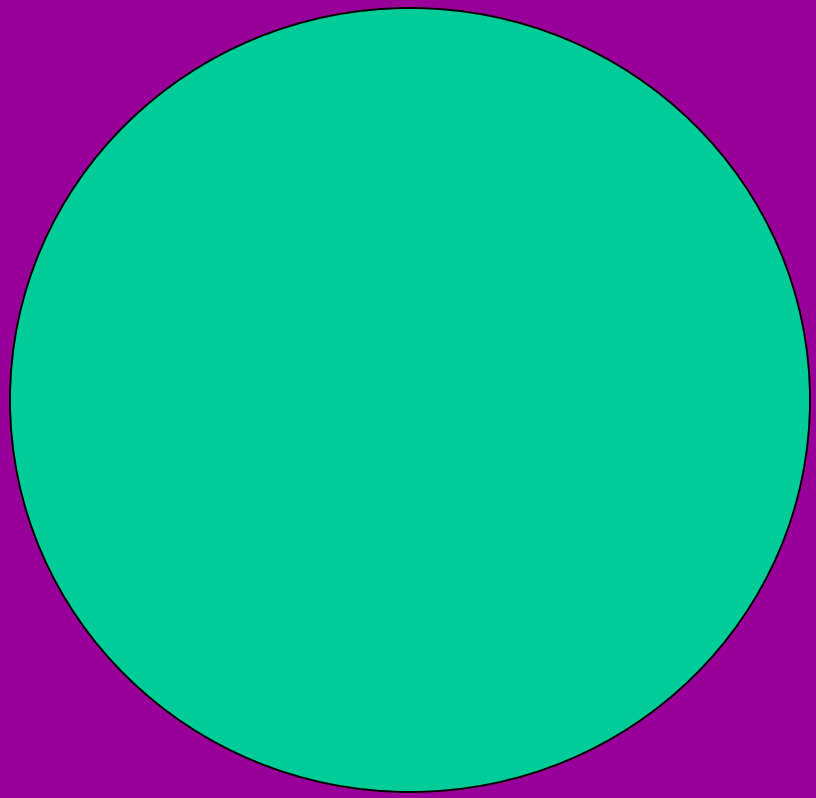
Burbot Biology and Life History

Burbot Circumpolar in distribution



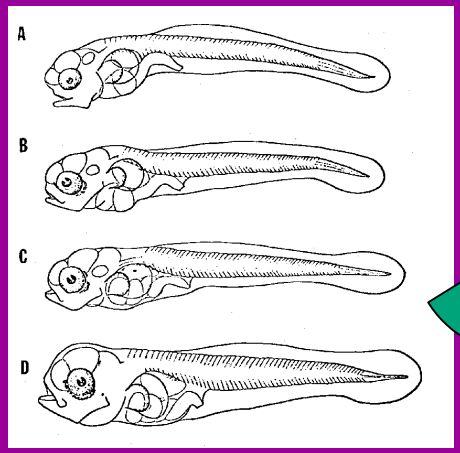

Freshwater
cod

Burbot life stages and food

Adults migrate to streams
In winter and form
“spawning balls”

Larger burbot move
To deeper water and
Feed on fish and shri

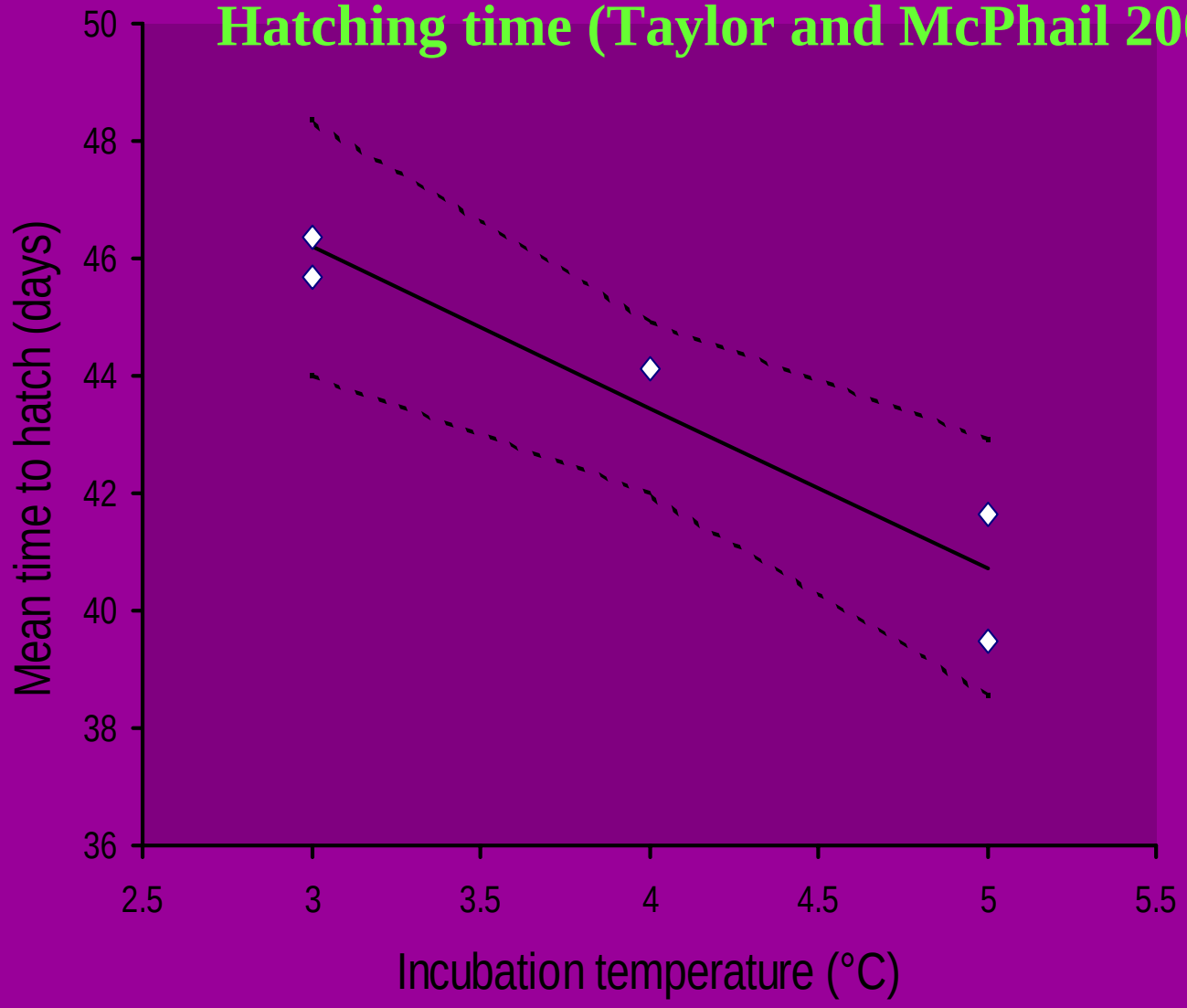
As young grow
in length they
move to shoreline
and feed on insects
and small fish

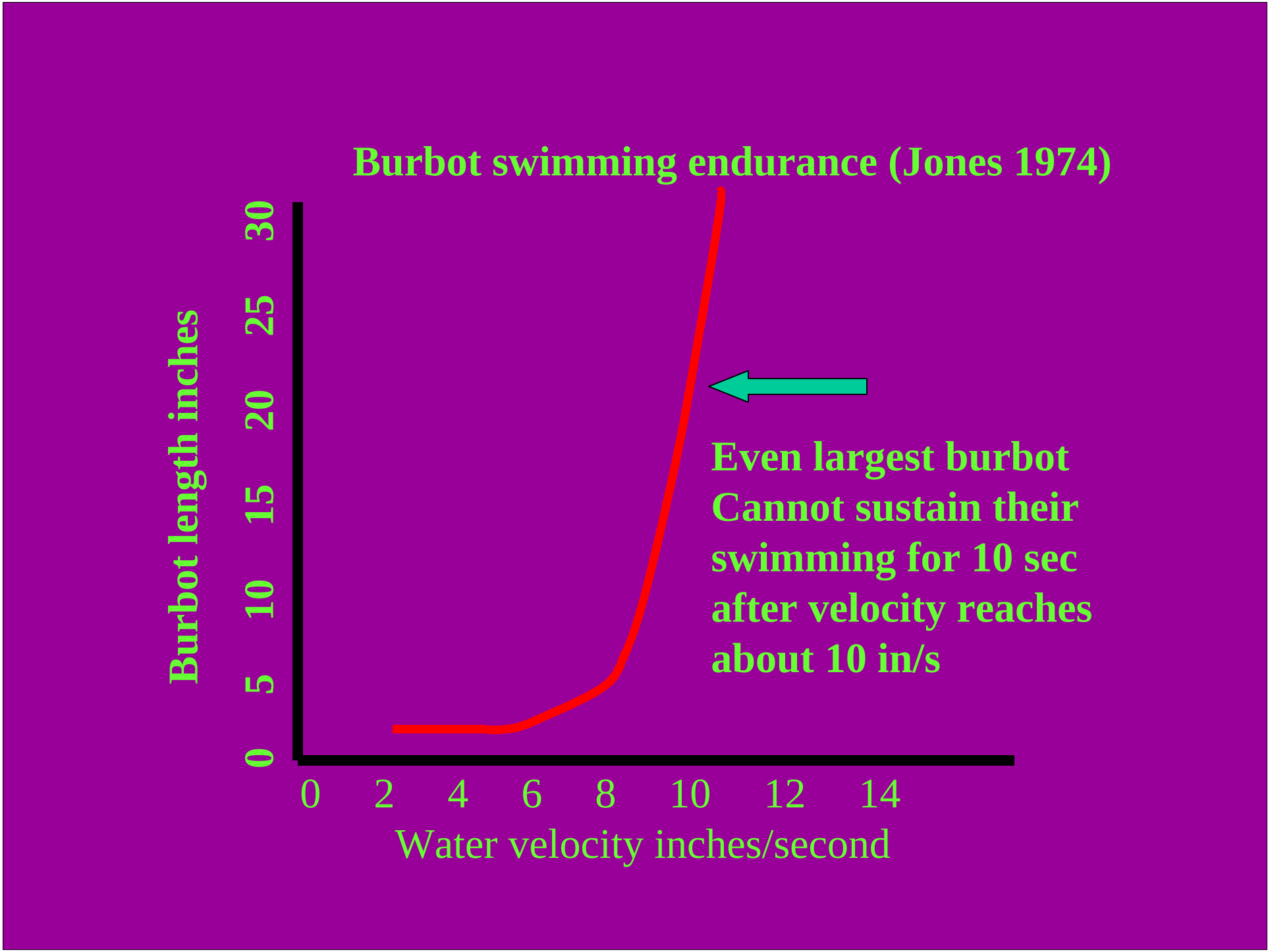


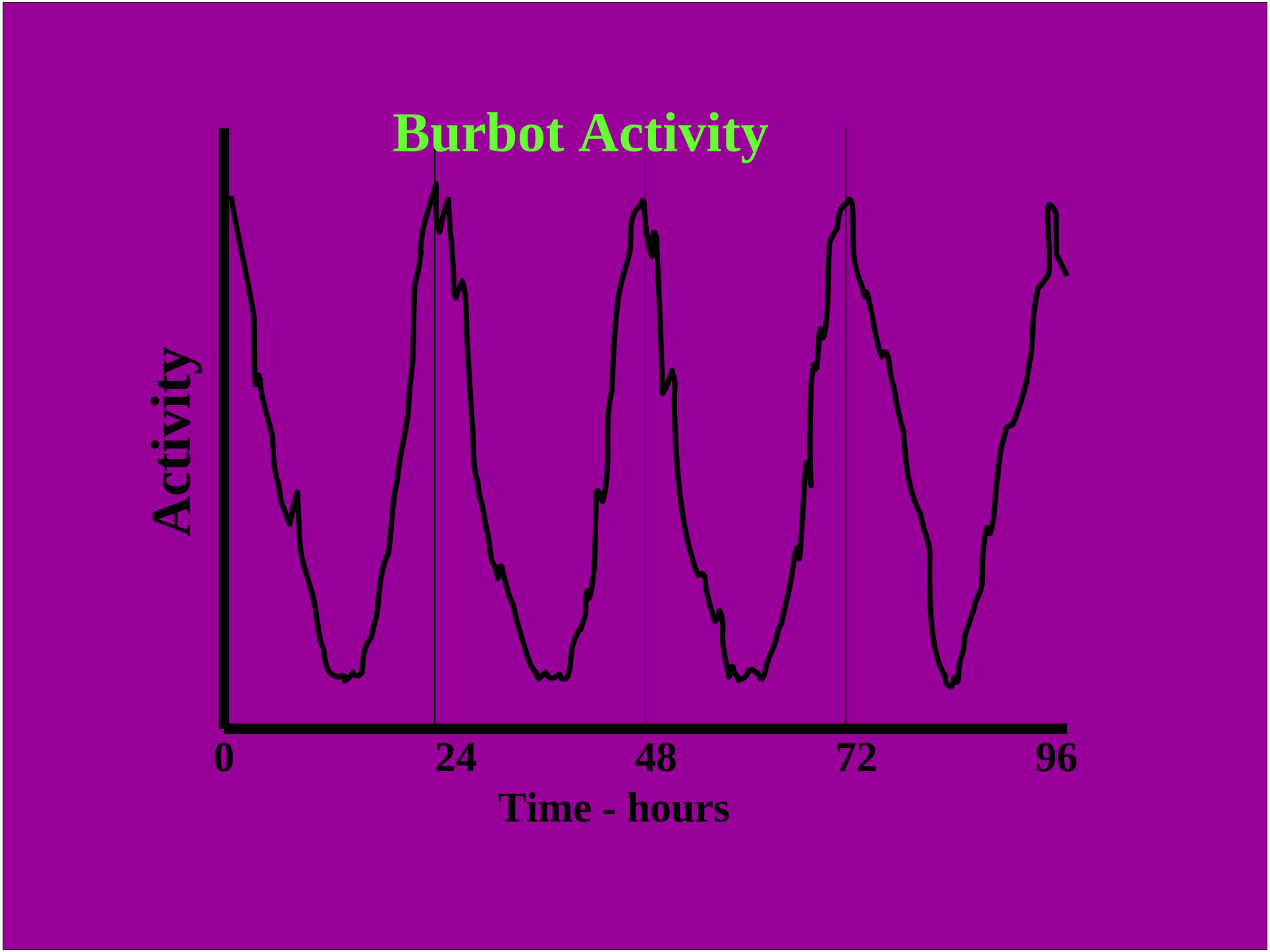
Pelagic
(open water)
Feed on
plankton

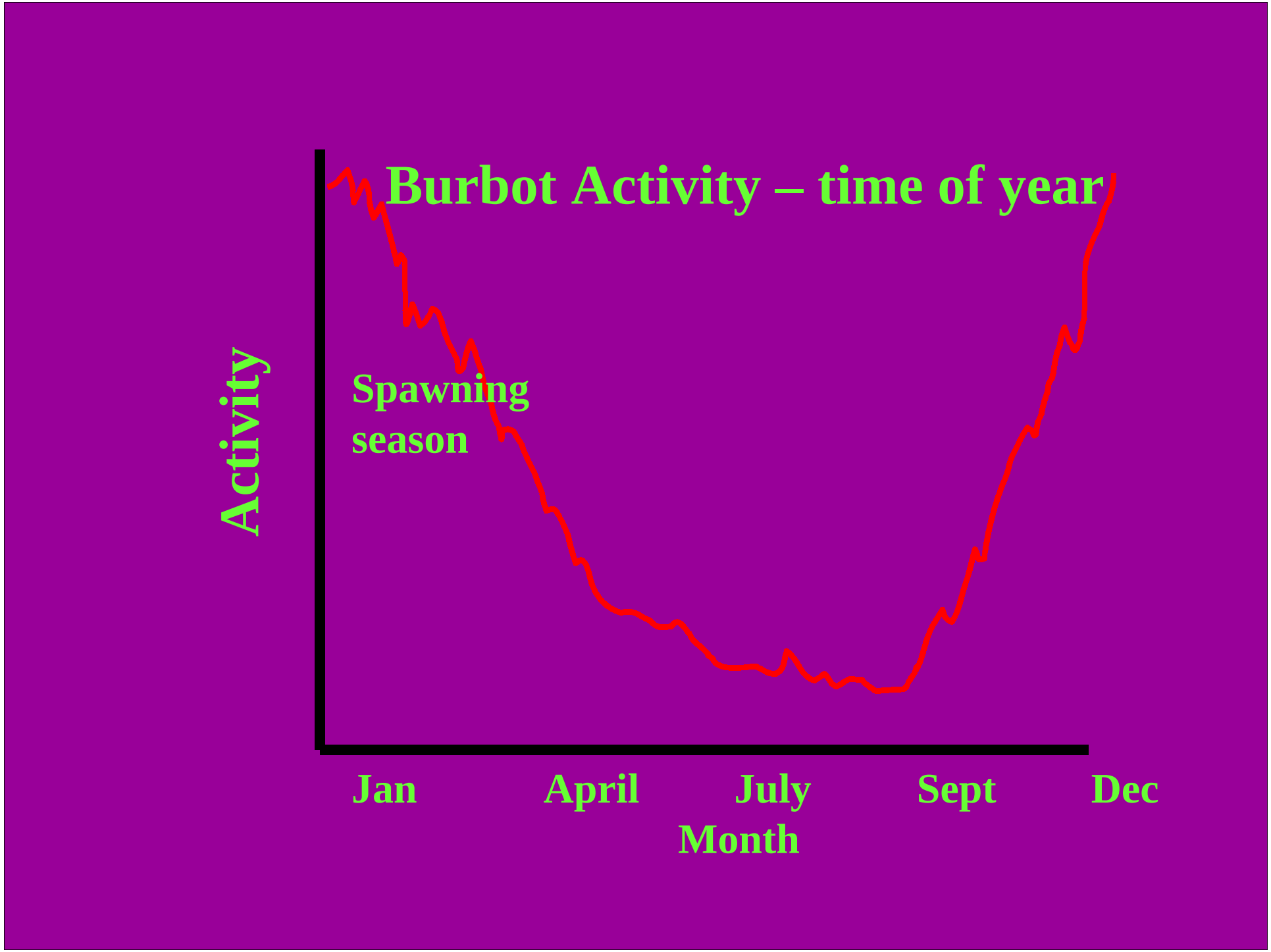
Burbot
Egg 1 mm
in diameter

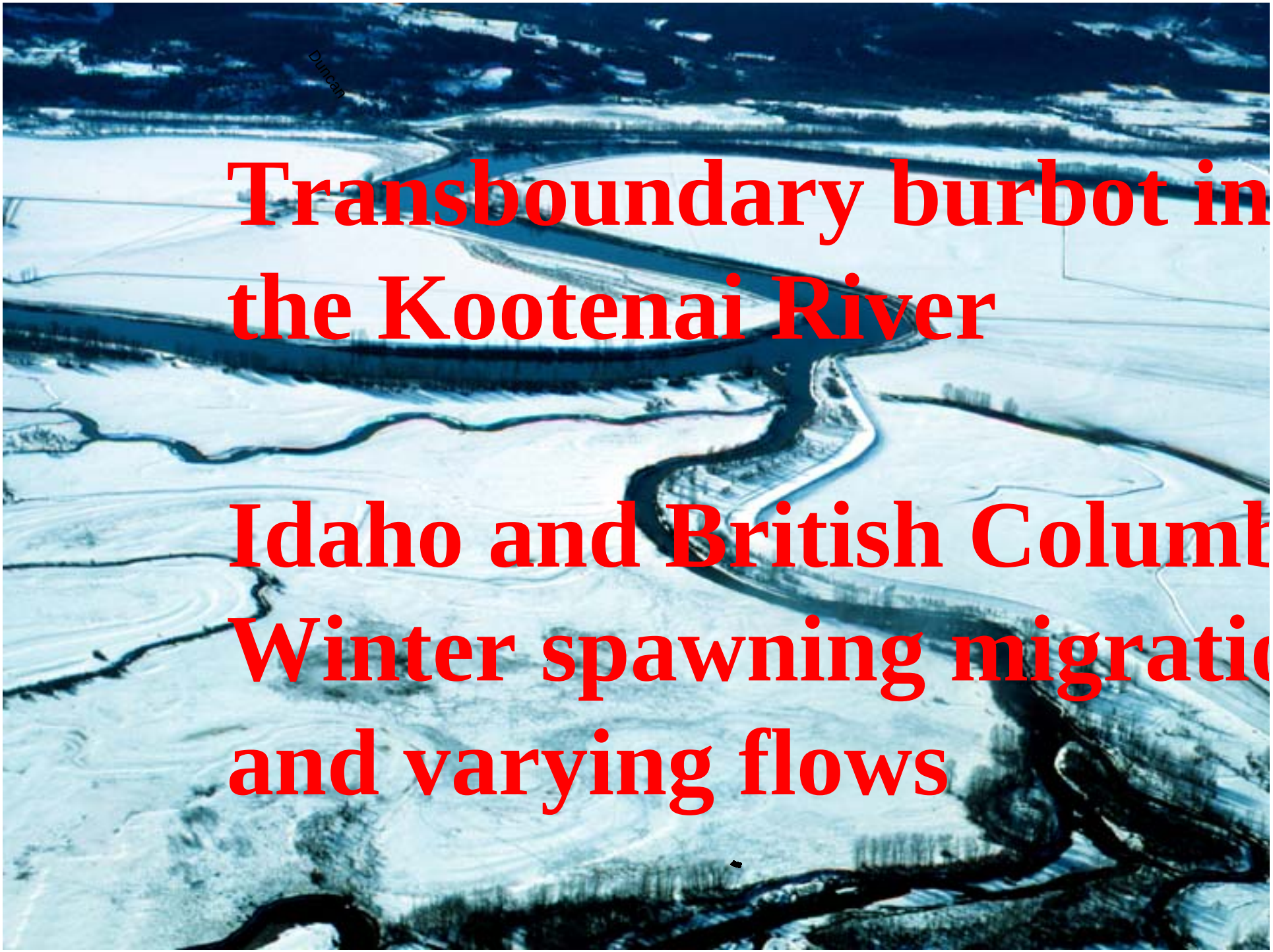
Hatching time (Taylor and McPhail 2000




Burbot swimming endurance (Jones 1974)
Burbot length inches
0
5
10
15
20
25
30
0
2
4
6
8
10
12
14
Water velocity inches/second
Even largest burbot
Cannot sustain their
swimming for 10 sec
after velocity reaches
about 10 in/s


Burbot Activity
Activity
0
24
48
72
96
Time - hours

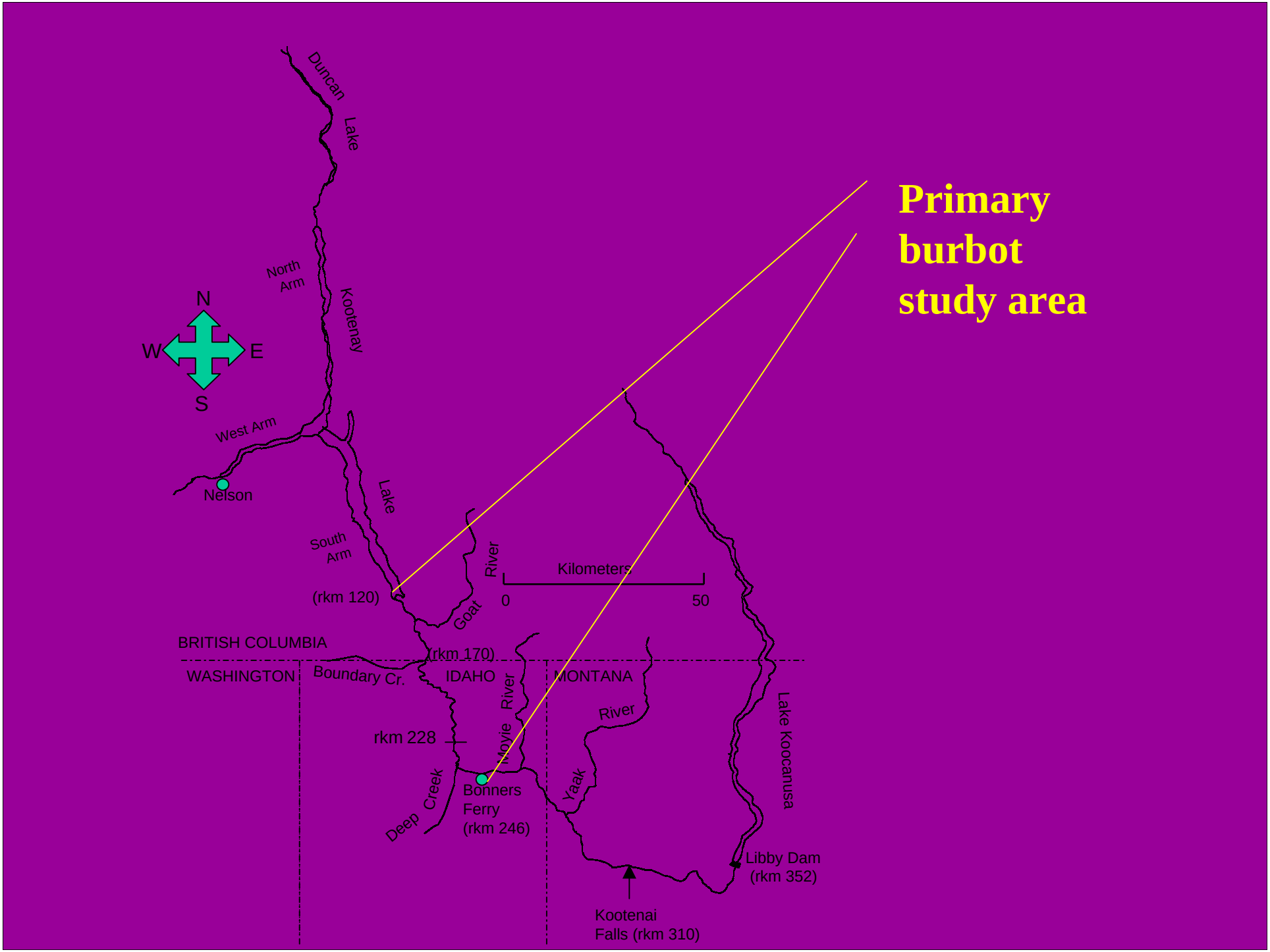

Burbot Activity – time of year
Activity
Spawning season
Jan
April
July
Sept
Dec
Month



Transboundary burbot in the Kootenai River

Idaho and British Columb

Winter spawning migratio and varying flows


Primary burbot study area
Duncan Lake
North Arm
Kootenay Lake
West Arm
Nelson
South Arm
(rkm 120)
Goat River
Kilometers
0
50
BRITISH COLUMBIA
(rkm 170)
WASHINGTON
Boundary Cr.
IDAHO
MONTANA
Moyie River
rkm 228
Deep Creek
Bonners Ferry (rkm 246)
Yaak River
Lake Koocanusa
Libby Dam (rkm 352)
Kootenai Falls (rkm 310)
N
W
E
S

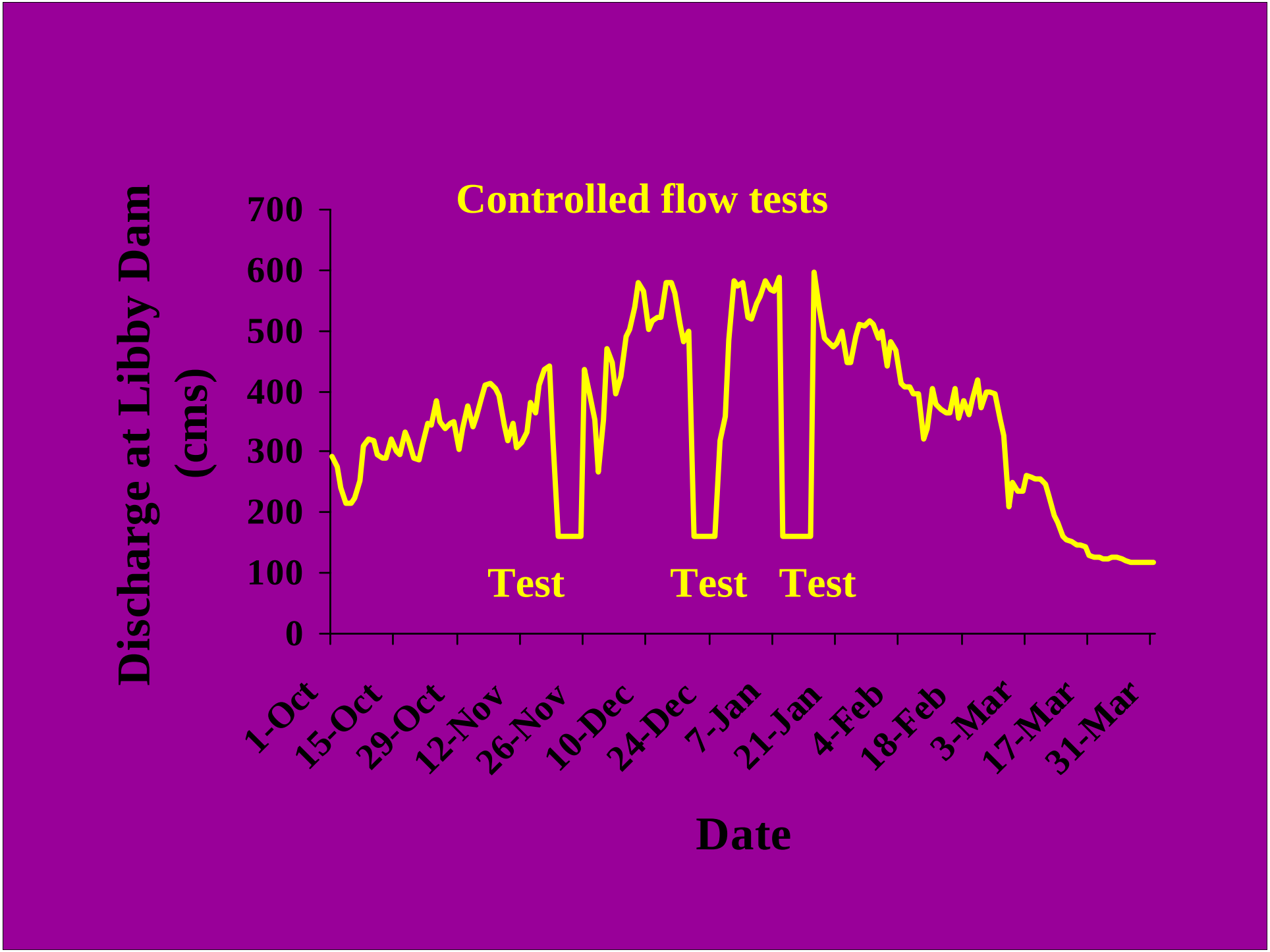
Objectives 1993-1994

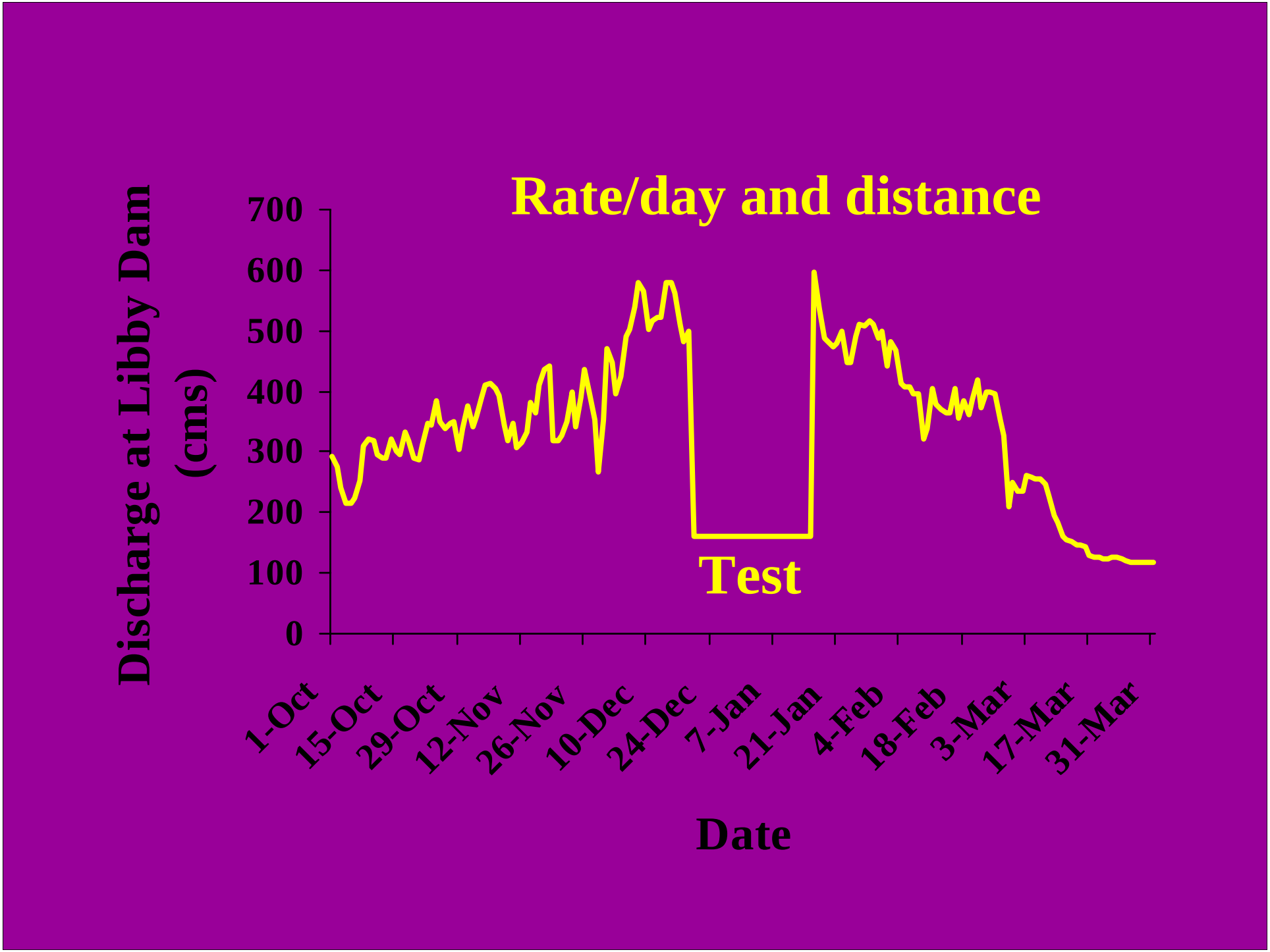
Determine the population status of burbot in the Kootenai River

(1) Size structure

(2) Distribution

(3) Abundance


Controlled flow tests
Discharge at Libby Dam (cms)
700
600
500
400
300
200
100
0
Test
Test
Test
1-Oct
15-Oct
29-Oct
12-Nov
26-Nov
10-Dec
24-Dec
7-Jan
21-Jan
4-Feb
18-Feb
3-Mar
17-Mar
31-Mar
Date


Rate/day and distance
Discharge at Libby Dam (cms)
700
600
500
400
300
200
100
0
Test
1-Oct
15-Oct
29-Oct
12-Nov
26-Nov
10-Dec
24-Dec
7-Jan
21-Jan
4-Feb
18-Feb
3-Mar
17-Mar
31-Mar
Date

Hypothesis tests

Movement/flow

1995-1996- No

1996-1997- Two incomplete

1997-1998- Three Complete

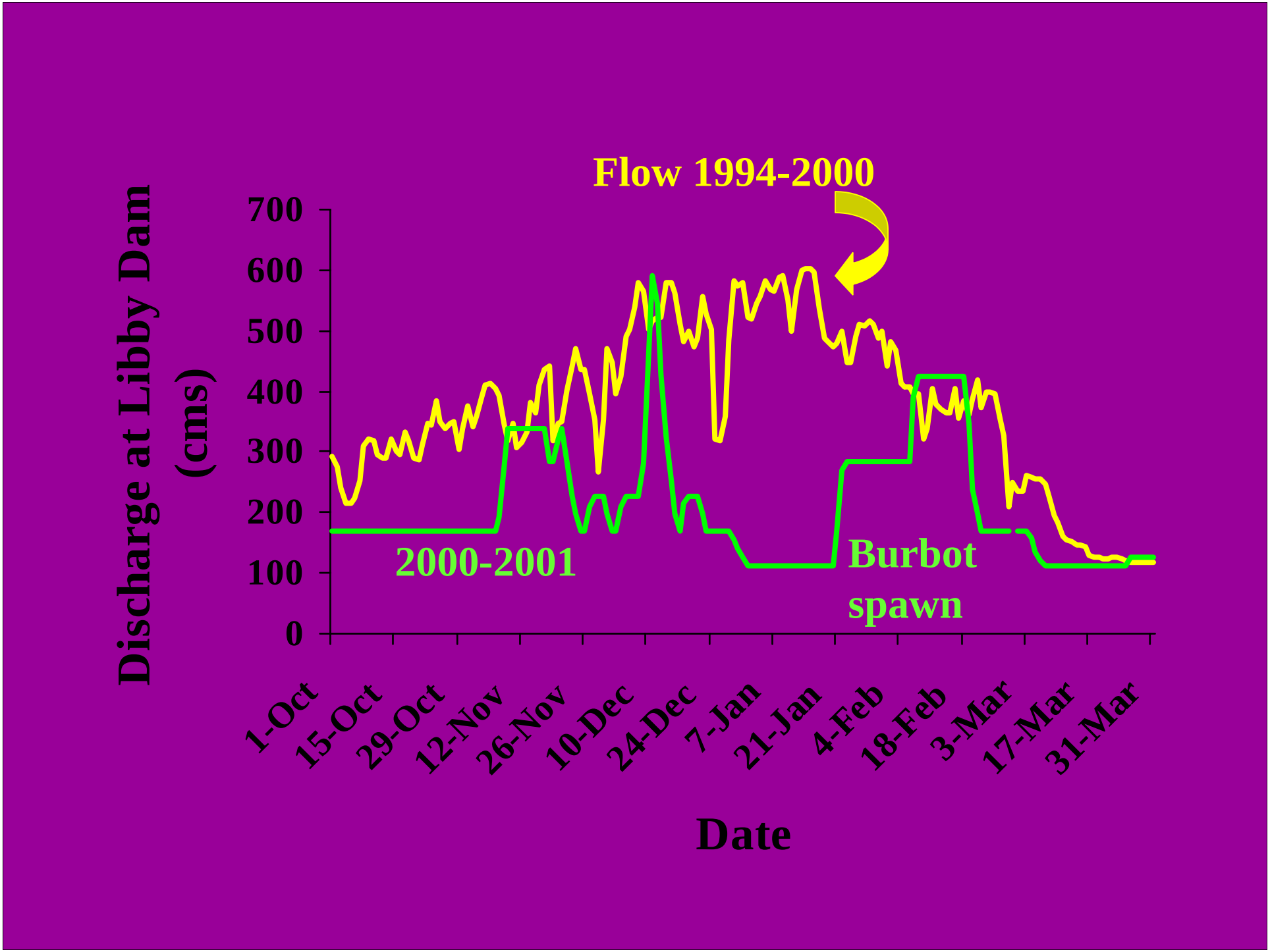
Travel rate/distance

1998-1999- Incomplete

1999-2000- No

2000-2001- No control

2001-2002- Yes three weeks +


Flow 1994-2000
Discharge at Libby Dam (cms)
700
600
500
400
300
200
100
0
2000-2001
Burbot spawn
1-Oct
15-Oct
29-Oct
12-Nov
26-Nov
10-Dec
24-Dec
7-Jan
21-Jan
4-Feb
18-Feb
3-Mar
17-Mar
31-Mar
Date

Long distance movements –
5 km or more in 10 days or less

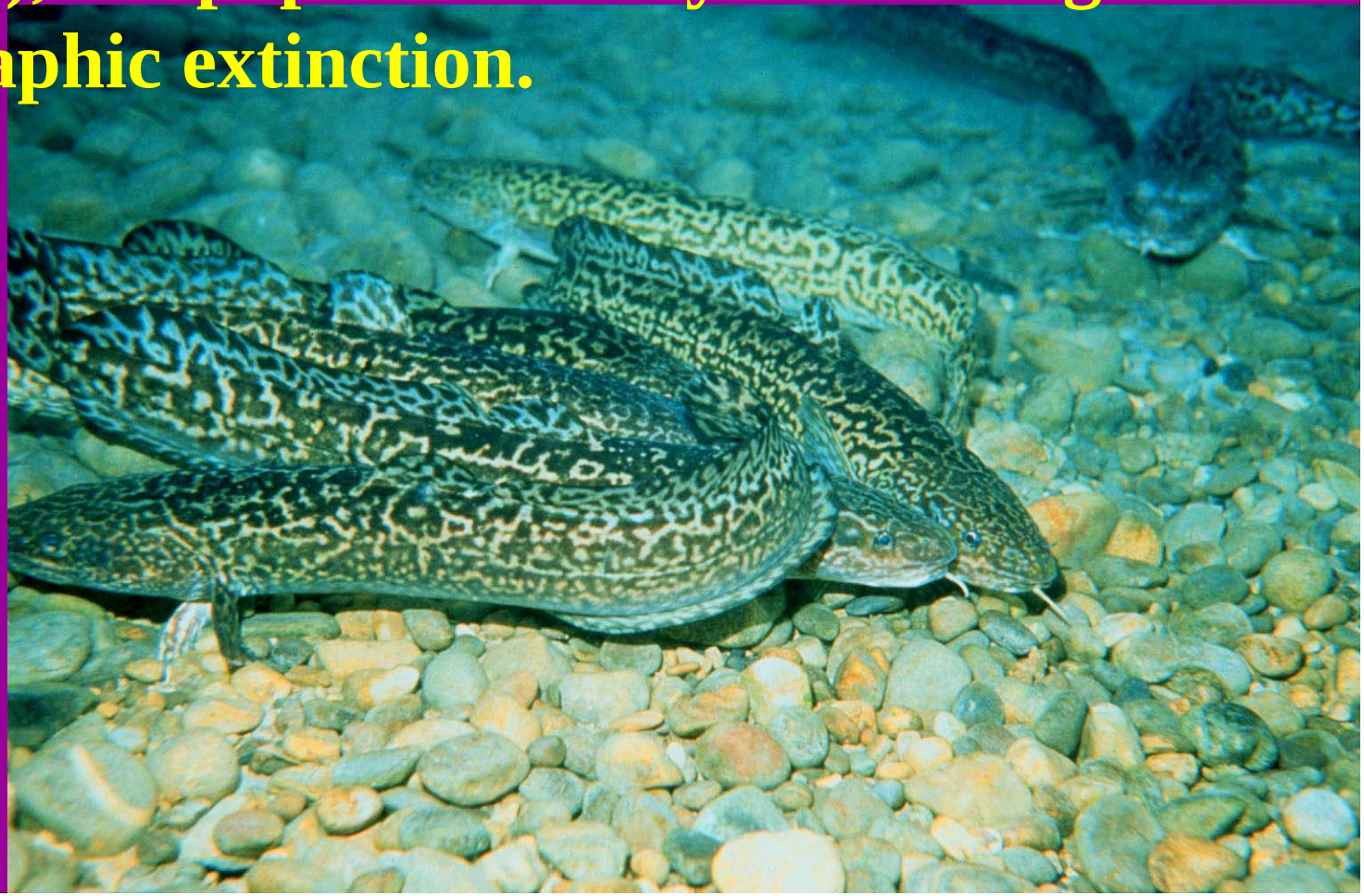
Examined all telemetry records and flows from 1994-2002

Flow range	Number of cases
100-200	20
201-300	7
301-400	6
401-500	4
501-600	4
601-700	1

Other limiting factors

1) Reduced productivity
2) Warmer water
3) Disrupted spawning synchrony
4) Physiological stress
5) Low stock numbers

The Kootenai River burbot in Idaho and British Columbia is genetically distinct from Montana and the population is at about 540 fish (SE=757), the population may be nearing demographic extinction.



Objectives 1995-present

1) Determine genetic differences
2) Estimate population size
3) Determine physiological if stressed
4) Determine flow vs. movement relationship
5) Determine travel rate and distances

What is needed?

1) **An International Conservation Strategy has been prepared**

2) **A Conservation Agreement is needed**

Examined all movements of burbot 5 km or more in 10 days or less and flows in two clas intervals and Nov-Feb 1994-2000 only

	Cases of movement	Cases of flow (m^3/s)
100-300	12	186
301-700	11	538

Fisher exact test

Examined all movements of burbot 5 km or more in 10 days or less and flows in two class intervals and Nov-Feb 1994-2000 only

m^3/s	Cases of movement	Contacts but non-conformance
100-300	15	496
301-700	11	998

Significance p = 0.012