

# Sacramento Valley Fall-run Chinook Salmon Inland Harvest and Relationship to Abundance Forecasting

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# Presentation Overview:

- Refresher on Inland Seasons and Zones
- Climate Change Impacts on Inland Harvest and Recruitment
- Inland Harvest and Escapement Relationships with Abundance Forecasting
- Stock Recruitment
  - Reliance on inland harvest and escapement
  - Are harvest and escapement adequate predictors of recruitment

## 3. Milestones for Ad Hoc Workgroup and Draft Terms of Reference and General Timeline

**a. Collaborate with affected management entities and scientists to collectively identify the issues, data available and gaps, and timeframe needed to complete work associated with the issues identified.**

b. Collect and summarize relevant information regarding the status of SRFC, biological characteristics, magnitude and distribution of fishing mortality, and marine and freshwater environmental indicators.

c. Based on the results of 3a and 3b, provide a report to the Council that includes an assessment of the suitability of current management measures (reference points, conservation objective, and harvest control rules), recommendations and a workplan/timeline for development of alternatives.

# Inland Harvest Brief Overview

## Data needs

- One piece of the puzzle in relative smolt to adult return rates
- Opportunity for gathering important data and metrics.
  - Angler effort and harvest by area
  - CWT recovery
  - Performance and angler satisfaction.
  - Hatchery to natural origin ratios.
  - Performance of rearing and release strategies

## Regulations

- Inland Regulations:
  - ISOR Development starts annually in Nov/Dec/Jan.
  - ISOR ...“Department recognizes the uncertainty of SRFC in-river harvest projections. Therefore, for the 2023 Central Valley fishery, the Department is presenting four regulatory options for the **Commission’s consideration** to tailor 2023 Central... ..The Commission may adopt these options for each river section independently, or in combination to meet PFMC SRFC management objectives and maximize recreational salmon fishing opportunities in the Central Valley.”
- Fishery includes Mokelumne River unlike SI
- Fishery excludes Yuba, smaller CV and SJ tributaries.
- PFMC is responsible for adopting recommendations for the management of recreational and commercial ocean salmon fisheries in the Exclusive Economic Zone (three to 200 miles offshore) off the coasts of Washington, Oregon, and California.

# 2022 Central Valley Salmon Season

General Season: July 16<sup>th</sup>- December 16<sup>th</sup> (154 days)  
2 fish daily bag, 4 in possession

## Upper Sacramento River Management Zone Knights Landing Bridge to Deschutes Road Bridge

Knights Landing Bridge to Red Bluff Diversion Dam (154 days)



Red Bluff Diversion Dam to Deschutes Road Bridge (153 days)



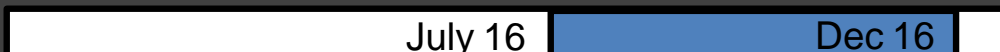
## Lower Sacramento River Management Zone Carquinez Bridge to Knights Landing Bridge



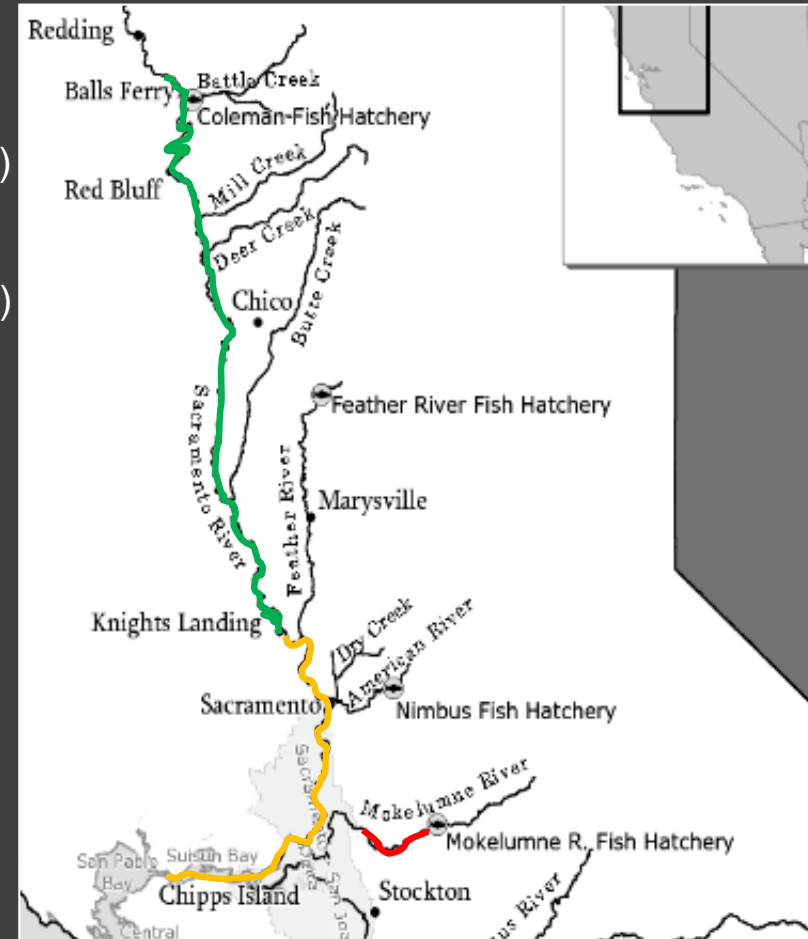
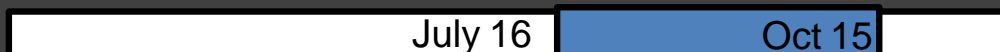
## Mokelumne River Management Zone

### Highway 12 overcrossing to Camanche Dam

Highway 12 overcrossing to confluence with Cosumnes R.\*\*



Camanche Dam to Elliot Road



# Metrics by Management Zones

	American	Feather	Lower Sacramento	Upper Sacramento
Effort (hours)	57,453	47,742	133,979	83,182
Est. SRFC Harvest	1,795	1,044	996	1,565
% SRFC Harvest <sup>1</sup>	33.2	19.3	18.4	29.1
Ave. FL (mm)	794.6	821.4	765.6	842.0
Ave. Wt. (Kg)	6.8	8.2	7.2	8.9
% Grilse <sup>2**</sup>	20%	0%	24%	8%

<sup>1</sup> Sacramento River Fall-run Chinook fishery, excludes late-fall and Mokelumne River harvest

<sup>2</sup> Based on expansions of coded-wire tag recoveries

\*\* Preliminary

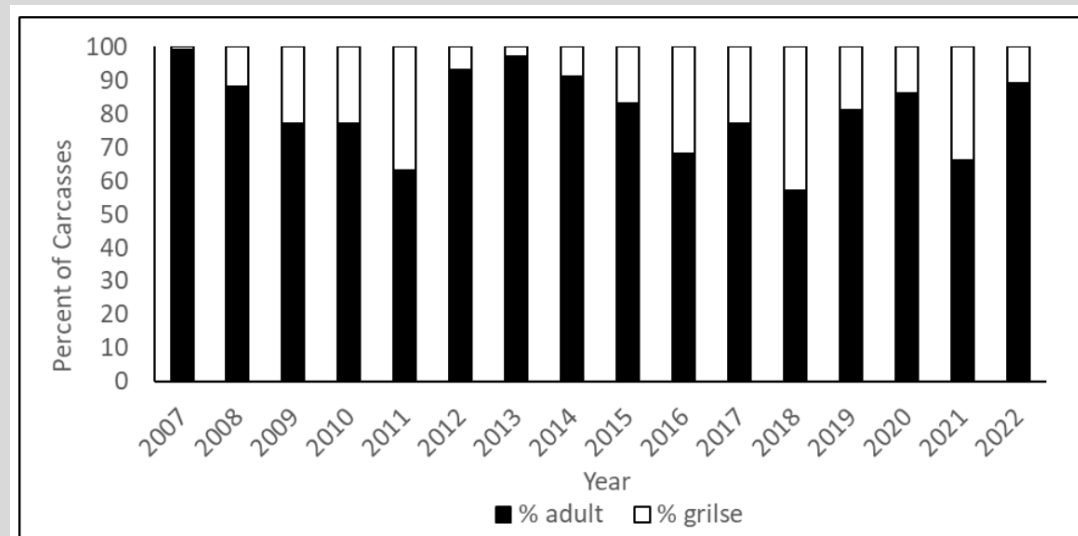
# Inland Harvest and Relationship to Abundance Forecasting and Sac Index

## SI

- Three parts to index
  - Ocean Adult Harvest
  - Inland Adult Harvest
    - Delta and Sacramento Valley Tributaries
      - Adult stray rate may influence data
  - Adult Escapement
    - Sacramento Valley Tributaries
      - Adult stray rate may influence data

## Forecast

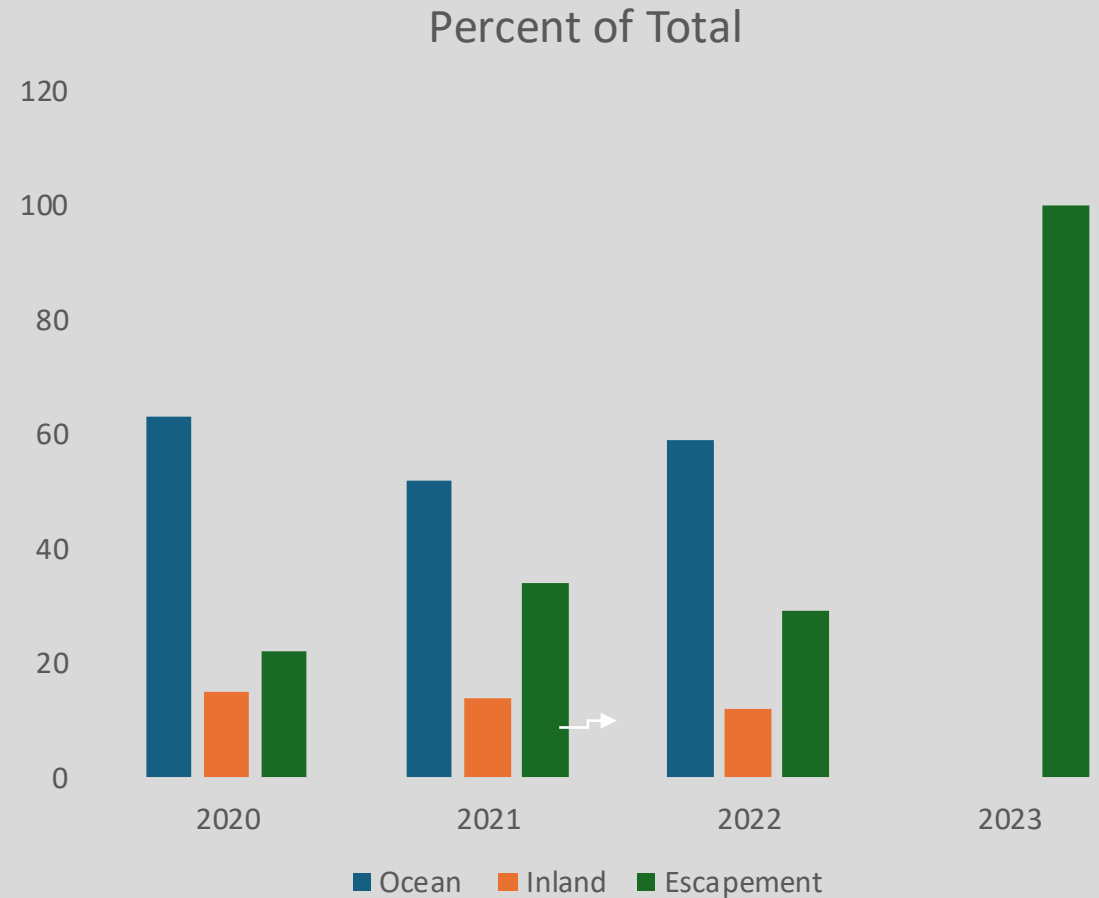
- Regression model w/ total number of grilse as explanatory variable and SI response variable
  - May be influenced by grilse stray rate



**Figure 15.** Proportion of adult and grilse carcasses observed each year from 2007 to 2022 during the lower American River escapement survey.

# Sacramento Index and Inland Harvest

- Inland Harvest:
  - Relatively small portion of the total SI
  - Contribution to SI is relatively consistent over time
  - Total annual harvest appears to be reflective of magnitude of adult return



• Note: data in figure is not actual data and only for descriptive purposes.

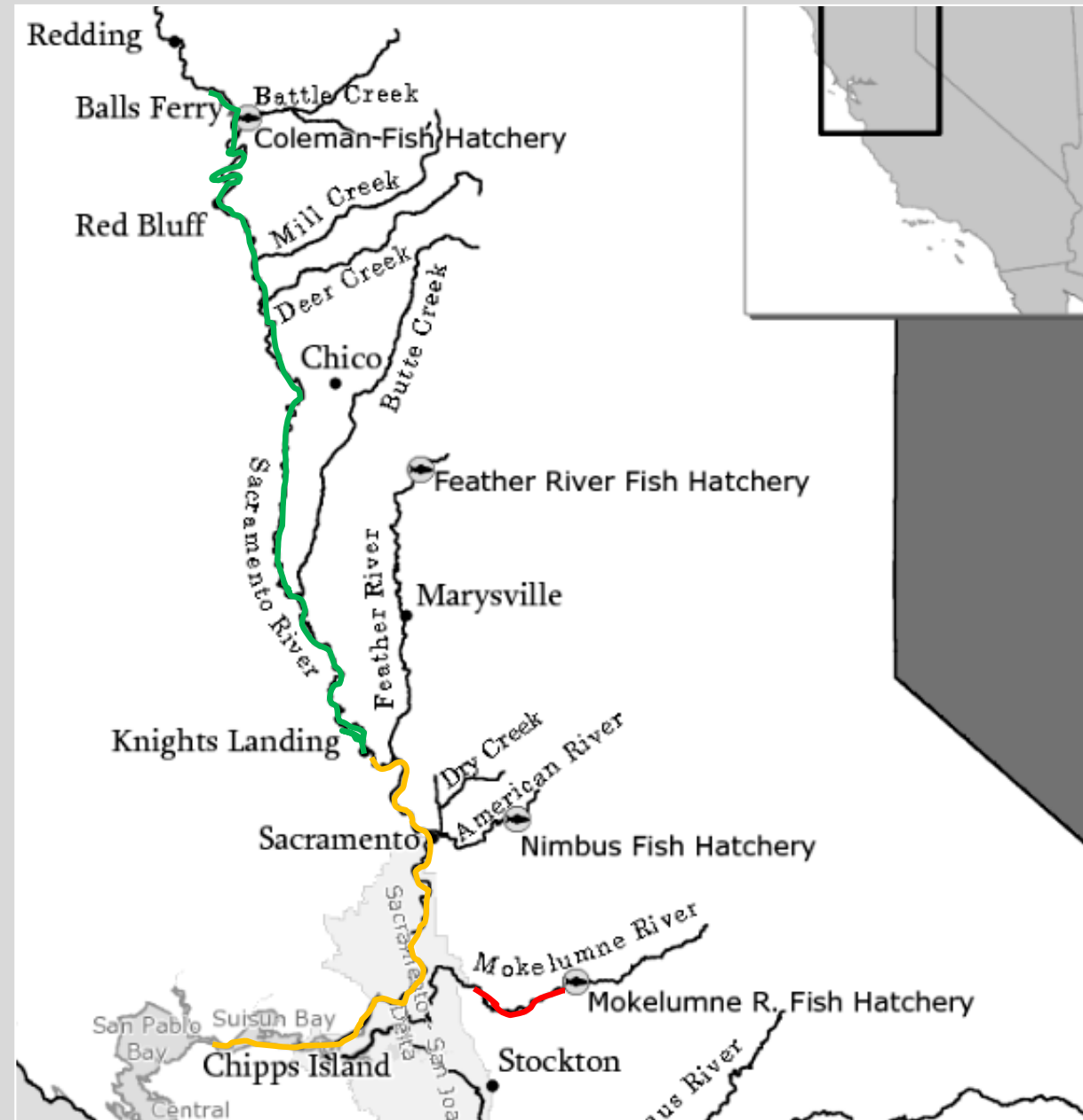
# Climate Change

## Affecting Inland Harvest

- Water Quality
  - Delta prespawn morts and river temperatures
    - Diseases
  - HAB's
- Thiamine => Increased prespawn mortality in migratory routes
- Decreased harvest opportunity:
  - Stressors driving change to hatchery dominated runs
    - => changes in run timing and habitat utilization
  - Prespawn mortalities during migration
  - Note: prespawn mortalities in tributaries may be captured by escapement

## Not Affecting Harvest => Stock Recruitment

- Decreased spawning habitat
- Redd dewatering
- Water temps during spawning and egg incubation.
- Low flows:
  - Poor survival
  - Increased energetic expenditure during emigration
- Thiamine => Decreased productivity and juvenile survival
  - Sex ratio bias?





# Take-home thoughts

- Inland harvest and adult escapement aren't good indicators of juvenile production and stock recruitment.
  - Need new tools to better incorporate stock recruitment relationships and track performance of hatchery and natural origin fish is needed.
- Inland harvest is largely related to magnitude of adult freshwater returns
  - Accurate adult ocean abundance forecasting is important for predicting inland harvest opportunity.
- Climate change is likely to continue to influence fall-run recruitment and consequently the SI.
  - Water temps
    - Poor migration success and prespawn mortality (juvenile and adult survival)
    - Disease
    - Decreased survival egg incubation-fry emergence
  - Low flows:
    - Decreased spawning habitat
    - Redd dewatering
    - Poor survival
    - Increased energetic expenditure during emigration
  - Changed food-webs and rearing conditions.
    - Thiamine => Decreased productivity and juvenile survival
      - Sex ratio bias?