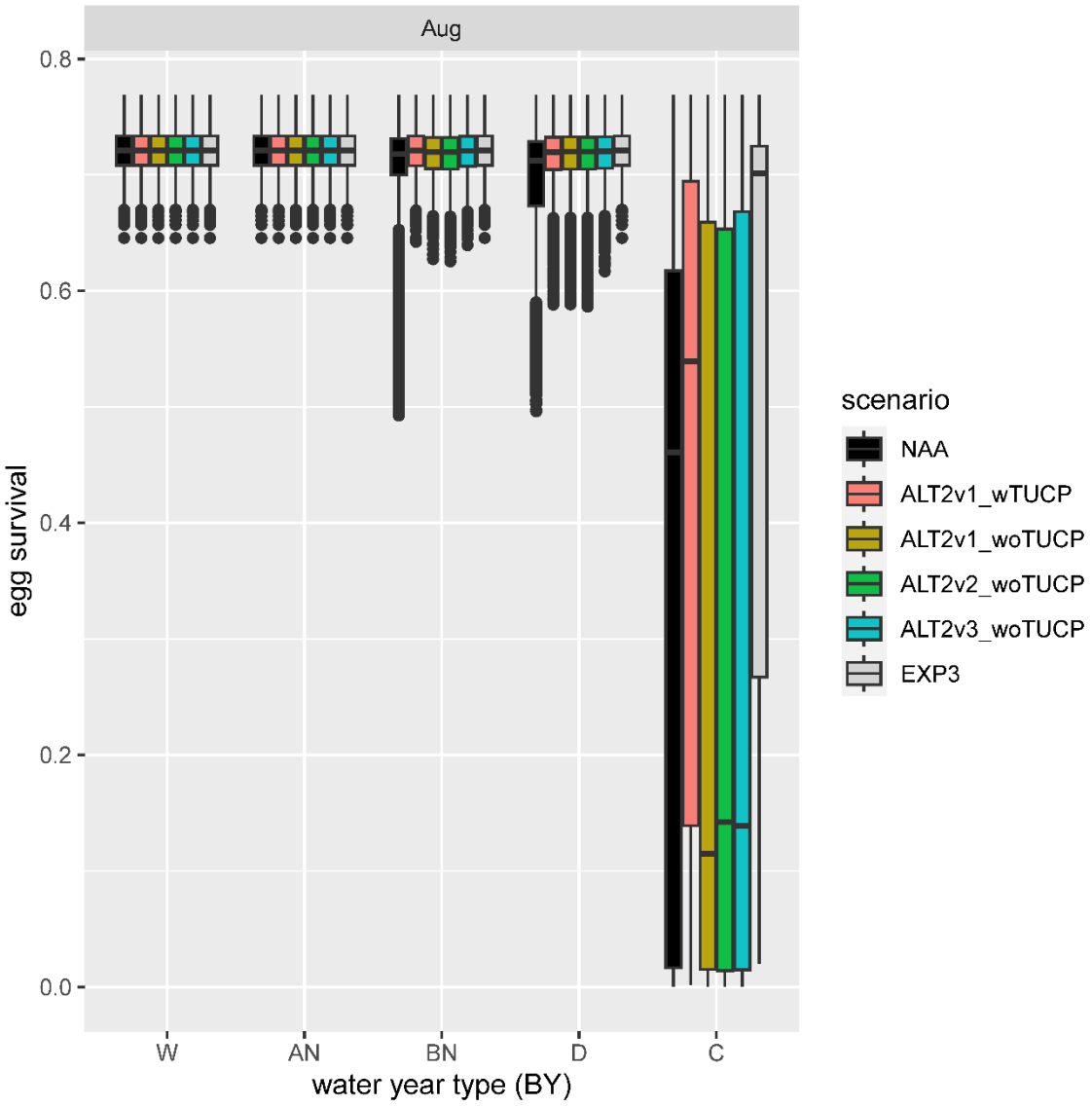


Figure 5: Aug egg survival by water year type.

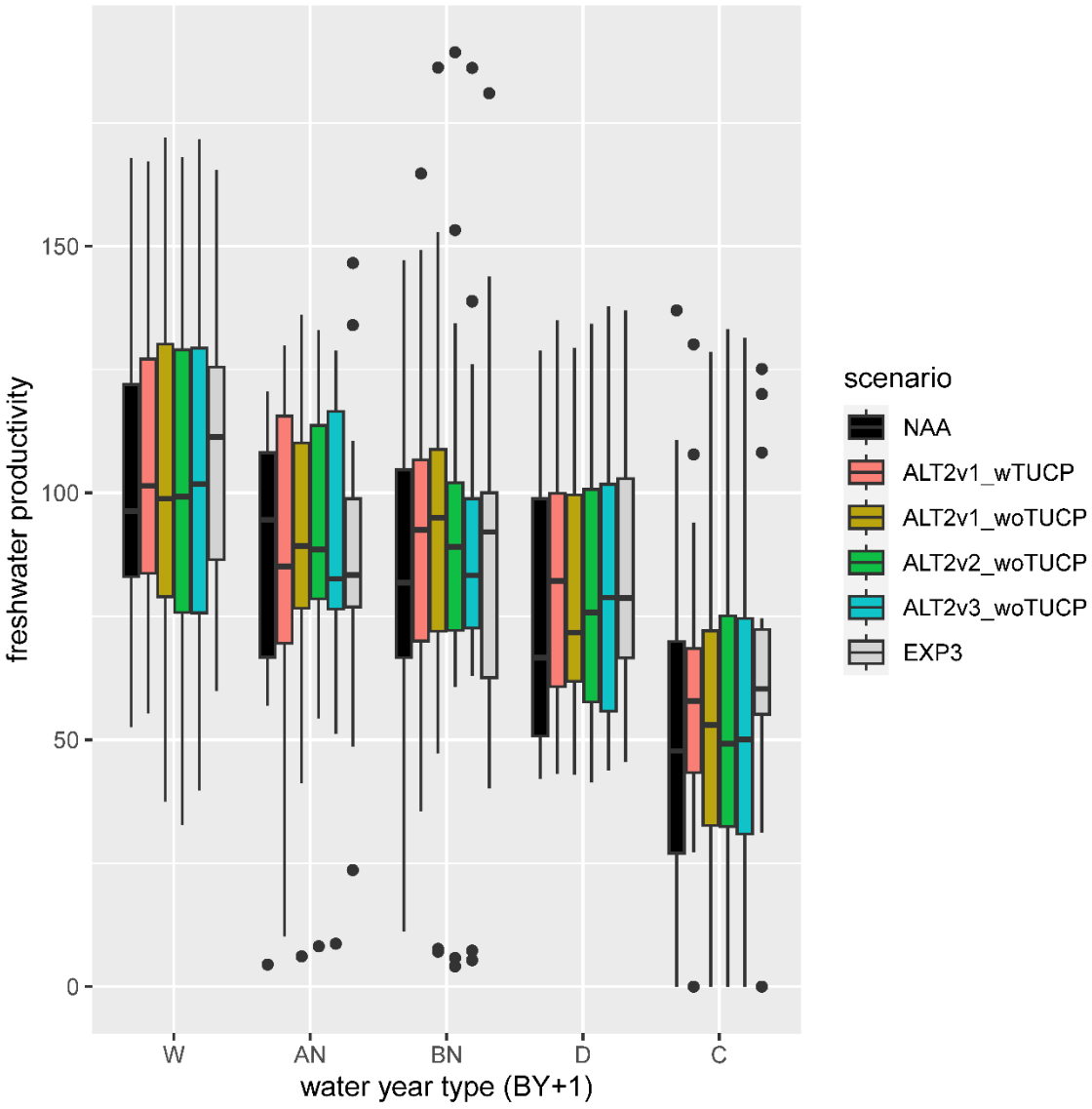


Figure 6: Boxplots of median freshwater productivity (gulf smolts per spawner) by water year type.

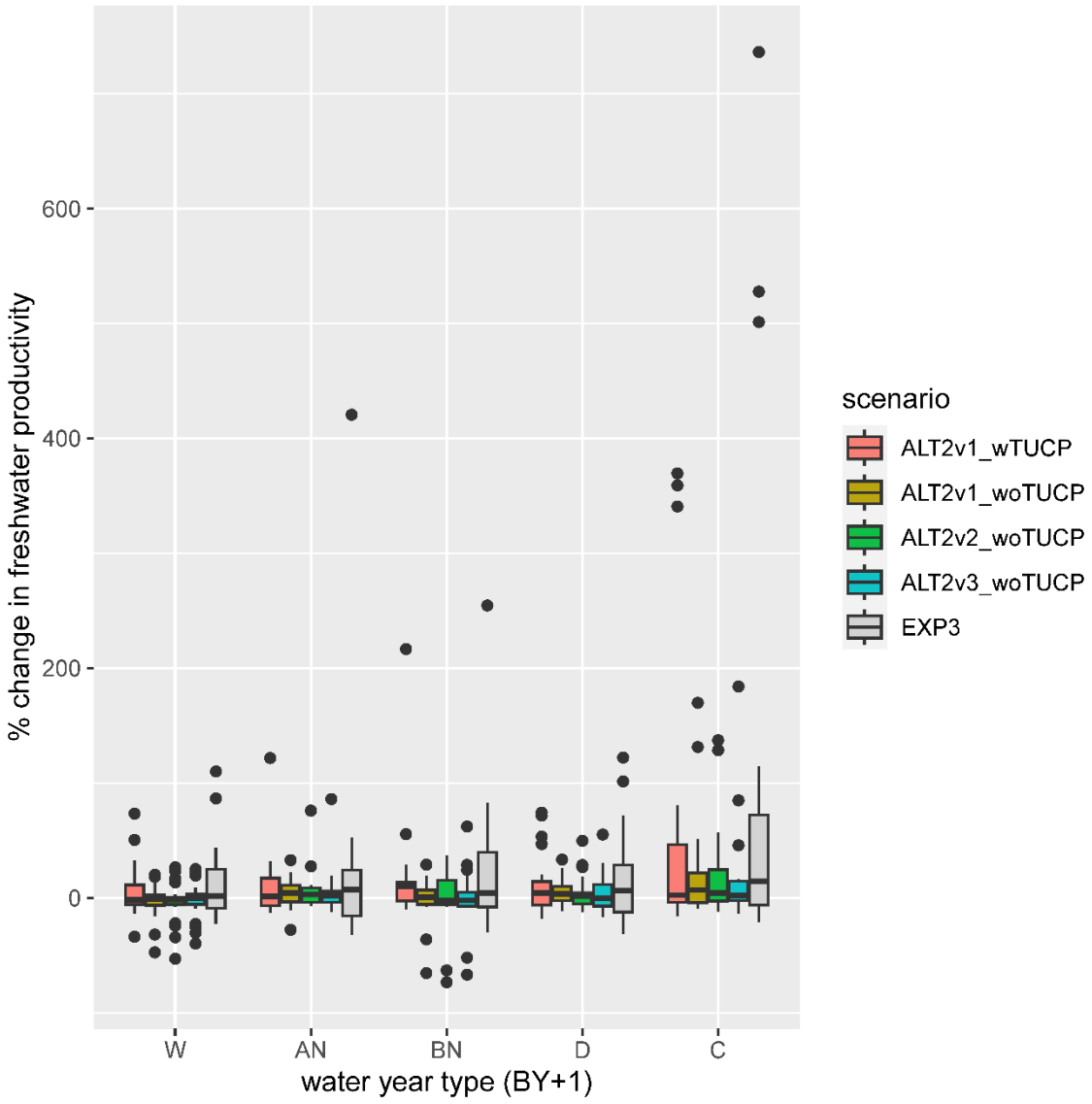


Figure 7: Boxplots of percent change in median freshwater productivity (gulf smolts per spawner) by water year type.

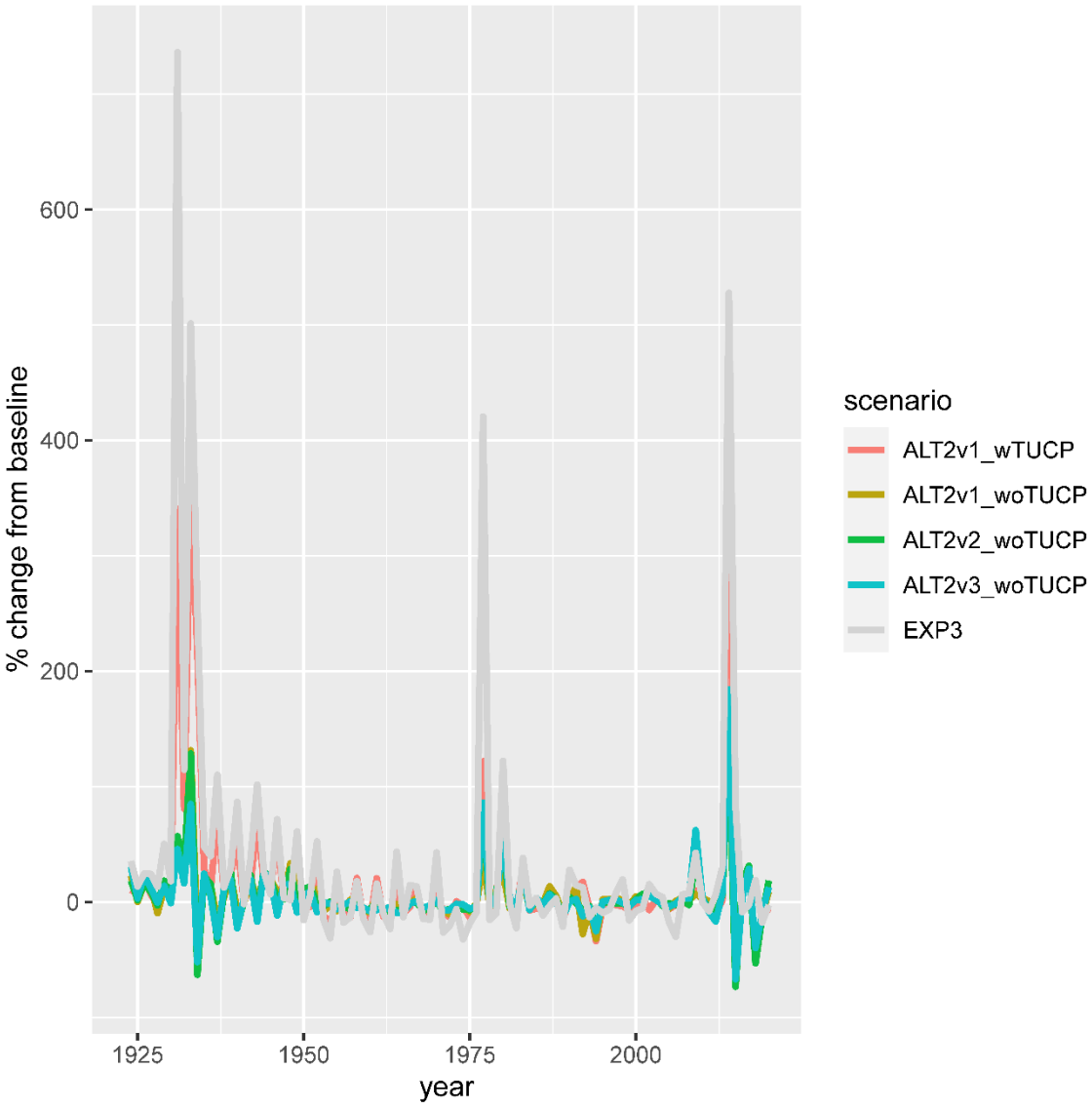


Figure 8: Percent change in freshwater productivity (gulf smolts per spawner).

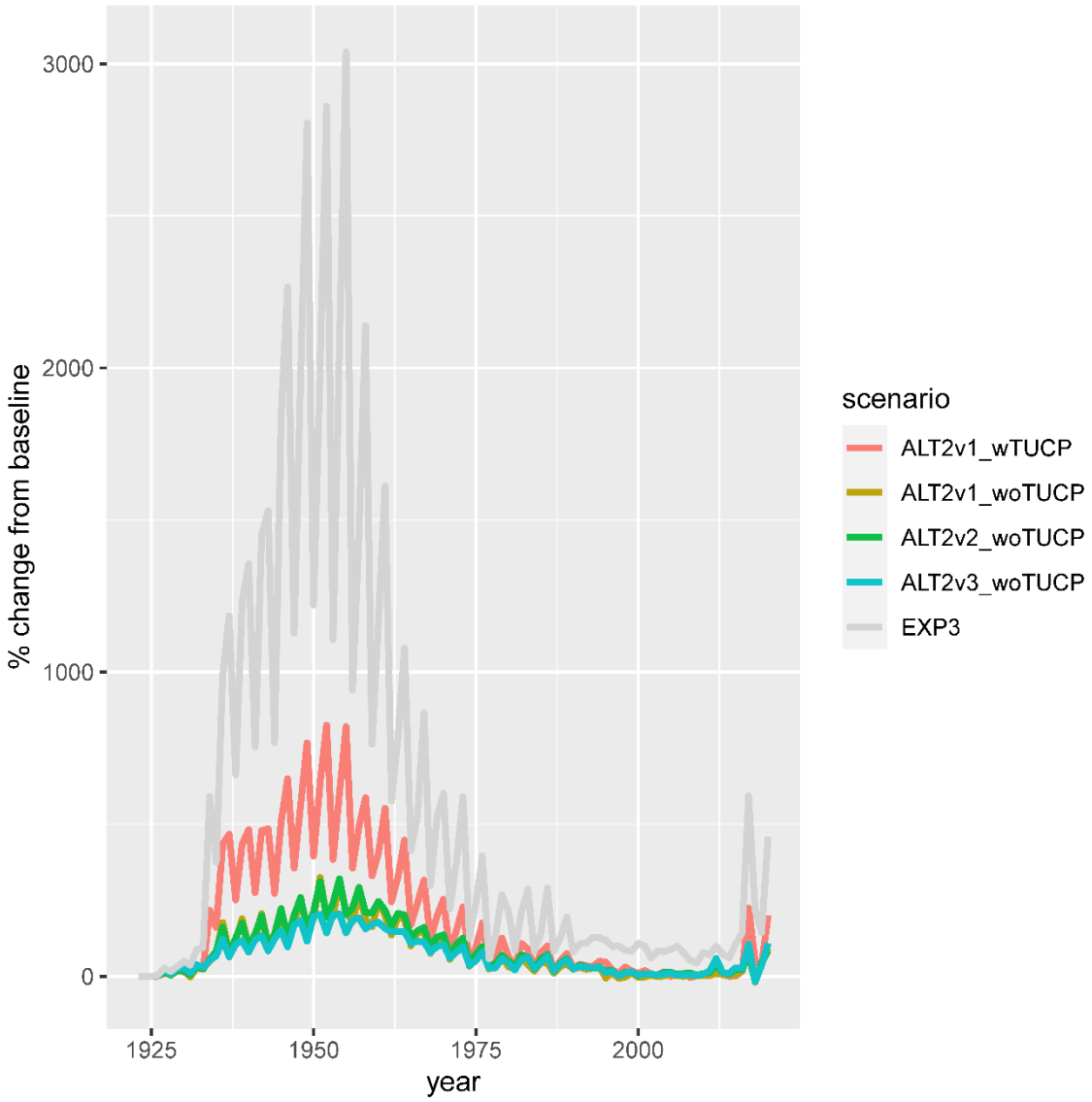


Figure 9: Percent change in annual escapement.

| scenario | mean % change in abundance | 95% CI | Pr(Alt>baseline) |
|---|---|---|---|
| ALT2v1_wTUCP | 3689.53 | [2360.04, 5019.03] | 1.00 |
| ALT2v1_woTUCP | 640.60 | [543.43, 737.77] | 1.00 |
| ALT2v2_woTUCP | 1192.48 | [956.18, 1428.78] | 1.00 |
| ALT2v3_woTUCP | 790.39 | [646.34, 934.44] | 1.00 |
| EXP3 | 1485941.55 | [644113.87, 2327769.23] | 1.00 |

Table 1: Mean of percent change in annual abundance (sum of in-river, natural, and hatchery-origin spawners) averaged across all years. Pr(Alt>baseline) is the probability that a realization of the alternative scenario will have a positive percent change averaged across all years.

| scenario | mean % change in productivity |
|---|---|
| ALT2v1_wTUCP | 20.65 |
| ALT2v1_woTUCP | 4.95 |
| ALT2v2_woTUCP | 4.64 |
| ALT2v3_woTUCP | 4.48 |
| EXP3 | 36.14 |

Table 2: Mean percent change in freshwater productivity (gulf smolt per spawner) relative to baseline

| scenario | mean % change in CRR | 95% CI | Pr(Alt>baseline) |
|---|---|---|---|
| ALT2v1_wTUCP | 33.62 | [30.29, 36.95] | 1.00 |
| ALT2v1_woTUCP | 12.77 | [11.01, 14.54] | 1.00 |
| ALT2v2_woTUCP | 14.90 | [12.8, 17.01] | 0.99 |
| ALT2v3_woTUCP | 14.37 | [12.21, 16.53] | 1.00 |
| EXP3 | 51.98 | [46.99, 56.98] | 1.00 |

Table 3: Mean of percent change in cohort replacement rate (CRR) averaged across all years. Pr(Alt>baseline) is the probability that a realization of the alternative scenario will have a positive percent change averaged across all years.