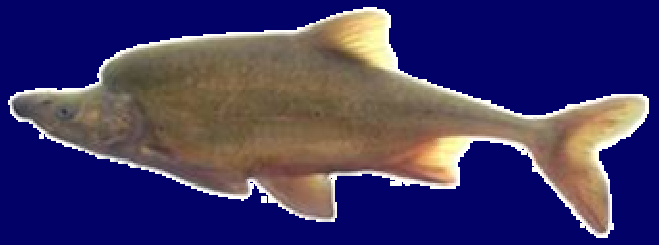
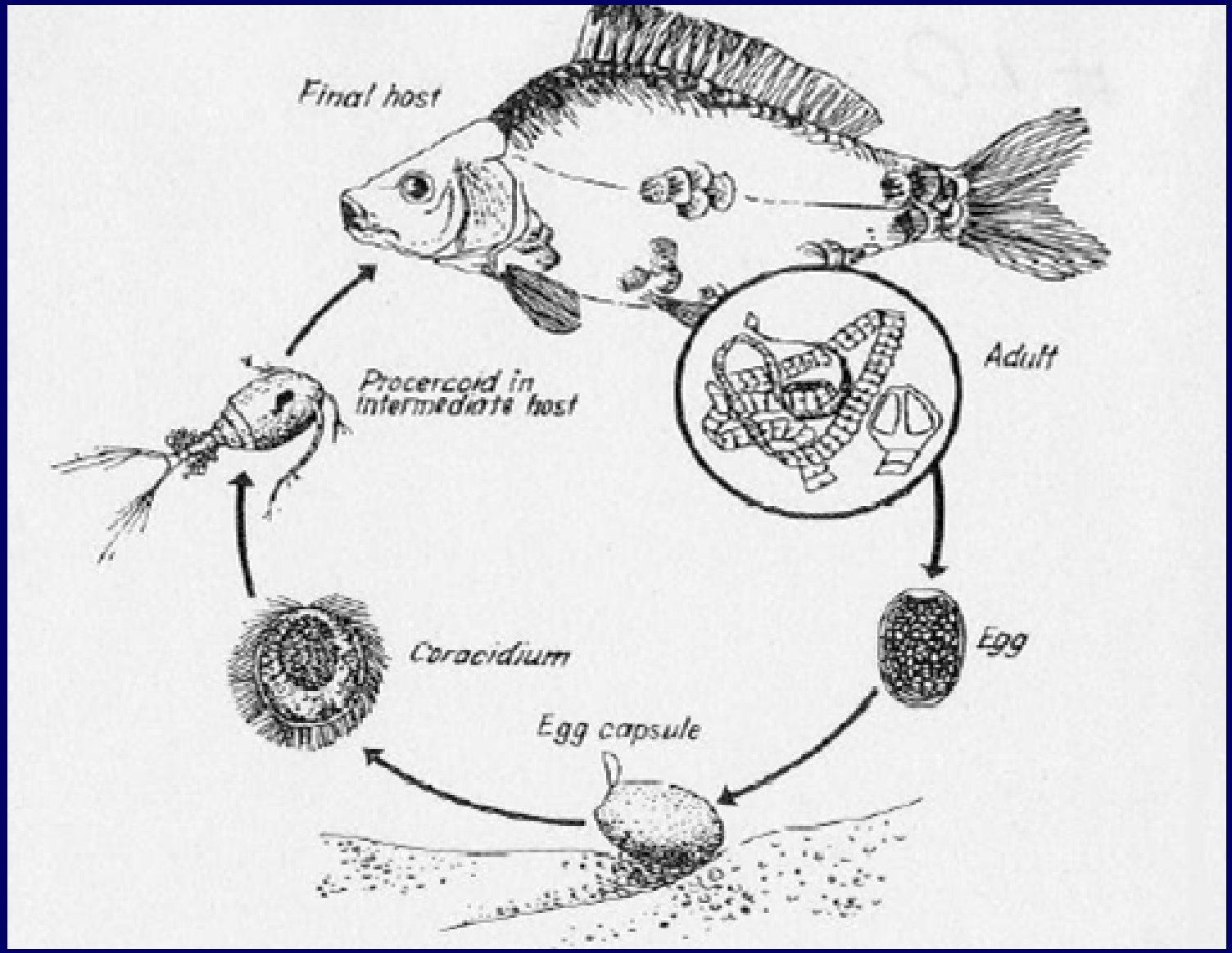
Removal and quantification of Asian tapeworm from humpback chub using Praziquantel

David Ward
Arizona Game and Fish Department
Research Branch



Why ?

Asian Tapeworm



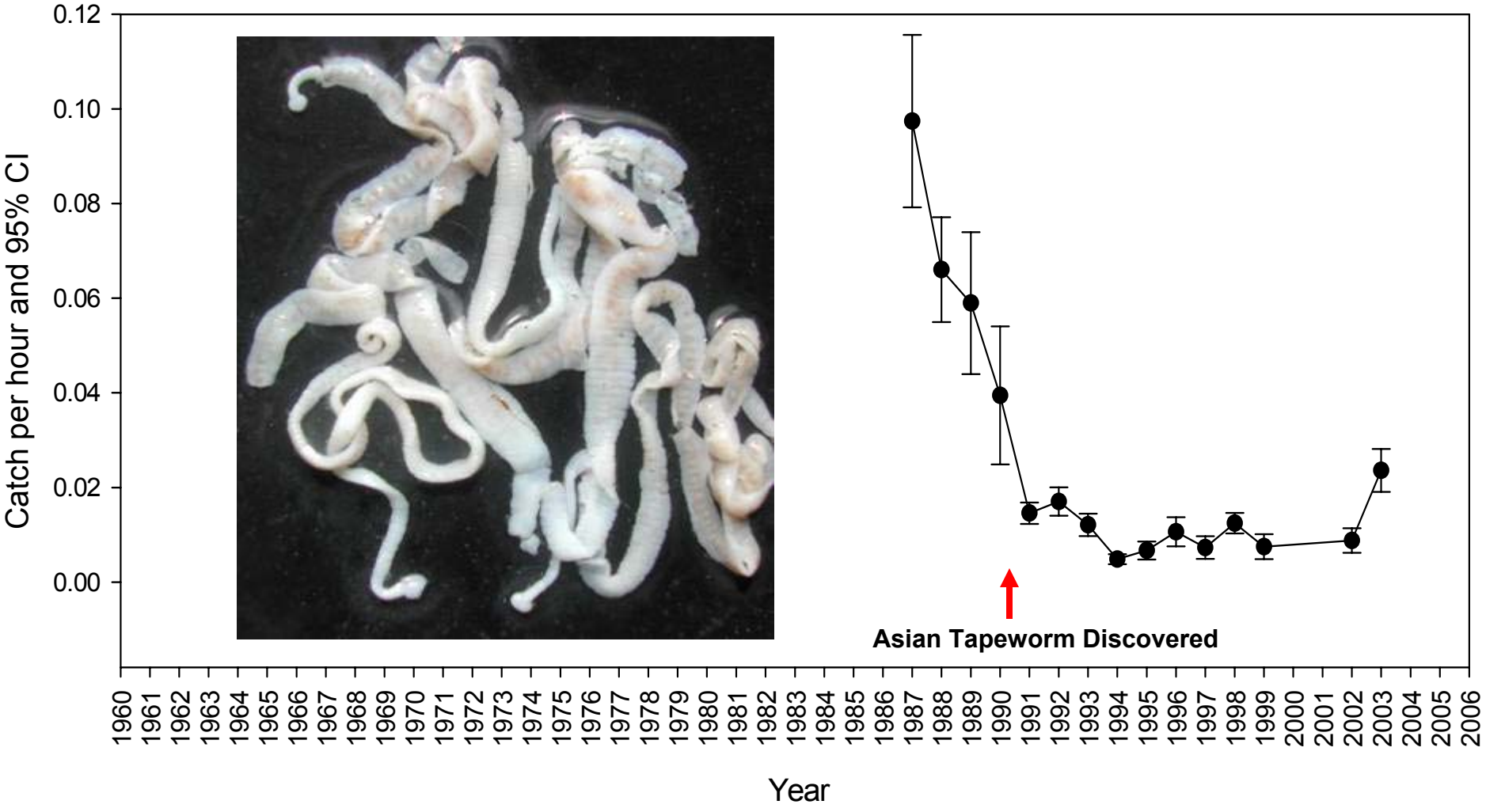
Drawn by Leibmann

Asian Tapeworm

- Introduced with Grass Carp imported from Asia
- First discovered in the Little Colorado River in 1990
- Can cause high mortality in new host species
- Destruction of the intestine - infected fish began dying 20 days earlier and at nearly twice the rate of controls

  R. Cole 2004 USGS
- listed as one of six potential threats humpback chub

Asian fish tapeworm



Co-evolved parasites and hosts

- Co-evolved parasites generally do not threaten the persistence of their host species
- Individuals excluded from the best habitat are highly vulnerable to disease due to poor nutrition and the stress response - disease becomes the proximal cause of death
- Non- co-evolved parasites and hosts - ??

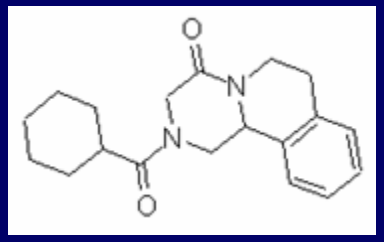
Choudhury et al. 2001

<150 mm TL

Mean = 18 per fish

- No baseline information for adult humpback chub

Can we quantify tapeworm loads in fish using non-lethal methods?



Formula: C19 H21 N2 O2

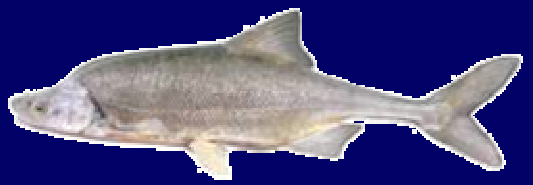
Praziquantel
Prazipond ®

- **Anti-cestodal drug / Humans and Veterinary**
- **Has been used extensively in fish hatcheries**
  - **No established protocols**

Objectives

- Evaluate dosage and time needed to remove Asian Fish Tapeworm using Praziquantel
- Evaluate effects and side effects of Praziquantel use
- Establish a standardized protocol for treating fish
- Evaluate Asian fish tapeworm loads in adult humpback chub in the Little Colorado River

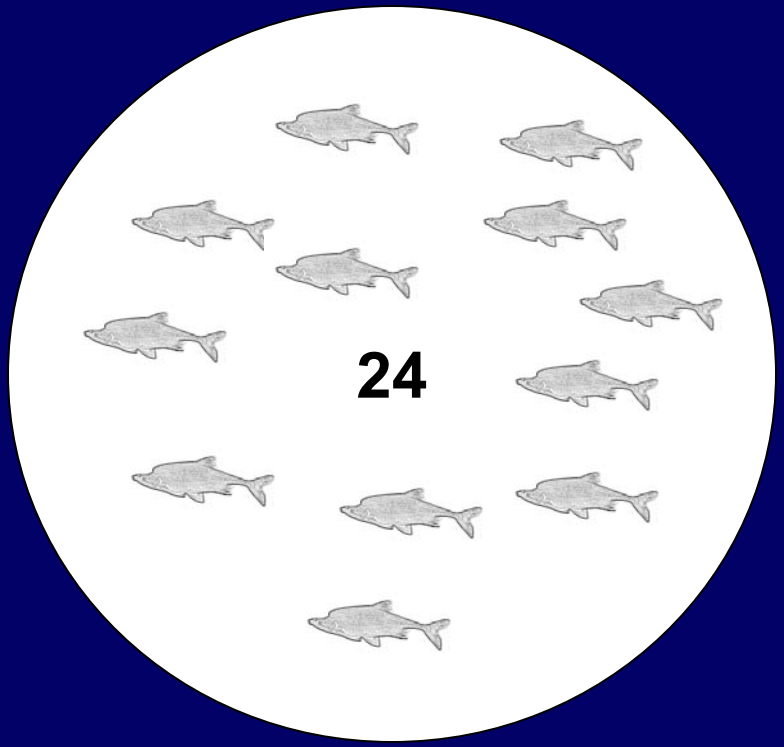
Methods



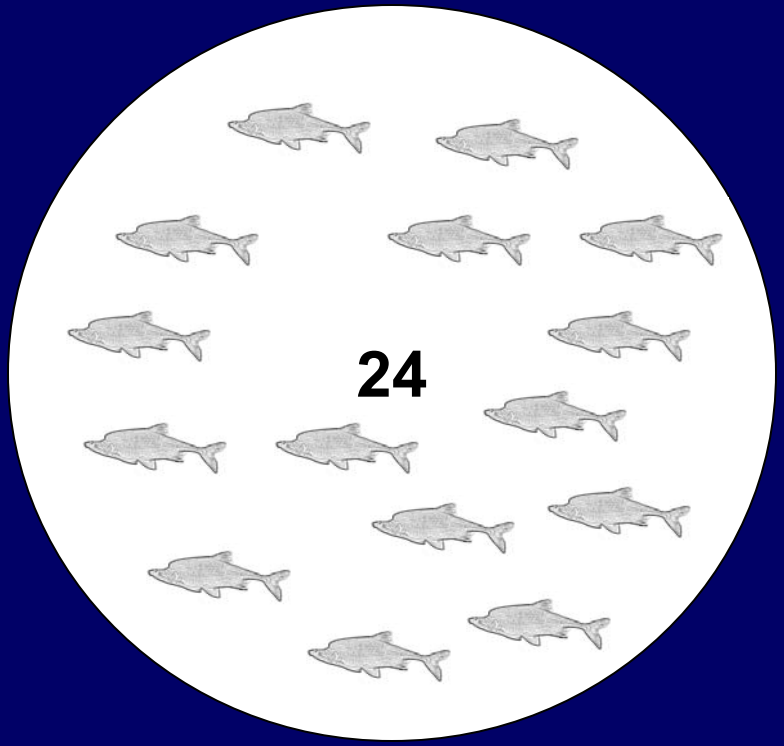
20 days

Methods

Control



Experimental



Praziquantel

Methods

- 4 different dosages of Praziquantel

  0.7 mg/l 1.5 mg/l 6.0 mg/l 36.0 mg/

- 2 time durations

12 hours

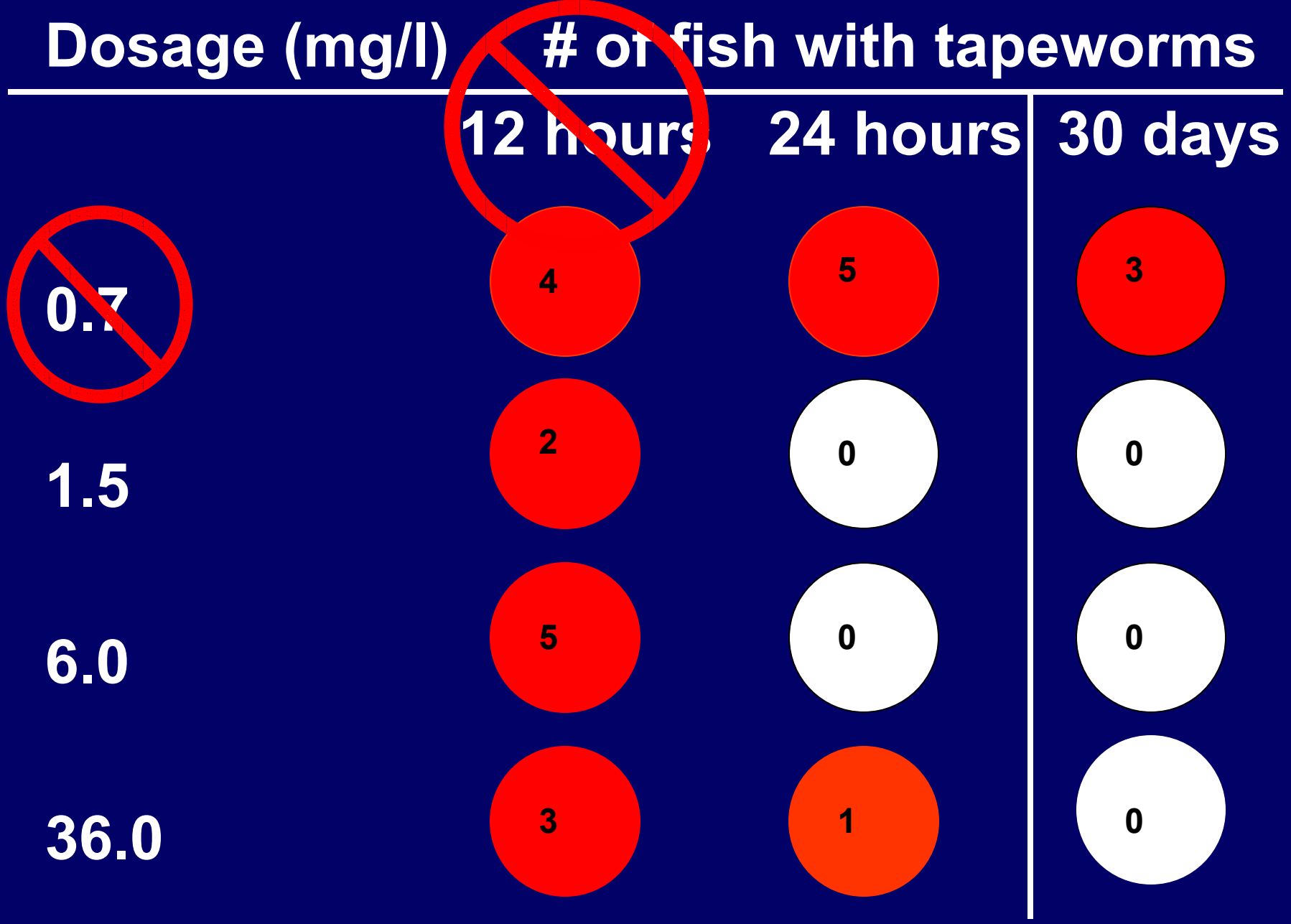
24 hours

Total = 108 fish tested

Mean = 150 mm TL, Range 110 – 457 mm TL

½ fish dissected immediately after treatment

½ fish dissected 1 month later


Dosage (mg/l)
# of fish with tapeworms
12 hours
24 hours
30 days
0.7
4
5
3
1.5
2
0
0
6.0
5
0
0
36.0
3
1
0

Laboratory Conclusions

- **Praziquantel is safe for use on chub**
- **Commonly used dosage < 0.7 mg/L are insufficient to remove 100 % of tapeworms**
- **Minimum duration of treatment is 24hrs**
- **Minimum effective dosage is 1.5 mg/l**
  - **Recommend 6 mg/l for 24 hrs**

Field trials

- **Evaluate tapeworm loads in adult humpback chub**
  - **Little Colorado River**
  - **Mainstem Colorado River**
    - **Effects of temperature on tapeworm dynamics**

0.68 grams

(25 ml) Isopropyl alcohol

183 tapeworms

259 mm TL

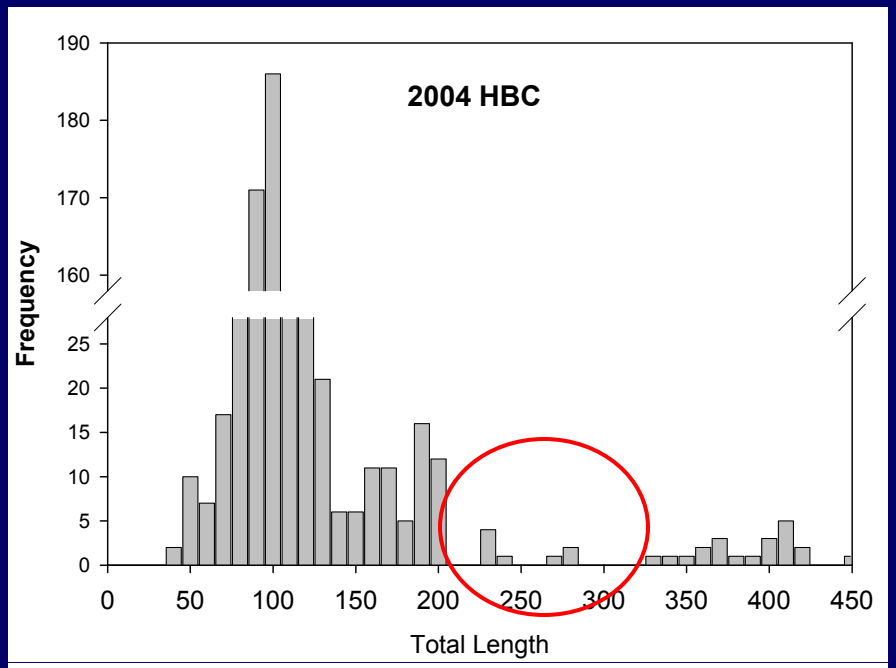
2005 Asian Tapeworm in Humpback chub

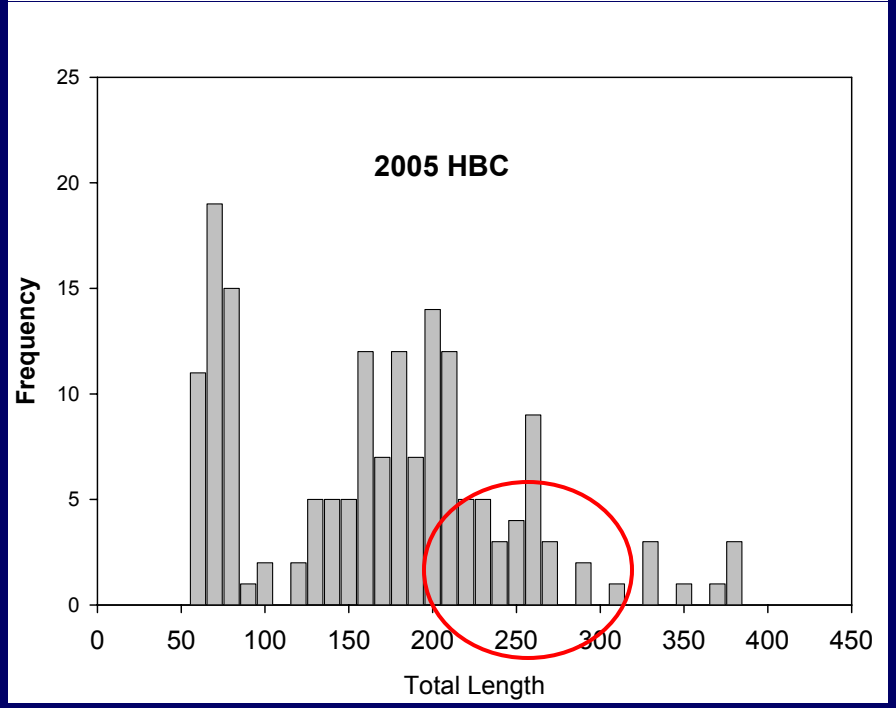
Number of tapeworms

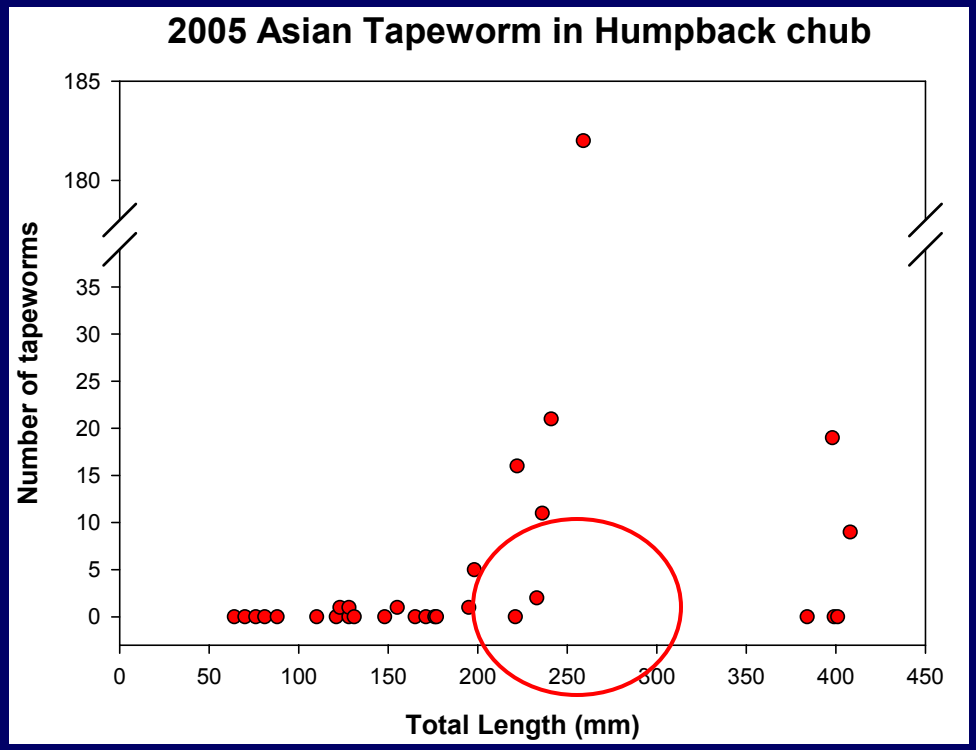
185
180
35
30
25
20
15
10
5
0

0 50 100 150 200 250 300 350 400 450

Total Length (mm)


2004 HBC
Frequency
Total Length
190
180
170
160
25
20
15
10
5
0
0
50
100
150
200
250
300
350
400
450


2005 HBC
Frequency
Total Length
25
20
15
10
5
0
0
50
100
150
200
250
300
350
400
450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Could we Control Asian Tapeworm using Praziquantel ?

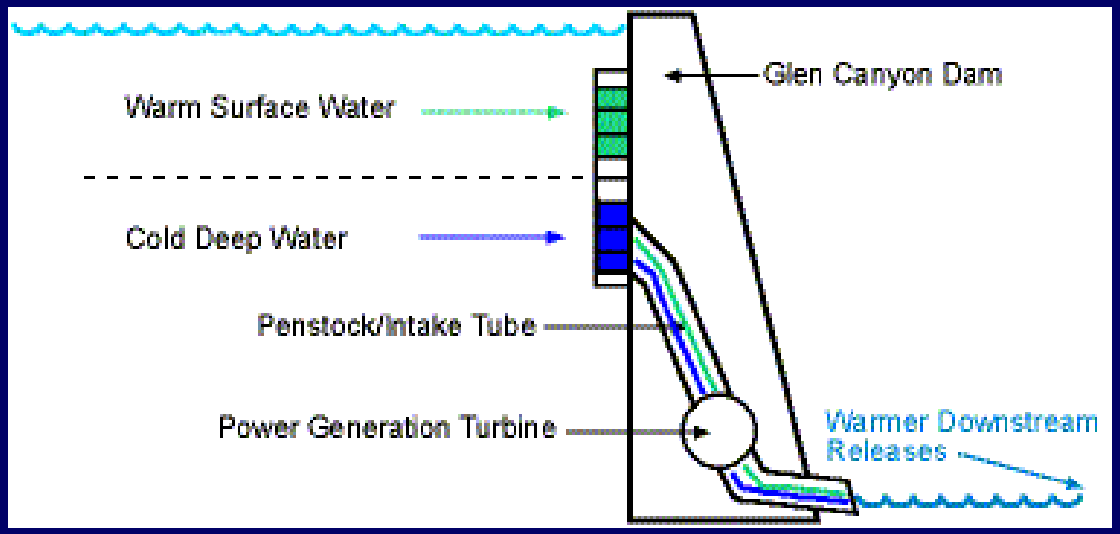
- **Entire river treatment and eradication - not likely**

- **Treatement of highly infected fish during monitoring activities - possible**
  - **Insert a few ml of liquid praziquantel down the throat with an eye dropper**
  - **Needs laboratory evaluation**

Conclusions

- **Praziquantel can be used to monitor tapeworm loads in humpback chub**
- **Flooding may be correlated with tapeworm loads**
- **Effects of cold mainstem temps - ??**
- **Some level of control may be possible**

Temperature Control Device



- Baseline information on Asian tapeworm prior to a TCD
- Methods in place to track changes in Asian tapeworm infestation

Acknowledgements

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