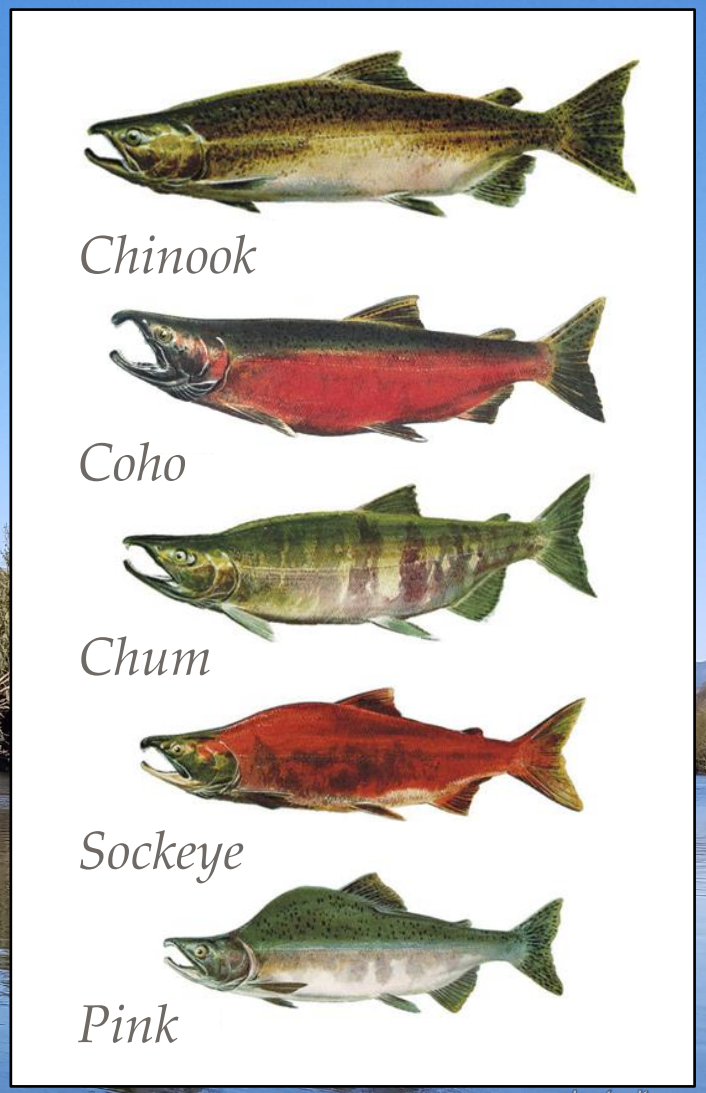
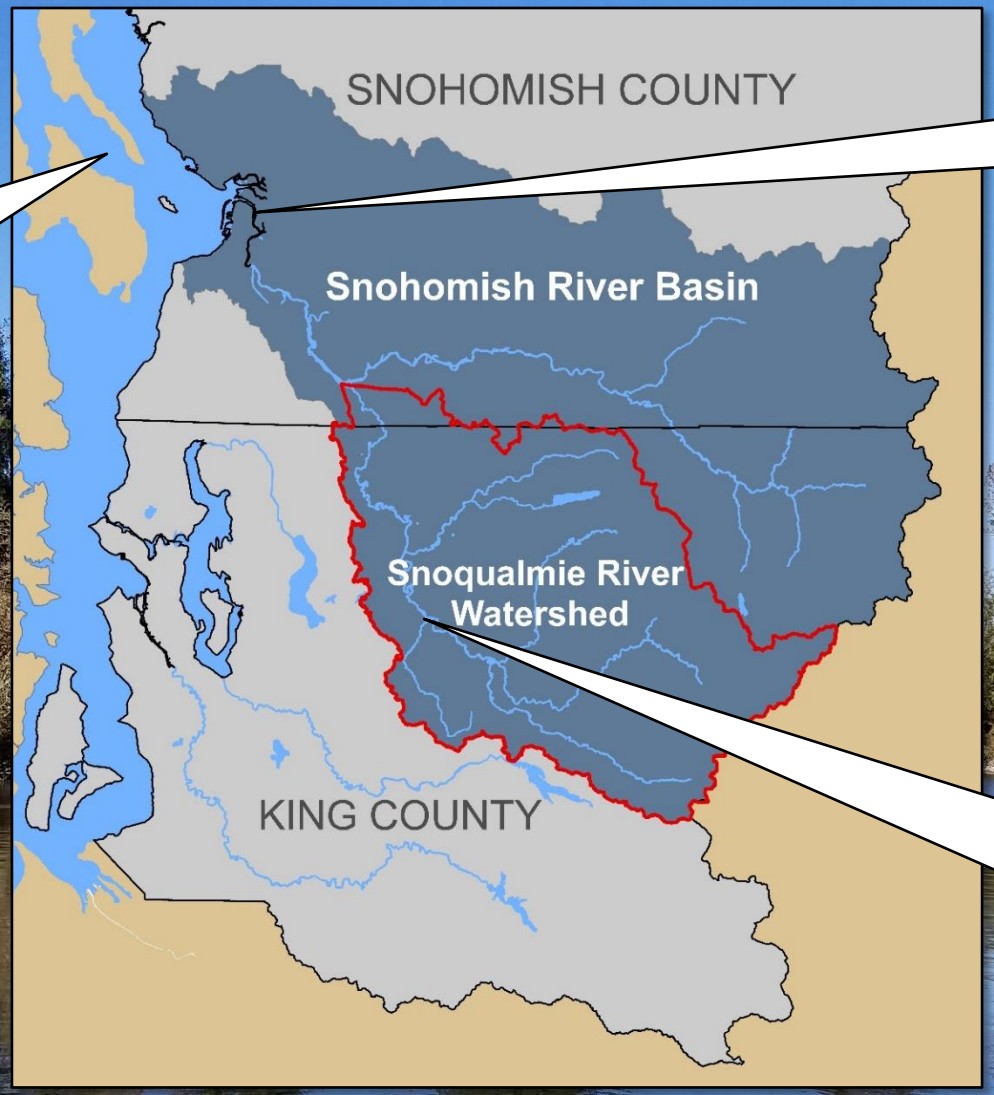
In Search of a Unique Juvenile Salmon in the Snoqualmie River

Josh Kubo
Science and Technical Support Section
King County Water and Land Resources Division



georgiastrait.org

Nearshore & Marine

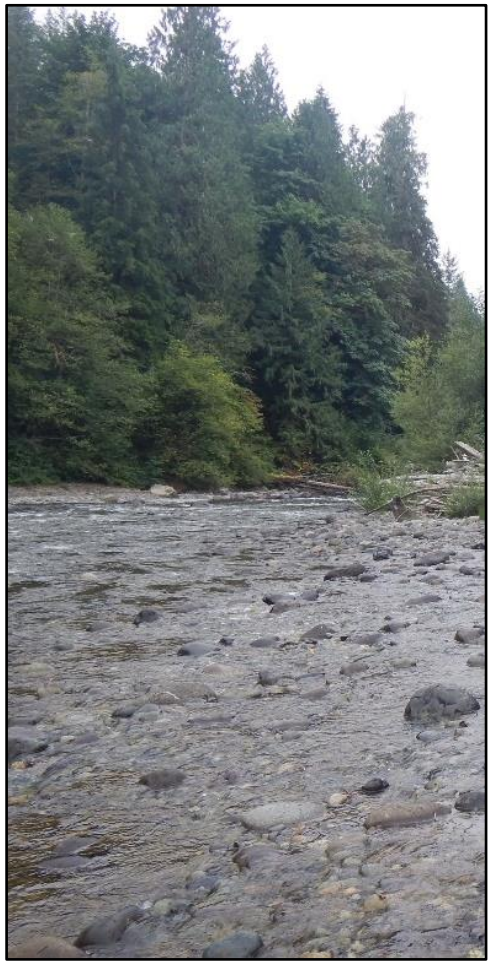

SNOHOMISH COUNTY
Snohomish River Basin
Snoqualmie River Watershed
KING COUNTY

Estuarine

Freshwater

Snoqualmie River Watershed

Spawning Areas



Rearing Areas

Snohomish Basin Estuary

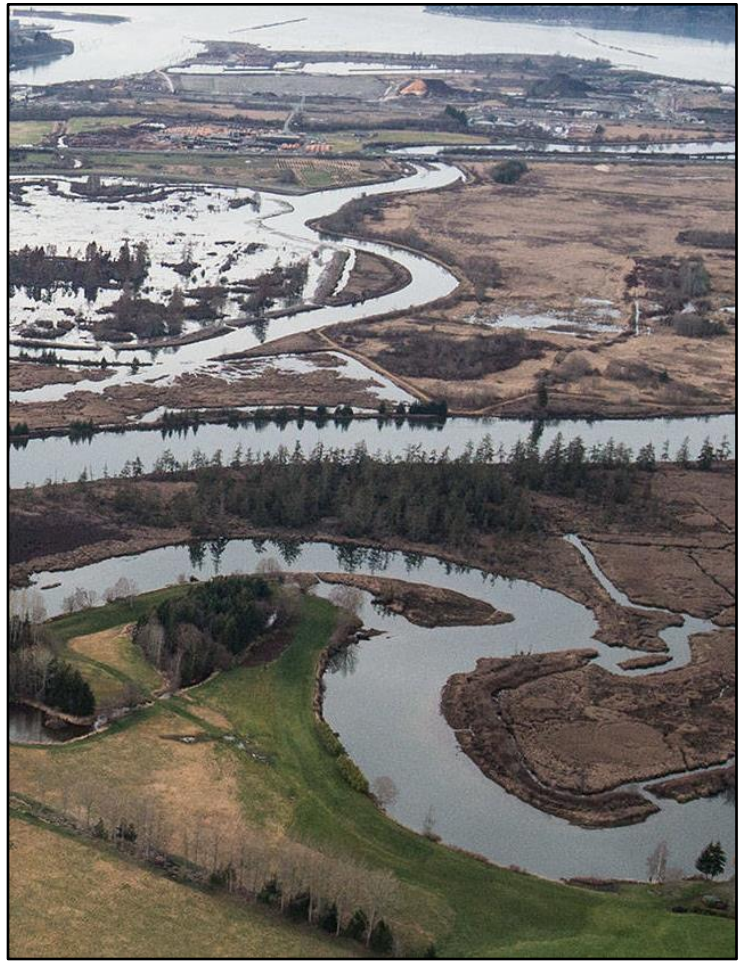


Photo: Wild Lands Inc.

Puget Sound

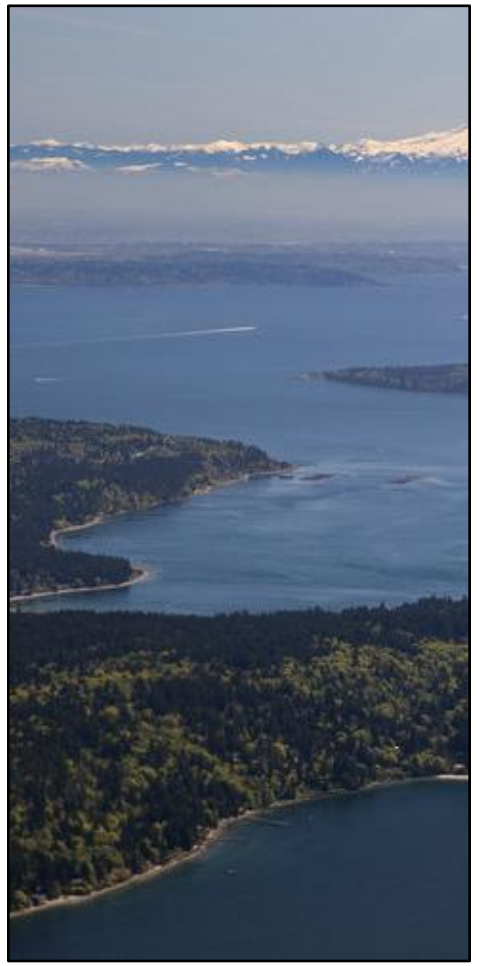


Photo: Washington Nature

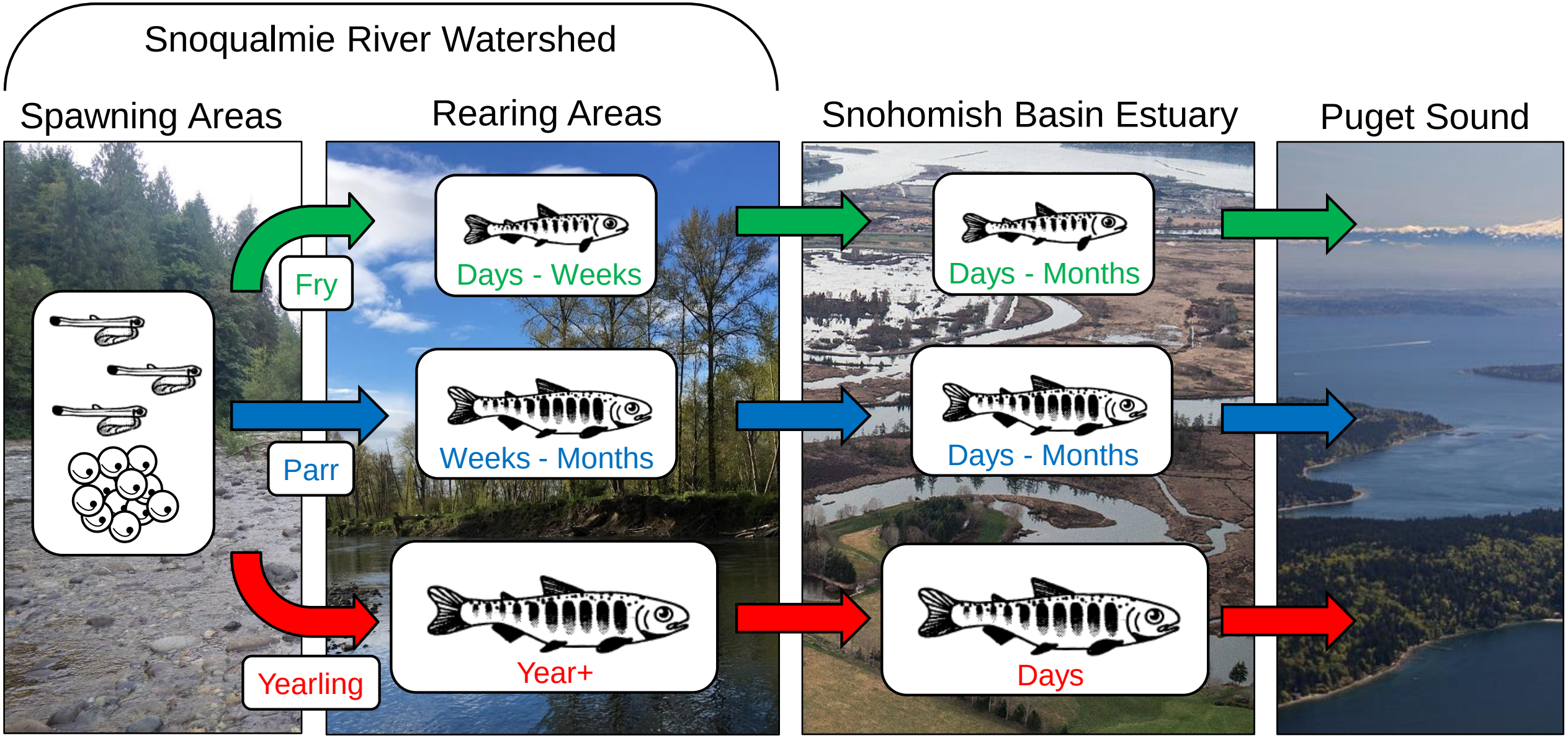


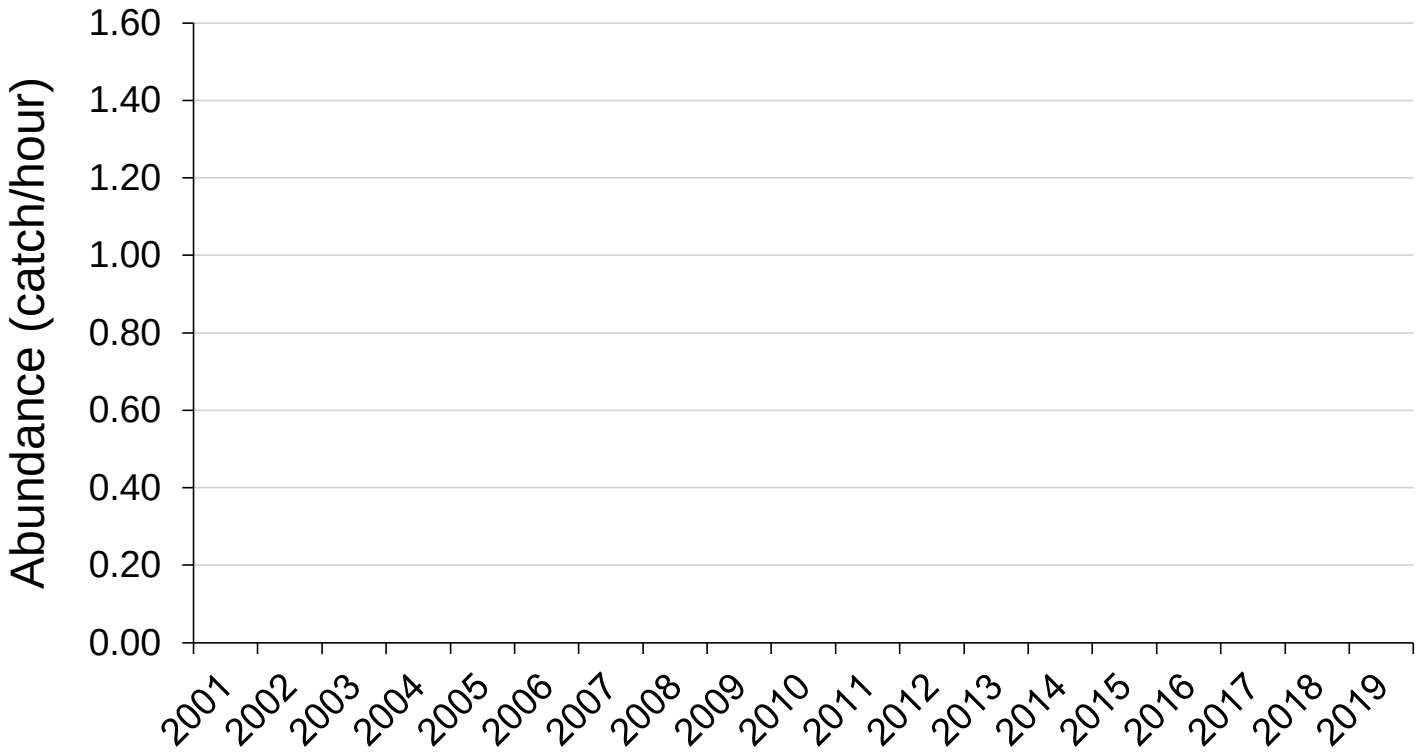
Photo: Wild Lands Inc.

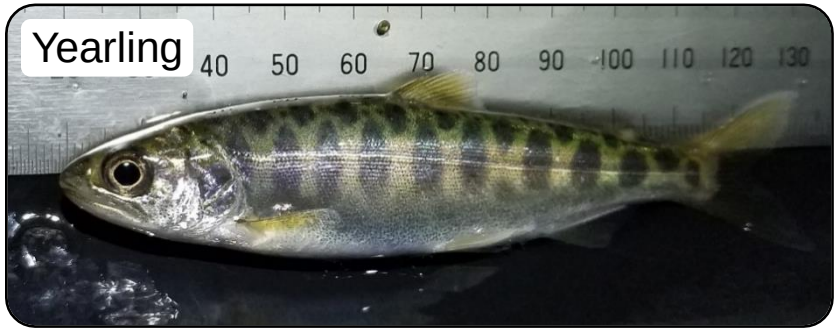
Photo: Washington Nature

Fry

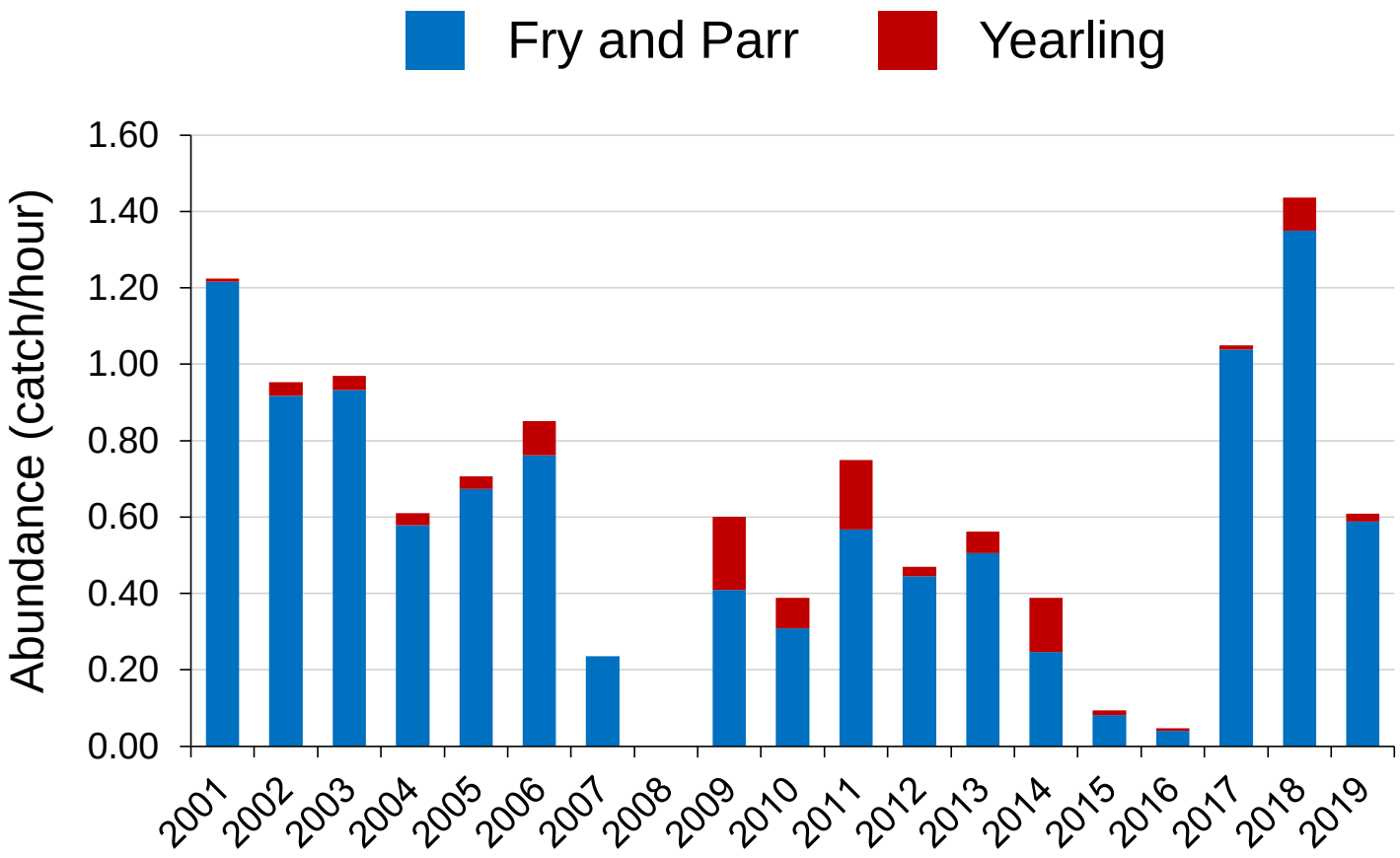
Parr

Yearling
40 50 60 70 80 90 100 110 120 130

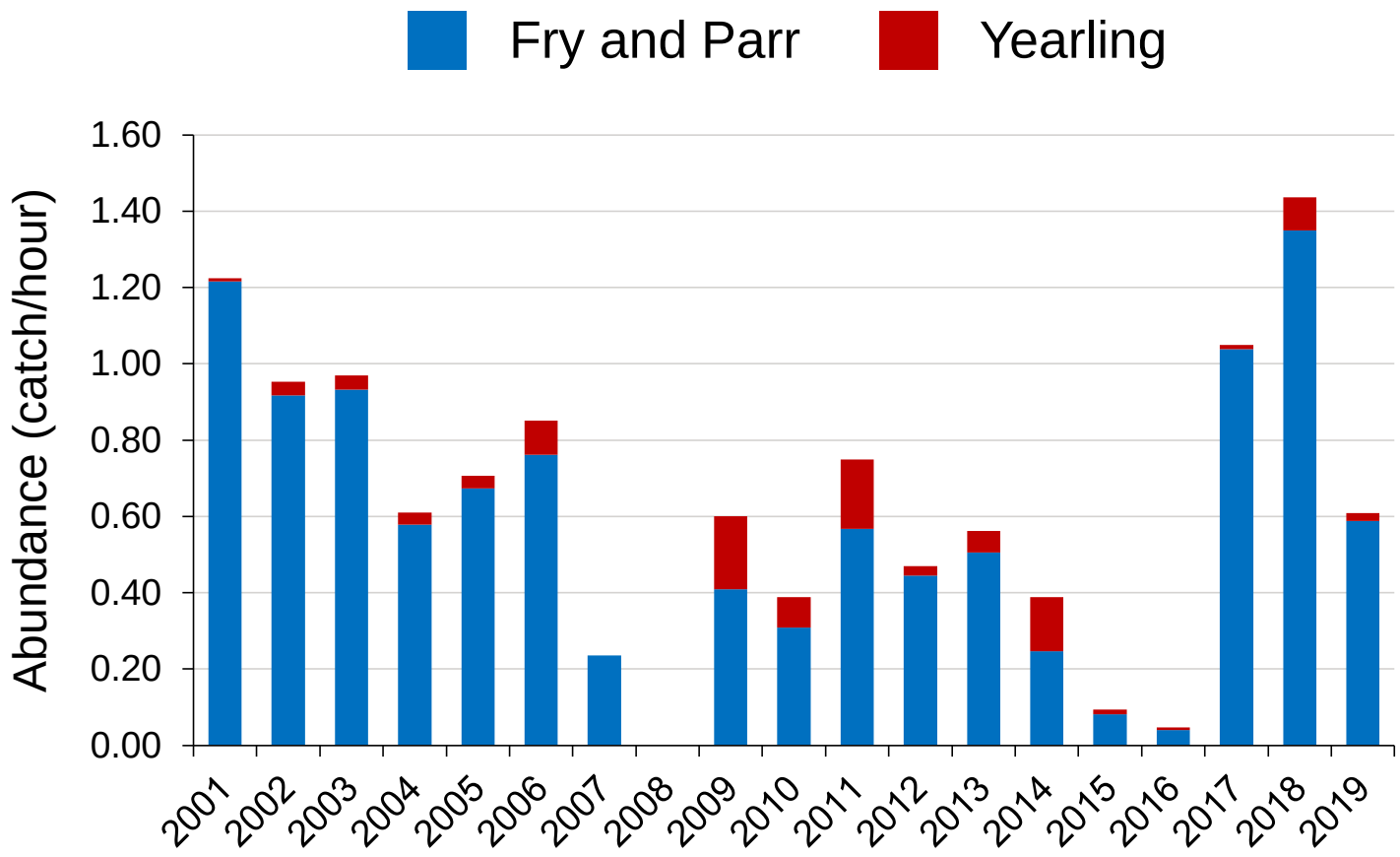




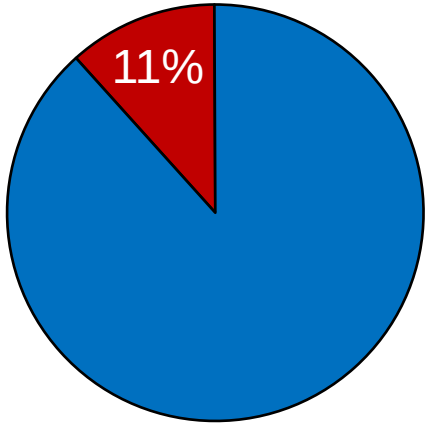
Data provided by the Tulalip Tribes

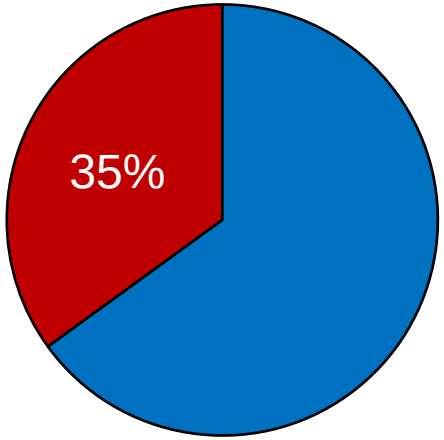


Data provided by the Tulalip Tribes

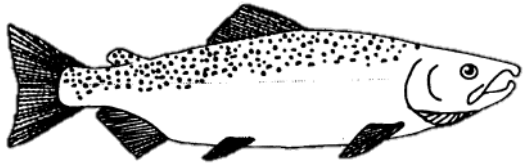


Juveniles

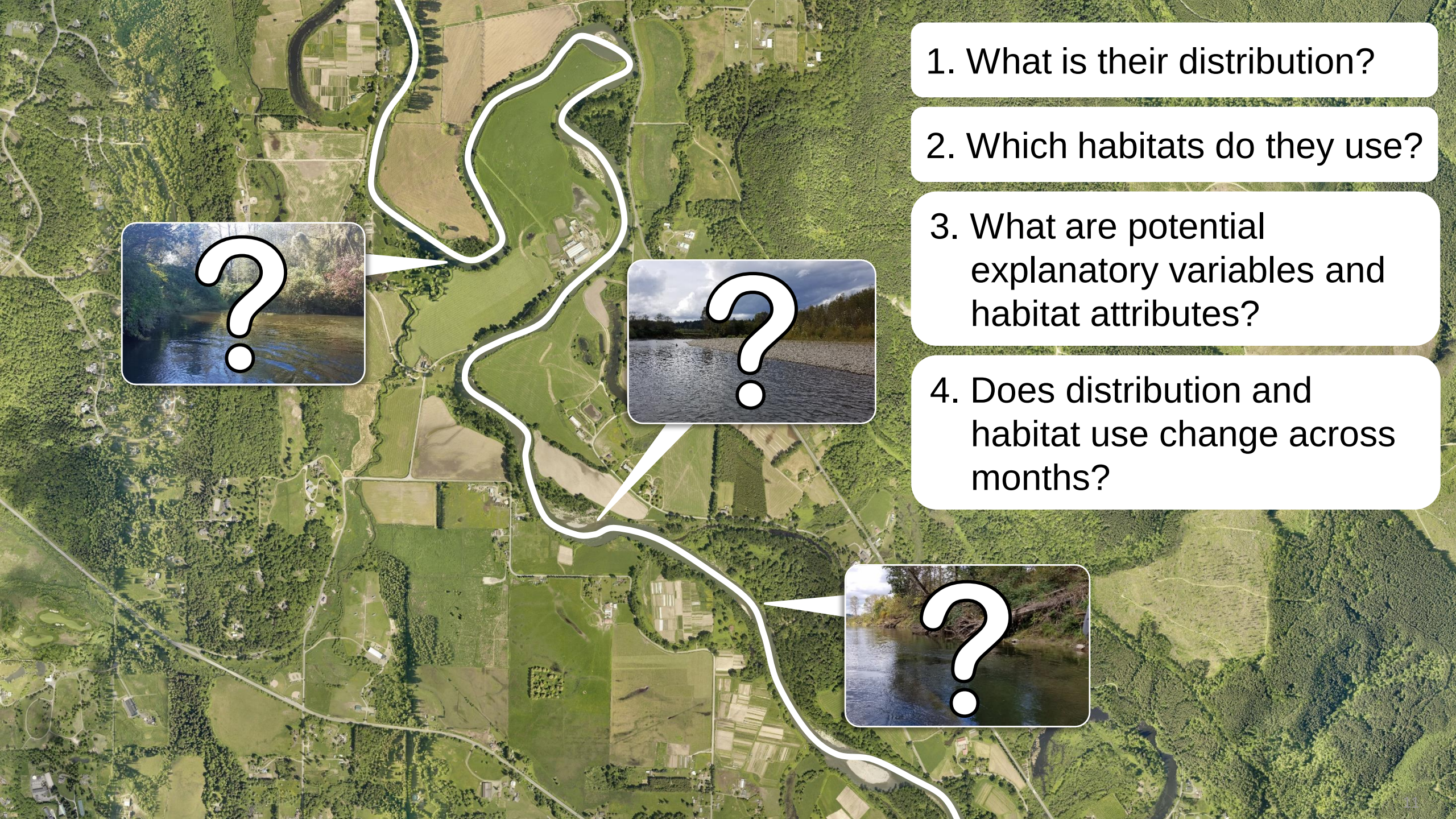


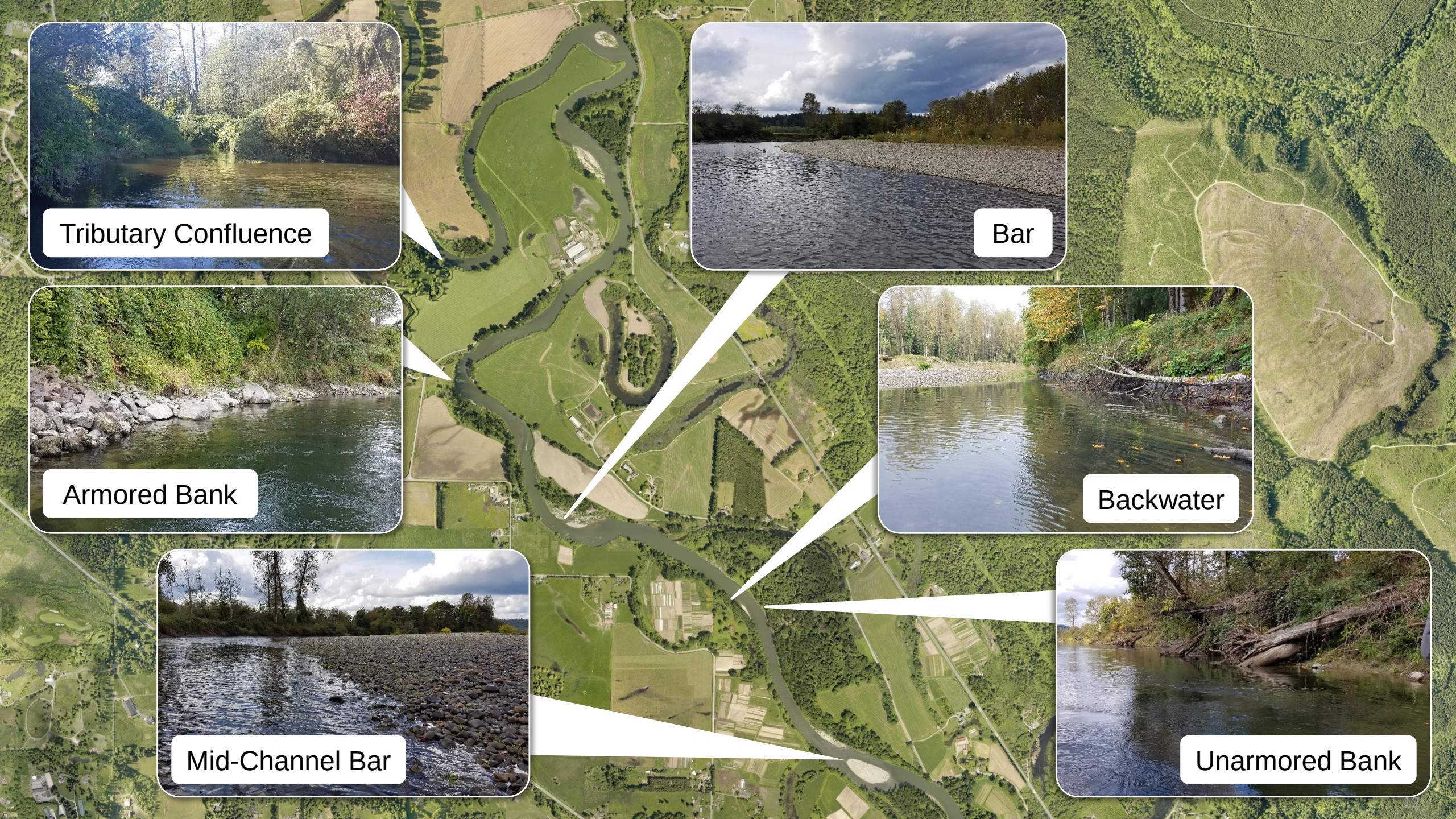


Returning Adults

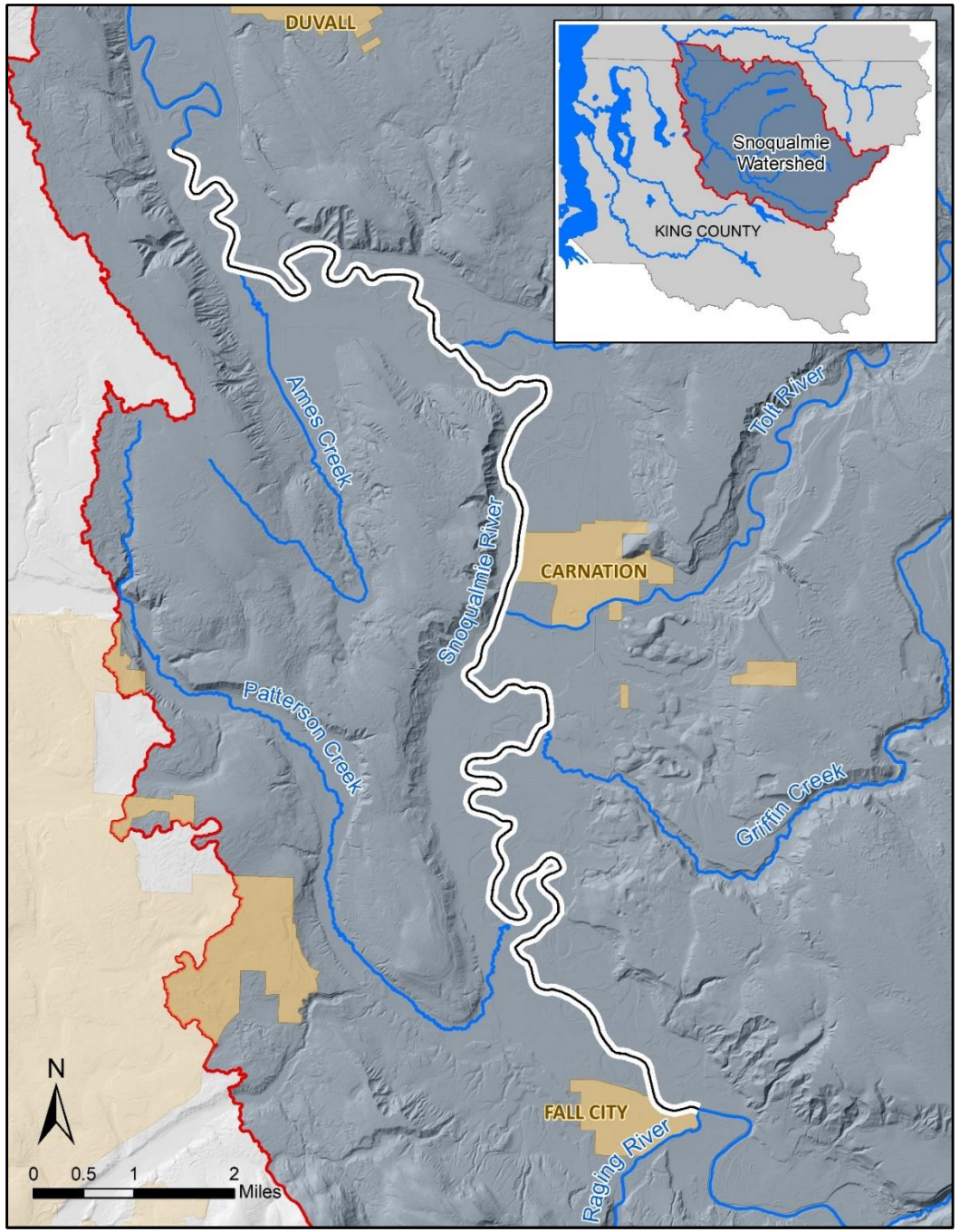


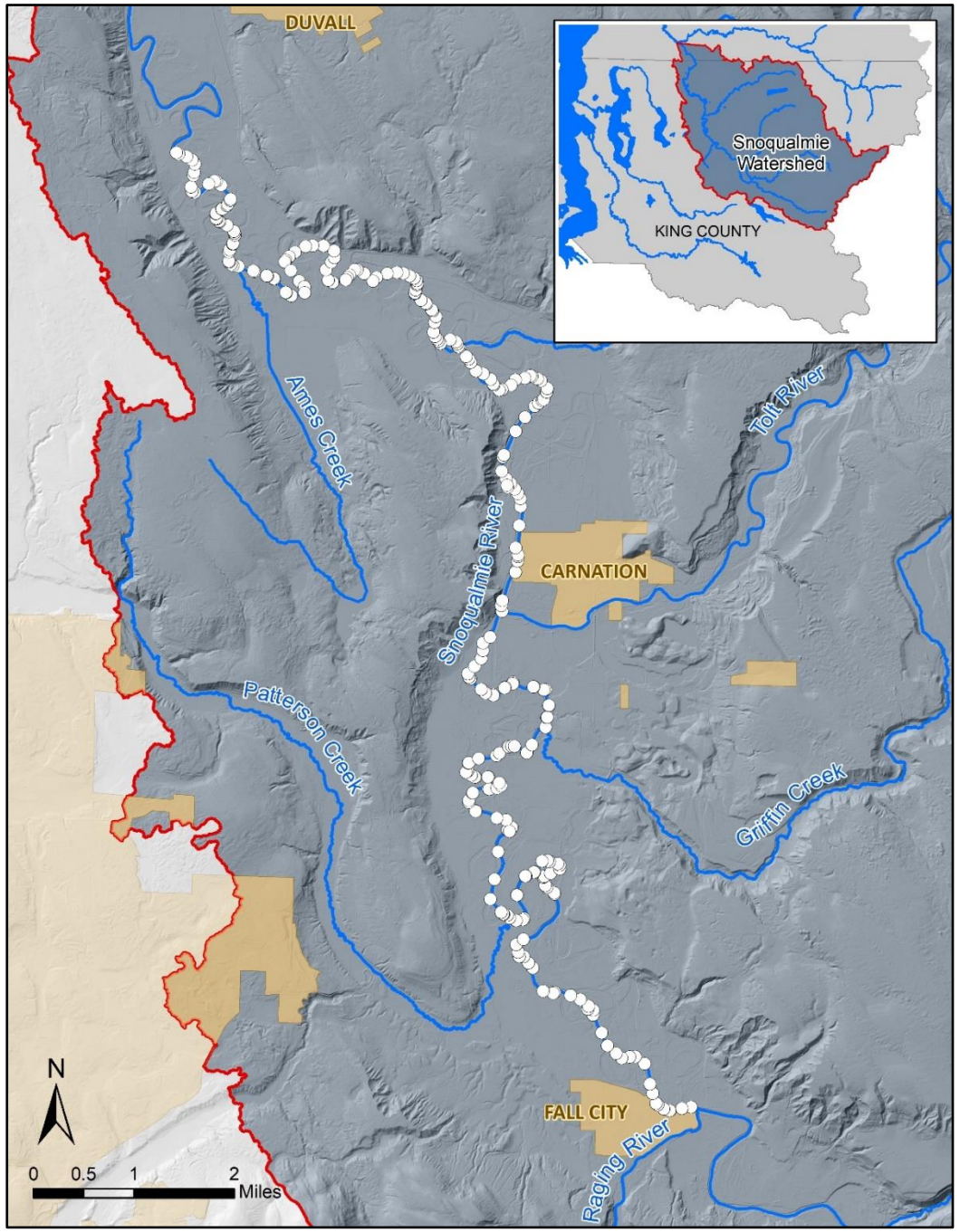
Data provided by the Tulalip Tribes

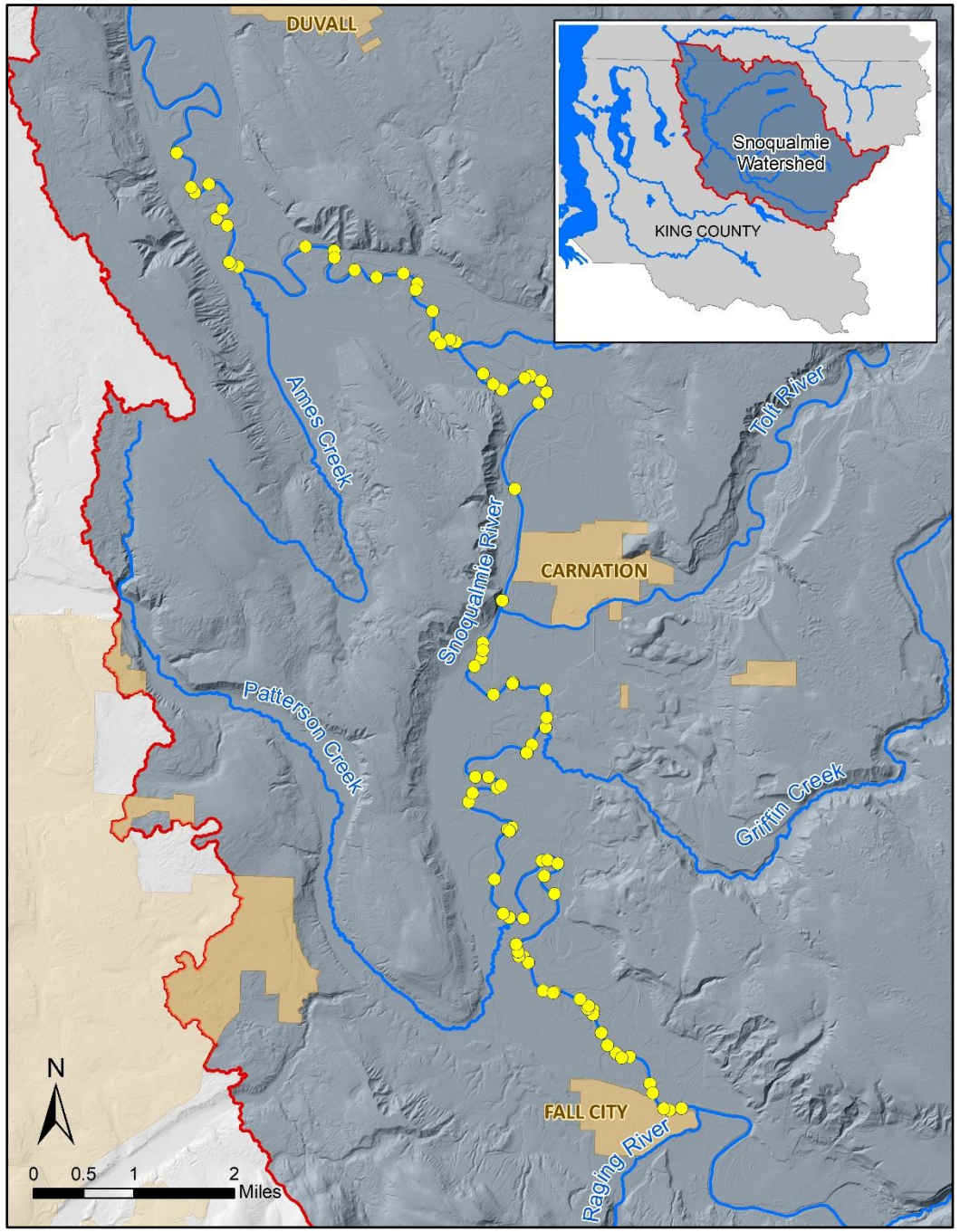

1. What is their distribution?
2. Which habitats do they use?
3. What are potential explanatory variables and habitat attributes?
4. Does distribution and habitat use change across months?

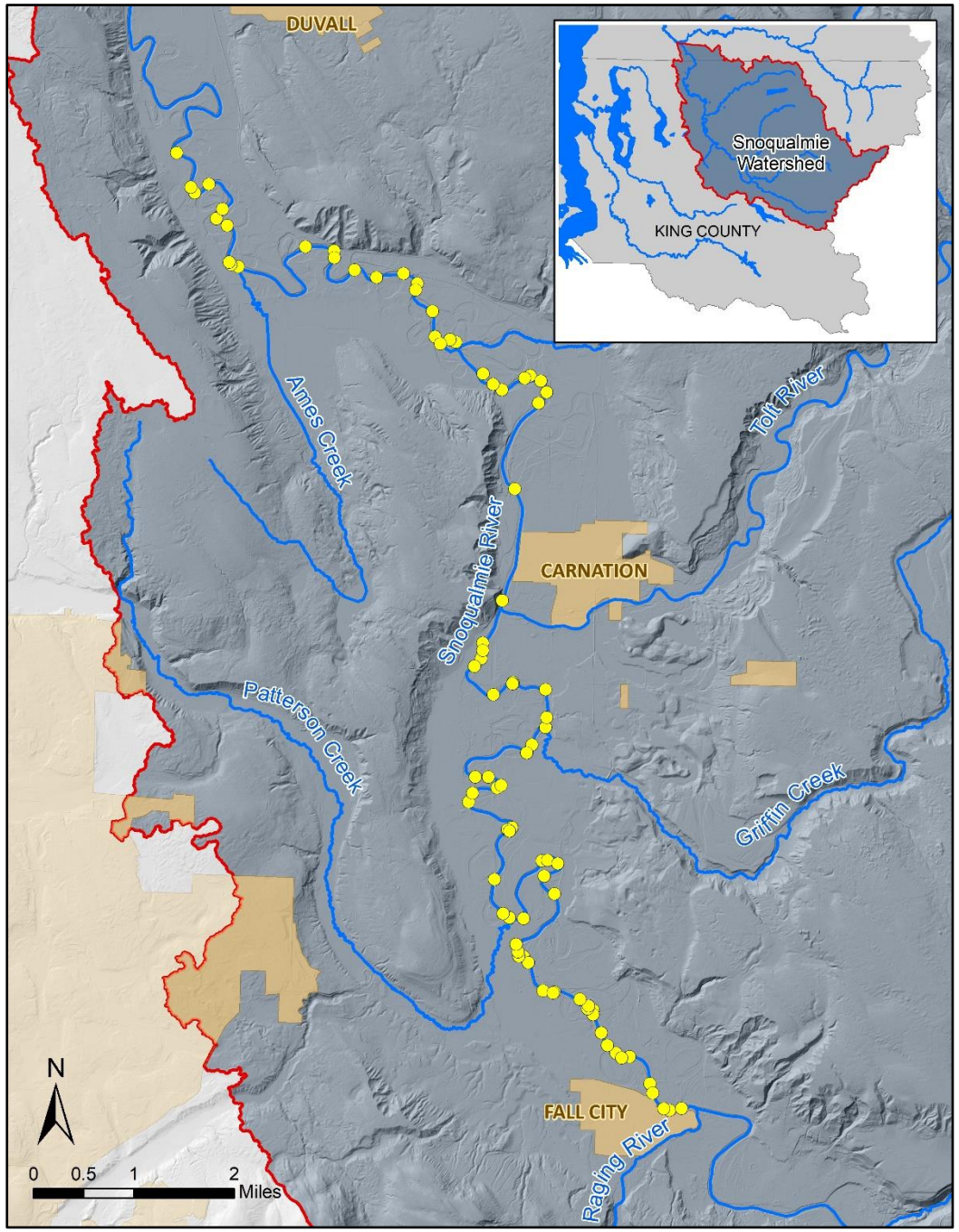

Tributary Confluence
Bar
Armored Bank
Backwater
Mid-Channel Bar
Unarmored Bank

Cataraft Electrofishing

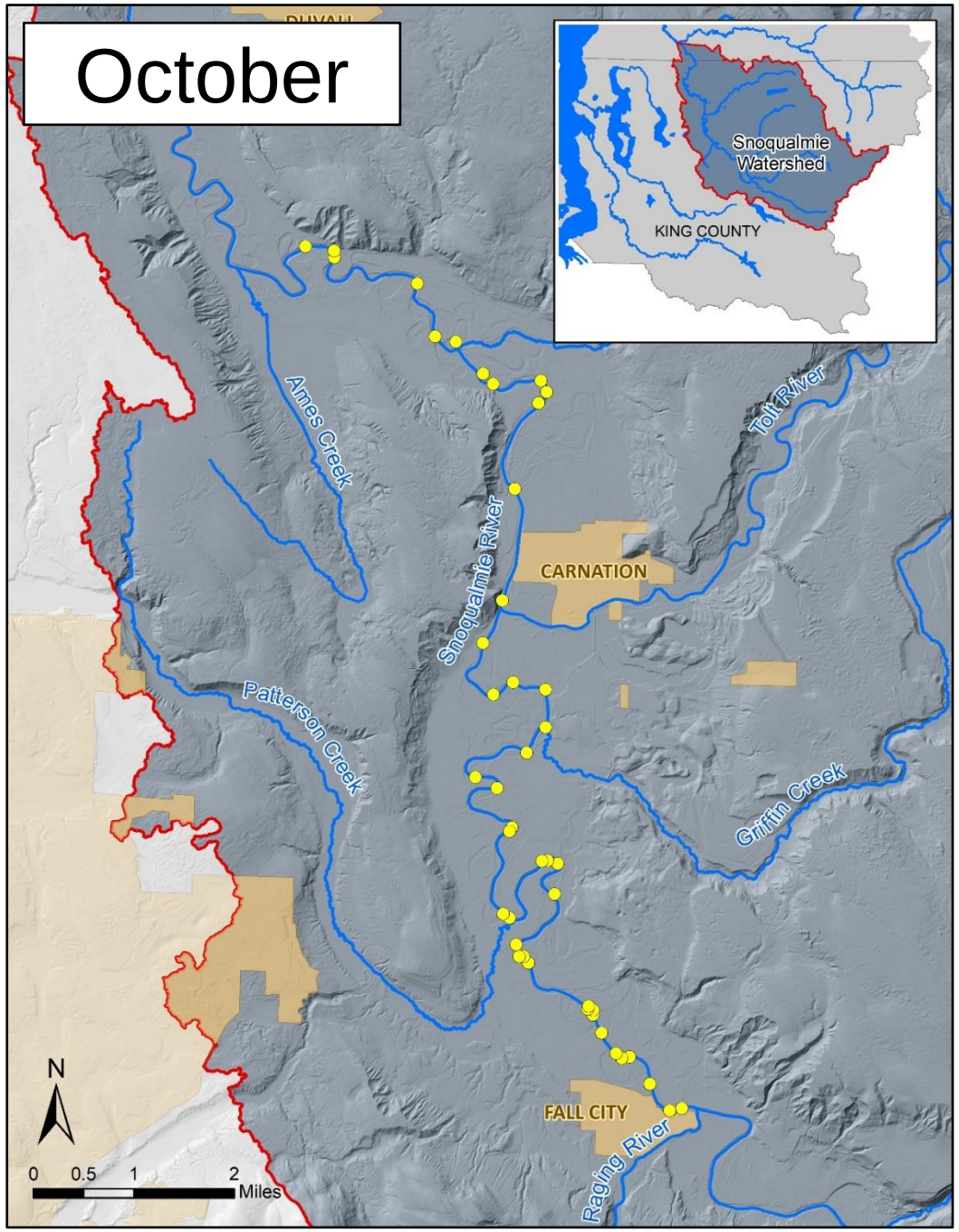

DUVALL
Snoqualmie Watershed
KING COUNTY
Ames Creek
Tolt River
Snoqualmie River
CARNATION
Patterson Creek
Griffin Creek
FALL CITY
Raging River
N
0 0.5 1 2 Miles


DUVALL
Snoqualmie Watershed
KING COUNTY
Ames Creek
Tolt River
Snoqualmie River
CARNATION
Patterson Creek
Griffin Creek
FALL CITY
Raging River
N
0 0.5 1 2 Miles


DUVALL
Snoqualmie Watershed
KING COUNTY
Ames Creek
Tolt River
Snoqualmie River
CARNATION
Patterson Creek
Griffin Creek
FALL CITY
Raging River
N
0 0.5 1 2 Miles

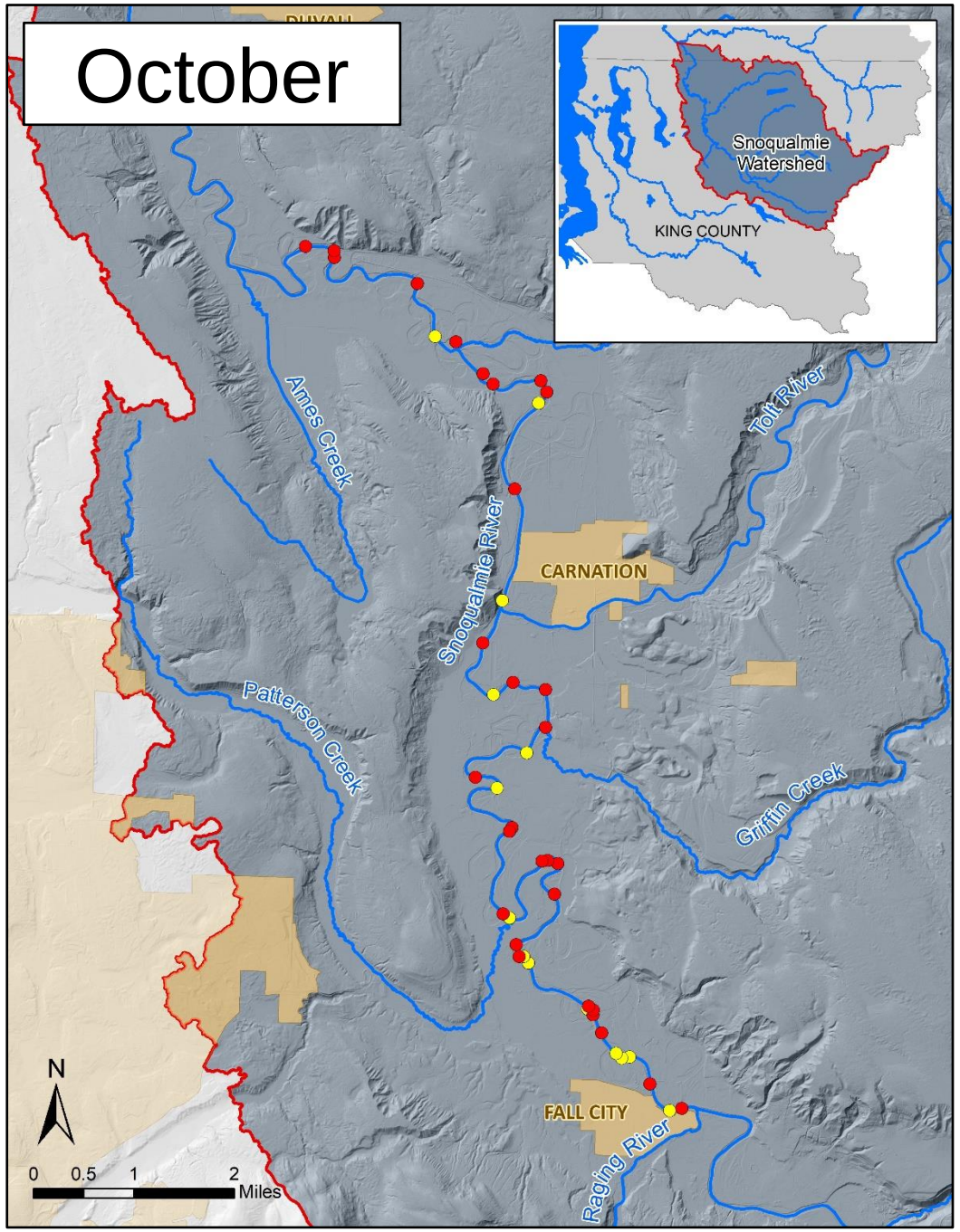


What is their distribution?

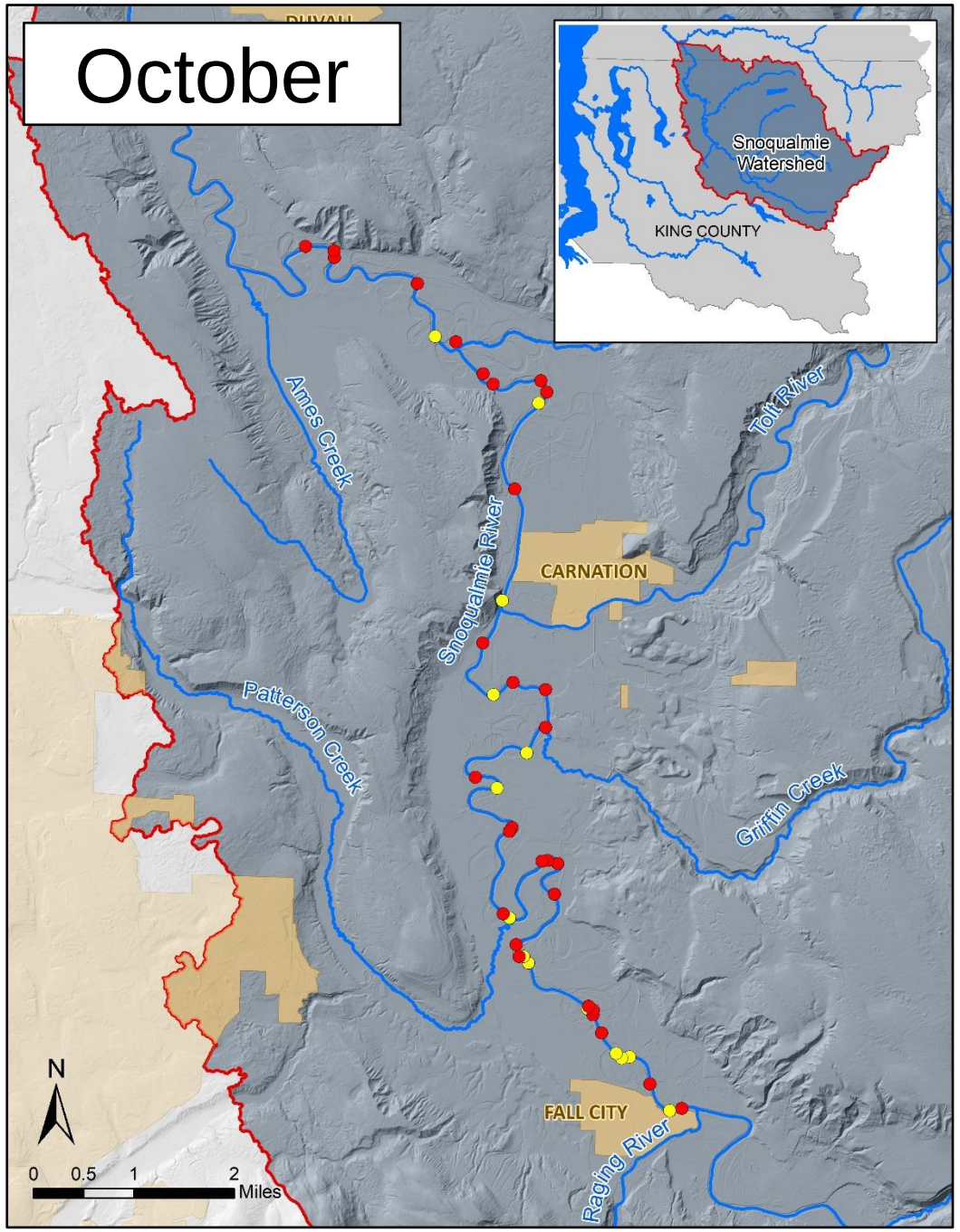

October
Snoqualmie Watershed
KING COUNTY
Ames Creek
Snoqualmie River
Tolt River
CARNATION
Patterson Creek
Griffin Creek
FALL CITY
Raging River
N
0 0.5 1 2 Miles

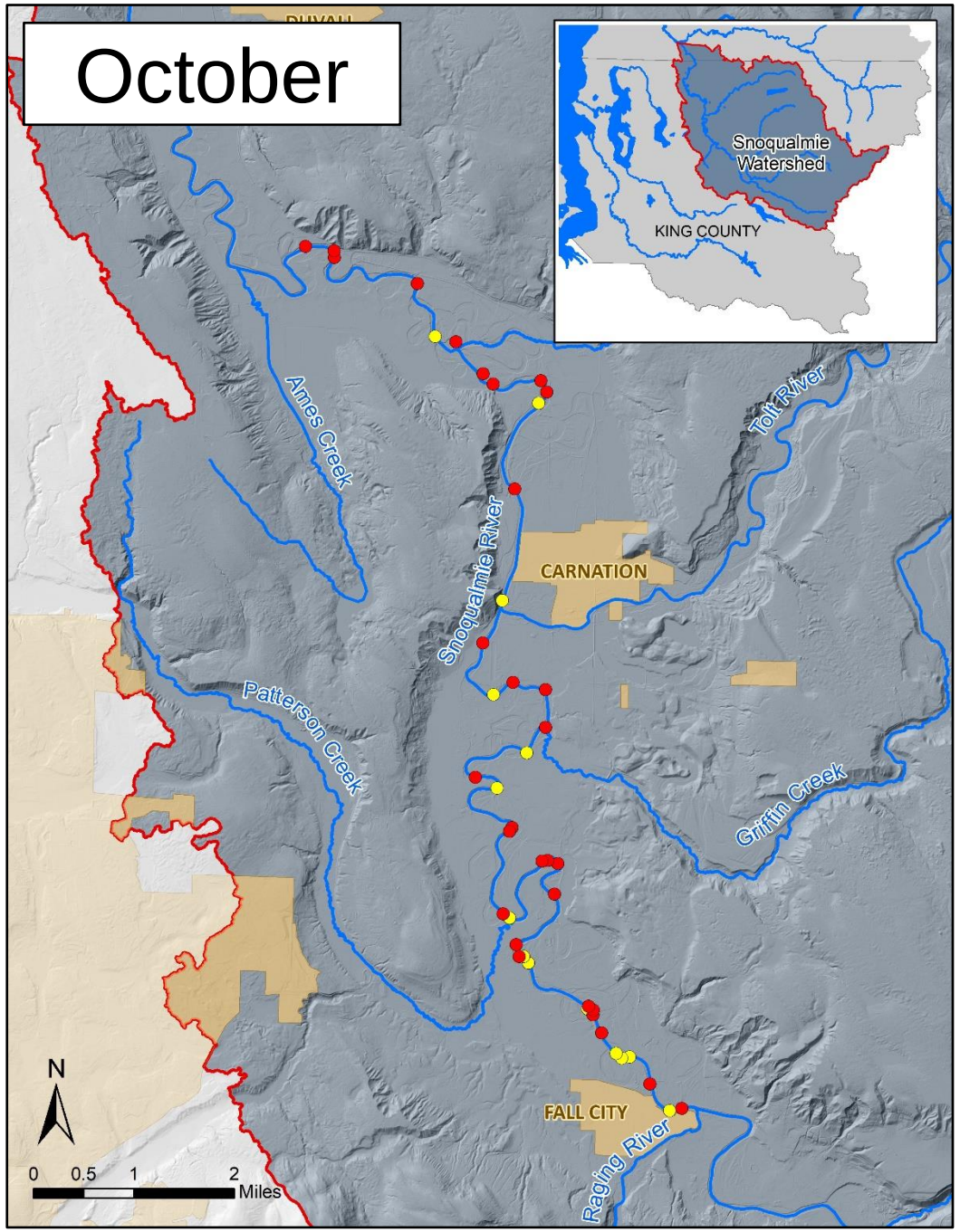
● =

20 30 40 50 60 70 80 90 100 110 120 130

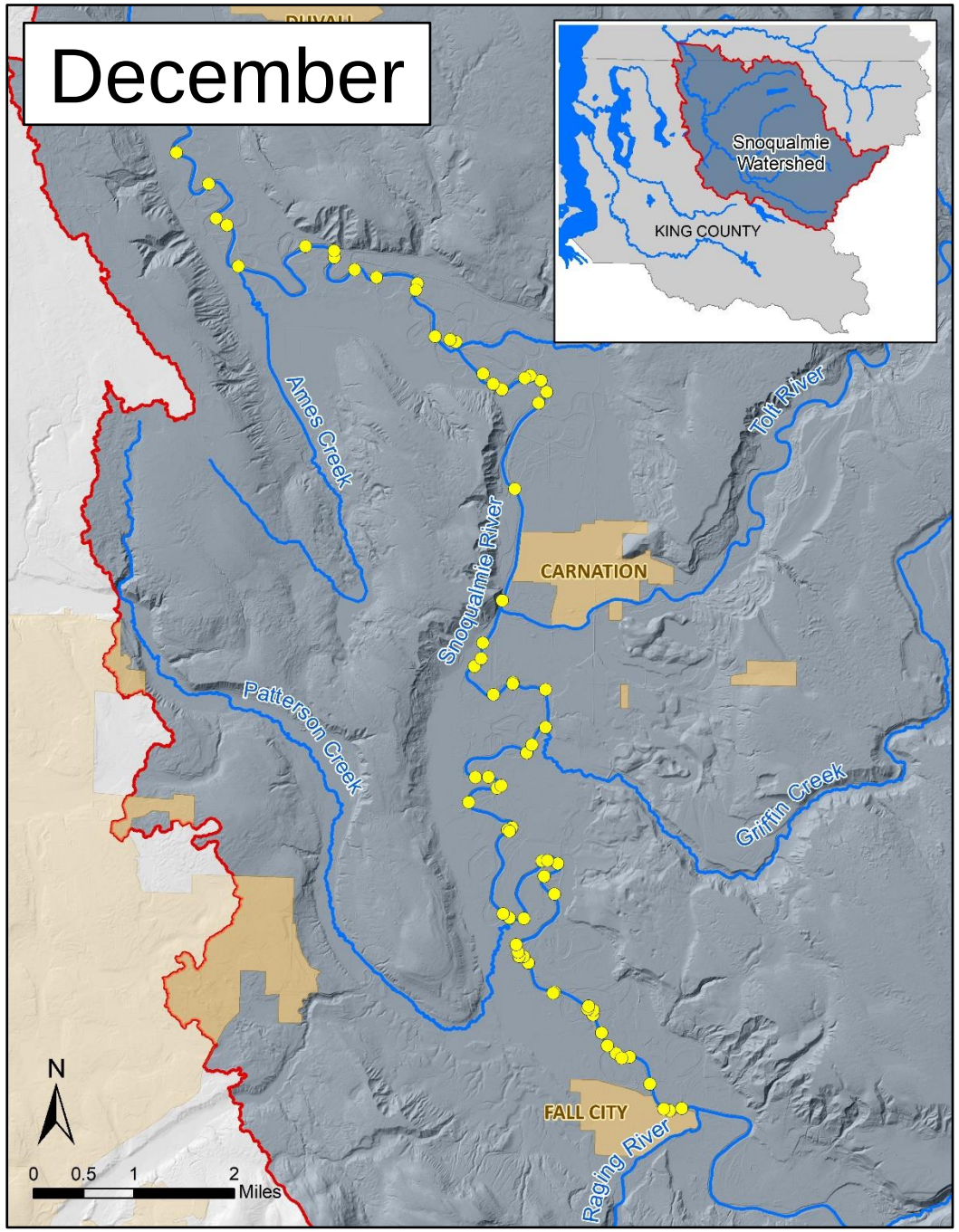

October
Snoqualmie Watershed
KING COUNTY
Ames Creek
Snoqualmie River
Tolt River
CARNATION
Patterson Creek
Griffin Creek
FALL CITY
Raging River
N
0 0.5 1 2 Miles

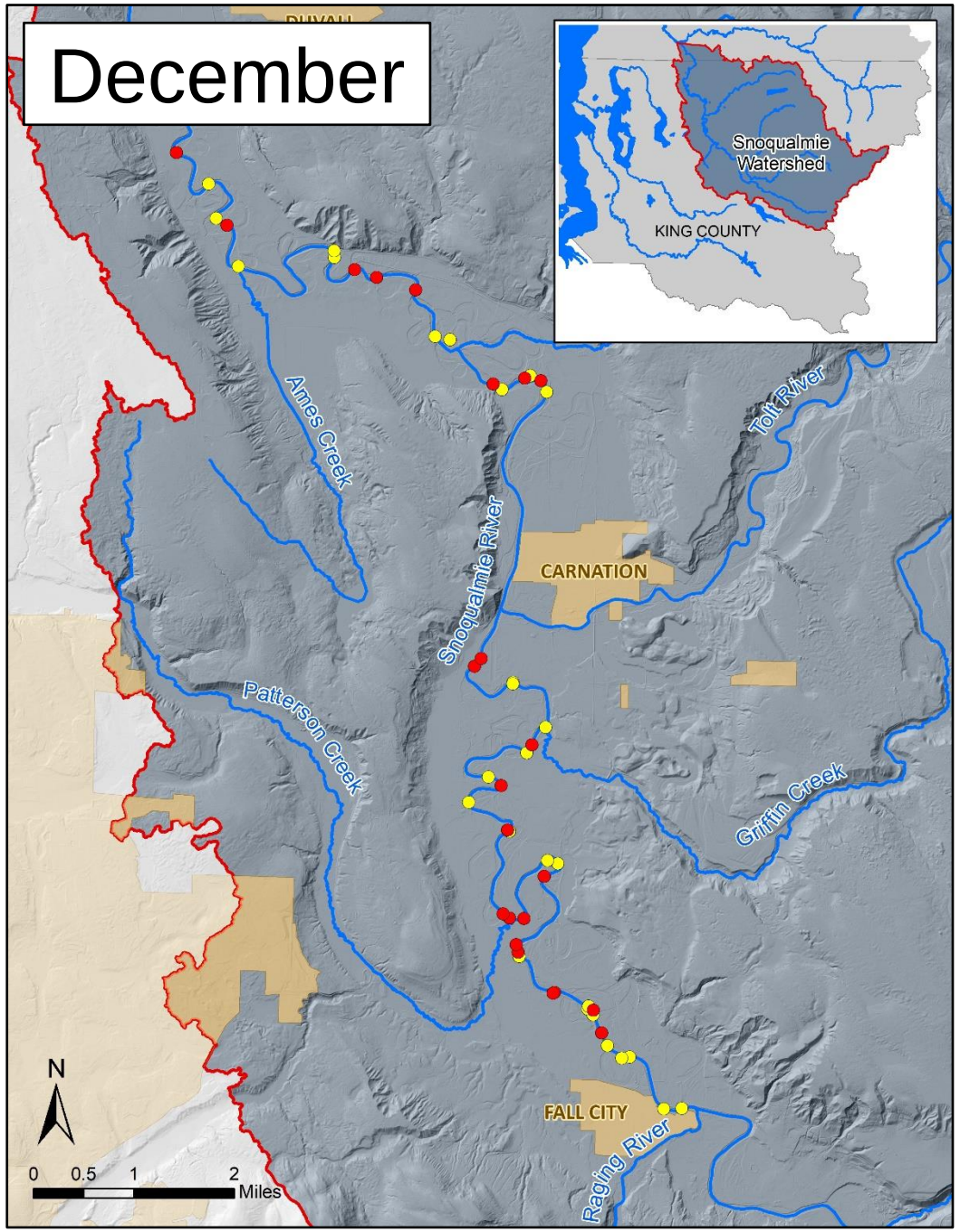
20 30 40 50 60 70 80 90 100 110 120 130


October
Snoqualmie Watershed
KING COUNTY
Ames Creek
Tolt River
Snoqualmie River
CARNATION
Patterson Creek
Griffin Creek
FALL CITY
Raging River
N
0 0.5 1 2 Miles



Photos: Seattle Times

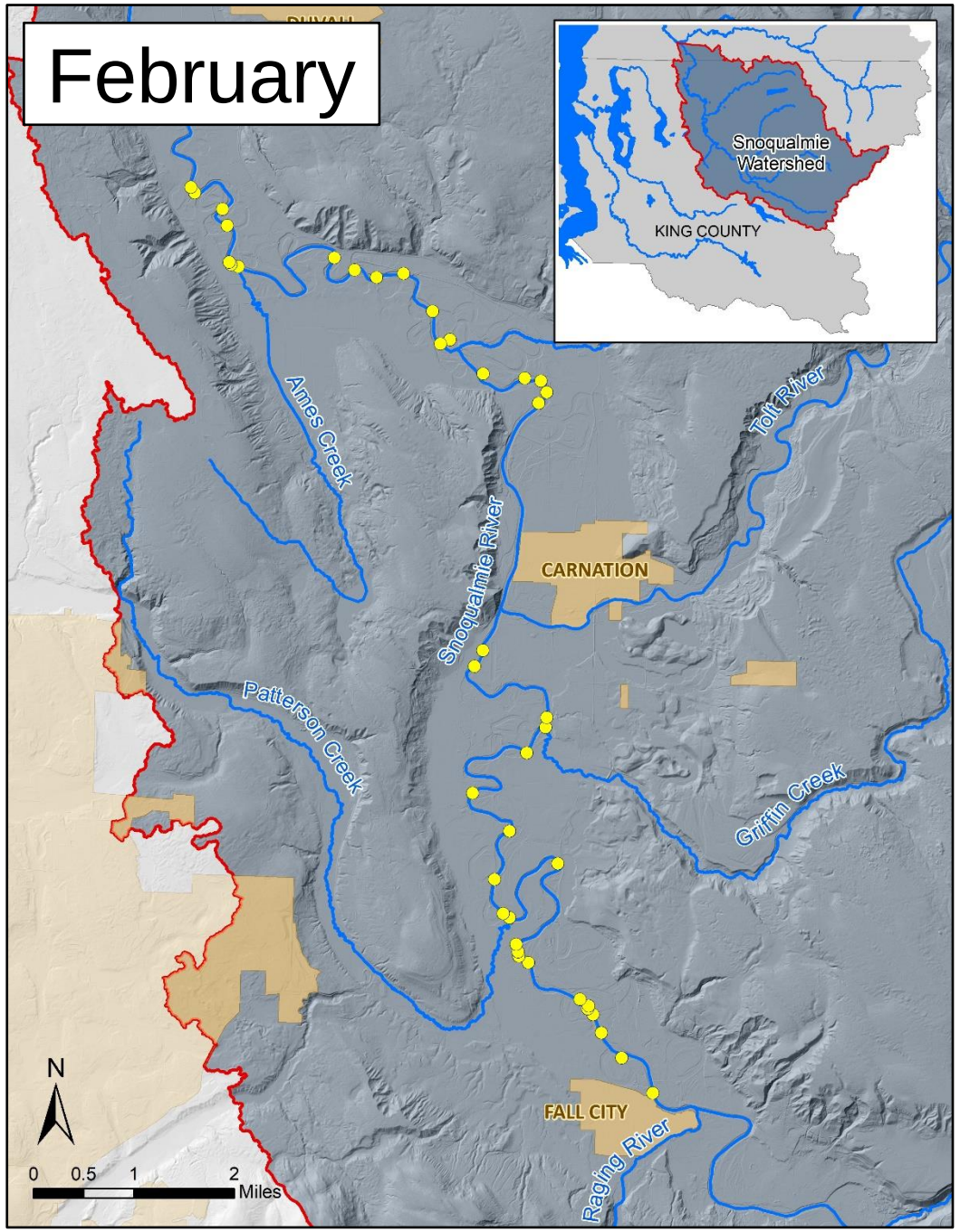

December
Snoqualmie Watershed
KING COUNTY
Ames Creek
Snoqualmie River
Tolt River
CARNATION
Patterson Creek
Griffin Creek
FALL CITY
Raging River
N
0 0.5 1 2 Miles

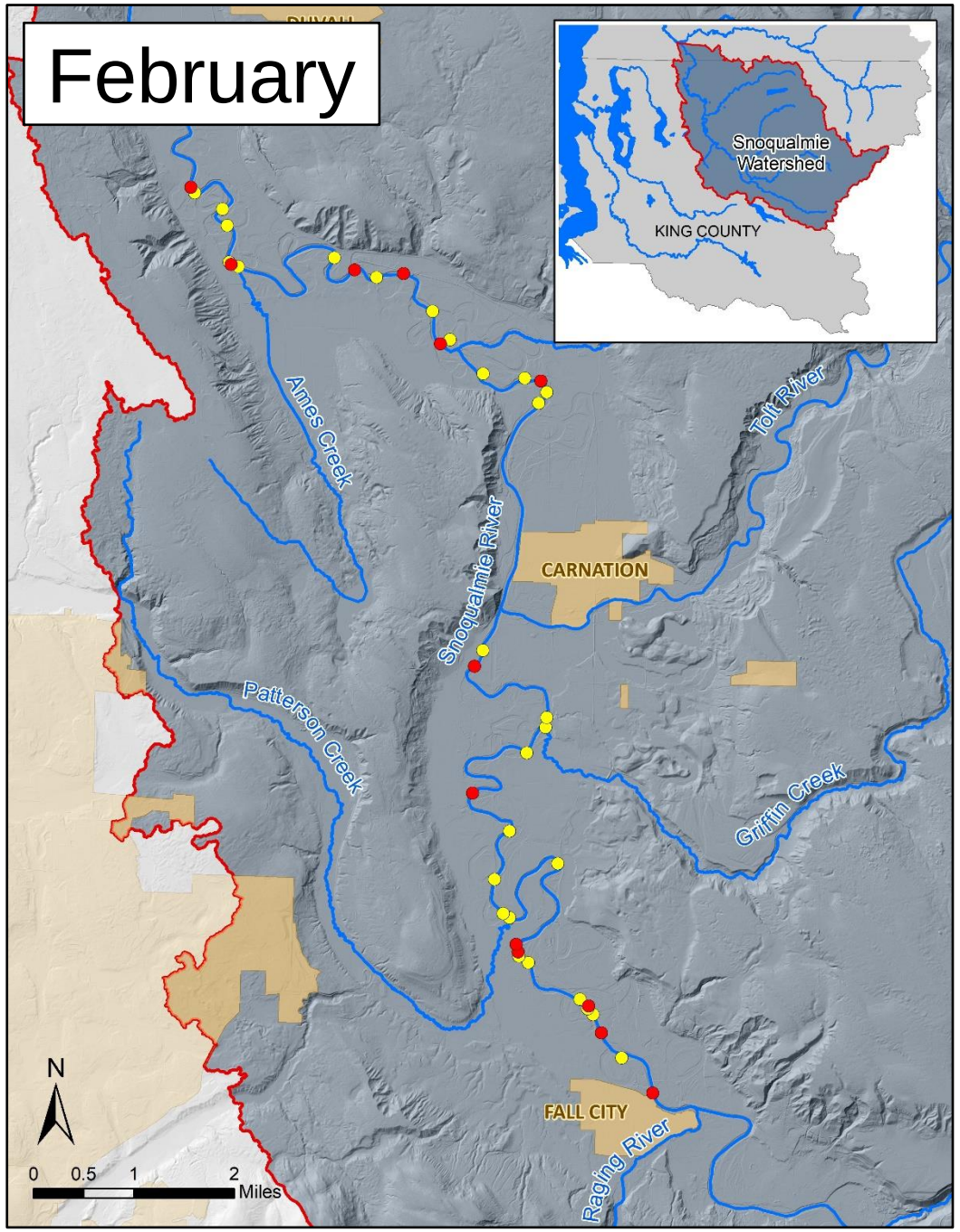

December
Snoqualmie Watershed
KING COUNTY
Ames Creek
Snoqualmie River
Tolt River
CARNATION
Patterson Creek
Griffin Creek
FALL CITY
Raging River
N
0 0.5 1 2 Miles

20 30 40 50 60 70 80 90 100 110 120 130

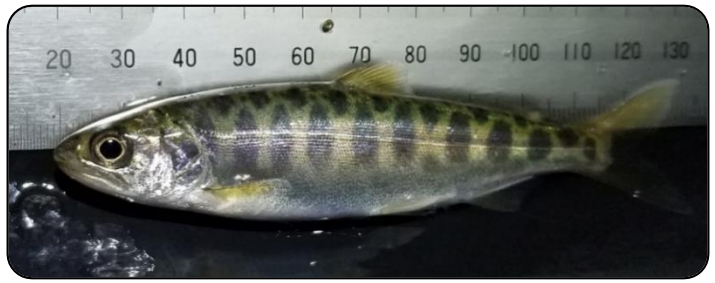
Photo: Colin Butler (Watershed Science and Engineering)

Video: Colin Butler (Watershed Science and Engineering)

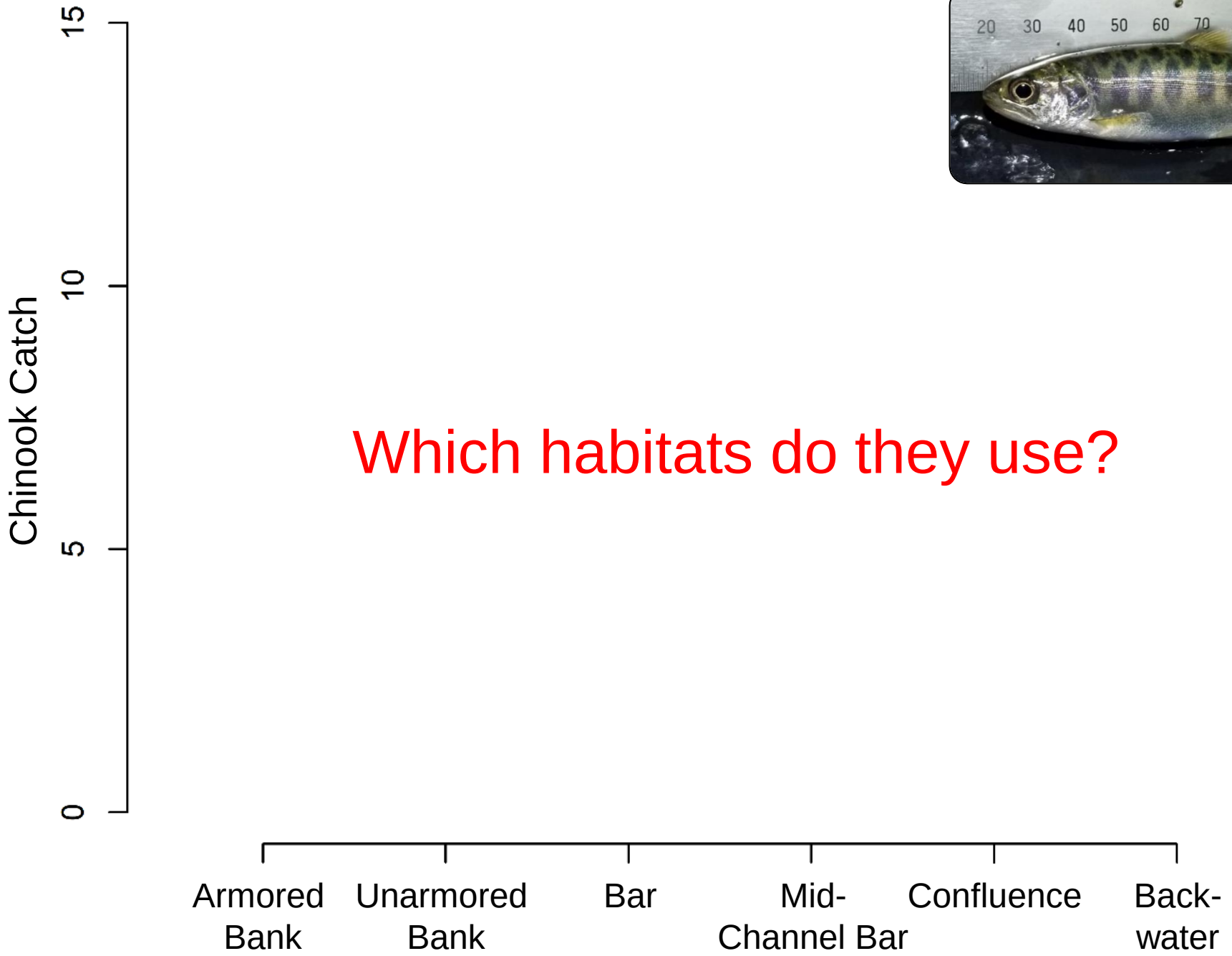

February
Snoqualmie Watershed
KING COUNTY
Ames Creek
Snoqualmie River
Tolt River
CARNATION
Patterson Creek
Griffin Creek
FALL CITY
Raging River
N
0 0.5 1 2
Miles

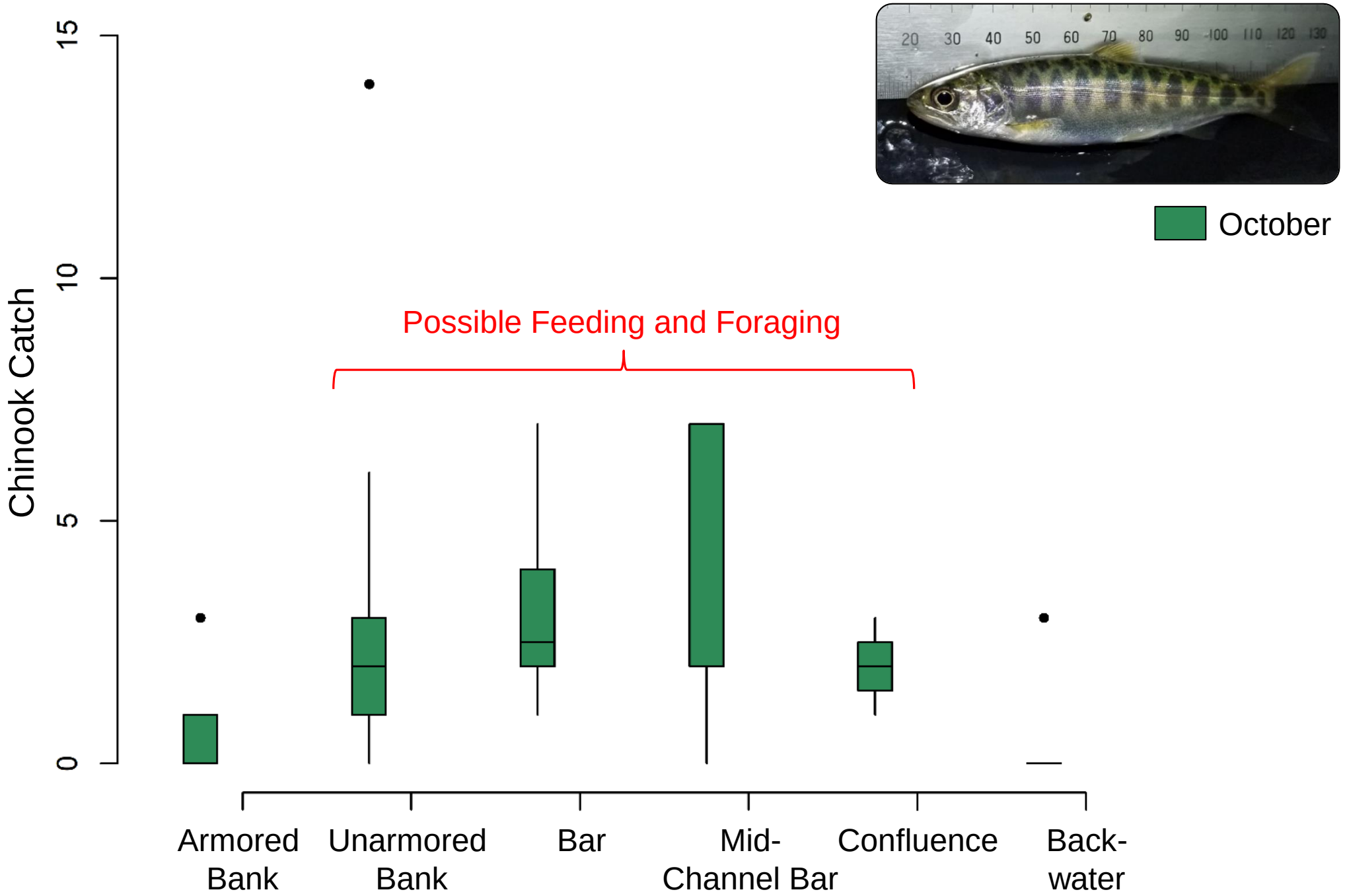

February
Snoqualmie Watershed
KING COUNTY
Ames Creek
Snoqualmie River
Tolt River
CARNATION
Patterson Creek
Griffin Creek
FALL CITY
Raging River
N
0 0.5 1 2 Miles

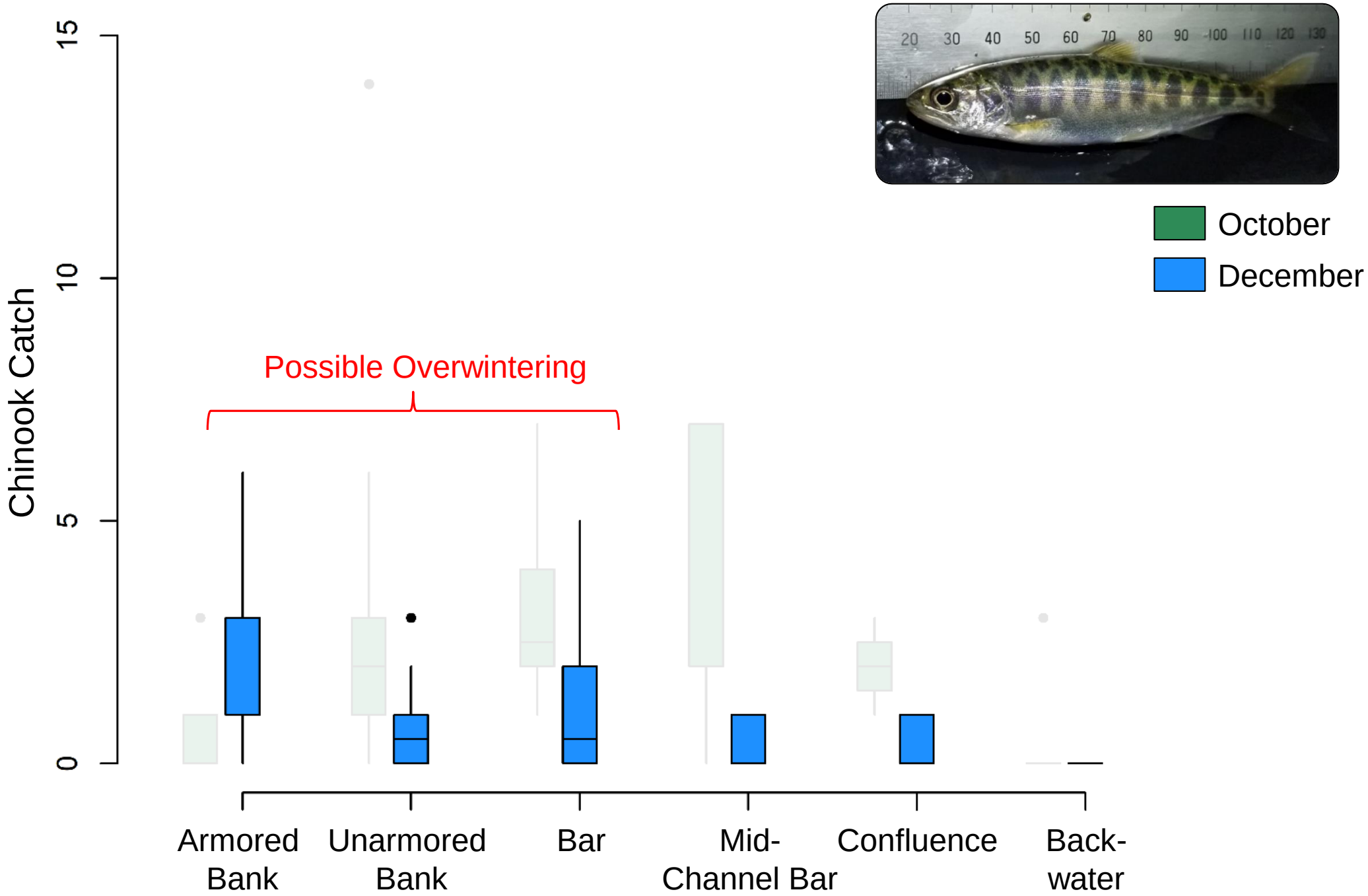
20 30 40 50 60 70 80 90 100 110 120 130

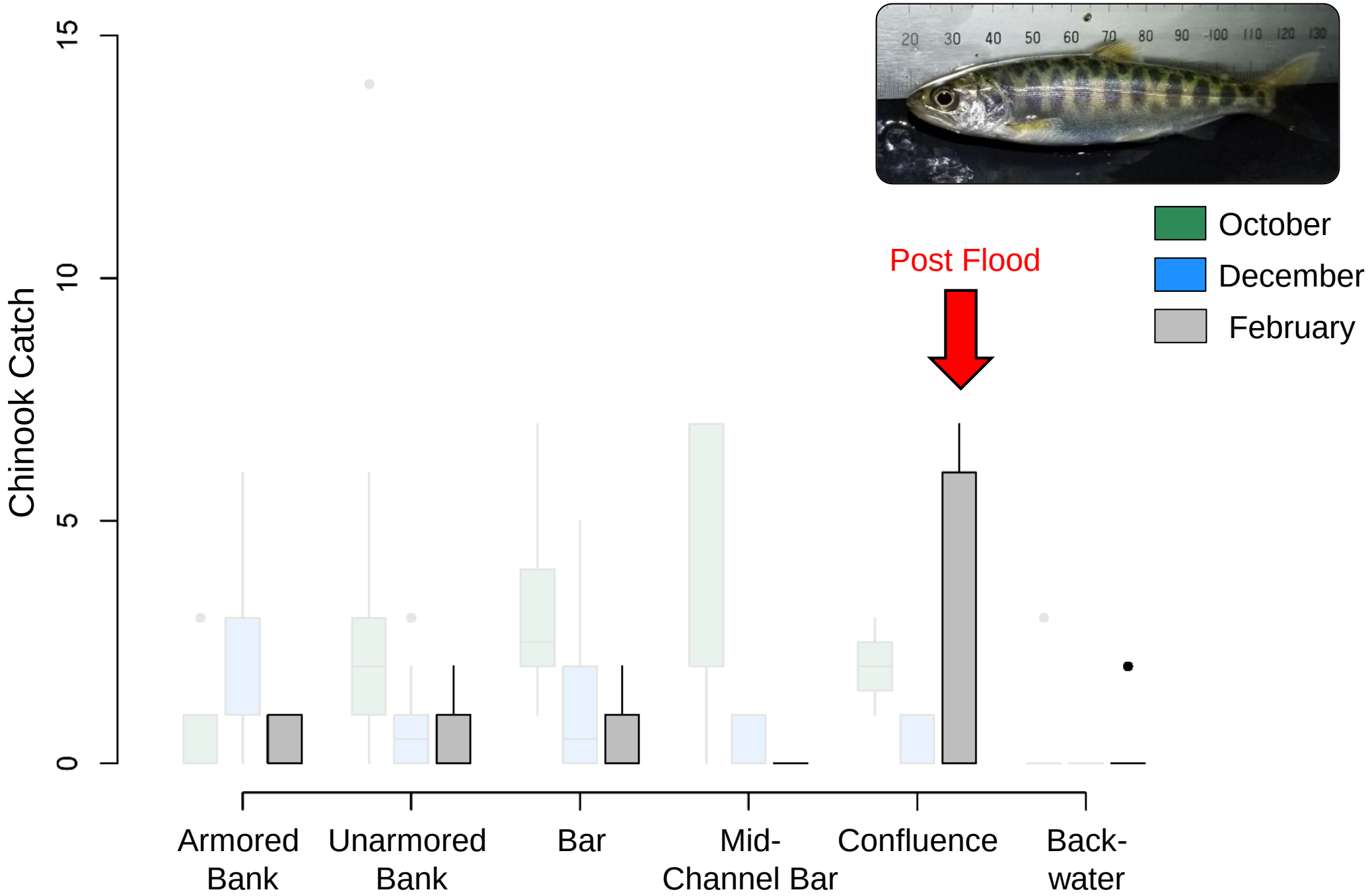


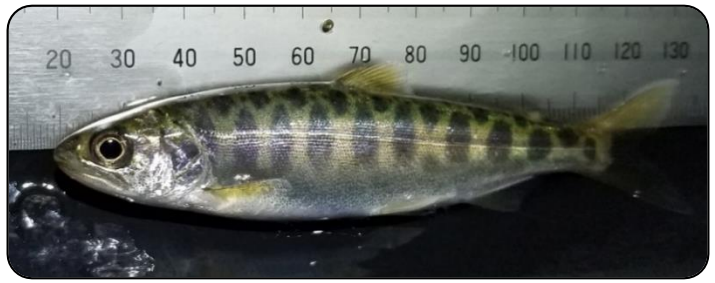
Which habitats do they use?



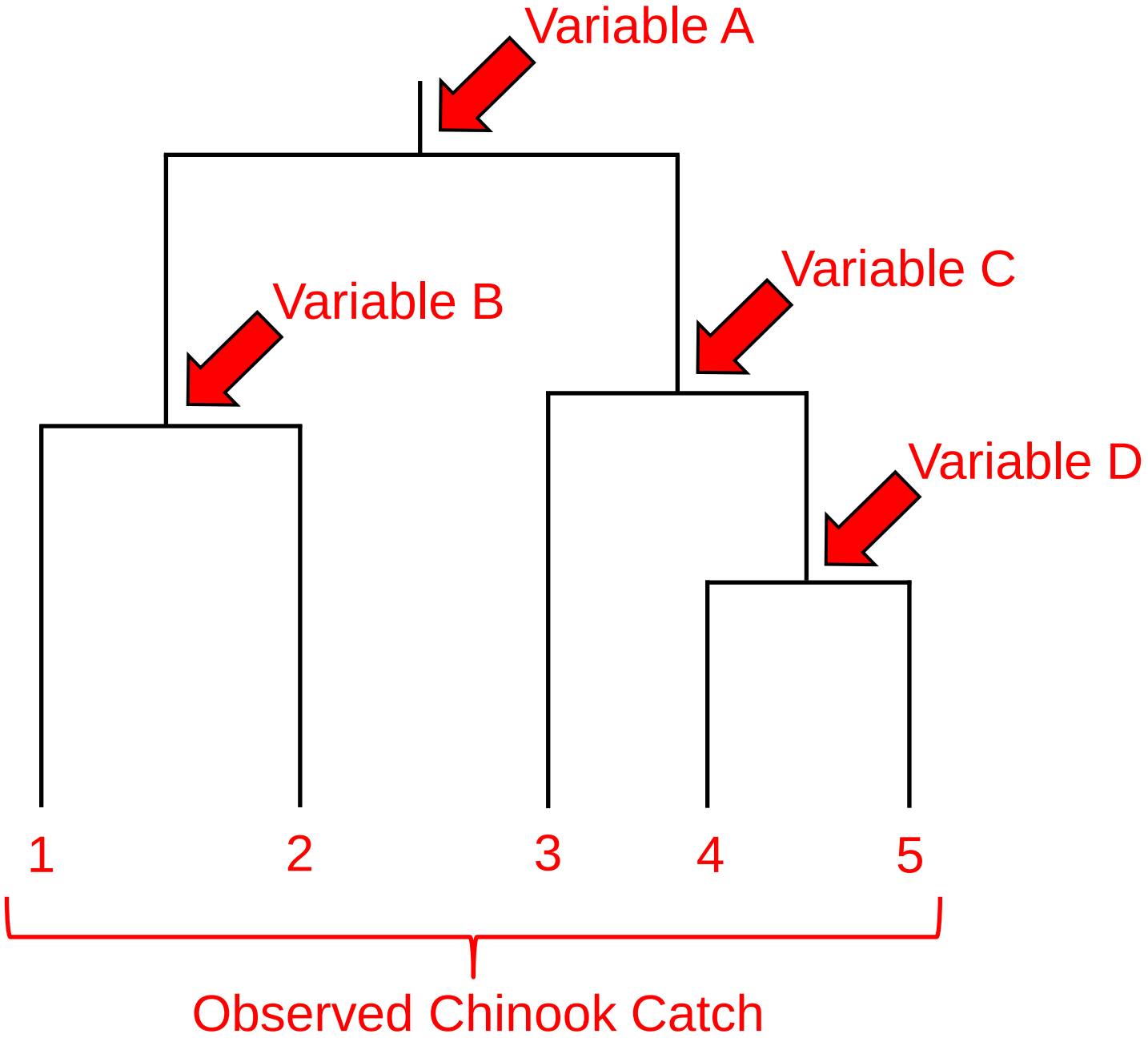

Chinook Catch
0
5
10
15
Possible Feeding and Foraging
Armored Bank
Unarmored Bank
Bar
Mid-Channel Bar
Confluence
Back-water
October

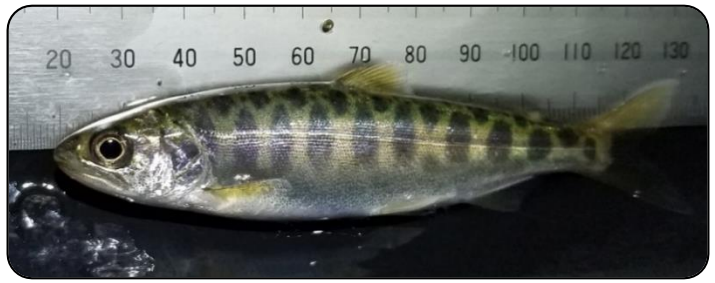

Chinook Catch
0
5
10
15
Possible Overwintering
Armored Bank
Unarmored Bank
Bar
Mid-Channel Bar
Confluence
Back-water
October
December

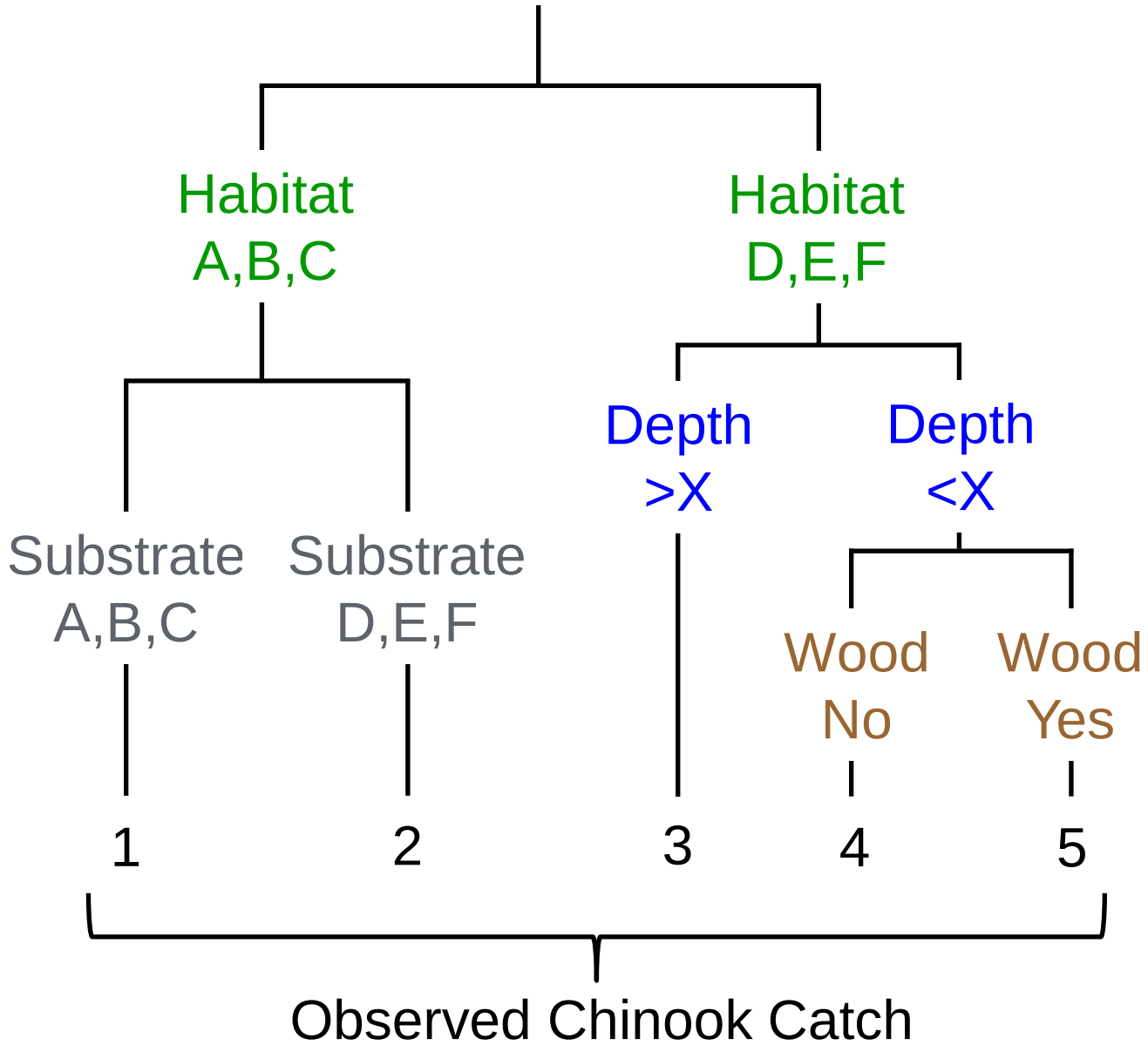

Chinook Catch
0
5
10
15
Post Flood
October
December
February
Armored Bank
Unarmored Bank
Bar
Mid-Channel Bar
Confluence
Back-water

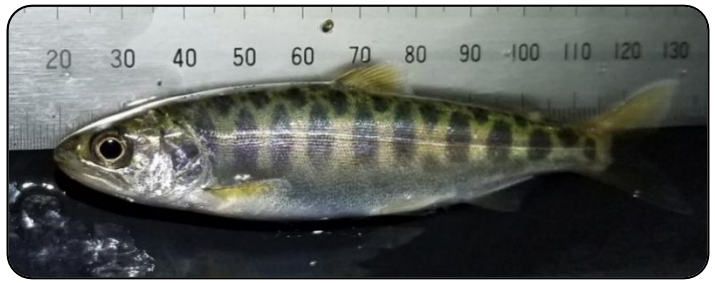


What are potential explanatory variables and habitat attributes?

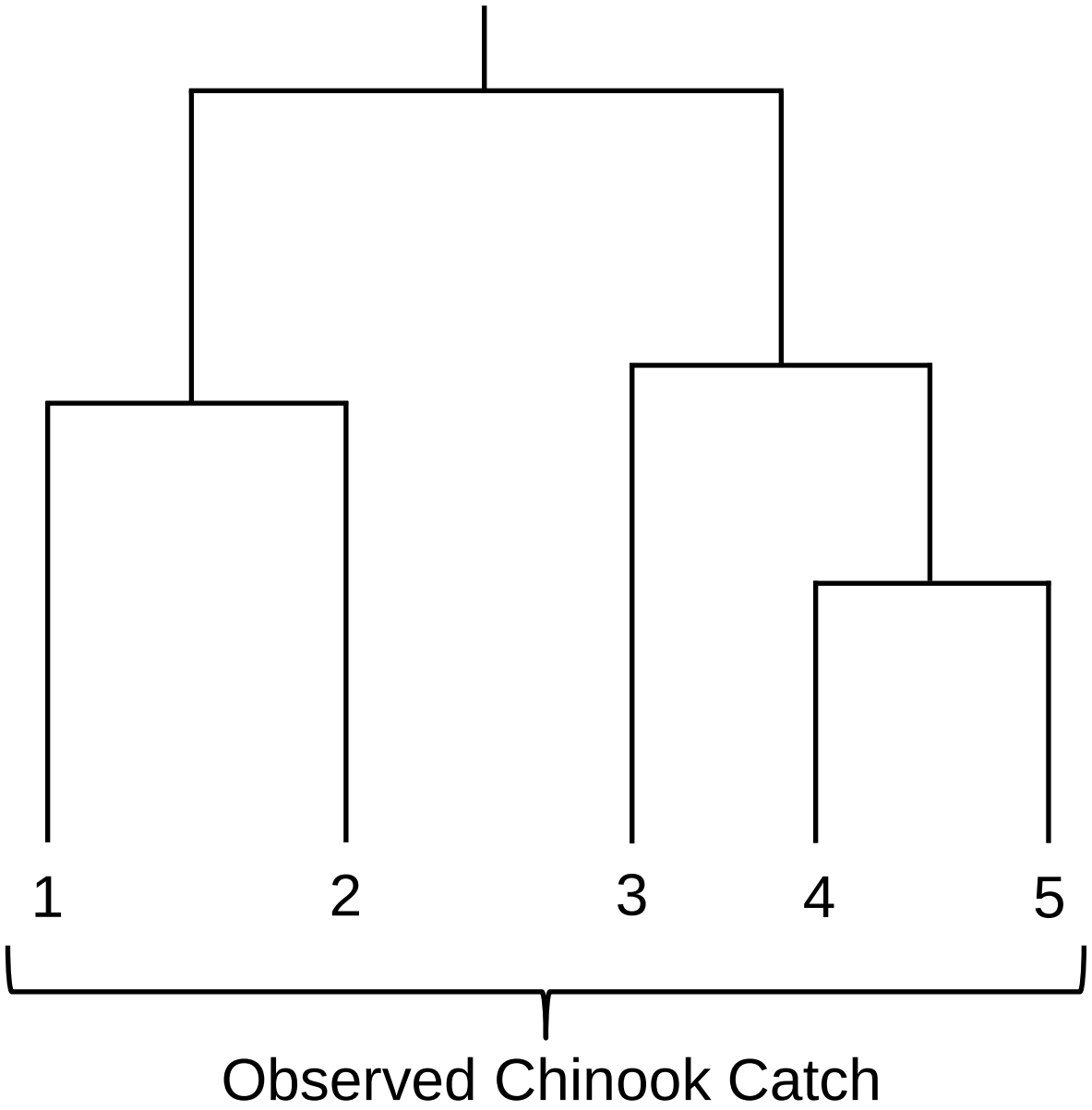

Variable A
Variable B
Variable C
Variable D
1
2
3
4
5
Observed Chinook Catch

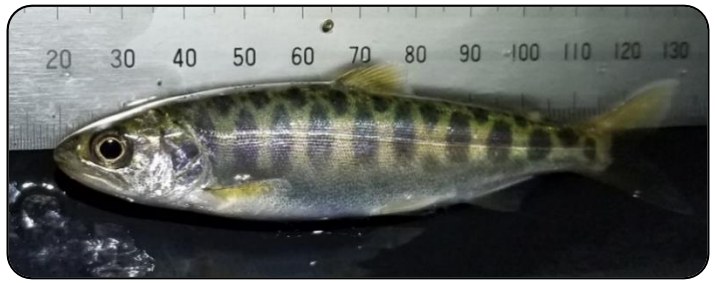

20 30 40 50 60 70 80 90 100 110 120 130



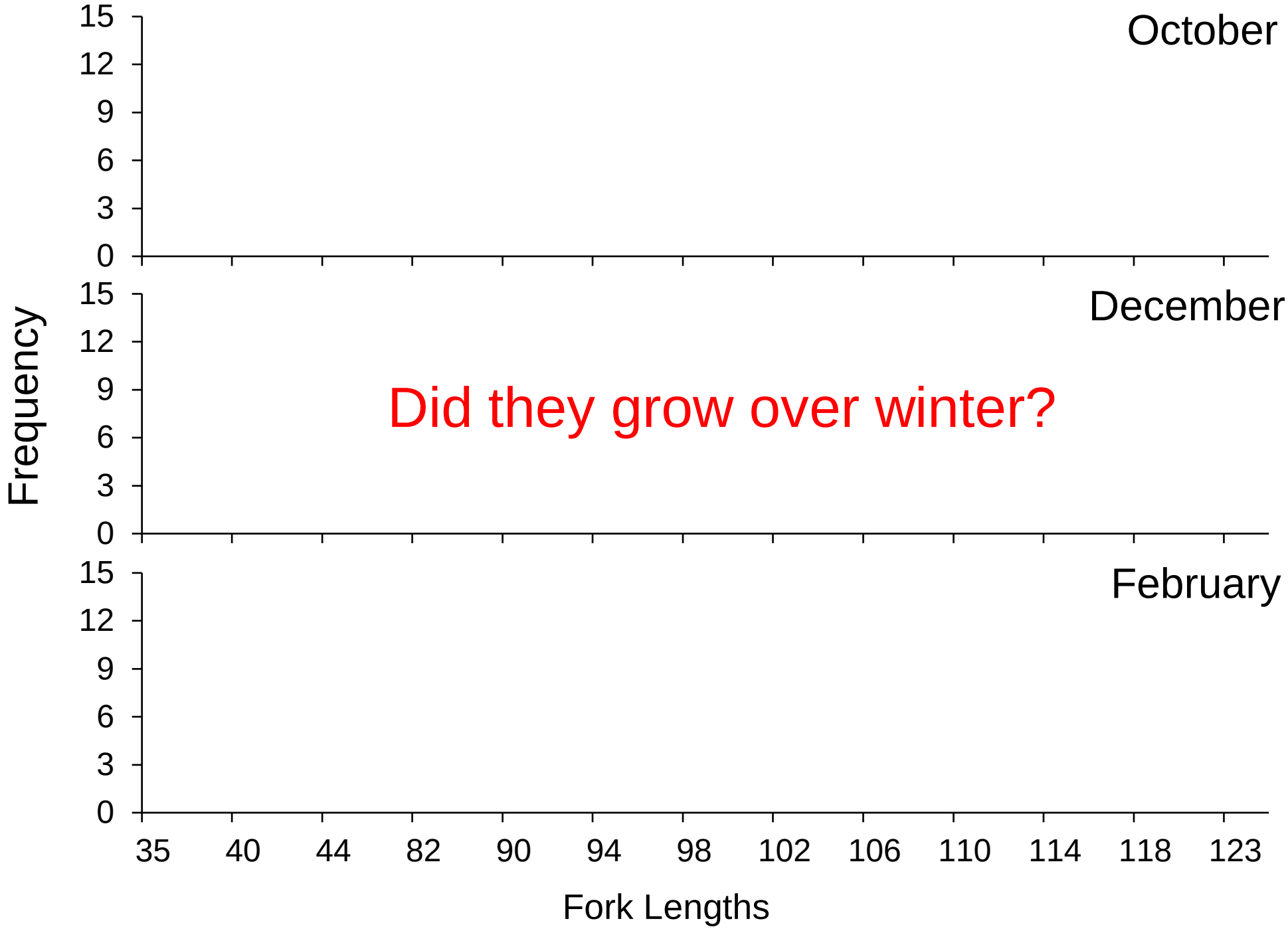


- Month
- Reach
- Habitat type
- Edge habitat width
- Edge habitat depth
- Substrate
- Temperature
- Large wood presence

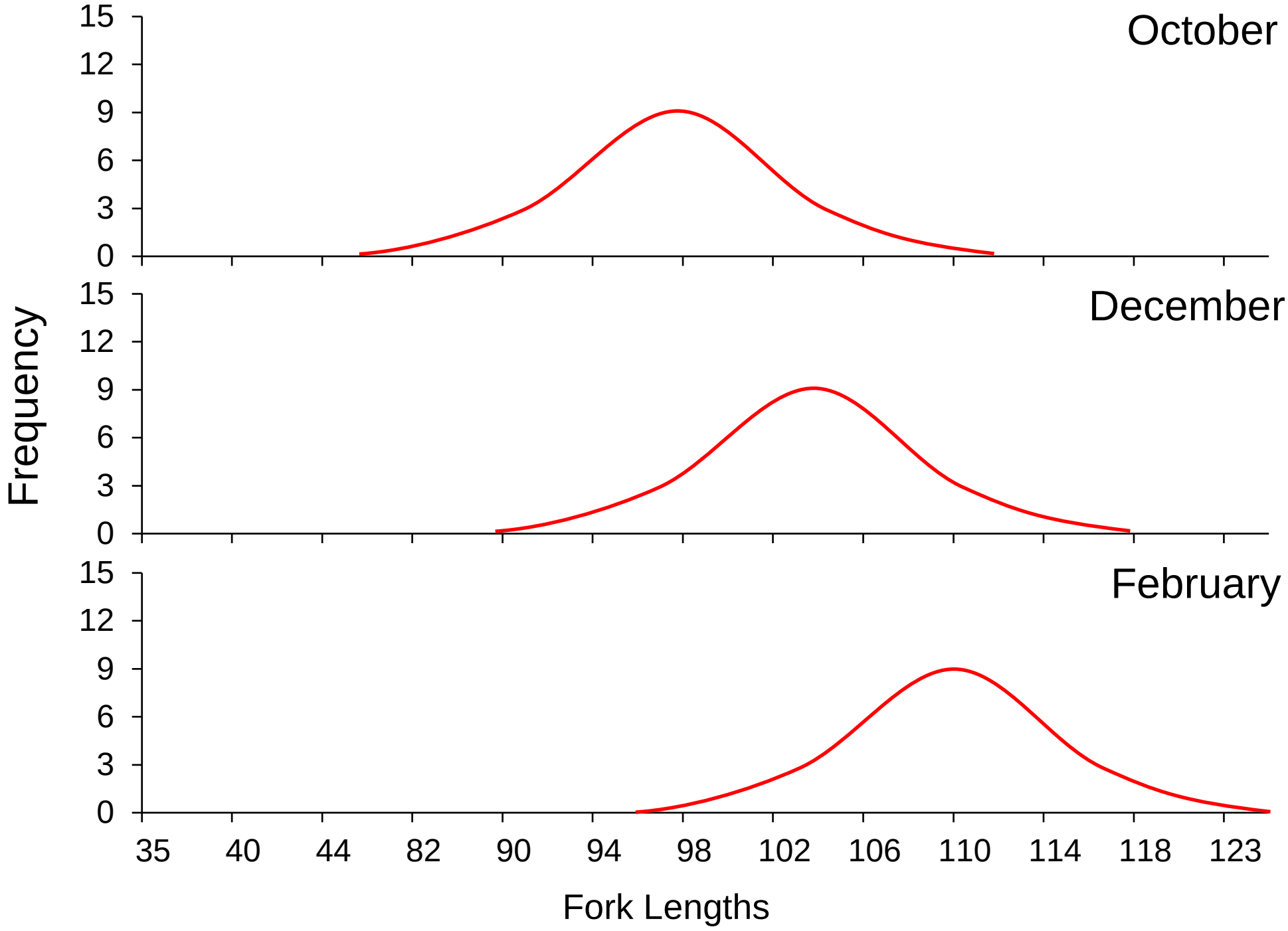


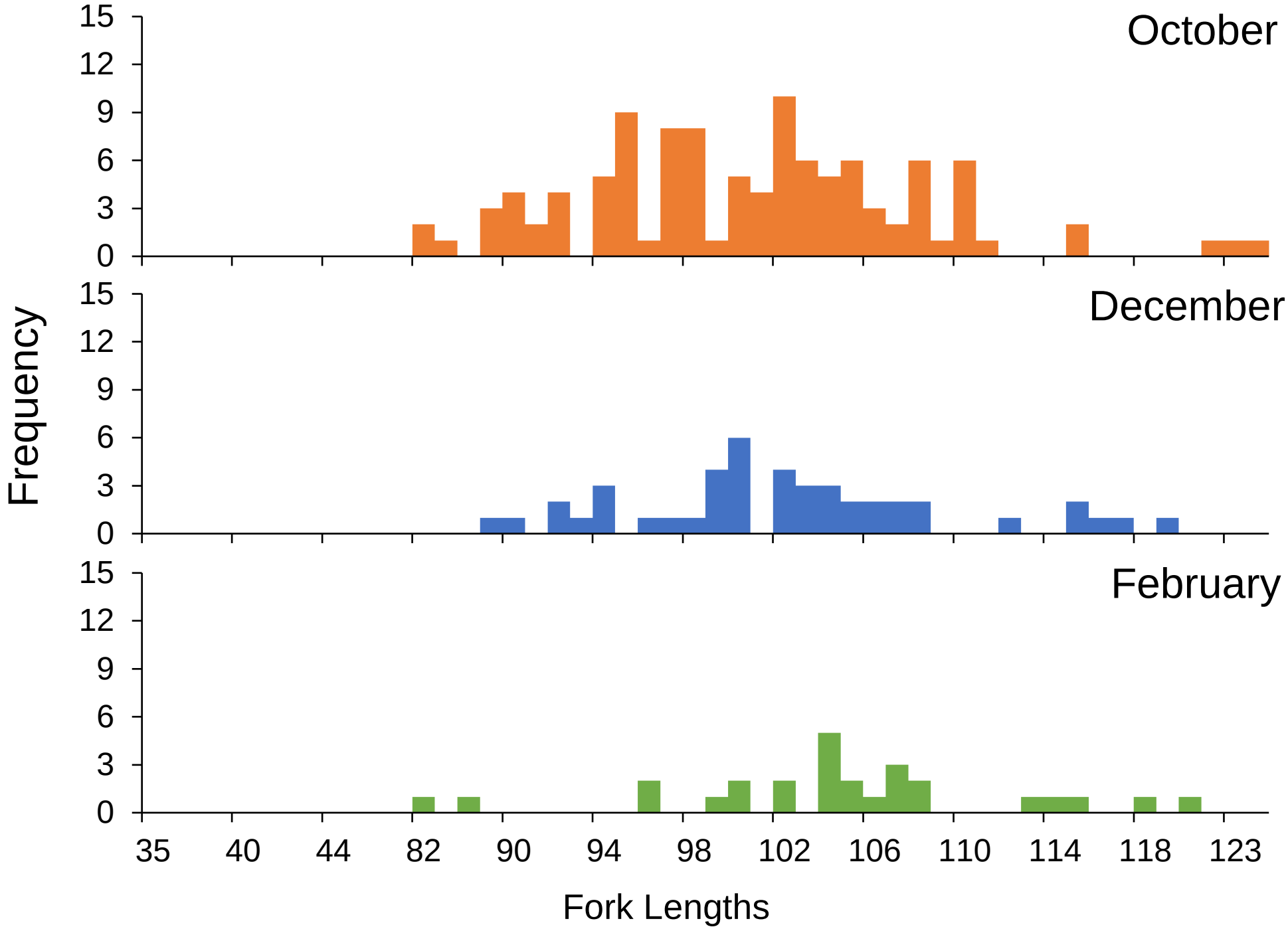


- Month
- Reach
- Habitat type
- Edge habitat width
- Edge habitat depth
- Substrate
- Temperature
- Large wood presence



Did they grow over winter?

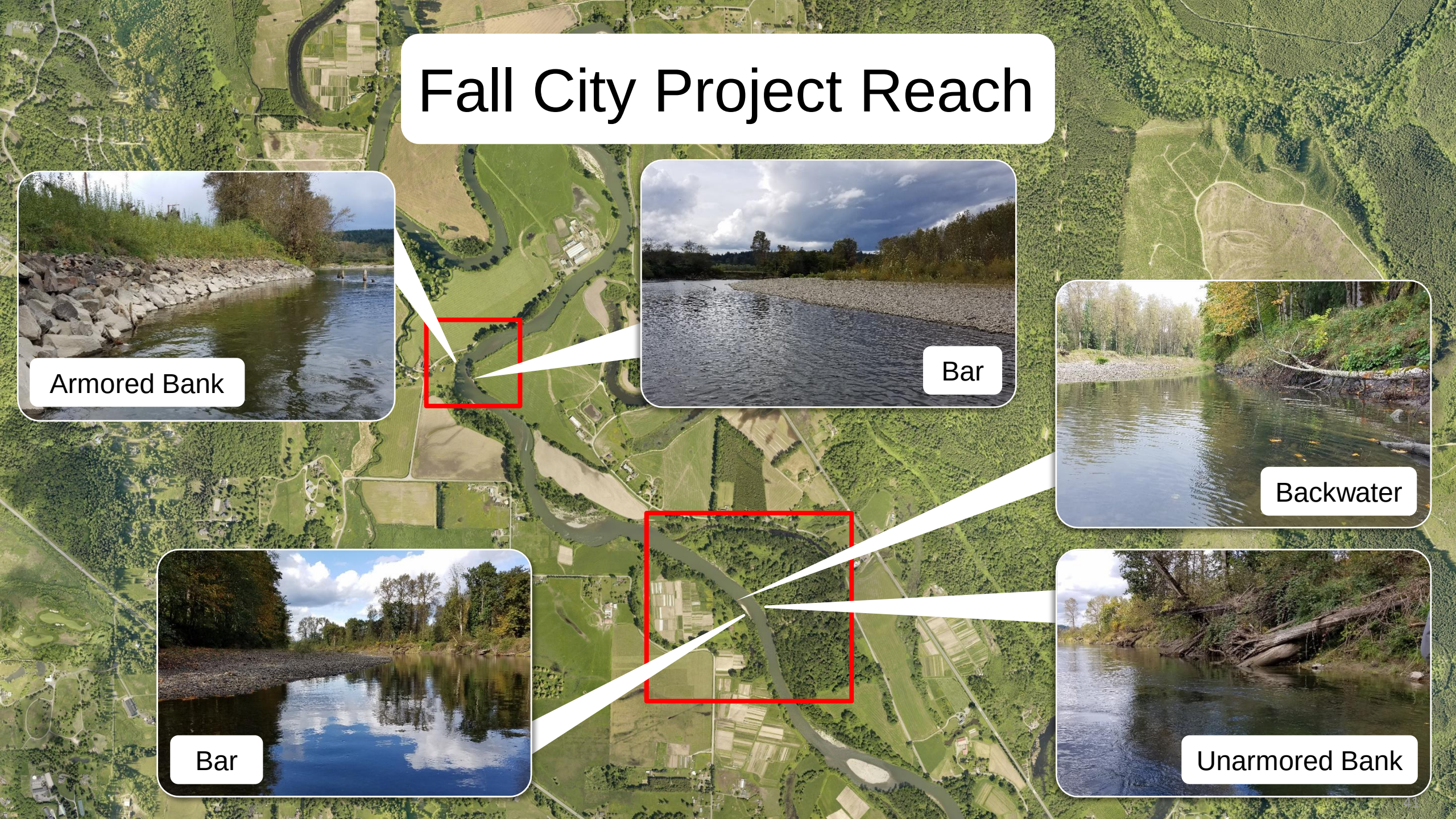

October
December
February
Frequency
15
12
9
6
3
0
35
40
44
82
90
94
98
102
106
110
114
118
123
Fork Lengths

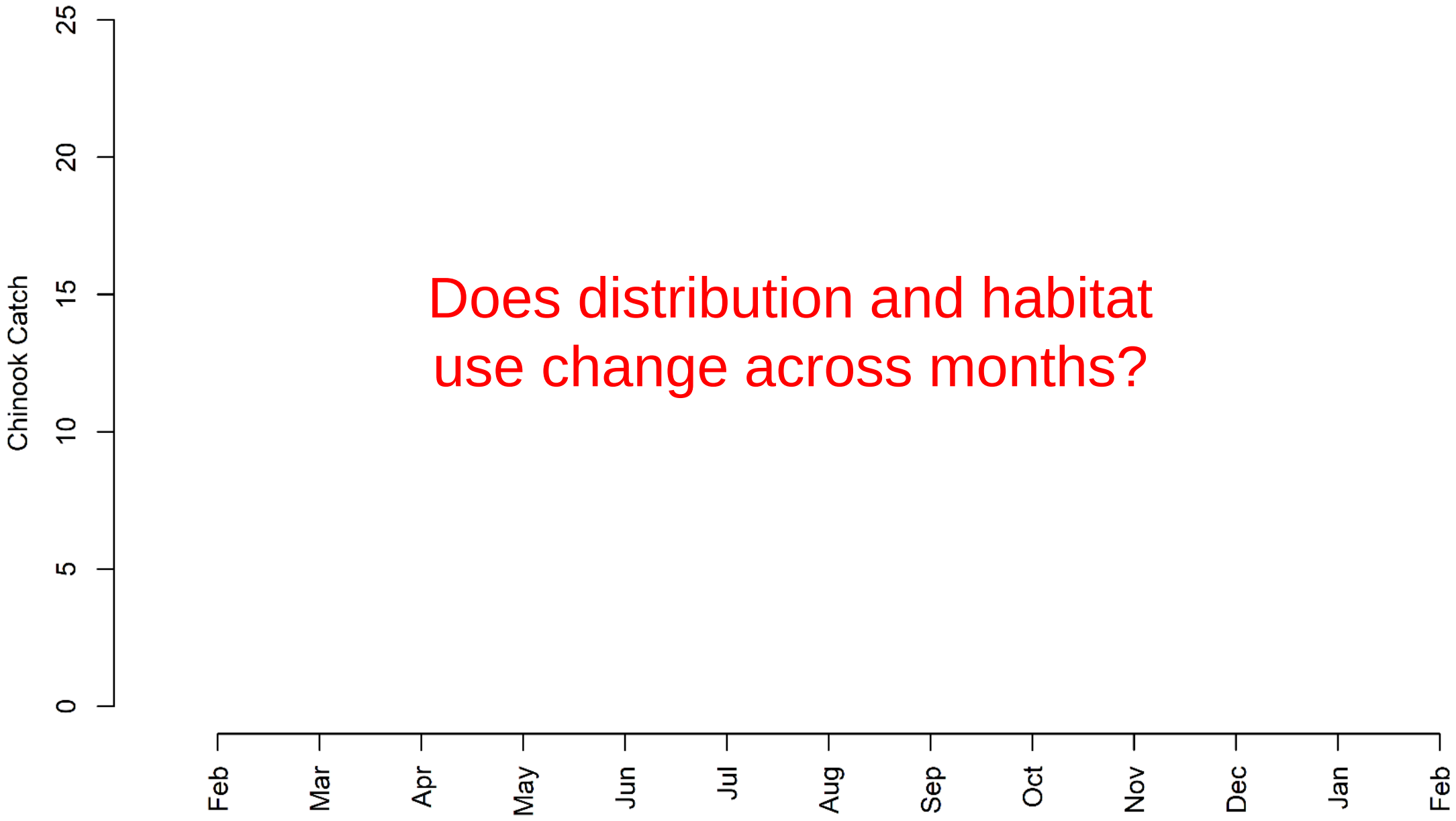

October
December
February
Frequency
15
12
9
6
3
0
35
40
44
82
90
94
98
102
106
110
114
118
123
Fork Lengths

Does distribution and habitat use change across months?

Fall City Project Reach

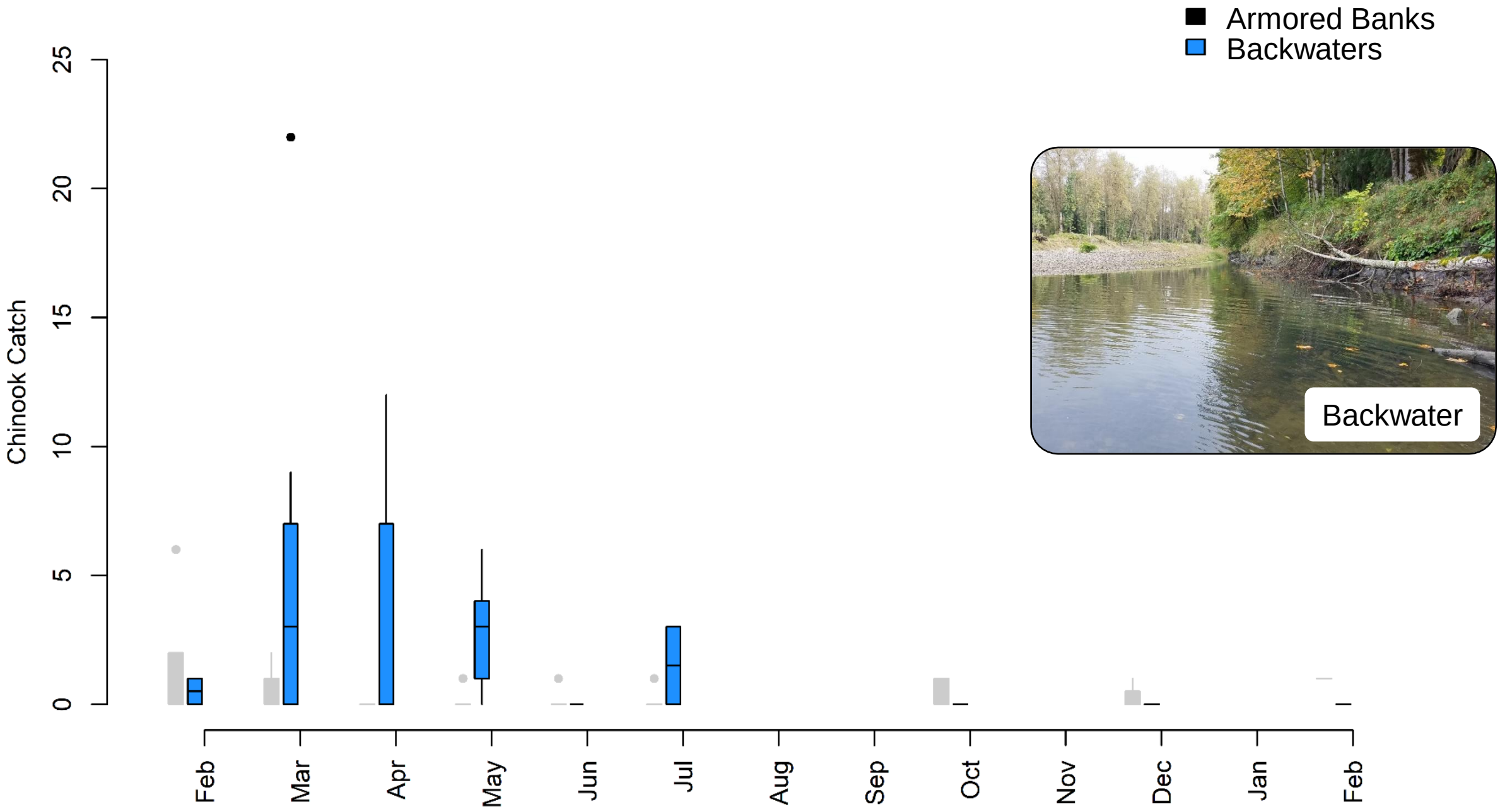
Fall City Project Reach

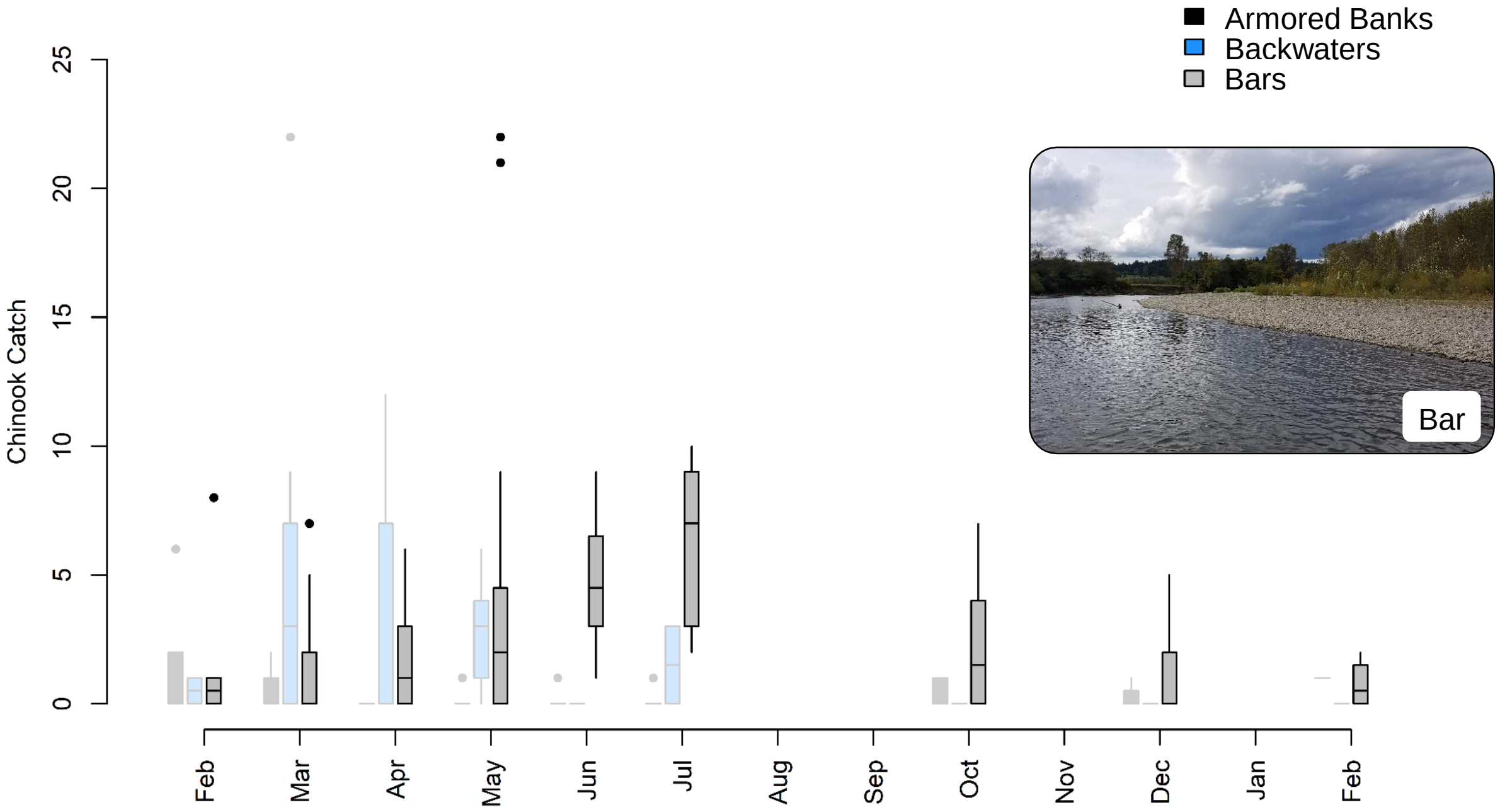


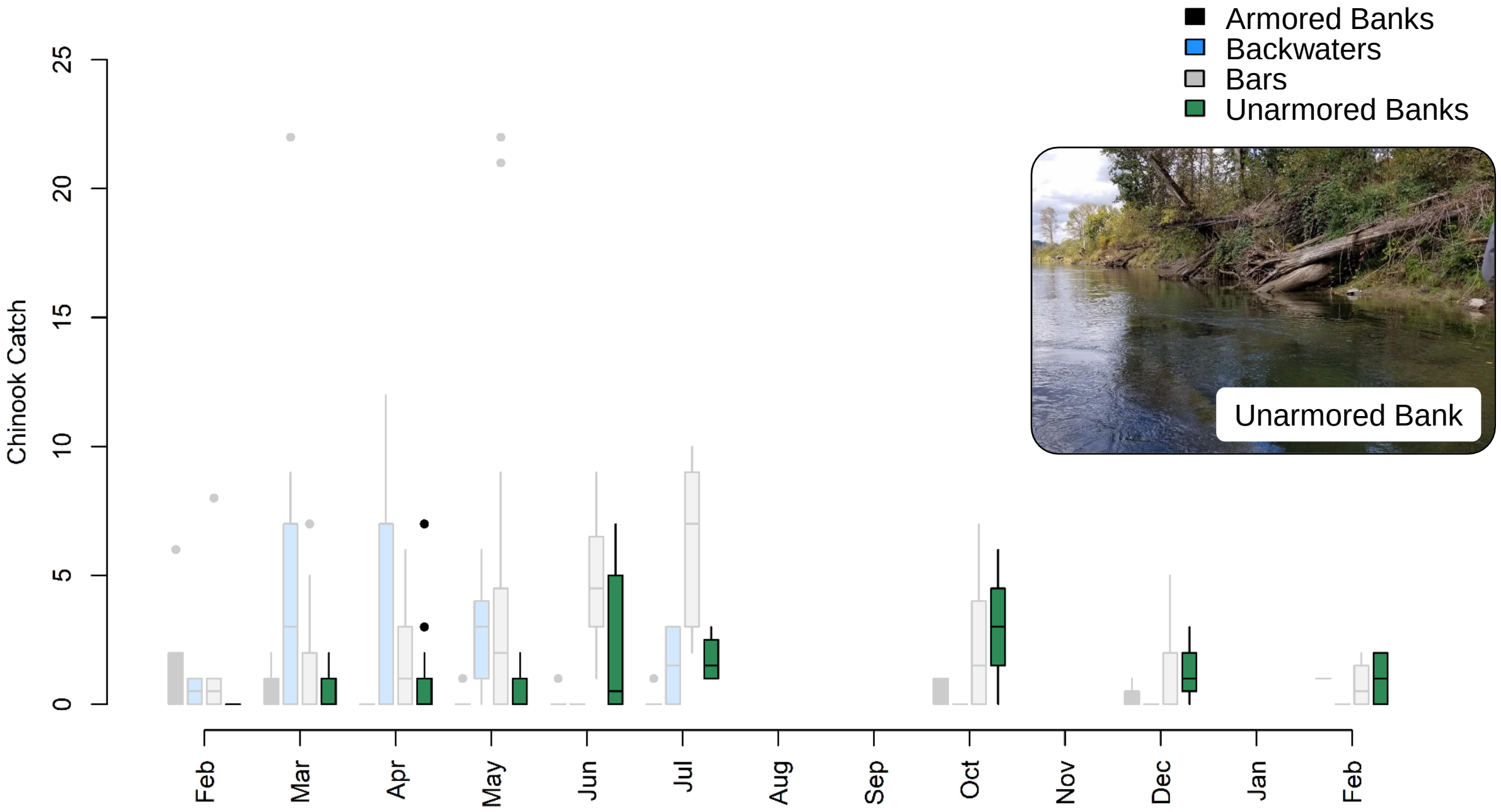


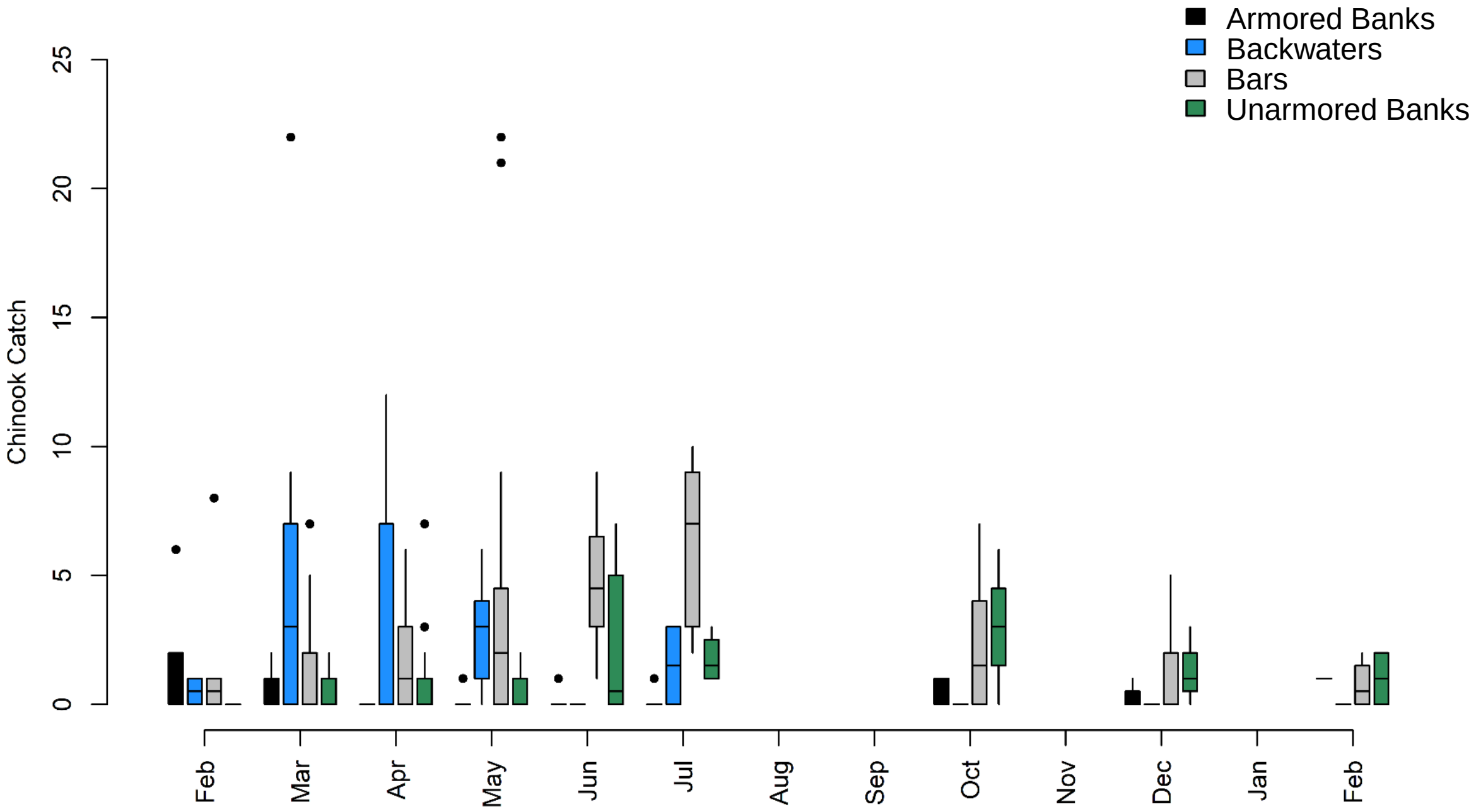
Does distribution and habitat use change across months?

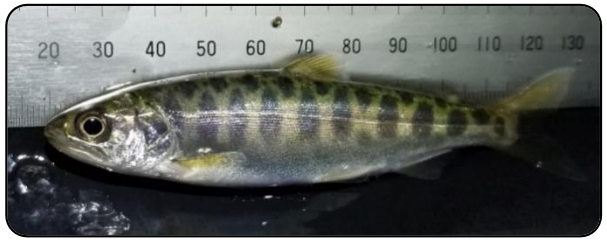
Armored Banks
Chinook Catch
0
5
10
15
20
25
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Armored Bank


Armored Banks
Backwaters
Chinook Catch
0
5
10
15
20
25
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Backwater


Armored Banks
Backwaters
Bars
Chinook Catch
0
5
10
15
20
25
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Bar


Chinook Catch
0
5
10
15
20
25
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Armored Banks
Backwaters
Bars
Unarmored Banks
Unarmored Bank


Armored Banks
Backwaters
Bars
Unarmored Banks
Chinook Catch
0
5
10
15
20
25
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb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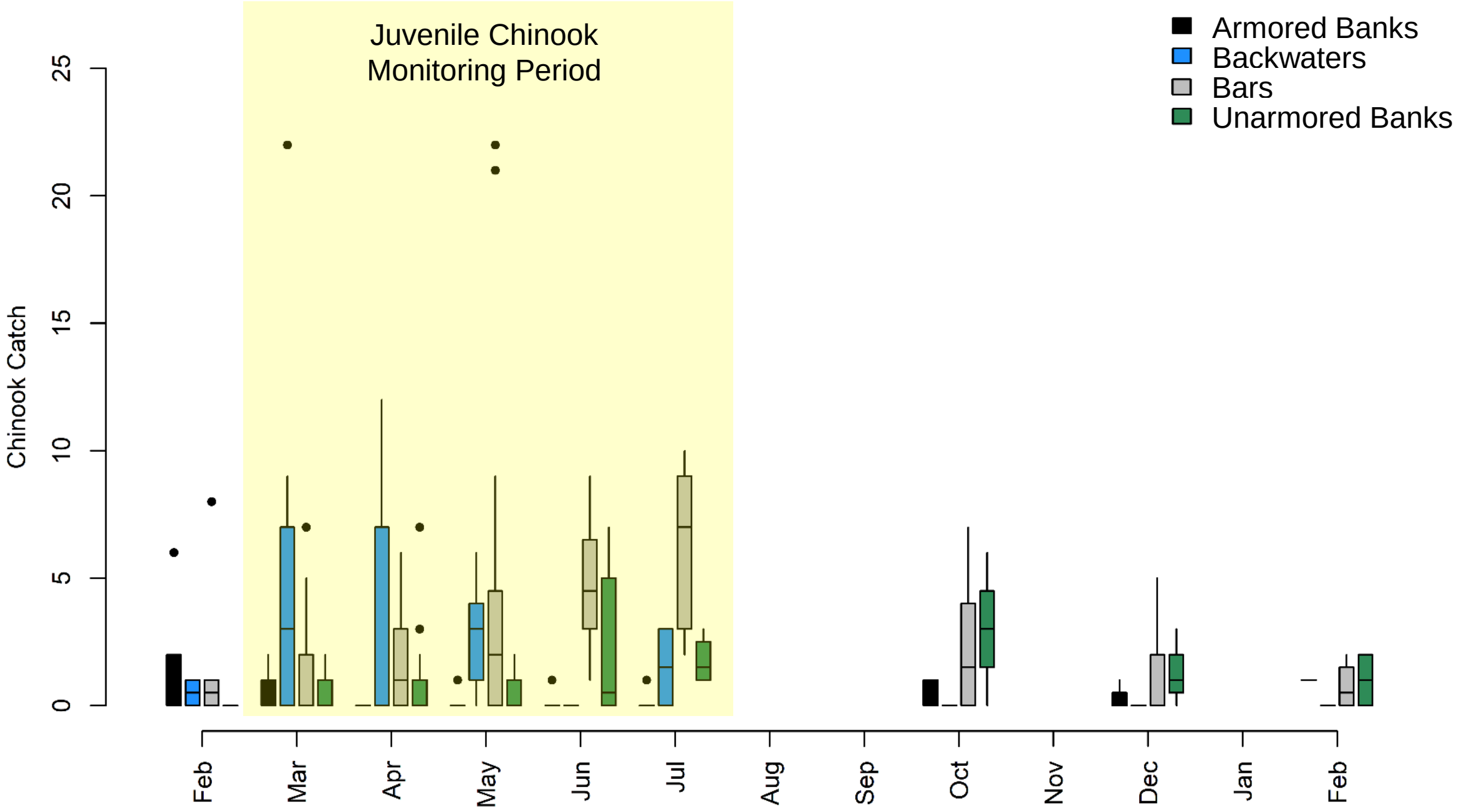
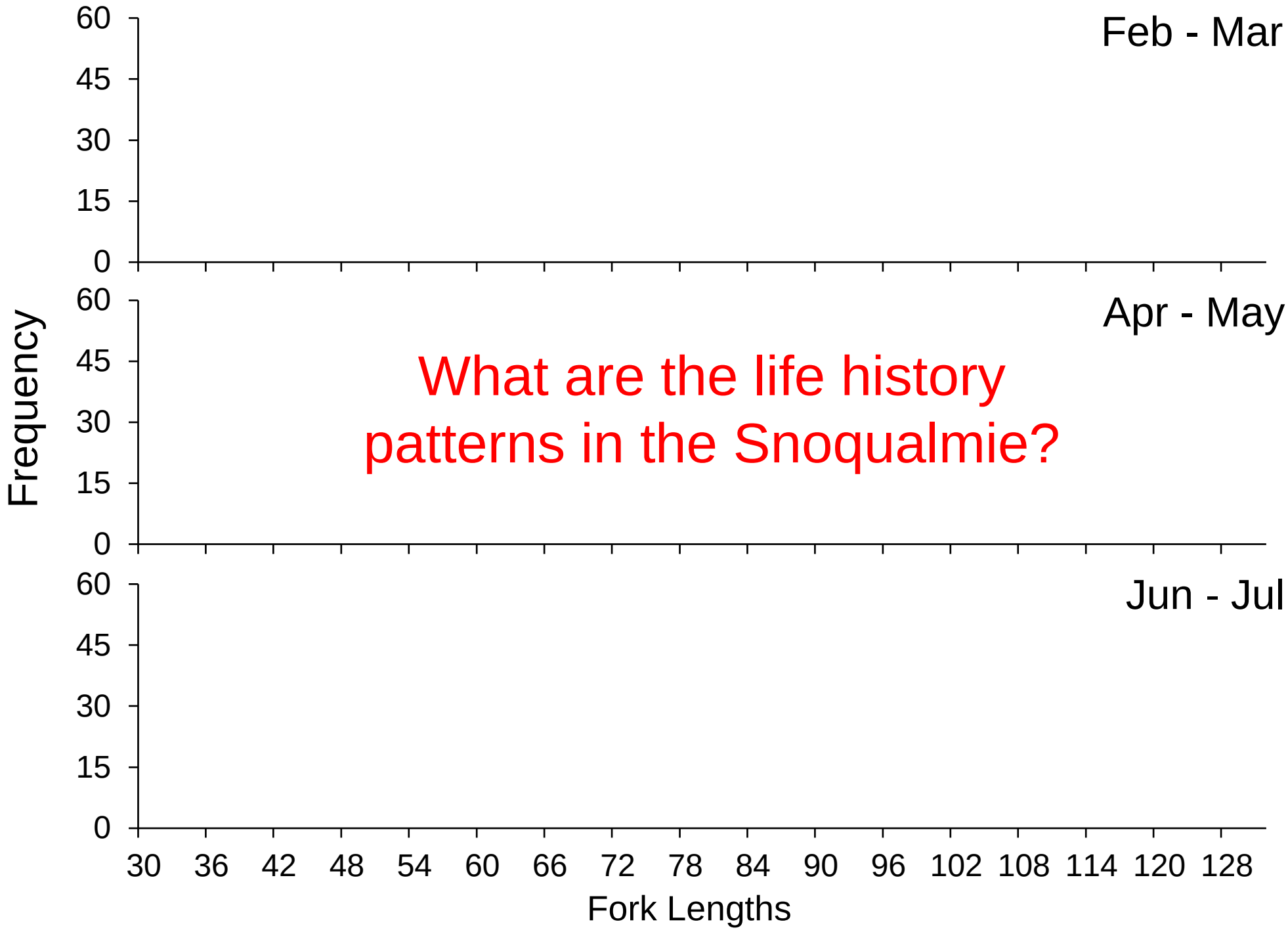
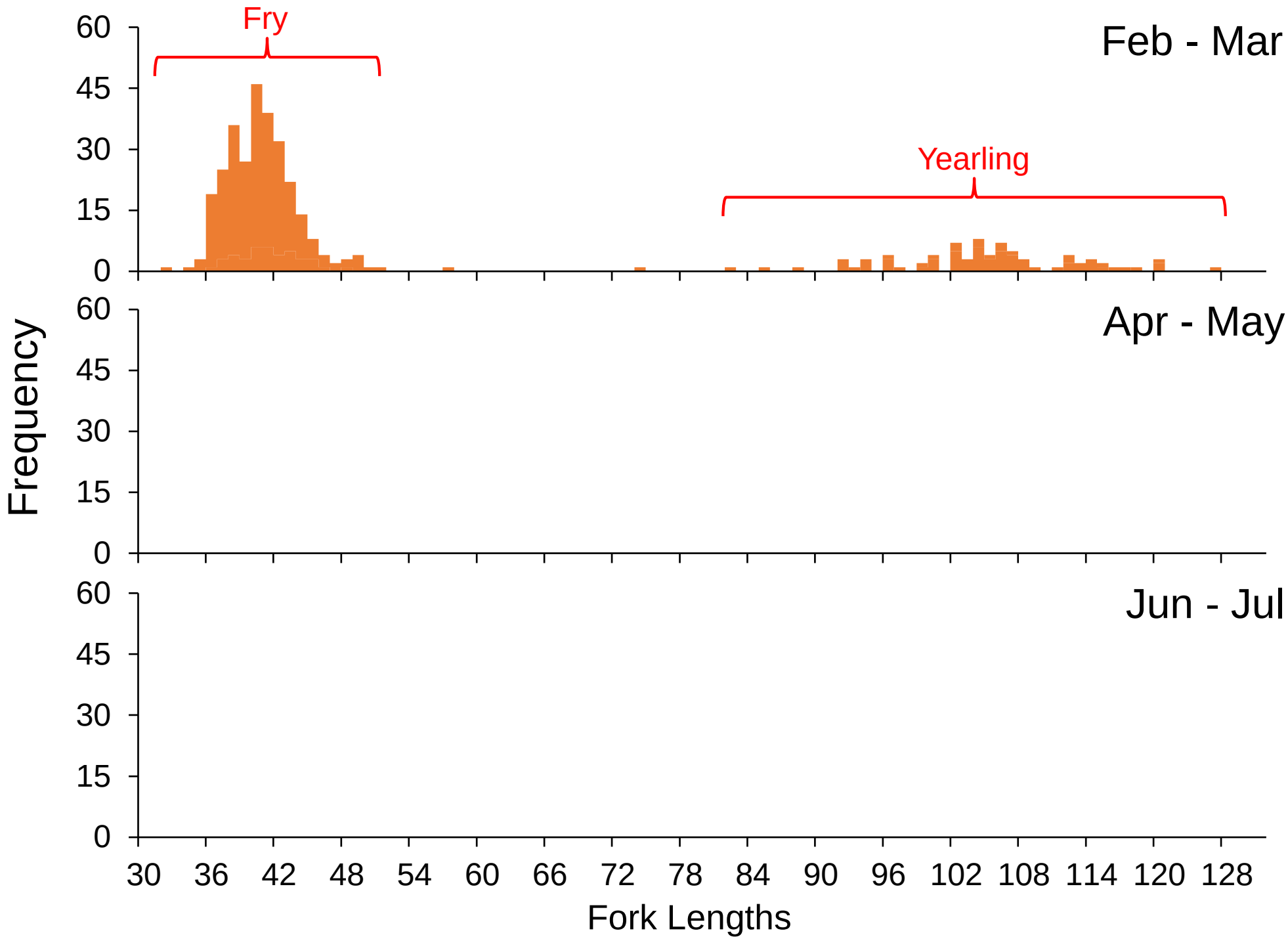
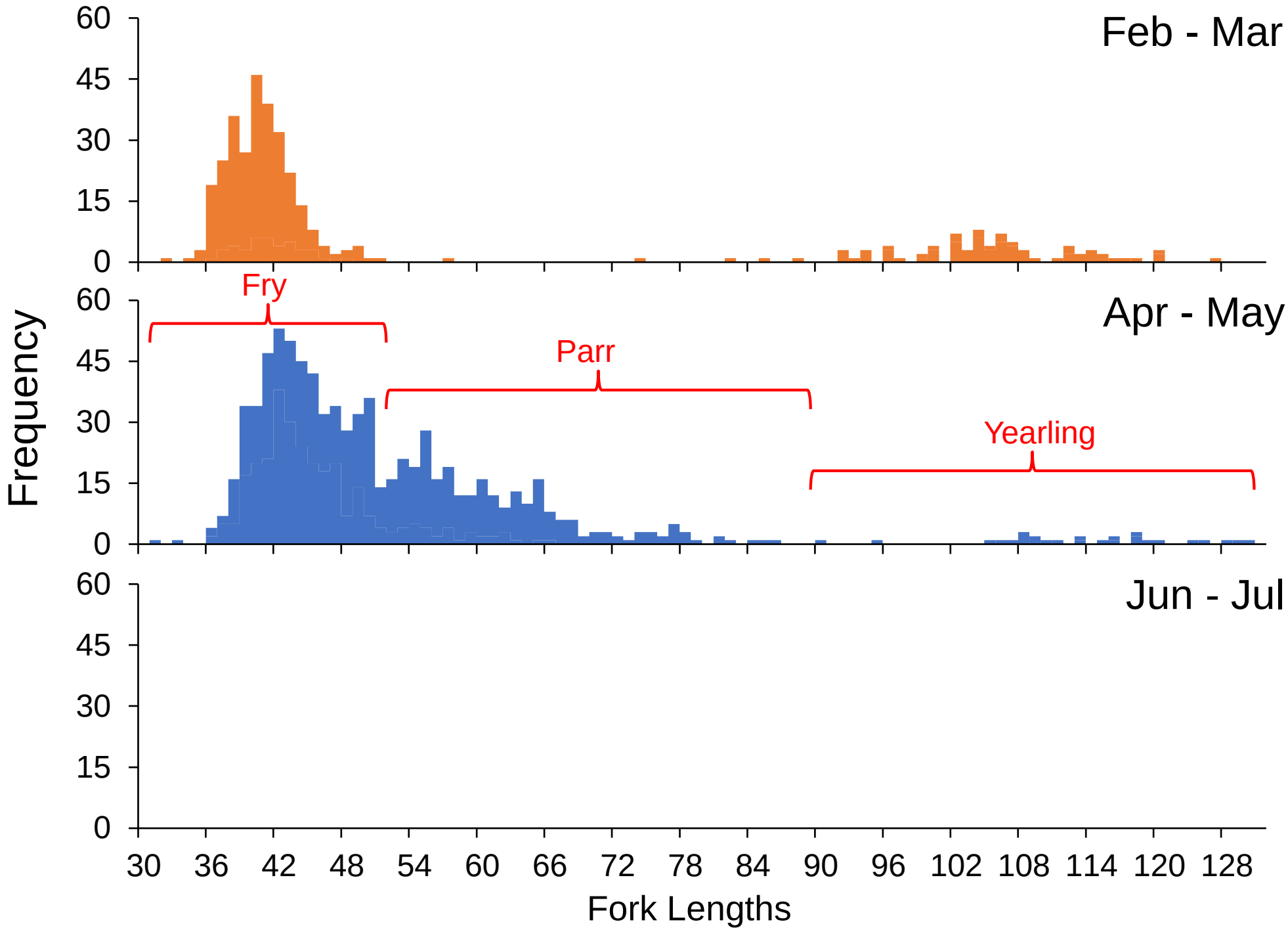
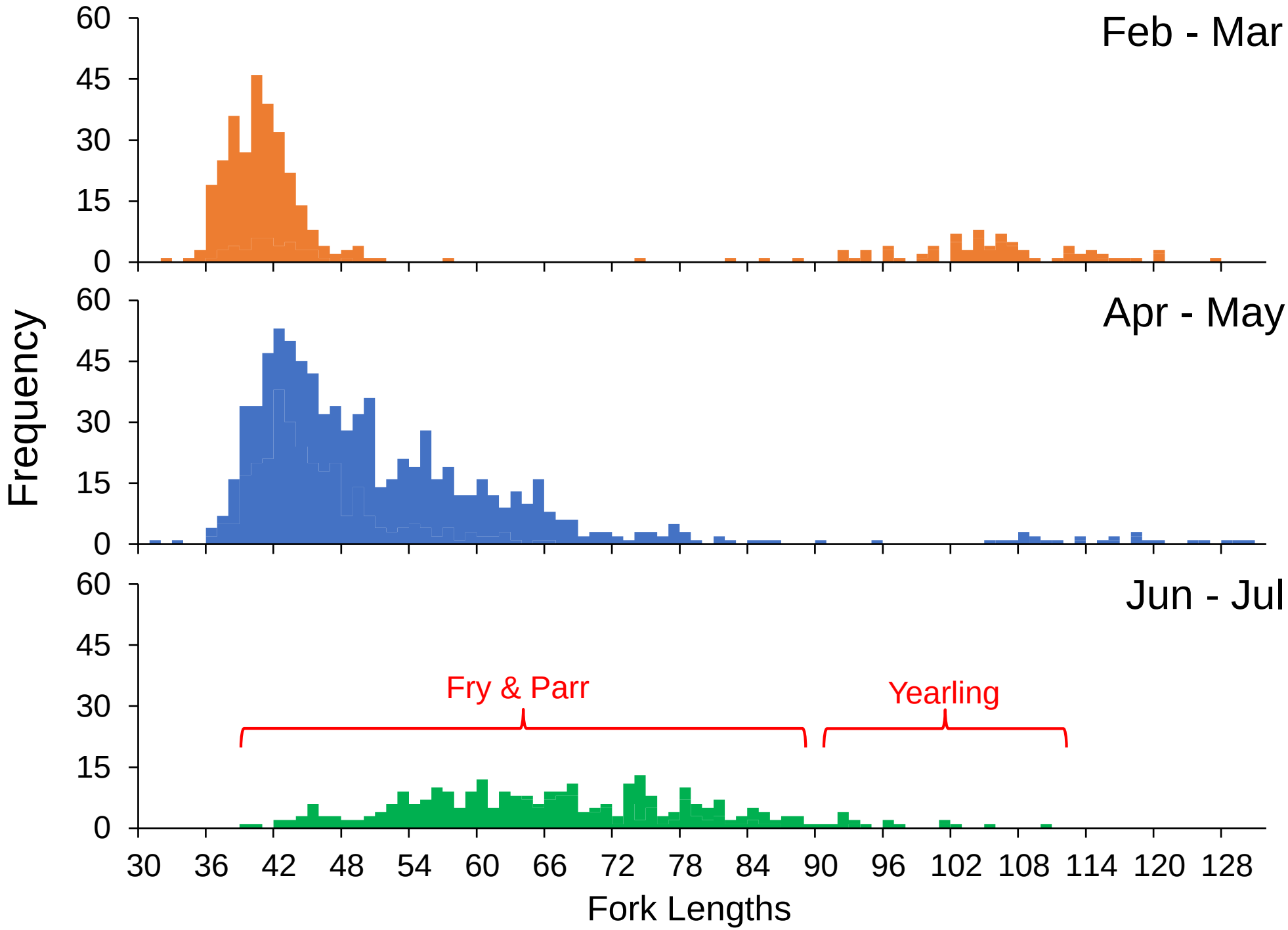

Juvenile Chinook
Monitoring Period
Armored Banks
Backwaters
Bars
Unarmored Banks
Chinook Catch
0
5
10
15
20
25
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb

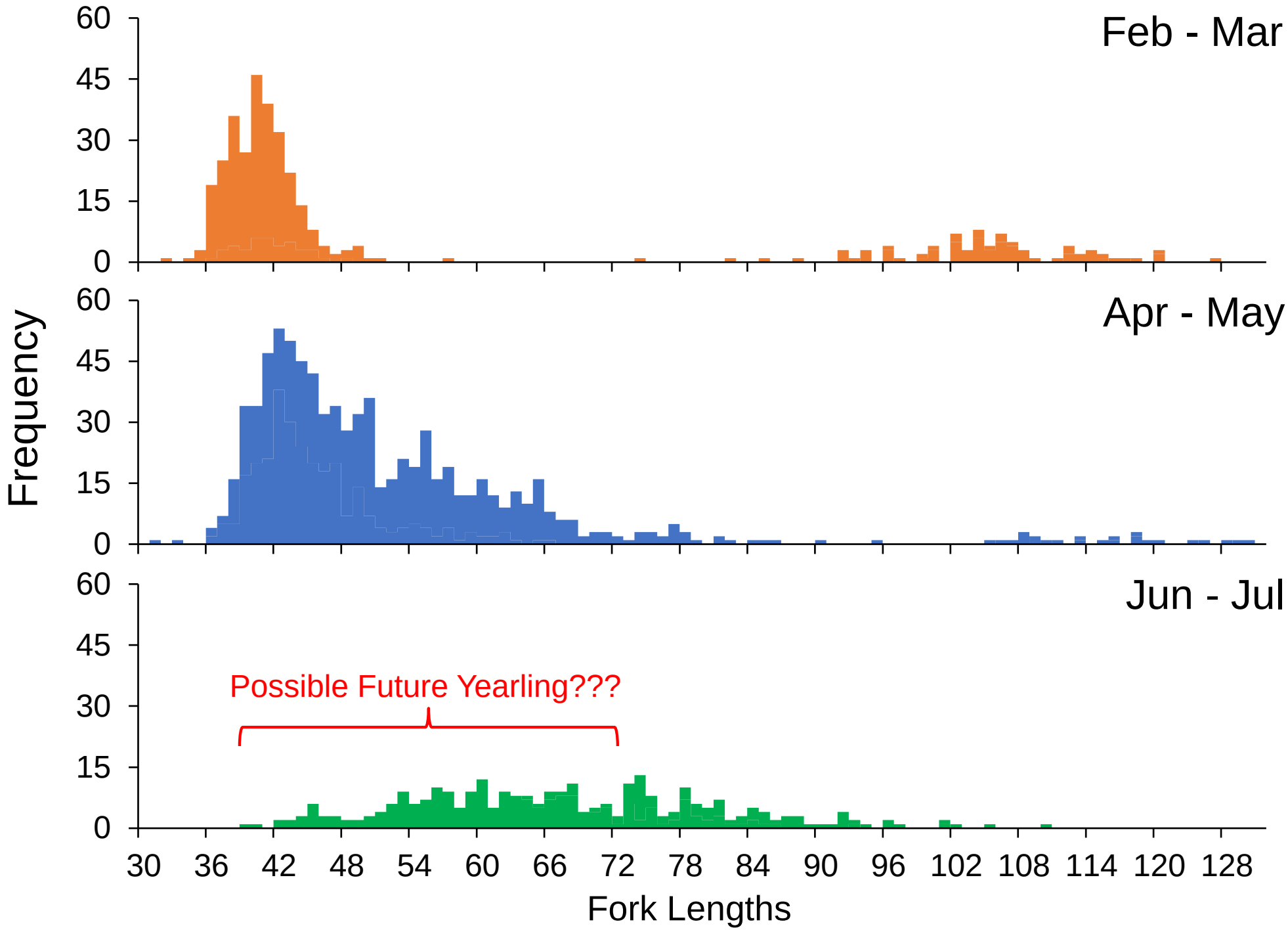


What are the life history patterns in the Snoqualmie?


Fry
Yearling
Feb - Mar
Apr - May
Jun - Jul
Frequency
60
45
30
15
0
30
36
42
48
54
60
66
72
78
84
90
96
102
108
114
120
128
Fork Lengths


Feb - Mar
Apr - May
Jun - Jul
Fry
Parr
Yearling
Frequency
Fork Lengths
0
15
30
45
60
30
36
42
48
54
60
66
72
78
84
90
96
102
108
114
120
128


Feb - Mar
Apr - May
Jun - Jul
Frequency
60
45
30
15
0
Fry & Parr
Yearling
30 36 42 48 54 60 66 72 78 84 90 96 102 108 114 120 128
Fork Lengths


Feb - Mar
Apr - May
Jun - Jul
Frequency
60
45
30
15
0
Possible Future Yearling???
30 36 42 48 54 60 66 72 78 84 90 96 102 108 114 120 128
Fork Lengths

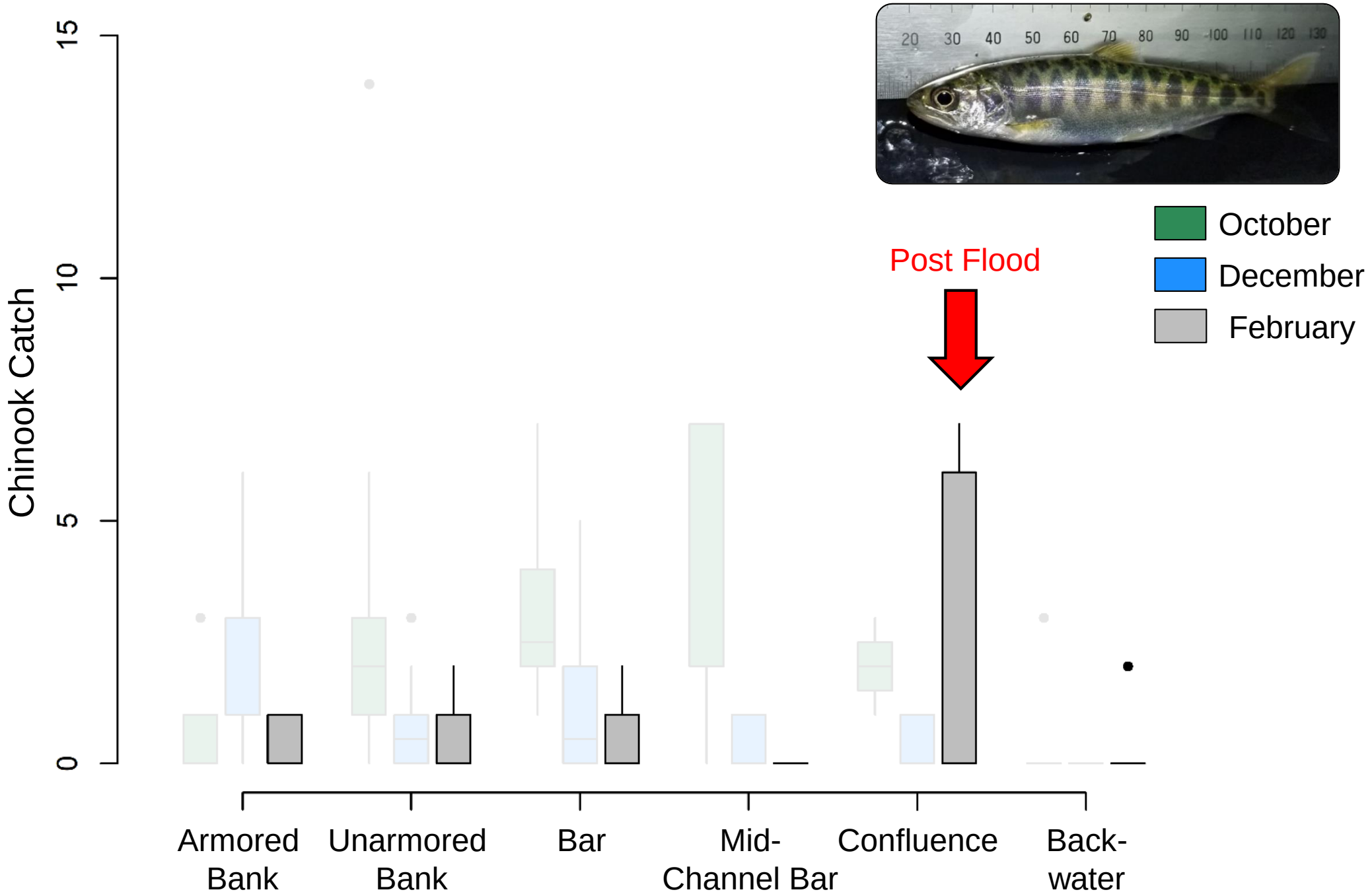

Chinook Catch
0
5
10
15
Post Flood
October
December
February
Armored Bank
Unarmored Bank
Bar
Mid-Channel Bar
Confluence
Back-water

Photo: Colin Butler (Watershed Science and Engineering)

Conclusions

1. What is their distribution?

- Snoqualmie River supports year-round use
- Chinook found throughout Snoqualmie River

1. What is their distribution?

2. Which habitats do they use?

- Diversity of habitats support Chinook
- Minimal growth during late-fall and winter
- Mainstem, floodplain, and tributaries

1. What is their distribution?

2. Which habitats do they use?

3. What are potential explanatory variables and habitat attributes?

- Ongoing classification/regression analysis
- Month, habitat type, depth, and substrate
- Potential break-out by month or reach

1. What is their distribution?

2. Which habitats do they use?

3. What are potential explanatory variables and habitat attributes?

4. Does distribution and habitat use change across months?

Habitat use shifts across seasons

Importance of conditions across seasons

Monitoring across habitats and seasons

Special Thanks

- Aaron David
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King County
Department of
Natural Resources and Parks
Water and Land Resources Division

KING COUNTY FLOOD CONTROL DISTRICT

SNOQUALMIE ~ WATERSHED FORUM

Questions

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