River Delta Eelgrass Supports Late Season Foraging by Outmigrating Chinook Salmon

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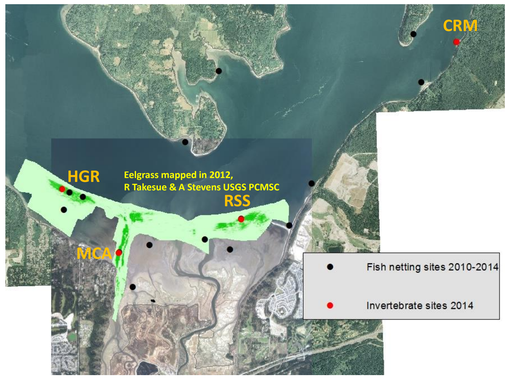
Introduction: Eelgrass can provide food and refuge for juvenile salmon but data to quantify these functions are sparse. River delta eelgrass may be particularly important as the first eelgrass encountered during outmigration. Knowing where, when, and how eelgrass benefits salmon is relevant to both salmon and eelgrass restoration.

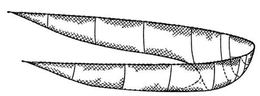
1. Chinook distribution, abundance, timing, size

Sites map. Nisqually River delta and nearshore, south Puget Sound, WA, USA. Sites with eelgrass are labeled.



Gear & schedule

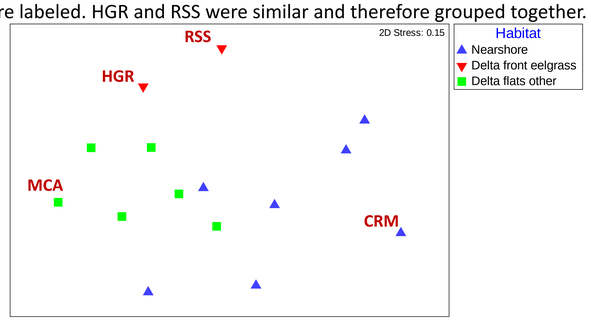
Lampara net (50 m long x 6 m deep at bag)



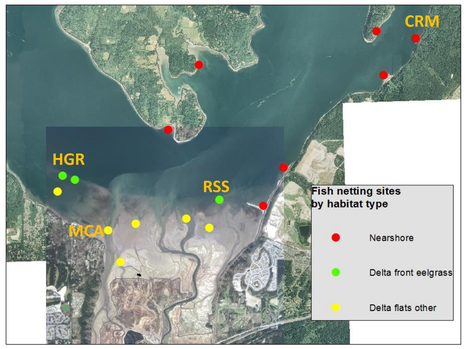
Deploy in circle and retrieve

Sample each site 2 times per month, Apr-Sep, during the day

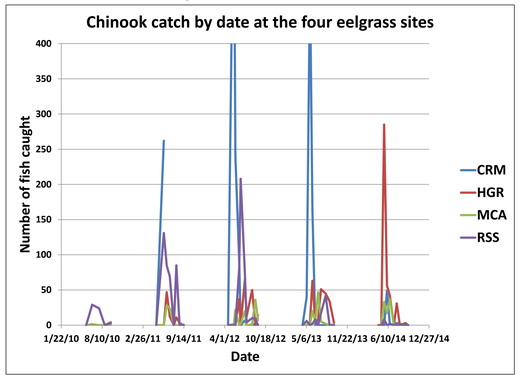
Similarity among sites in abundance and timing of Chinook catch (nMDS plot). Sites were classified to 3 habitats according to similarity. Sites with eelgrass are labeled. HGR and RSS were similar and therefore grouped together.



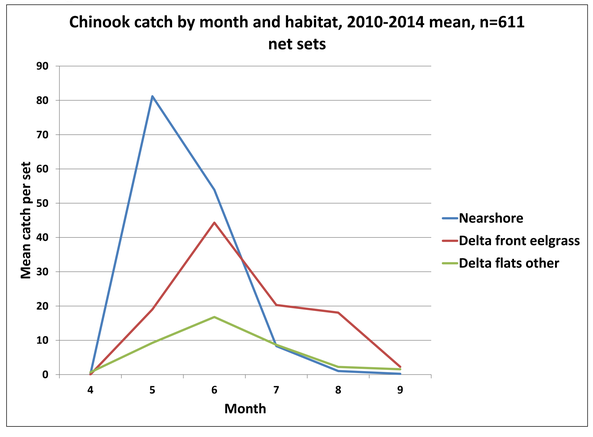
Sites color-coded by habitat. Sites with eelgrass are labeled.



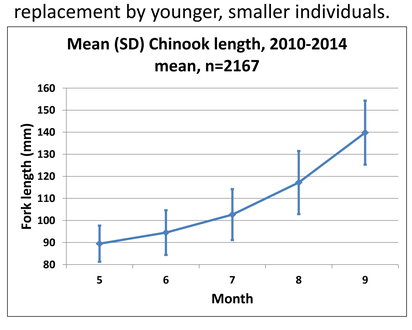
High catches at CRM in May. Moderate catches at HGR and/or RSS in Jun-Aug. Lower catches at MCA.



Higher catches in delta front eelgrass than in other habitats in Jul-Aug .



May-Sep size increase suggests growth, not replacement by younger, smaller individuals.

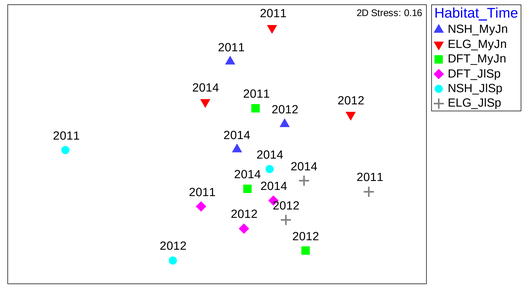


Key result: In Jul-Aug Chinook catches in delta front eelgrass were 2 or more times higher than in other habitats indicating importance of that type of eelgrass at that time.

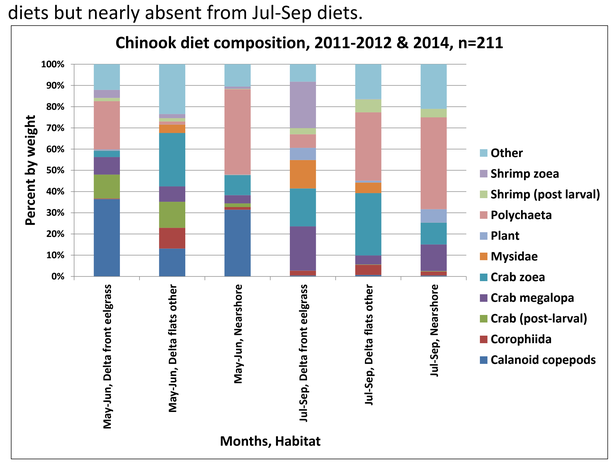
2. Chinook diets

Diets were processed from Chinook sampled for otoliths and CWTs in 2011, 2012, and 2014. Diets were grouped by year, months (May-Jun, Jul-Sep) and habitat (nearshore, delta front eelgrass, delta flats other).

Similarity of diets grouped by year, habitat (NSH=nearshore, ELG=delta front eelgrass, DFT=delta flats other), and months (nMDS plot). Delta front eelgrass Jul-Sep diets plotted in the lower right corner, showing some distinctness from the other habitat-month groups. Diets differed significantly among years, month groups, and habitats (3-way crossed ANOSIM).



Delta front eelgrass Jul-Sep diets were unique in having relatively high percentages of shrimp zoea, mysidae, and crab megalopa. Calanoid copepods and post-larval crab were abundant in May-June diets but nearly absent from Jul-Sep diets.

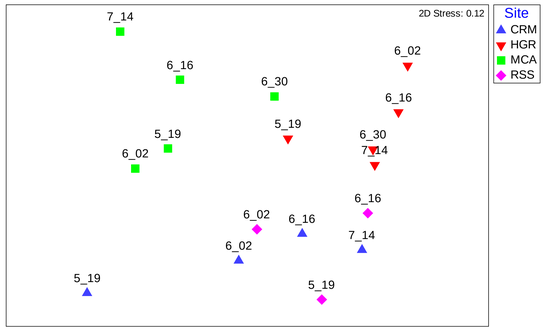


Key result: Chinook diets in delta front eelgrass in Jul-Sep differed from diets in other habitats and earlier in the year, suggesting that delta front eelgrass provided unique foraging opportunities late in the outmigration season.

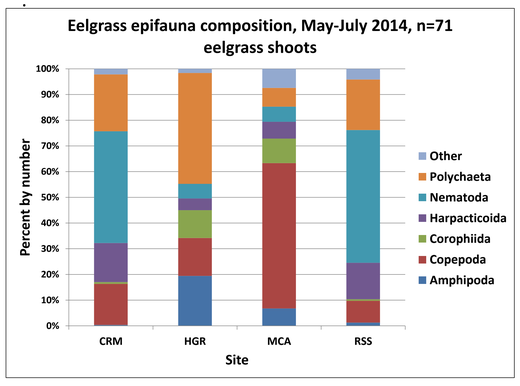
3. Eelgrass epifauna

Epifauna were sampled by collecting eelgrass shoots and submerging them in fresh water so that the epifauna fell off. Epifauna were sampled from the four eelgrass sites bi-weekly May-Jul in 2014 .

Similarity of epifaunal communities among sites and dates (nMDS plot). Community differences among sites and dates were significant (2-way crossed ANOSIM). Community similarity between CRM and RSS was relatively high whereas similarity in Chinook abundance and timing was not



Several abundant epifauna taxa were also abundant in Chinook diets, particularly polychaetes, copepods and amphipods.



Conclusions: High catches and unique diets indicate importance of delta front eelgrass to Chinook in Jul-Aug.

Not all eelgrass is created equal. CRM and MCA eelgrass were not targeted by Chinook but rather were treated similarly to nearby non-eelgrass habitats.

Changes in habitat-specific prey abundance or size of prey needed may be the reason for distributional shifts from the nearshore in May-June to delta front eelgrass later on.

More work is needed to characterize prey availability in eelgrass and elsewhere. Epifauna are one component, others being benthos, and neuston/zooplankton which may concentrate in eelgrass.