Optimizing control of invasive parrotfeather (*Myriophyllum aquaticum*) in Washington with herbicides and knowledge of environmental constraints

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UNIVERSITY of WASHINGTON

WASHINGTON DEPARTMENT OF NATURAL RESOURCES

THURSTON COUNTY WASHINGTON

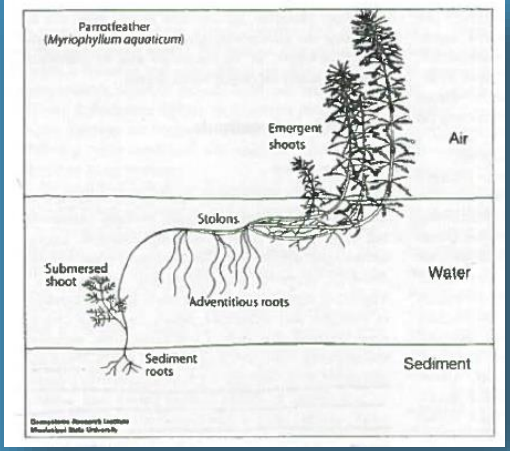
LEWIS COUNTY Washington's First County

Overview

- Parrotfeather: distribution and impacts
- Field herbicide tests (2015-2020)
- Distributional changes over time (1996 – 2016)
- Management conclusions

Parrotfeather: Distribution and Impacts

Parrotfeather: impacts



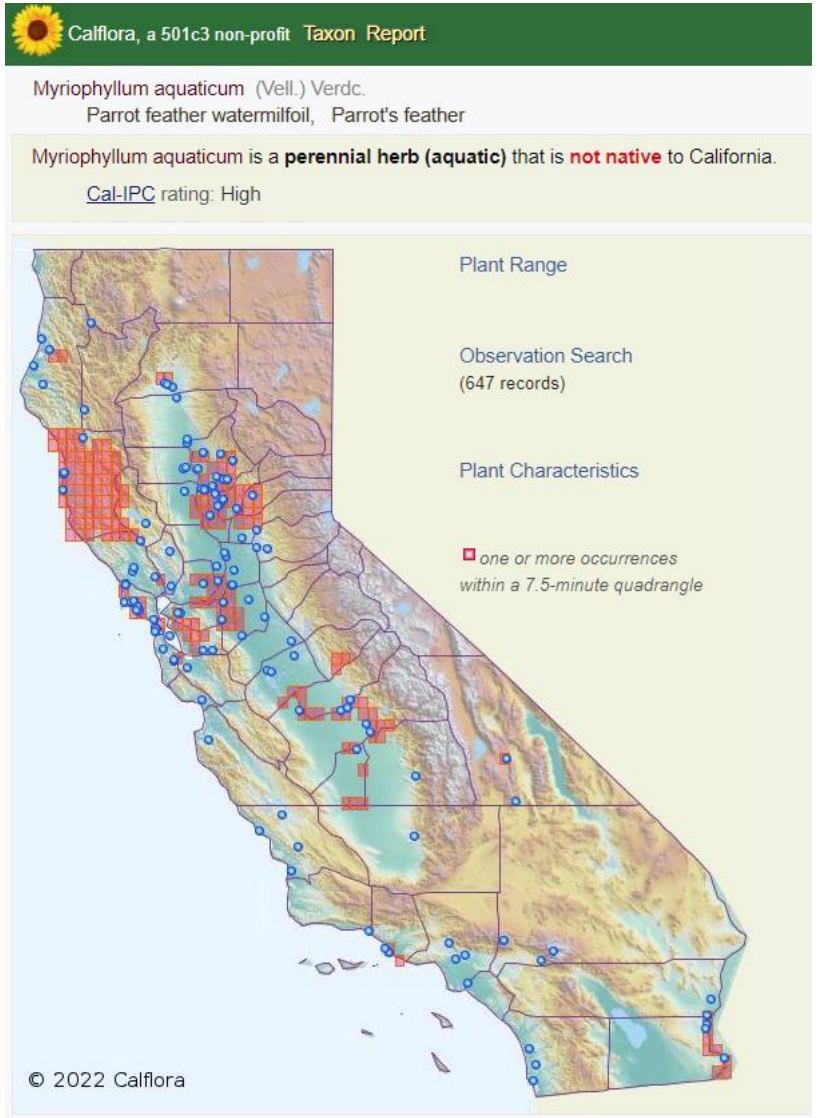
Wersel and Madsen 2011

- Forms dense mats that interfere with infrastructure, impede flow[5,6]
- Outcompetes native vegetation
- Reduces oxygen by blocking air/water exchange and emergent shoots that release oxygen to the air[7,8]
- Altered invertebrate communities[8]
- Associated with fish that tolerate dense vegetation and reduced oxygen[8]

[5] *Guillarmod 1979,* [6] *Moreira et al. 1999,* [7]*Hussner, 2009,* [8]*Kuehne, Olden & Rubenson 2016*

Parrotfeather: distribution

- Favors slow-moving wetland habitat
- Tolerates cold, drawdowns, some salinity[1,2]
- Does not tolerate high/variable flows[3,4]
- Only female plants in N. America; spreads vegetatively
- Mechanical or physical control are not advised



[1]*Wersal et al. 2013,* [2]*Thouvenot et al. 2012,* [3]*Moreira et al, 1999,* [4]*Hussner & Lösch 2005*

Field herbicide tests (2015-2020)

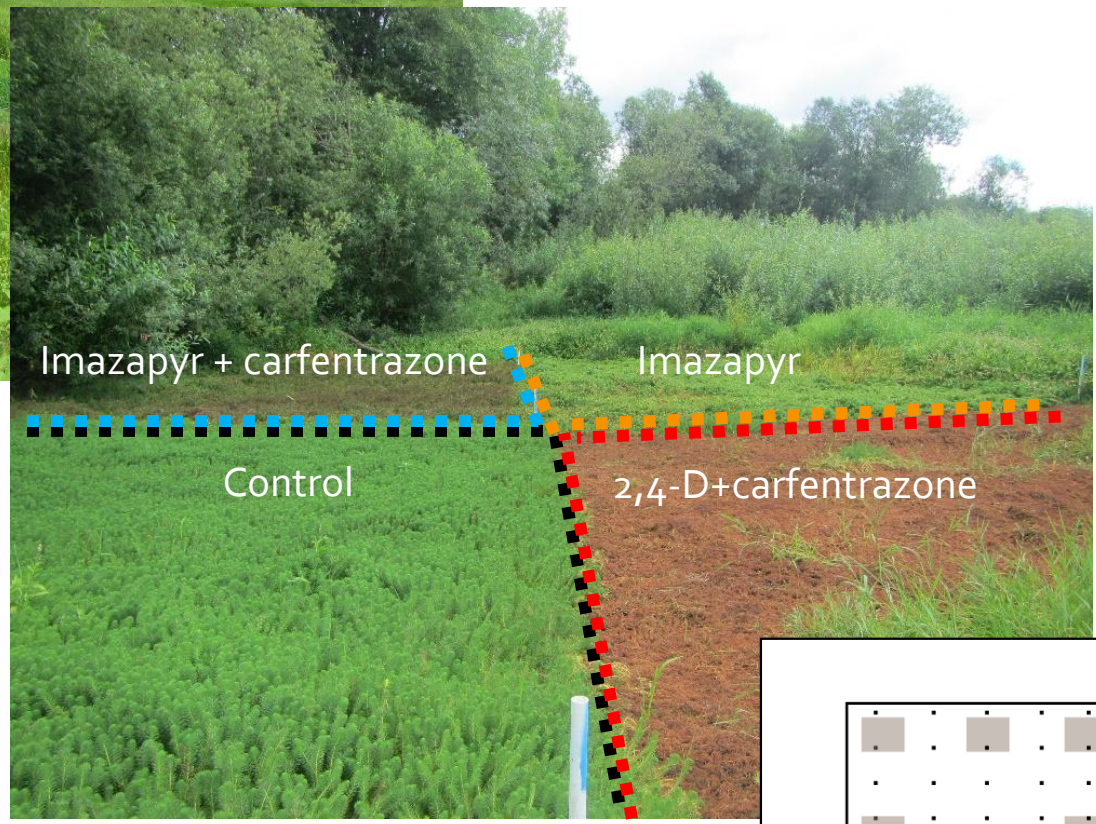
Field Herbicide Tests

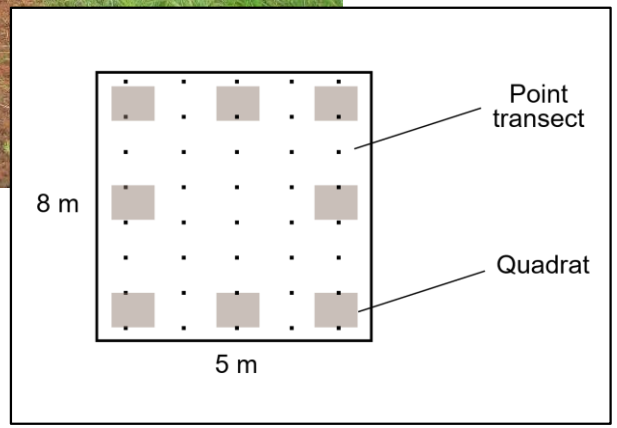
2015 – 2016

- Imazapyr
- 2,4-D + carfentrazone
- Imazapyr + carfentrazone

Evaluated plots six weeks after treatment (6WAT) and twelve months after treatment (12MAT)

Point-transect method

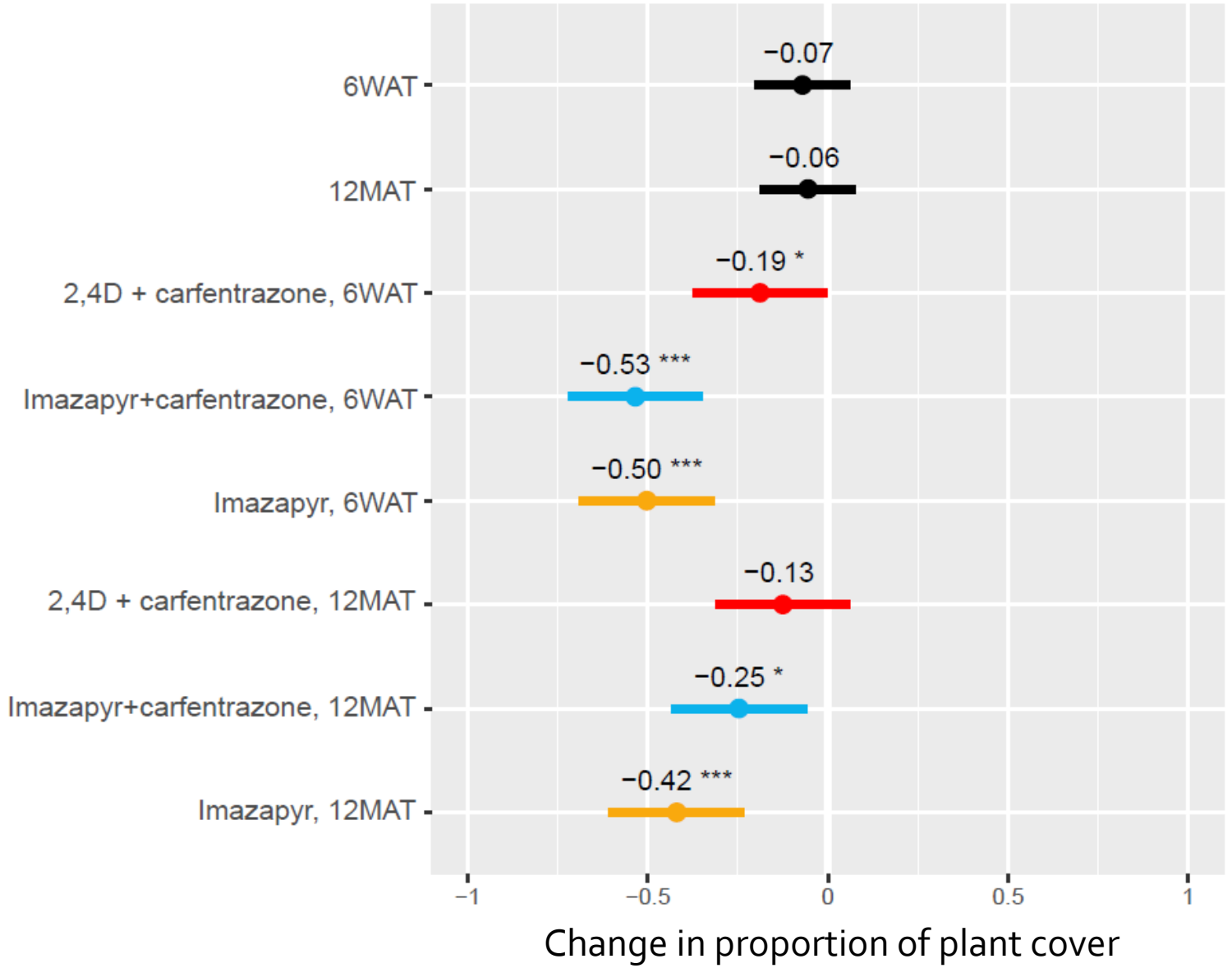




Results

Imazapyr treatments had highest effectiveness in both time periods

Addition of contact herbicide did not improve effectiveness



Kuehne et al. (2018), Field-based control of herbicides for control of parrotfeather (*Myriophyllum aquaticum*), *Journal of Aquatic Plant Management*

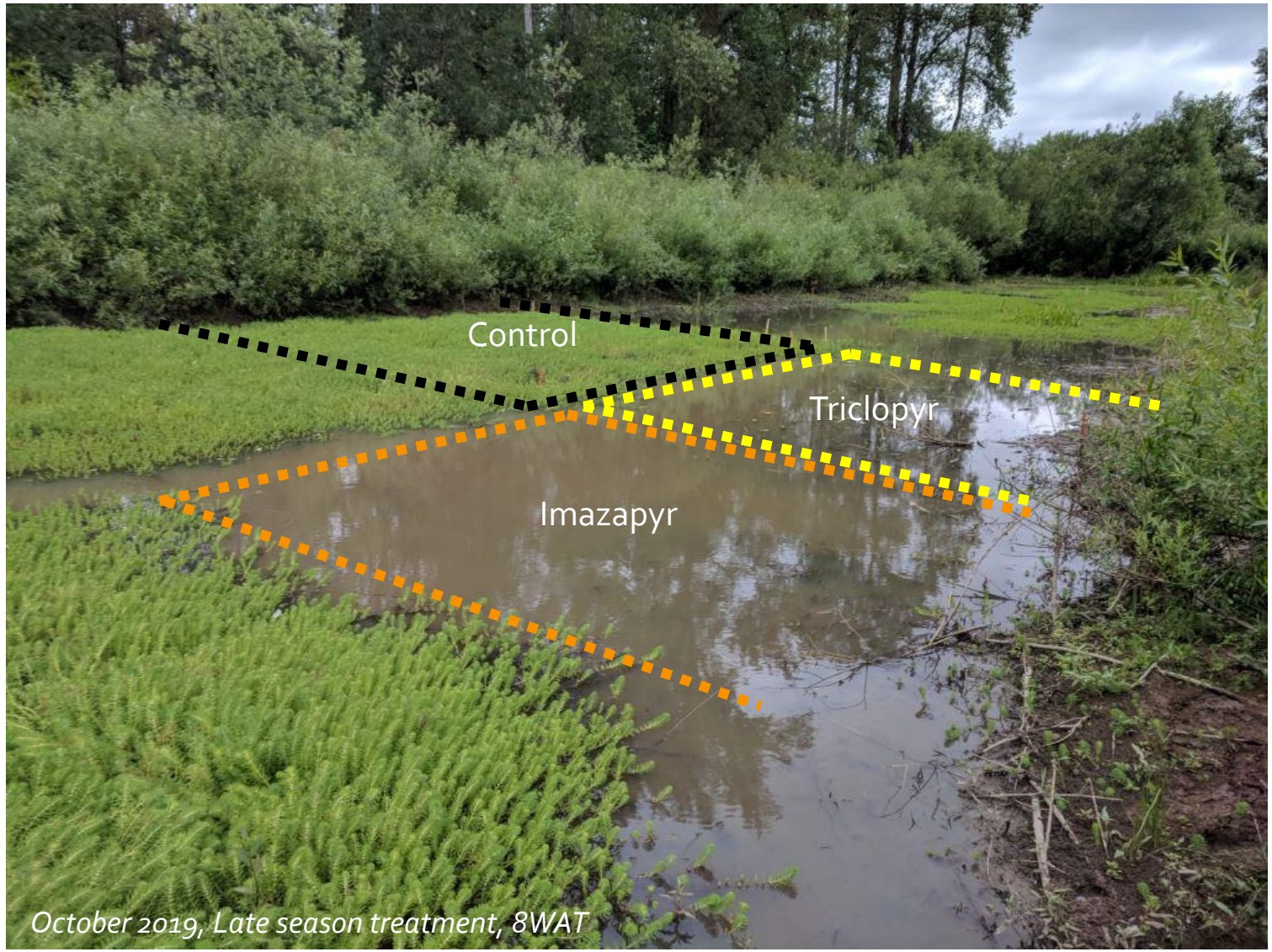
Field Herbicide Tests

2018 – 2019

- Imazapyr
- Triclopyr

Compared **early** and **late-season** application timing

Evaluated plots at 8WAT and 12MAT

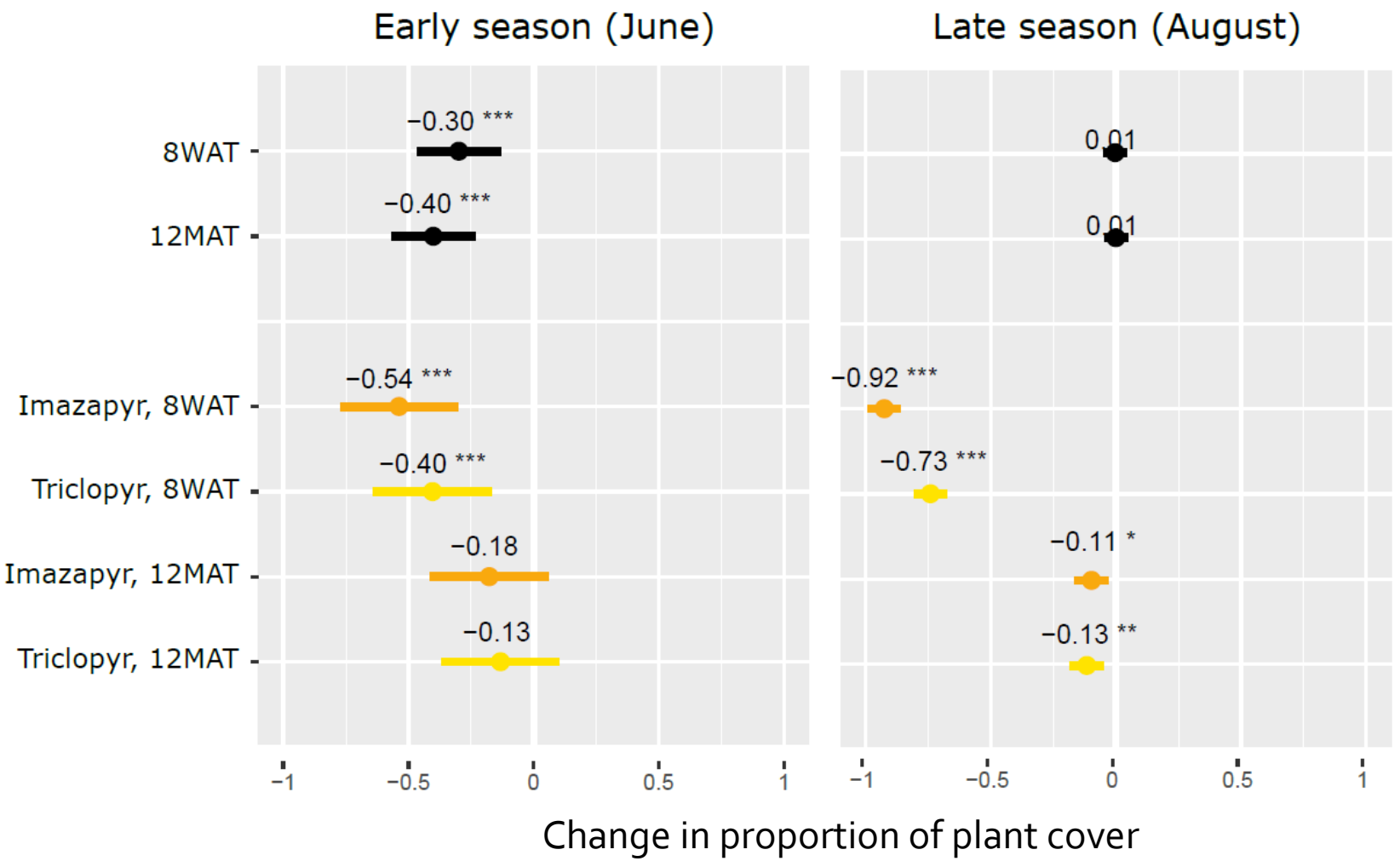


October 2019, Late season treatment, 8WAT

Results

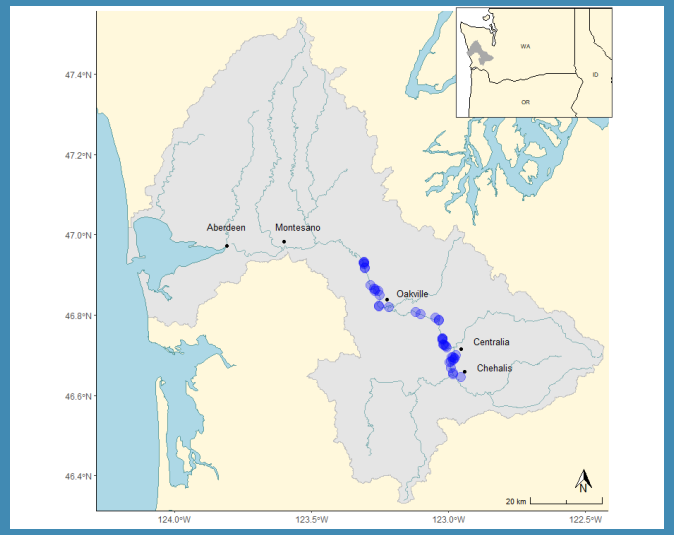
Significant natural reductions in the early-season treatment sites

Better control in late-season treatment at 8WAT, but did not result in substantially different control 12MAT



Summary: herbicide tests

- Imazapyr had highest efficacy, with triclopyr a close second
- Can expect ~50-75% control at 6-8WAT
- Can expect ~15-25% control at 12MAT
- Control at 12MAT did not substantially differ with treatment timing
- Tank mixing (e.g., + carfentrazone, glyphosate) did not increase short or long-term control



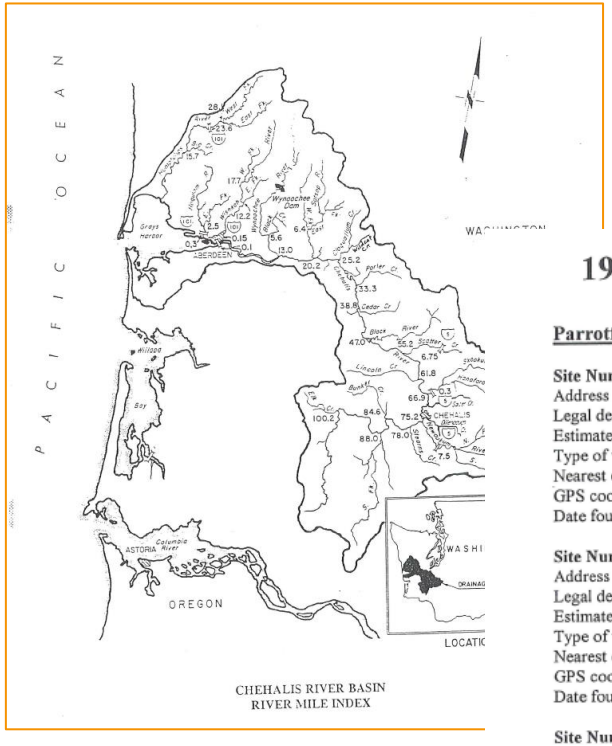
Distributional change: Chehalis River, WA 1996-2016

Historical Longitudinal survey

Chehalis to Montesano (90 km)

Mainstem and side channels surveyed by canoe and airboat in 1996-1997

Locations georeferenced using coordinates, site descriptions



CHEHALIS RIVER BASIN
RIVER MILE INDEX

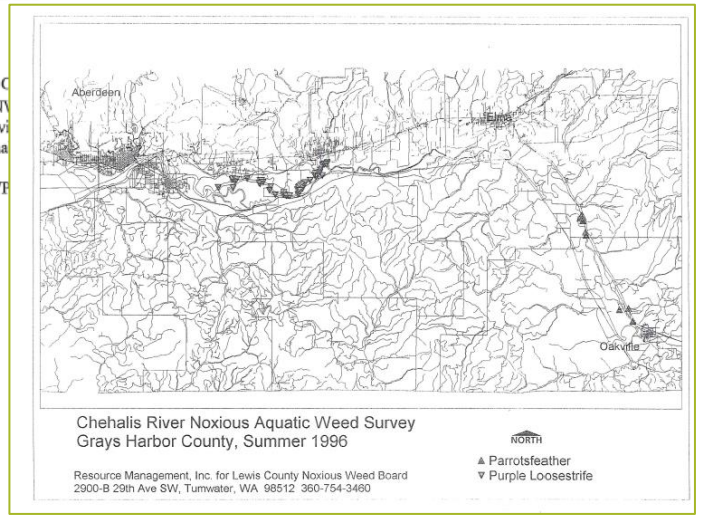
1996 Site Information for Noxious Weeds

Parrotfeather

Site Number 1
Address or common place name where seen: Chehalis River, below Garrard Creek
Legal description: T16N, R5W, Sec. 36, SW SE
Estimated size of infestation: Acre or greater
Type of waterway: Backwater slough
Nearest estimated river mile: River Mile #44
GPS coordinates: 123.15.355 46. 49. 428 Way point (WP)#60
Date found: 7/14/96

Site Number 2
Address or common place name where seen: Chehalis River; Prather / Maple Lane
Legal description: T15N., R3W., Sec. 36, SE NW
Estimated size of infestation: greater than 100 sq. ft. and less than 1 acre.
Type of waterway: Backwater slough
Nearest estimated river mile: River Mile #59
GPS coordinates: 123.01.971 46.47.111 WP #90
Date found: 7/24/96

Site Number 3
Address or common place name where seen:
Legal description: T 15N., R 3W., Sec. 35, NV
Estimated size of infestation: At least 16 indivi
Type of waterway: Main channel of the Cheha
Nearest estimated river mile: River Mile #64
GPS coordinates: 123.01.233 46.44.586 WP
Date found: 9/20/96

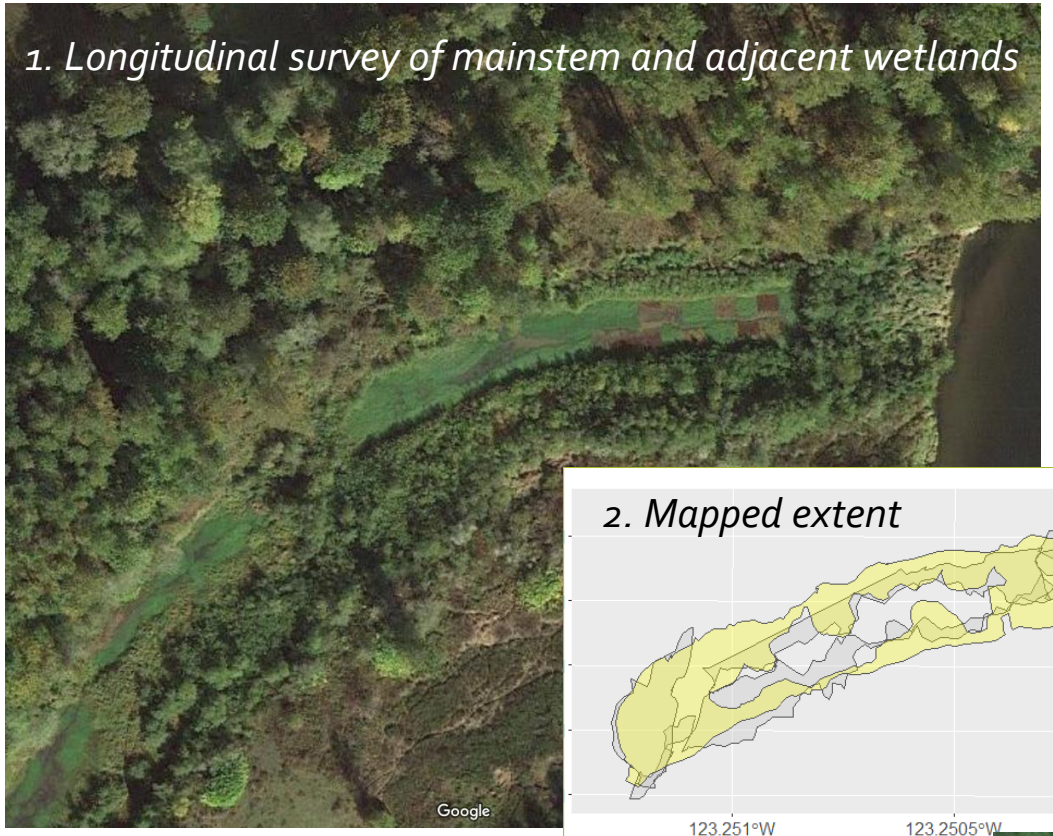


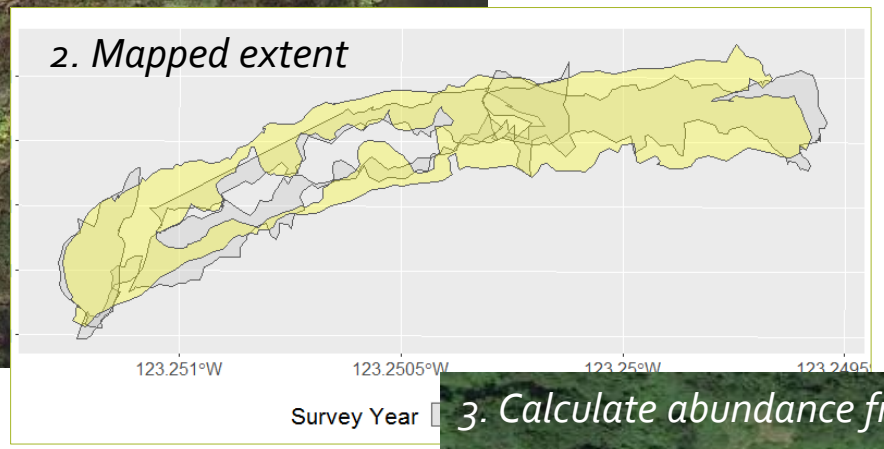
Contemporary Longitudinal Survey

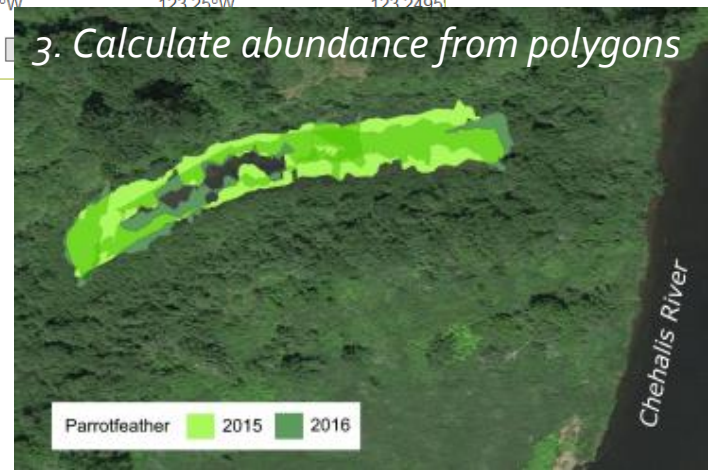
Chehalis to Montesano (90 km)

Mainstem and side channels surveyed by canoe in 2015 and 2016

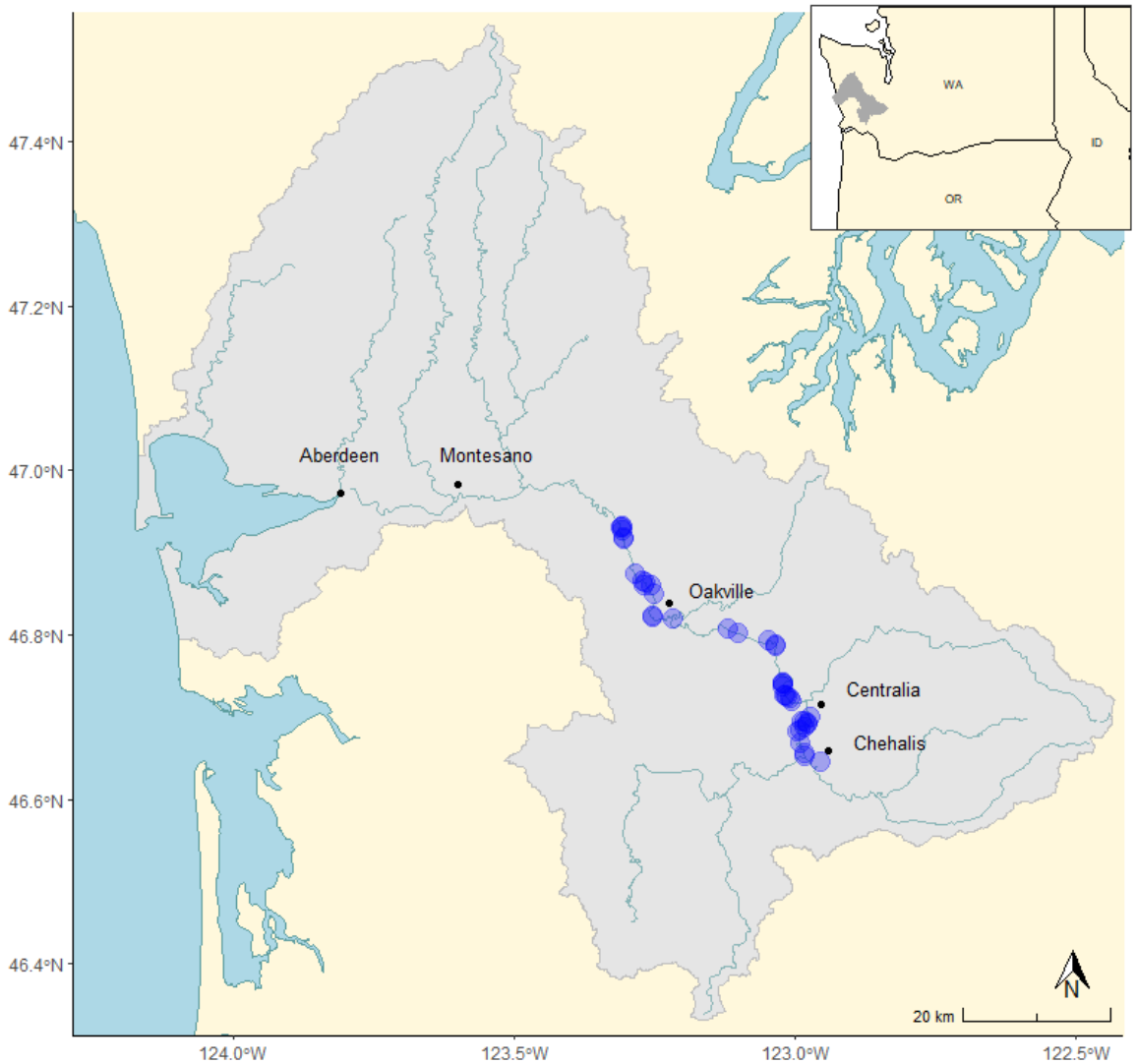
Parrotfeather extent (abundance) mapped using handheld GPS



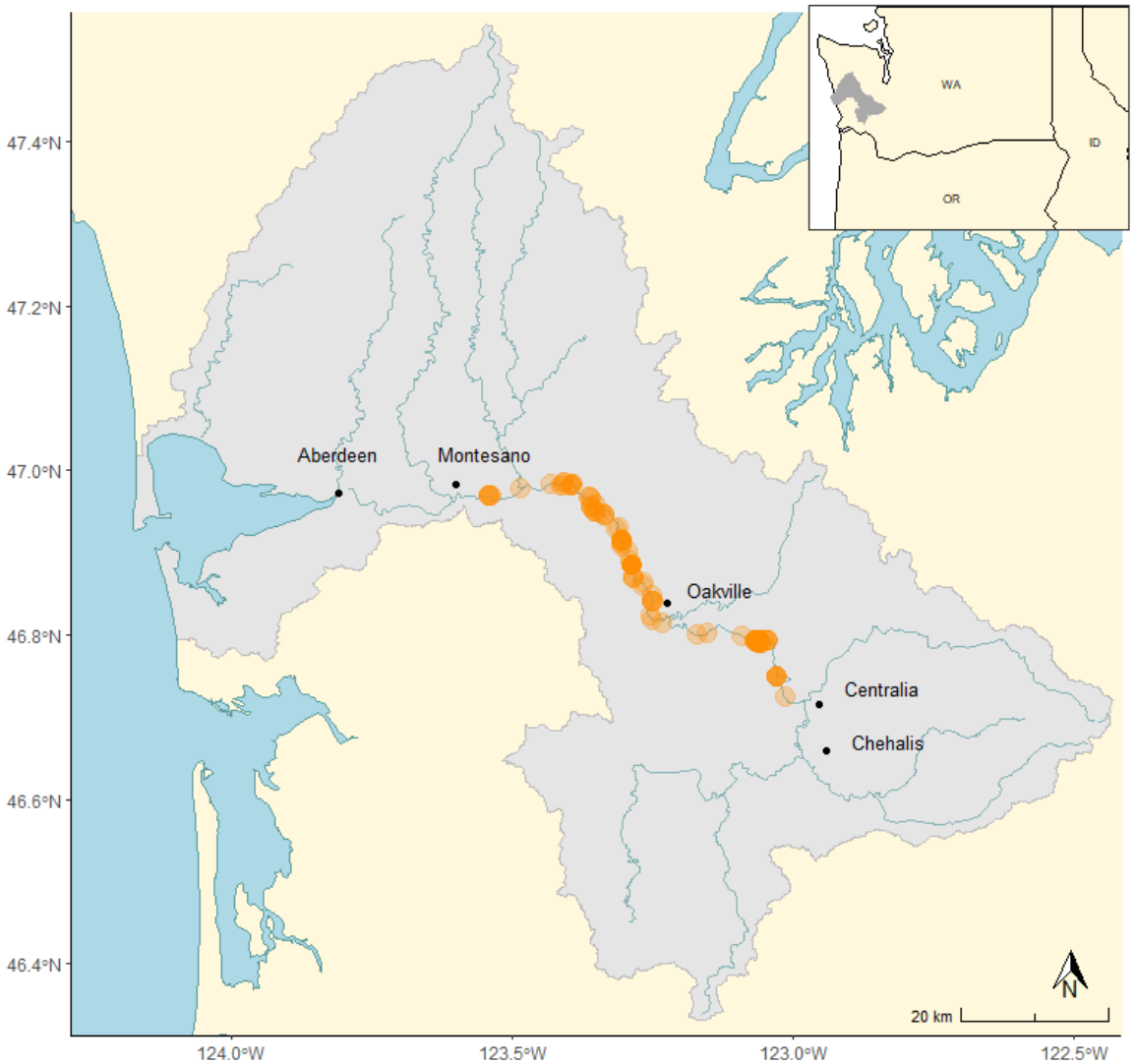




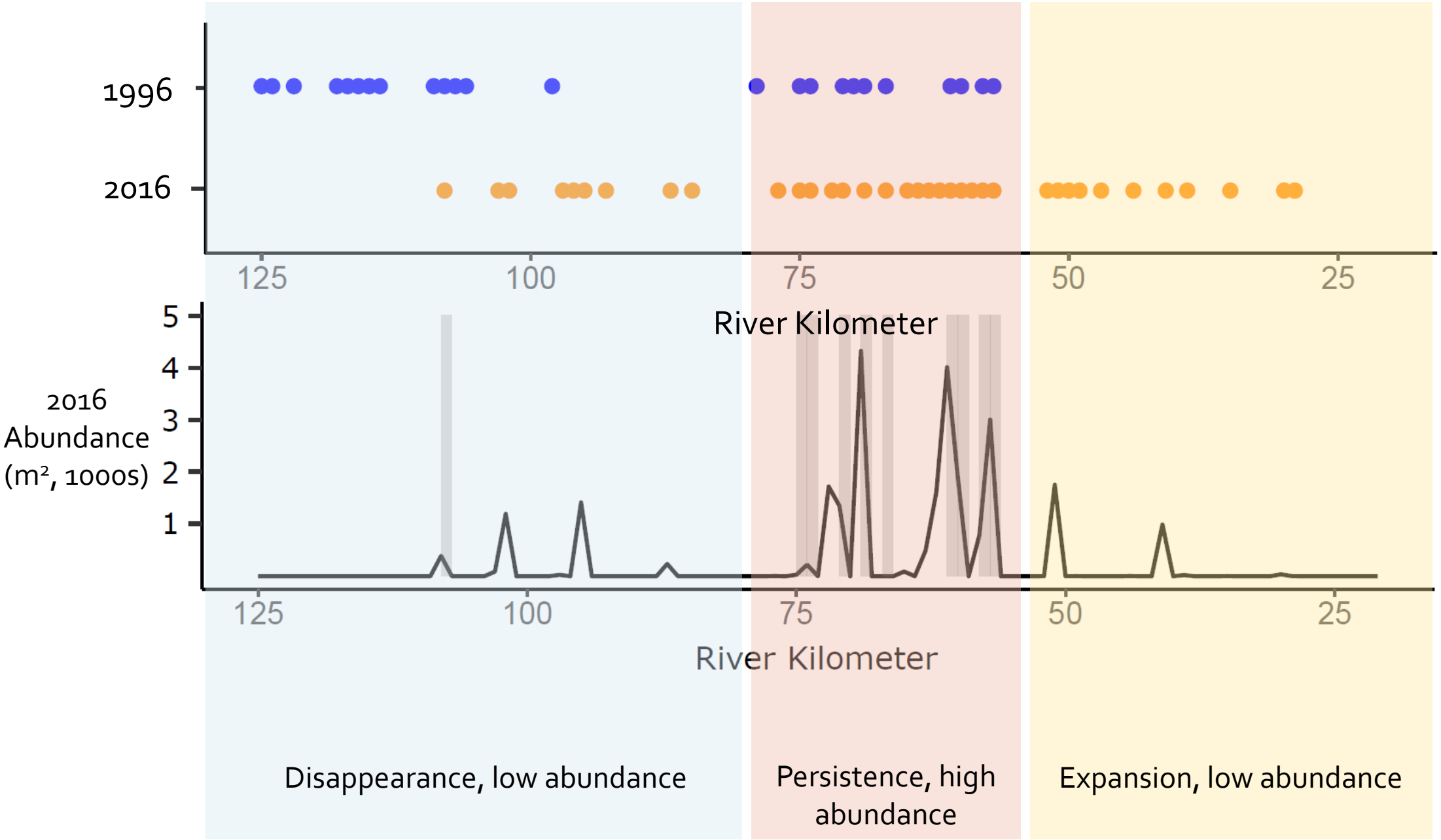
1996



2016



Kuehne et al. (2022), Twenty year contrast of non-native parrotfeather distribution and abundance in an unregulated river, *Hydrobiologia*



Kuehne et al. (2022)

Summary: Surveys, 1996-2016

- Abundance and persistence of parrotfeather over time associated with middle reaches of the river, unconstrained floodplain
- Suggests natural constraints on distribution and abundance, probably due to high/variable flows
- Management and control efforts more likely to be successful in upstream reaches
- Altering the hydrologic regime (e.g., adding a dam) may facilitate expansion and persistence

Management Conclusions

- Optimizing control of invasive plants is an iterative process
- Field-based testing is recommended to assess variation that can influence effectiveness of control (e.g., sites, year effects)
- Evaluating natural constraints on distribution can help focus management efforts where they are most likely to be effective

Contributors and Partners

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WA Dept of Natural Resources
WA Dept of Fish and Wildlife
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Lewis County Noxious Weeds
The Chehalis Tribe

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