Larval & Adult Ecology of Pacific Lamprey with Implications for Conservation

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Outline

1. Introduction

2. Maturation characteristics & run diversity

3. Migration characteristics
   * Habitat use
   * Distribution
   * Spawning

4. Relative abundance of larval lamprey
Pacific Lamprey
Spawning Migration

Clemens et al. 2010  
*Fisheries*
Migration Timing & Diversity

- Different run times

- Different morphs:
  - “Day” eel
  - “Night” eel
Maturation Characteristics and Diversity
Body morphology

Reproductive hormone levels

Fat samples

Maturation stage, ovary size, fecundity
Recent migrant

Unknown migrant (Willamette Falls)
Maturation timing 2007-2009

• N = 377 fish from Willamette Falls

• N = 44 recent migrants from Pacific Ocean

• April-Jun maturation period
“Take home” messages

1. Maturation unimodality
2. Maturation stages overlap in time
3. LVT through summer
4. Recent migrant LVT during 2008 (+1 during 2009)
“Take home” messages

1. Maturation unimodality

2. Maturation stages overlap in time

3. Immature through summer

4. Recent migrant SC during 2007 (+1 during 2009)
Gonad Histology: Testicular Atrophy
% Males w/ Testicular Atrophy

2007

2008
2008 Flow

Spring

Summer
Die-off

Temp. > 20 °C
% Males Over Time, 2008

r² = 0.78
Examine Run Diversity

☑ Cluster analyses

☑ Each sex clustered into 2 groups
  1. “Immature”
  2. “Maturing”
= “Immature” Males

1 Collection Date
Examine Run Diversity

- “Immature” fish collected w/ “Maturing”
  - Temporal overlap

- Some recent migrants clustered w/ “Maturing”!!
  - Ocean maturing fish
STREAM MATURING TYPE

= "day eels"?

OCEAN MATURING TYPE

= "night eels"?
FAST MATURATION
Clemens et al. 2009 Ecol. Freshw. Fish

SLOWED MIGRATION
Clemens et al. 2011 Env. Biol. Fish.

UNCOPLED SPAWNING IN UPPER BASIN?

Decreased fitness

GONAD ATROPHY

DEATH
PROLONGED FW RESIDENCY = STREAM MATURING TYPE

REDUCED FW RESIDENCY = OCEAN MATURING TYPE
Adult Migration: Habitat, Distribution, Destination
OBJECTIVES

• Describe migration
  – Distribution
  – Holding habitat
<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
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<tbody>
<tr>
<td></td>
<td>Detected 154 of 206 fish (75%)</td>
<td>Detected 180 out of 219 fish (82%)</td>
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</tbody>
</table>

*4 locations observed a lamprey*
Distribution in Mainstem: “Holders”

2009

$n = 76$

2010

$n = 112$
Habitat of Holding Fish

2010: more in channel & less on logs!

2009: 76 total fish
2010: 112 total fish

n = 112 total fish
n = 76 total fish
2010

% in tribs (n = 42)

3 above lowhead barriers

- 60%
- 24%
- 7%
- 5%
- 2%
Summary

- Similar detection efficiencies btw yrs

- 2009: lower flow yr, more fish in Newberg pool

- 2010: higher flow yr, evenly distributed; higher % held

- 2010: More fish held in channel vs. rock revets
  - Habitat use assoc w/ predominant habitat type

- Similar, often same holding locations!
Larval Distribution & Relative Abundance:

Western Brook (*Lampetra*) &
Pacific (*Entosphenus*) Lamprey
<table>
<thead>
<tr>
<th>Marys River</th>
<th>Crabtree Creek</th>
<th>Clear Creek</th>
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<tbody>
<tr>
<td><img src="image1" alt="Marys River" /></td>
<td><img src="image2" alt="Crabtree Creek" /></td>
<td><img src="image3" alt="Clear Creek" /></td>
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<tr>
<td>Thomas Creek</td>
<td>Deep Creek</td>
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<tr>
<td><img src="image4" alt="Thomas Creek" /></td>
<td><img src="image5" alt="Deep Creek" /></td>
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</tbody>
</table>
APB-2 backpack electroshocking
1 pass

Sampled entire pools & riffles
- Upper
- Middle
- Lower
Summary

• Variable relative abundance
  – Across Willamette Basin
  – Across sub-basins
  – Within individual rivers
• Pacific lamprey most abundant
  – Upper Willamette
  – Lower reaches
• Clackamas sub-basin abundant
• South Santiam sub-basin variable abundance
• Marys intermediate abundance
• More diversity (*Lampetra*) in Clackamas
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