

Some Culvert Prioritization Efforts in Alaska

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Fish Passage Working Group

Copper River Watershed Project

September 30, 2015

Priorities Prior to 2008

MatSu:

- ◆ **Dominated by Dirt to Paving Projects**
- ◆ **“Top 30” List for MSB**
 - **Mainstem, major tributaries, “whole stream approach”**
 - **Road Service Area funding match available**
 - **Opportunistic with landowners**

Copper River Watershed:

- ◆ **Near/In Cordova Only**
- ◆ **Where Support Exists**
 - **DOT willing to take on replacement**
 - **ADFG support**

Priorities Prior to 2008

Kenai:

- ◆ ADFG Assessments/working with DOT (~140 culverts)
- ◆ ADFG Initial Prioritization, Cost Benefits Draft (circa 2000 optimization model, never published)
- ◆ Kenai Watershed Forum Priorities
 - Mainstems, major tributaries
 - Opportunistic with landowners

UPDATE 2015:

- ◆ Estimate over 2/3 fish passage culverts replaced.
- ◆ Highest remaining benefits are large \$ million plus.

2008 MatSu Prioritization

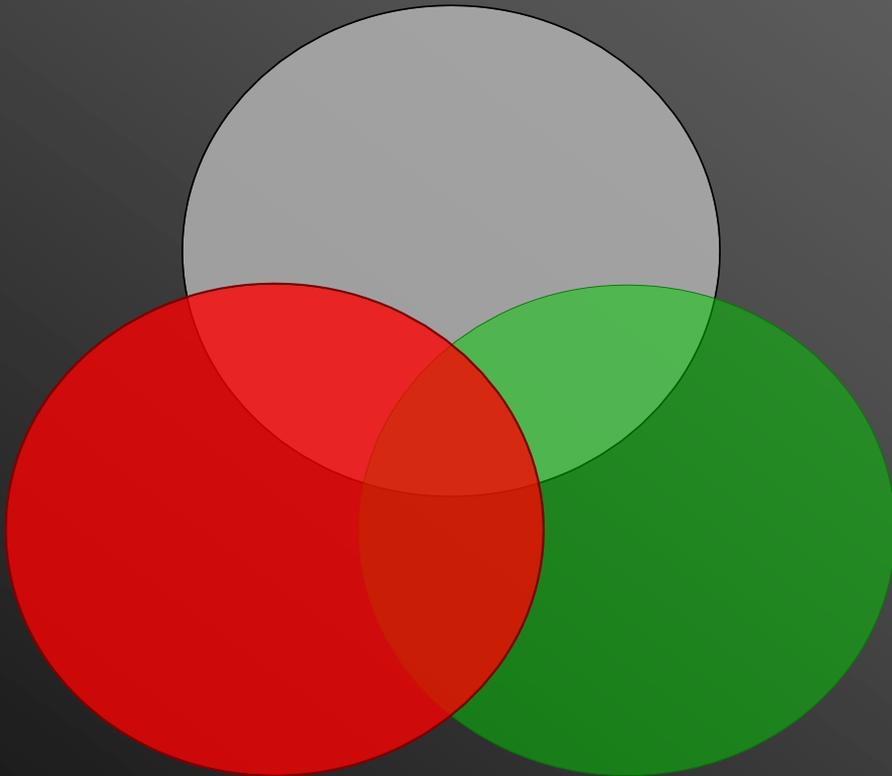
No Go, Slow Go, Go-Go



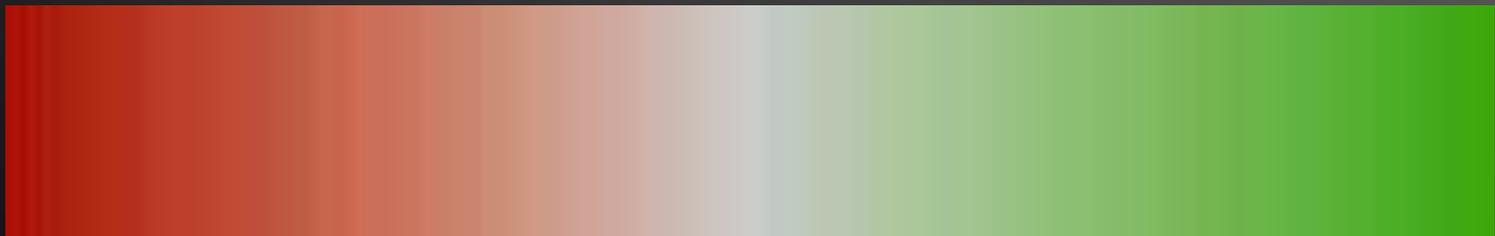
- Identify the Reddest of the Red

Strategic Action 4.2.2 to
“Develop and Implement Fish
Passage Prioritization and
Improvement Plan”.

Gray Culvert: Friend or Foe ?



- Reddish Gray or
- Grayish Green ?



Priority Criteria

- 1) Anadromy – emphasized Anadromous Waters Catalog (ADF&G) and potential salmon streams
- 2) Level of Blockage (Level 1 Red/Gray/Green)
- 3) Constriction – higher score for extreme culverts
- 4) Gradient – higher score for extreme culverts

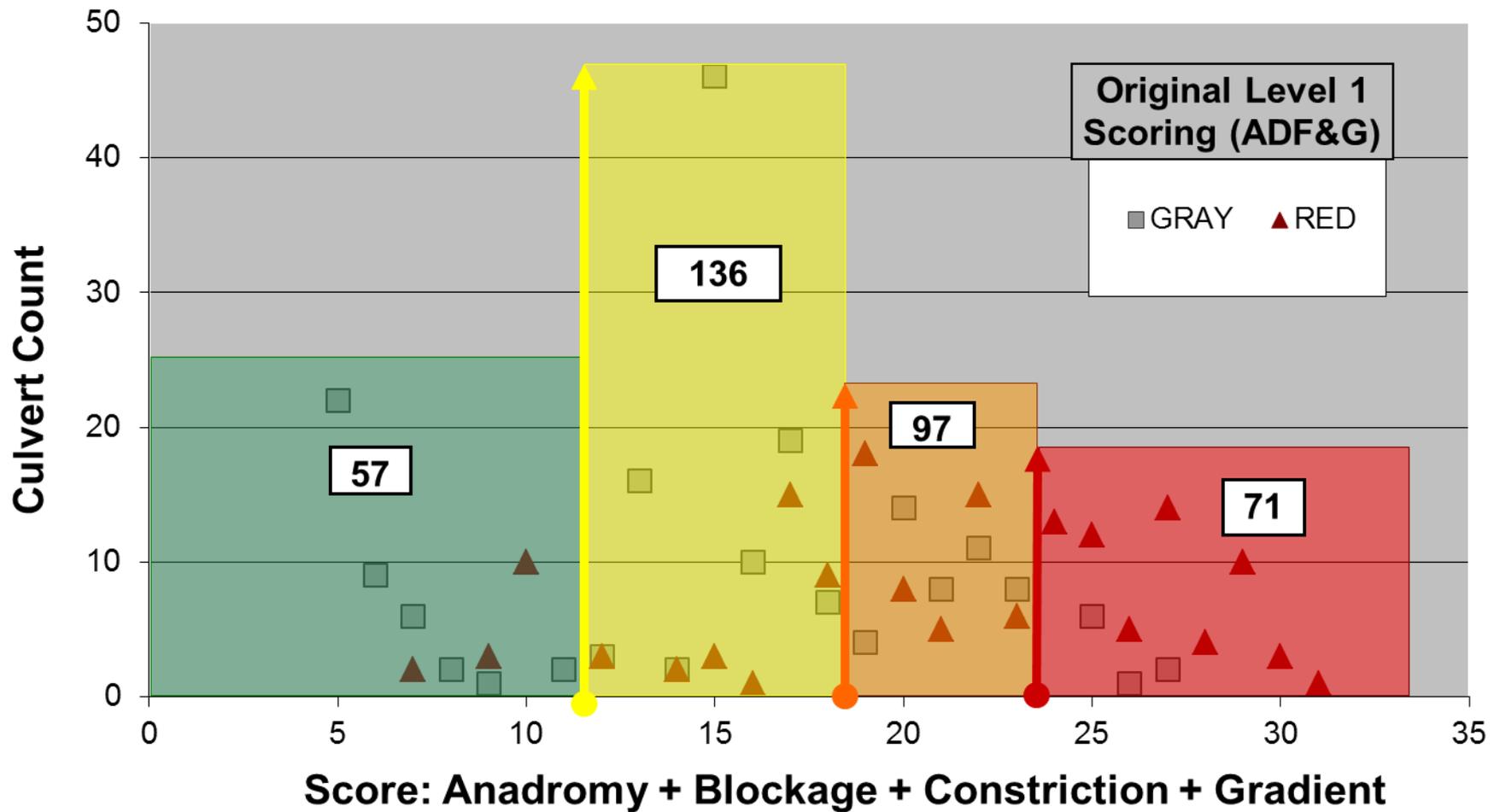
Priority Criteria – Constriction Ratio

Ratio of Culvert span to OHW	Score
> 1.0 or continually backwatered	0
0.9 – 1.0	1
0.75 – 0.9	2
0.5 - 0.75	5
0.5 – 0.4	7
< 0.4	10

Priority Criteria - Gradient

Gradient within culvert	Score
If culvert embedded < 1.0%	0
>1.0%	2
If culvert not embedded < 0.5%	0
0.5 – 1.0%	1
1.0 – 2.0%	2
2.0 – 3.5%	3
3.5 – 5%	7
>5%	10

Revised Prioritization Scoring



Desired Ranking Criteria

1) Habitat Quantity Upstream

- AWC, NHD, and Culvert data do not agree
- can be calculated manually – time consuming
- favors culverts in lower watershed

2) Habitat Quantity Downstream

- same as upstream data challenges
- favors culverts in upper watershed

3) Perch Height

- For MatSu - different data collection methods
- For MatSu - can be used for post 2005 surveys

Copper River Watershed Project

Prioritizing Fish Passage Improvement Projects in the Copper River Watershed

Prepared by:



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Cordova, AK 99574

Project Partners:

Alaska Department of Fish & Game
Alaska Department of Transportation & Public Facilities
Ecotrust
United States Fish and Wildlife Service

Funded By:

Alaska Conservation Foundation
Alaska Department of Environmental Conservation
Ecotrust
Native Village of Eyak
United States Fish and Wildlife Service

March, 2011

Copper River Watershed Project (2011)

1) Culvert Condition

- same as 2011 MatSu but includes perch.

2) Ecological Conditions

4) Cost Assessment

5) Opportunities for Action

Copper River Watershed Project

1) Culvert Condition (same as MatSu) (30)

- Constriction (1-10)
- Gradient (1-10)
- Perch (1-10)

2) Ecological Conditions (30)

- Fish Species (1-10)
- Upstream Habitat Length (1-10)
- Upstream Habitat Quality (1-10)

Upstream Habitat Quality Classification

(0) Unsuitable (USFS Class IV)

The reach upstream of the culvert has excessive gradient (>25%), excessive stream velocities, lacks spawning substrate, or has other hydrological and geomorphological characteristics (i.e. is stagnant, or ephemeral) that would preclude its capability of supporting fish.

(2) Low Suitability (most similar to USFS Class II)

Habitat may be suitable for some resident fish and/or anadromous species and life history stages, low in mesohabitat diversity (pools, riffles, runs). May be steep in gradient, >10%, but accessible to fish.

(5) Moderate Suitability (Between USFS Class I and II)

Habitat is relatively good for one or several species, resident and/or anadromous, moderately diverse (pools, riffles, runs) mesohabitat.

(10) High Suitability (USFS Class 1)

Fish habitat favorable for spawning and rearing, for anadromous and resident species, clean and abundant spawning gravels but also a range of substrates; has a diversity of mesohabitat types and channel complexity.

Copper River Watershed Project

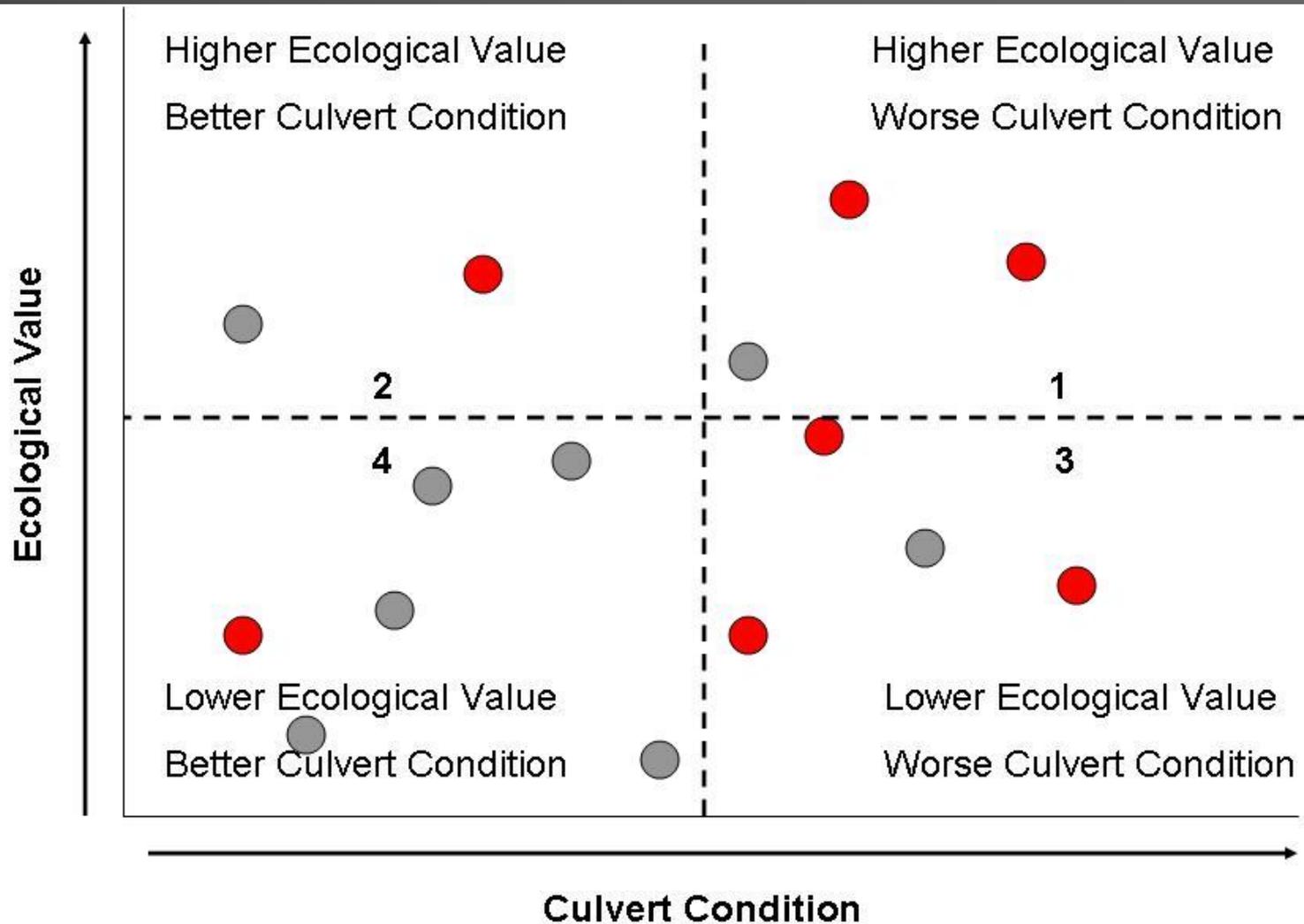
3) Cost Assessment (1-10)

- Less than \$100,000
- \$100,000-\$250,000
- \$250,000-499,999
- \$500,000-999,999
- Greater than \$1 million

4) Opportunities for Action (1-15)

- Partnership potential
- Local resident need/support
- Maintenance Potential
- Erosion Issues
- Downstream Barriers

Benefit Matrix



Online Mapper

http://www.crks.org/CRWP_CulvertMapper/

Road Name
Choose a value...

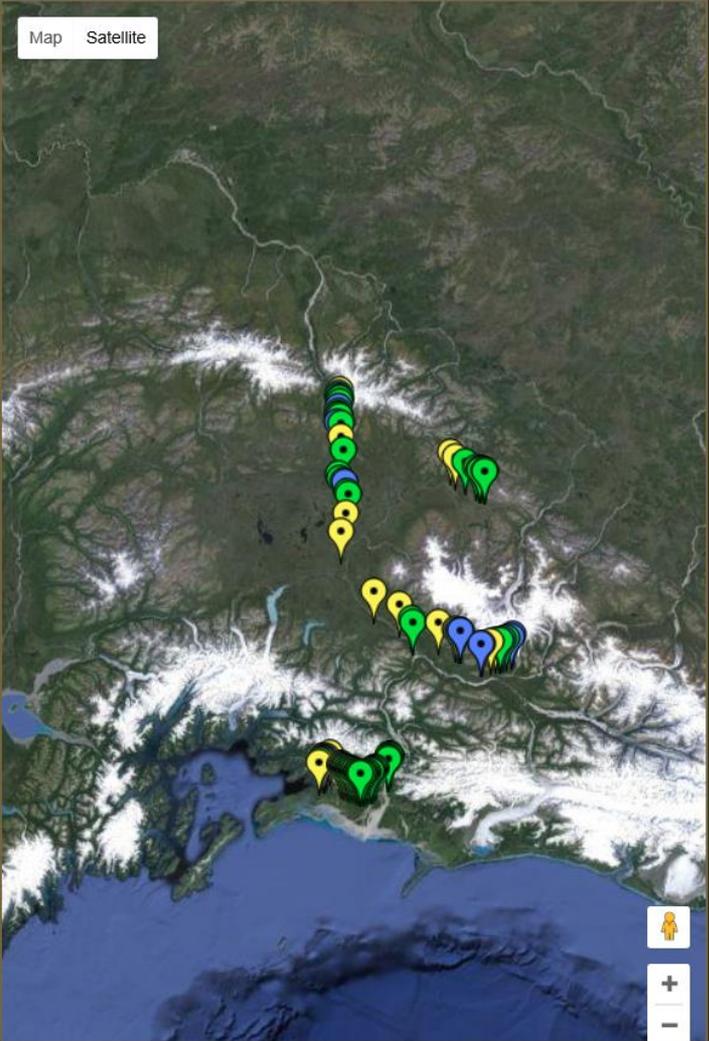
Milepost
0.0 190.0

Milepost	AK ID	Priority
117	20100736	II
126	20100719	II
136	20100735	IV
138	20100734	IV
143	20100733	III

Map Layers

- AWC
- Mileposts
- Bridges
- Gage Sites
- NHD Flowlines

Map Satellite



Culvert Data Spreadsheet Metadata Scoring Summary Prioritization Documentation

Details

Plotted Scores

Total Scores

Road Name

Choose a value...

Milepost

0.0 190.0

Milepost	AK ID	Priority
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Culvert Data Spreadsheet

Metadata

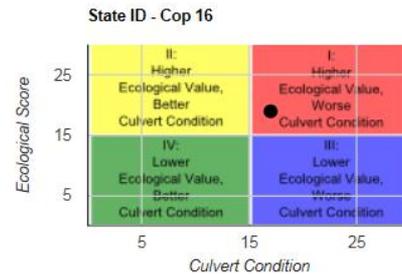
Scoring Summary

Prioritization Documentation

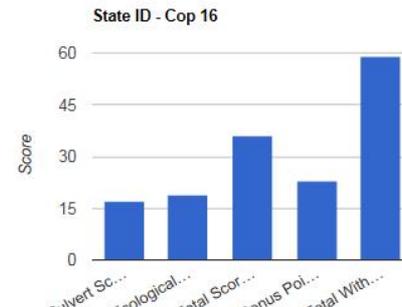
Details

1	Road Name	Copper River Hwy
2	Milepost	17
3	CRWP Survey ID	Cop 16
4	AK ID	20100482
5	ADFG fish passage score	Gray (CRWP, 2010)
6	Road Type	Gravel

Plotted Scores

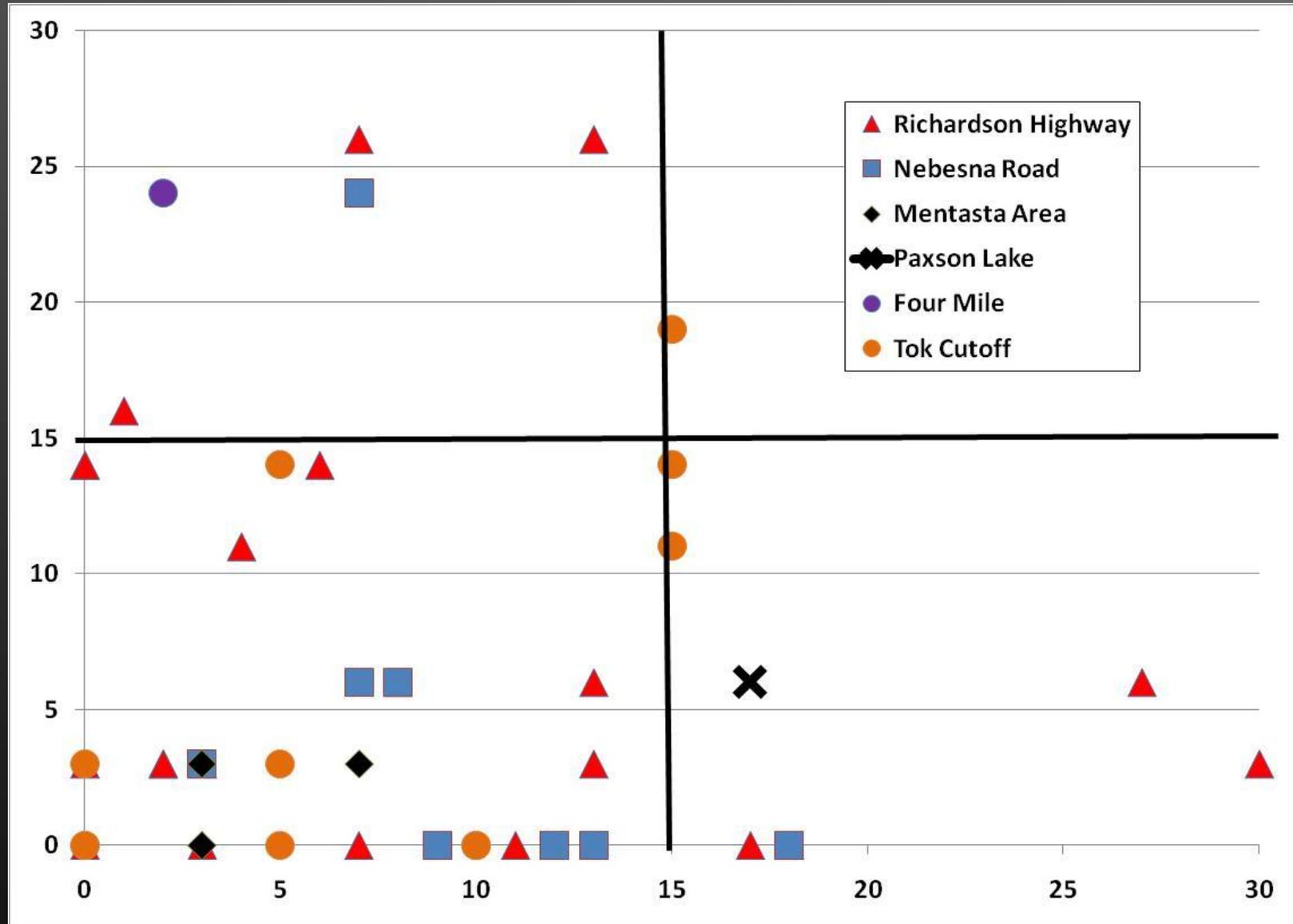


Total Scores



Example: Old Draft Upper Copper Scoring

Ecological Value



Culvert Condition

2015 MatSu Prioritization Update <Draft>

U.S. Fish and Wildlife Service

<Draft> Fish Passage Restoration Cost –
Benefit Prioritization for the MatSu Basin,
Alaska

Alaska Fisheries Technical Report Number XXX



- 1) Anadromous Evaluation - Similar to 2011 document
- 2) Culvert Level 1 Assessments
- 3) Upstream Miles Evaluated
- 4) Ownership
- 5) Estimated Costs per Culvert
- 6) Adult vs. Juvenile Barriers

2015 Prioritization Goal

Strategic Action 4.2.2

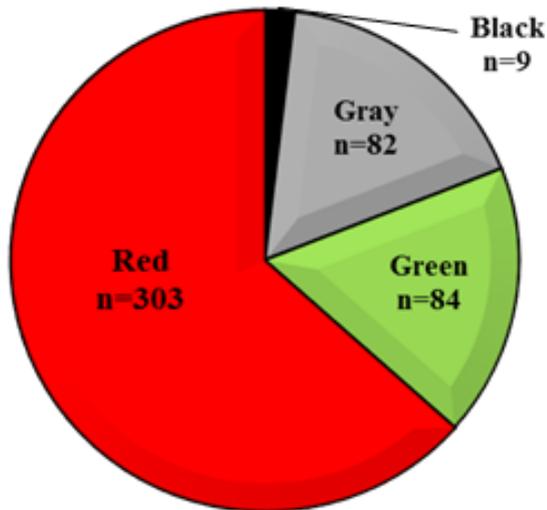
“...the need for additional research to analyze culverts based on the “benefit to fish versus cost of replacement” (Mat-Su Salmon Partnership 2013 Appendix 8).”

Population	Number of Fish Passage Sites	Percentage of Total Fish Passage Sites
All Fish Bearing Sites	573	-
Non-Anadromous	95	17%
AWC Anadromous	216	38%
Likely Anadromous	262	46%
Total Anadromous	478	83%

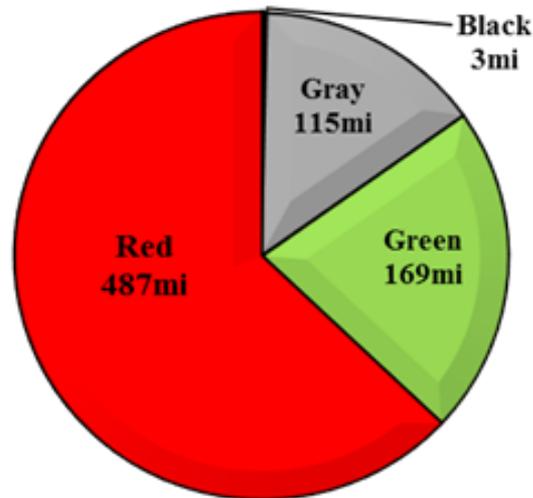
Draft Results

2000

Number of

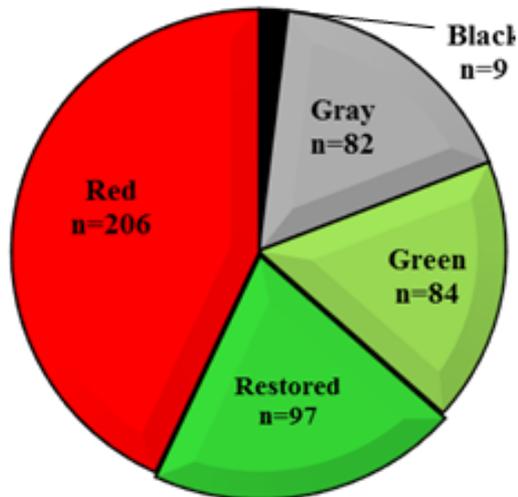


Miles Upstream of Barriers

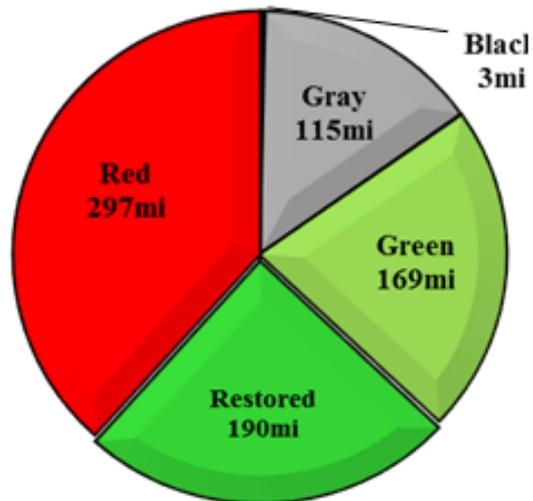


2015

Number of Barriers

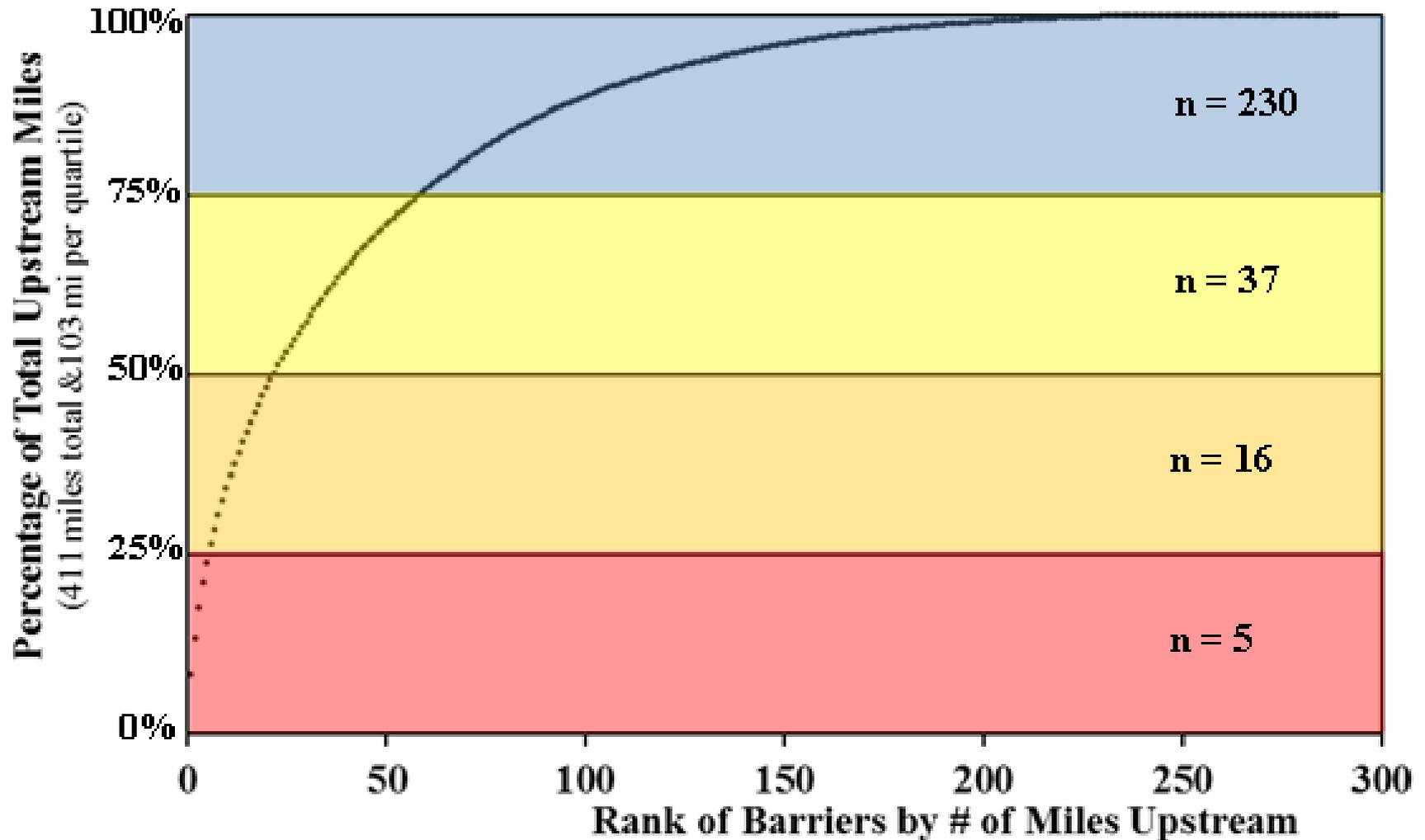


Miles Upstream of Barriers



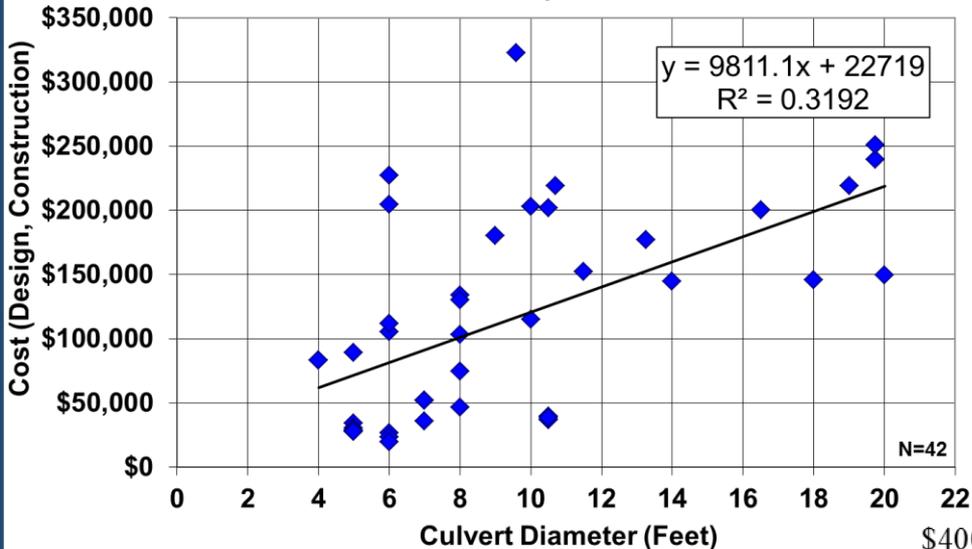
- N = 771 Upstream Miles
- N = 478 Culverts

Upstream Miles Ranking

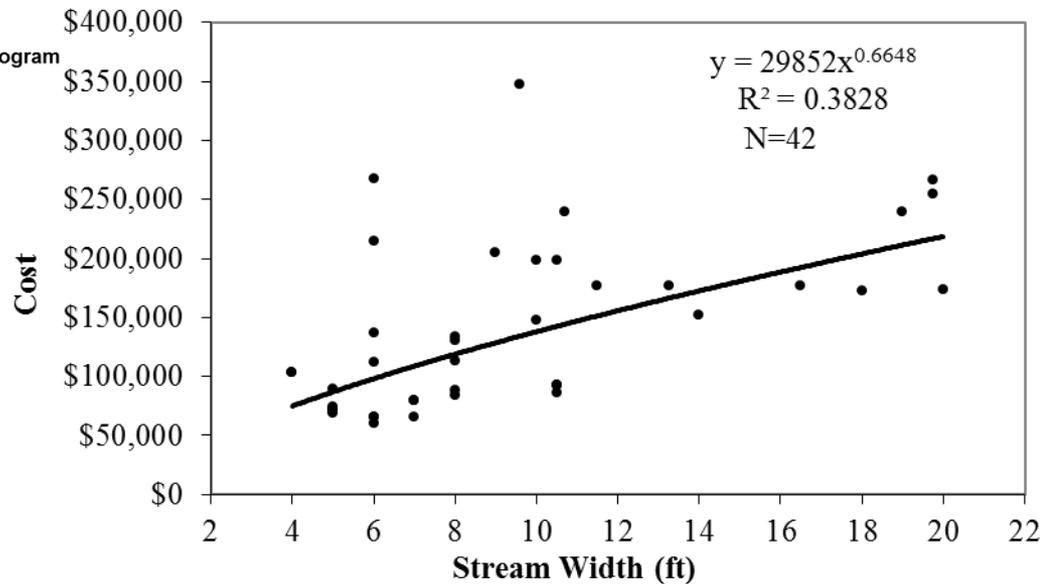


Cost Per Mile Analysis

Matanuska-Susitna Borough Fish Passage Program
All Culverts Replaced 2008-2014



Source: William Rice, US Fish and Wildlife Service Fish Passage Program



Cost Per Mile Draft Results

	Number of Barriers	Total Miles	Average Upstream Miles per Restoration	Total Estimated Cost	Average Cost-Benefit (\$/mile)
MSB	6	36	6.0	\$1,253,000	\$33,919
DOT	9	111.3	12.4	\$3,149,000	\$37,095
Tot	15	147.3	9.8	\$4,402,000	\$35,824

Where do we go from here?

1) Fish Passage Improvement Plans

Habitat factors – Spawning vs. Rearing

Habitat Quality factors – Impacted vs. Nonimpacted

Connectivity, cumulative effects – Optimization

2) Adult Barrier Evaluation (What is the potential in increase spawning area (ie. Production)?

3) Ownership focus?

4) Watershed Initiative?

Watershed Initiative

