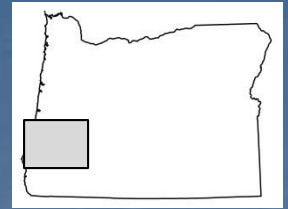# Distribution and Abundance of Umpqua Dace in the Umpqua River Basin, 2015

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Umpqua Dace
Rhinichthys evermanni

- Form of longnose dace endemic to Umpqua River basin; sister species to Millicoma dace

- Sparse historical records (24 records; 15 locations) from 1926-1997

- Infrequent recent encounters prompted 2015 surveys (historical locations)

Objectives

Describe current distribution and abundance of Umpqua dace at historical locations (OSU museum)

1) Estimate dace capture probabilities using repeated sampling visits

2) Estimate dace abundance using N-mixture modeling

Methods

- Sampled historical locations using backpack electrofishing (single pass)

- Sampled on successive days (twice if dace collected on first pass; 3x's if dace not collected on first pass)

- Scaled sampling area to size of stream (6x's stream width = stream length sampled)

- Collected habitat covariates (site dimensions, average depth, dominant substrate type, percent cover, water temperature, EF duration)

N-mixture model (Royle 2004)

- Uses data from spatially replicated populations (i.e. sampling sites) with temporally replicated counts of independent individuals (i.e. multiple sampling occasions) to estimate abundance (N) and capture probability (p)
- Goal- find estimates of detection probability and average abundance across all sites that will generate results that closely match the field data
- Can evaluate effects of covariates on N and p
- Assumptions:
  - Whether or not an animal is detected at a site is a function of the number of individuals at site
  - Population closure between surveys
  - Capture of animals present at site is modeled assuming a binomial distribution
  - Spatial distribution (# individuals occurring at each site) follows a prior distribution (e.g. Poisson)

Best Model

- Capture probability modeled as a function of time spent electrofishing (complexity)

- Abundance modeled as function of smallmouth bass presence

- Dace capture probabilities varied with electrofishing duration, ranging from 6% (25 min) to 58% (90 min), averaging 27%
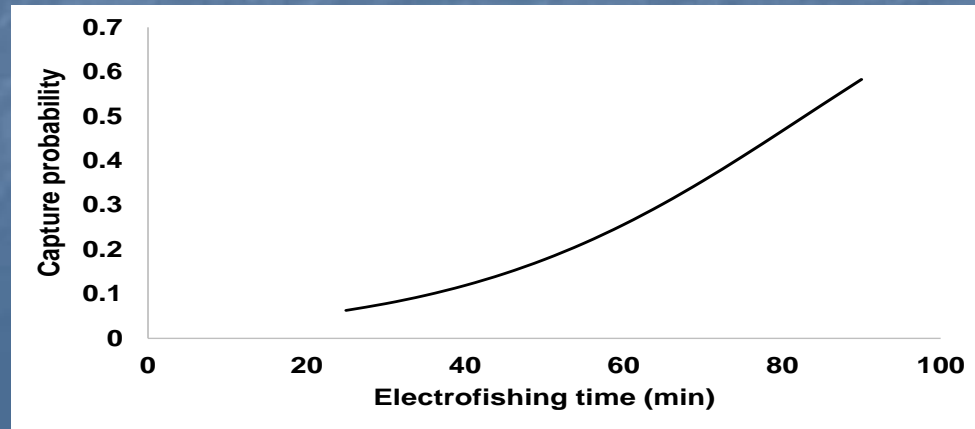
Results

- Sampled 16 historical locations (2 weeks)
- Collected Umpqua dace at 13 of 16 sites; numbers captured consistent across site visits
- Dace abundance ranged from 1 -276 fish per site (1,479 for all sites sampled)
- Dace were absent or in lower abundance at locations with smallmouth bass (averaged 67 fewer dace per site when SMB present)
- Native species: SPD, CRS, RS, RSS, RT, LSu, PGS, signal CF
- Nonnative species: SMB, BBu, BG, PKS, ringed CF
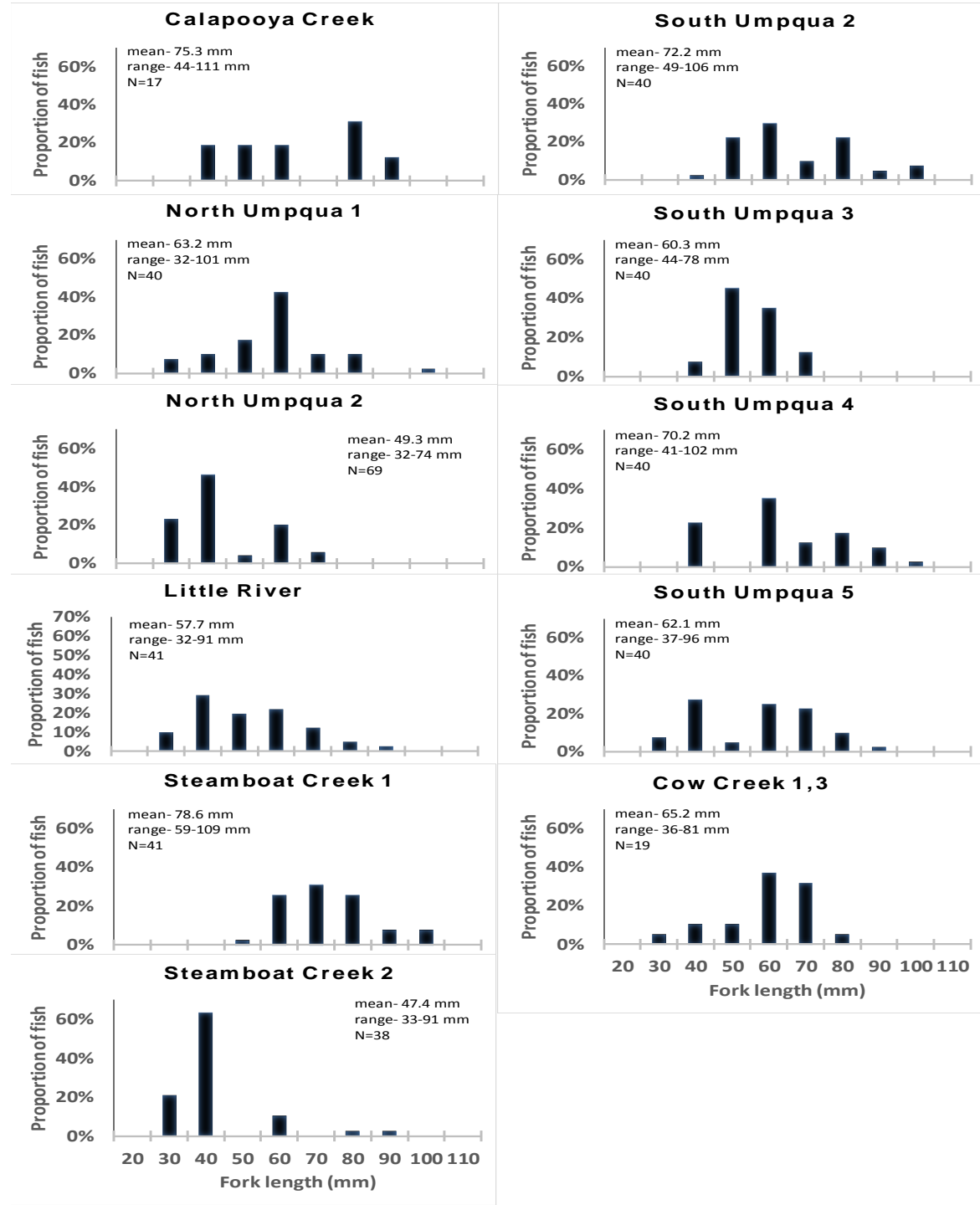
Fish and Habitat Details

Date	Site Name	Subbasin	Water temperature (C)	Pass	Shock time (min)	Length (m)	Width (m)	Average depth (m)	Dominant substrate	Cover (%)	UD	SD	CRS	RT	RS	LSU	RSS	LAM	PKS	BG	BBU	SMB
9/17/15	Umpqua 1	Umpqua	18.5	1	45	152.0	15.0	0.18	bedrock	10	**0**		x						x	x	x	x
9/21/15	Umpqua 1	Umpqua	19.0	2	46	152.0	15.0	0.18	bedrock	10	**0**		x							x	x	x
9/21/15	Umpqua 1	Umpqua	19.0	3	40	152.0	15.0	0.18	bedrock	10	**0**		x									
9/16/15	Calapooya Creek	Umpqua	16.0	1	37	38.6	5.5	0.11	bedrock	0	**9**	x						x				x
9/17/15	Calapooya Creek	Umpqua	16.0	2	41	38.6	5.5	0.11	bedrock	0	**8**	x										
9/14/15	North Umpqua 1	N. Umpqua	16.0	1	69	78.0	10.7	0.23	cobble	10	**81**	x	x	x								
9/15/15	North Umpqua 1	N. Umpqua	15.0	2	76	78.0	10.7	0.23	cobble	10	**100**	x	x	x		x						
9/16/15	North Umpqua 2	N. Umpqua	15.0	1	55	59.4	11.4	0.22	bedrock	10	**34**	x	x			x						
9/17/15	North Umpqua 2	N. Umpqua	15.0	2	55	59.4	11.4	0.22	bedrock	10	**35**	x	x									
9/15/15	Little River	N. Umpqua	15.0	1	46	81.0	6.9	0.19	cobble	10	**41**	x	x	x			x					
9/16/15	Little River	N. Umpqua	15.0	2	48	81.0	6.9	0.19	cobble	10	**47**	x	x	x			x					
9/14/15	Steamboat Creek 1	N. Umpqua	13.0	1	44	134.0	14.4	0.21	boulder	10	**22**		x	x								
9/15/15	Steamboat Creek 1	N. Umpqua	11.0	2	39	134.0	14.4	0.21	boulder	10	**17**		x	x								
9/14/15	Steamboat Creek 2	N. Umpqua	15.0	1	55	100.0	18.0	0.30	bedrock	10	**19**	x	x									
9/15/15	Steamboat Creek 2	N. Umpqua	12.0	2	49	100.0	18.0	0.30	bedrock	10	**19**	x	x				x					
9/16/15	South Umpqua 1	S. Umpqua	18.0	1	28	85.0	11.6	0.22	bedrock	5	**0**	x									x	x
9/17/15	South Umpqua 1	S. Umpqua	18.5	2	25	85.0	11.6	0.22	bedrock	5	**0**											x
9/17/15	South Umpqua 1	S. Umpqua	18.5	3	29	85.0	11.6	0.22	bedrock	5	**0**		x								x	x
9/22/15	South Umpqua 2	S. Umpqua	20.0	1	65	81.2	13.5	0.27	cobble	5	**19**	x									x	x
9/23/15	South Umpqua 2	S. Umpqua	16.0	2	69	81.2	13.5	0.27	cobble	5	**40**										x	x
9/23/15	South Umpqua 3	S. Umpqua	16.0	1	76	82.8	10.6	0.22	cobble	5	**27**	x					x					
9/24/15	South Umpqua 3	S. Umpqua	18.5	2	90	82.8	10.6	0.22	cobble	5	**33**	x										
9/23/15	South Umpqua 4	S. Umpqua	15.0	1	66	88.0	14.6	0.25	boulder	15	**50**	x	x		x	x						
9/24/15	South Umpqua 4	S. Umpqua	16.5	2	70	88.0	14.6	0.25	boulder	15	**55**	x	x		x	x						
9/23/15	South Umpqua 5	S. Umpqua	17.0	1	61	69.3	9.9	0.28	cobble	15	**23**	x	x		x		x					x
9/24/15	South Umpqua 5	S. Umpqua	16.0	2	58	69.3	9.9	0.28	cobble	15	**22**	x	x		x		x					x
9/23/15	Jackson Creek	S. Umpqua	14.0	1	74	68.0	10.5	0.19	boulder	5	**2**	x		x								
9/24/15	Jackson Creek	S. Umpqua	14.5	2	66	68.0	10.5	0.19	boulder	5	**5**	x	x	x								
9/21/15	Cow Creek 1	S. Umpqua	20.0	1	50	76.5	9.8	0.14	cobble	10	**7**	x	x		x							
9/22/15	Cow Creek 1	S. Umpqua	19.0	2	45	76.5	9.8	0.14	cobble	10	**8**	x	x		x							
9/21/15	Cow Creek 2	S. Umpqua	17.0	1	45	72.0	12.0	0.20	gravel	5	**0**	x	x	x	x						x	x
9/22/15	Cow Creek 2	S. Umpqua	15.0	2	44	72.0	12.0	0.20	gravel	5	**0**	x	x	x							x	x
9/22/15	Cow Creek 2	S. Umpqua	15.0	3	40	72.0	12.0	0.20	gravel	5	**0**	x	x	x	x						x	x
9/21/15	Cow Creek 3	S. Umpqua	13.0	1	38	46.0	7.6	0.19	cobble	5	**1**	x	x	x	x							
9/22/15	Cow Creek 3	S. Umpqua	12.0	2	35	46.0	7.6	0.19	cobble	5	**3**	x	x	x								

Umpqua dace

No Umpqua dace
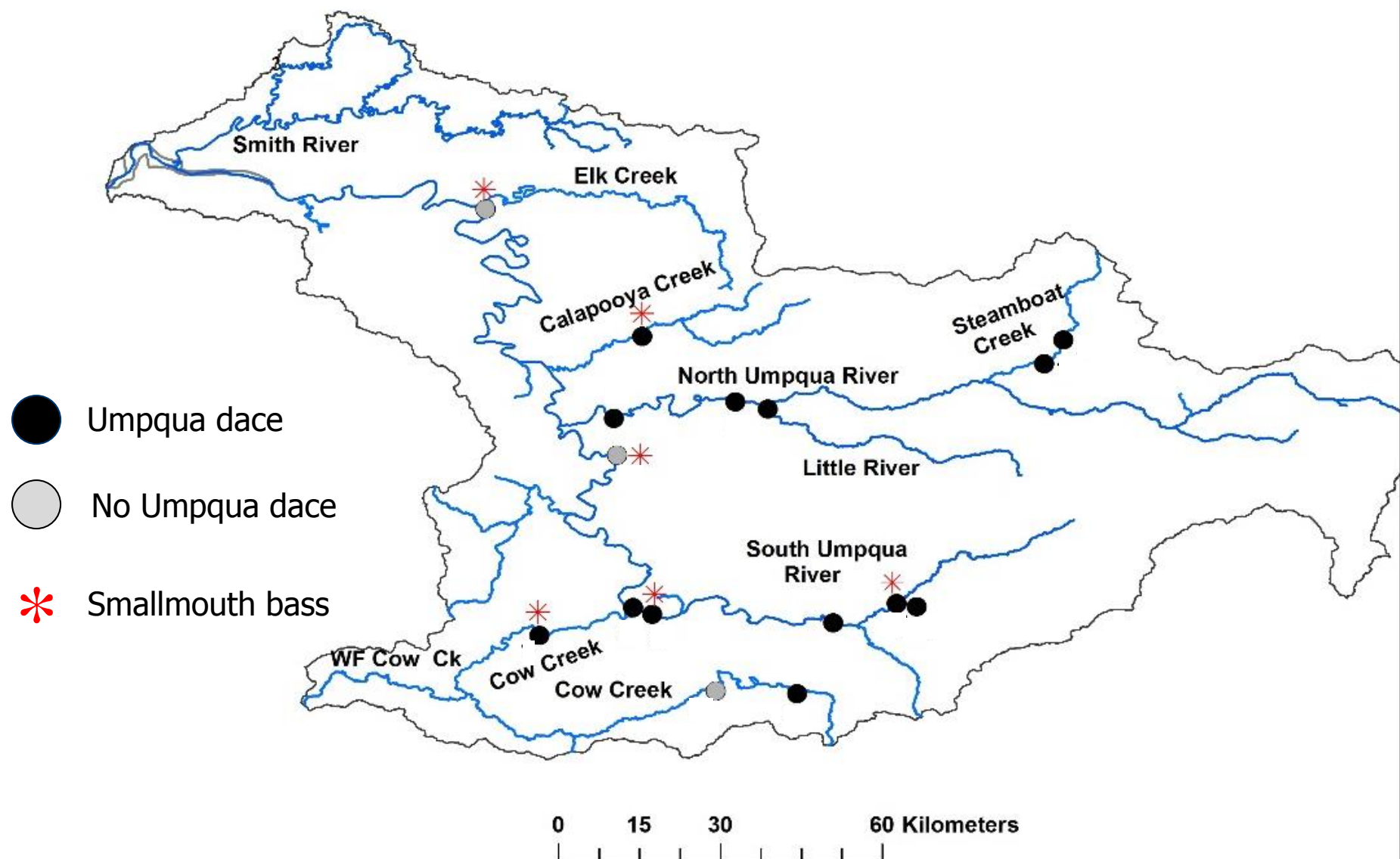
Smallmouth bass

Umpqua Dace Abundance

	Estimate	Lower 95%	Upper 95%	Smallmouth presence
Umpqua 1	**1**	0	6	yes
Calapooya Creek	**73**	45	108	yes
North Umpqua 1	**236**	210	264	no
North Umpqua 2	**161**	129	196	no
Little River	**276**	226	332	no
Steamboat Creek 1	**153**	112	200	no
Steamboat Creek 2	**99**	73	129	no
South Umpqua 1	**3**	0	13	yes
South Umpqua 2	**93**	76	113	yes
South Umpqua 3	**59**	50	70	no
South Umpqua 4	**157**	134	183	no
South Umpqua 5	**88**	68	112	yes
Jackson Creek	**11**	6	18	no
Cow Creek 1	**46**	28	70	no
Cow Creek 2	**1**	0	6	yes
Cow Creek 3	**22**	7	45	no

Length Frequency

Calapooya Creek
mean- 75.3 mm
range- 44-111 mm
N=17

South Umpqua 2
mean- 72.2 mm
range- 49-106 mm
N=40

North Umpqua 1
mean- 63.2 mm
range- 32-101 mm
N=40

South Umpqua 3
mean- 60.3 mm
range- 44-78 mm
N=40

North Umpqua 2
mean- 49.3 mm
range- 32-74 mm
N=69

South Umpqua 4
mean- 70.2 mm
range- 41-102 mm
N=40

Little River
mean- 57.7 mm
range- 32-91 mm
N=41

South Umpqua 5
mean- 62.1 mm
range- 37-96 mm
N=40

Steamboat Creek 1
mean- 78.6 mm
range- 59-109 mm
N=41

Cow Creek 1,3
mean- 65.2 mm
range- 36-81 mm
N=19

Steamboat Creek 2
mean- 47.4 mm
range- 33-91 mm
N=38

Summary

- We found Umpqua dace were widespread and relatively abundant

- Umpqua dace were in lower abundance or absent when smallmouth bass were present

- Found exclusively in swift water habitats!

- Effects of splash dam logging still evident

- Need more information on distribution limits of both Umpqua dace and smallmouth bass