A photograph of a rainbow trout swimming in a stream. The fish is positioned in the center-right of the frame, facing left. The water is clear, and the riverbed is composed of various sized rocks in shades of grey, yellow, and black. The background shows more rocks and some green vegetation. The text is overlaid on the upper portion of the image.

TREATMENTS TO CONTROL MORTALITY CAUSED BY BKD

A. DOUGLAS MUNSON

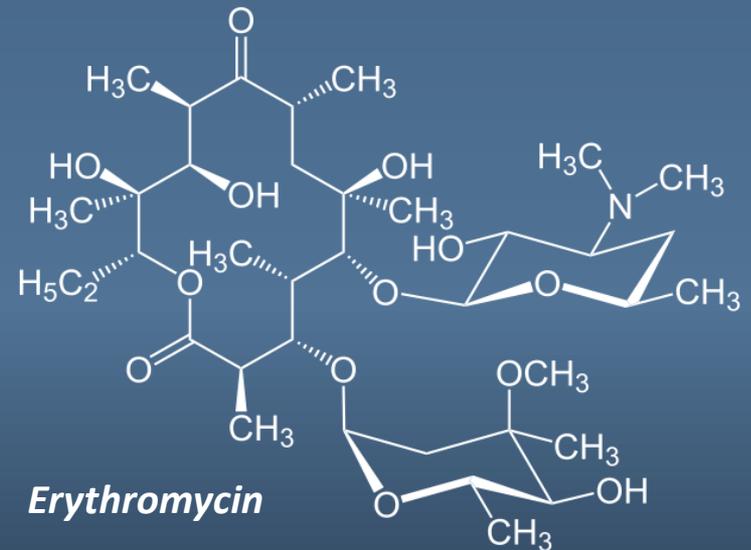
**Eagle Fish Health Laboratory
Idaho Department of Fish and Game**

INJECTABLE ERYTHROMYCIN

- Returning anadromous adult spring and summer Chinook Salmon
- Usually injected once as they are processed at the trap
- Idaho injects 10-20 mg/kg
- Intraperitoneal (IP)
- Limit prespawning mortality
 - Incorporation of antibiotic into the egg

ALTERNATIVES TO ERYTHROMYCIN?

- Injectable erythromycin has not been produced in years
- Search for a substitute began
- Other macrolides
 - Azithromycin **Zithromax™**
 - Tildipirosin **Zuprevo™**
 - Tulathromycin **Draxxin®**



OR RETURN TO ERYTHROMYCIN?

- **Renewed interest in obtaining injectable erythromycin**
- **I was asked to survey PNFHPC members and others to gauge interest and potential usage for injectable erythromycin under a new INAD**

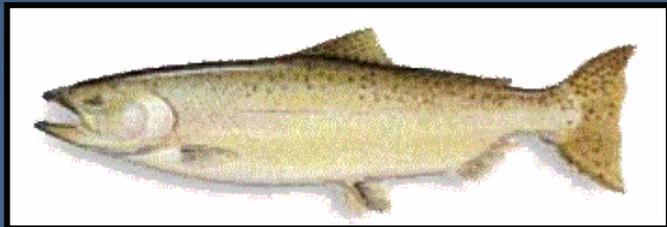
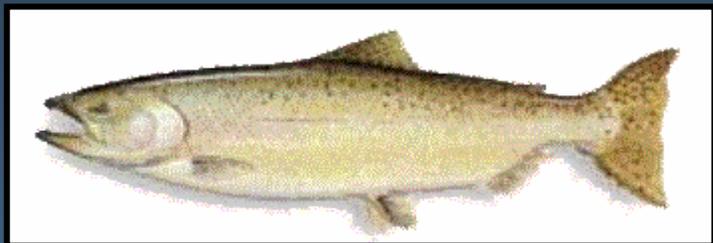
PREDICTED INJECTABLE ERYTHROMYCIN USE

AGENCY	ROUTE	DOSE (mg/kg)	MIN # TREATED	MAX # TREATED	# INJECTIONS
ADFG	Both	10-20	4000	16,450	Single
CDFW	DS	10-20	0	1,500	Single
IDFG	IP	10-20	0	4500	Single
MDFWP					
MI DNR	DS	10-20		30,000	Multiple
NWIFC	Both	20	0	2191	Variable
ODFW	IP	22	0	10,000	Variable
USFWS	Both*	10-20	2952	6575	Single**
PAFBC	IP	10-20	1500	5000	Double
WDFW*	DS	10-20	0	21,000	Multiple*

DIMINISHING ADULT RETURNS

- **Climate change**
 - Warmer water temperatures
- **Ocean conditions**
 - The Blob
 - Son of the Blob
 - Godzilla
- **Lower numbers of returning adults**
 - Possible nutritional stress
- **Implement the full integrated management program for BKD**
 - High BKD segregation

ADULT BROOD INJECTIONS

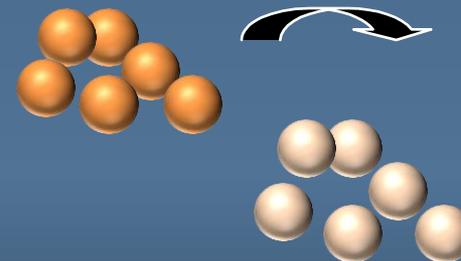
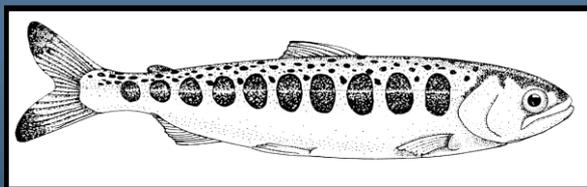
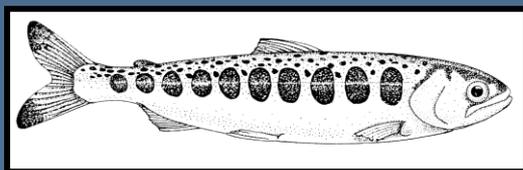


DISINFECTION

100 mg/L for 30 minutes



NUTRICEUTIAL/FUNCTIONAL FEEDS
SEGREGATED RELEASES

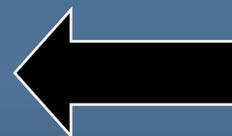


ELISA-BASED CULLING

EGGS FROM FEMALES WITH ELISA VALUES ABOVE 0.25

ERYTHROMYCIN MEDICATED FEED

100 mg/kg for 28 days



POTENTIAL USES

- **Captive broodstock**
 - Multiple injections throughout life
- **Other salmonids**
 - Fall Chinook Salmon
 - Coho Salmon
 - Rainbow Trout
 - Cutthroat Trout
 - Brook Trout
- **Warm and cool water species**
 - Other susceptible bacteria

PAHSIMEROI HATCHERY

- Annual epizootics of BKD
- Outbreaks occur from June until January
- Successful treatments if diagnosed early
- Erythromycin medicated feed
 - 28 day treatment
 - 100 mg/kg/day

TREATMENT IN 2016?

- Due to the problems in getting medicated feed in 2015
- Hatchery manager preparing for treatment in 2016
- Contact feed company for availability of pre-mix of erythromycin medicated feed
- Not enough to treat half the fish for 14 days
- Contacted Dr. Moffitt

CONCLUSIONS

- Erythromycin appears to have support among conservation salmon hatcheries
- Injectable absolutely needed for captive broodstock programs
- Absolutely needed for high BKD segregation programs
- Other salmonid hatchery programs can benefit if BKD is a problem
- Potential warm and cool water broodstock uses
 - Susceptible bacteria
- Erythromycin is still used in human medicine

CONCLUSION

- **Need sponsor for erythromycin**
 - Feed premix
 - injectable
- **Need to develop early detection methods**
 - qPCR techniques
 - Fin, water, mucus, gill
- **Need to label more antibiotics for BKD**
 - Draxxin
 - Aquaflor

QUESTIONS?





Team EFHL

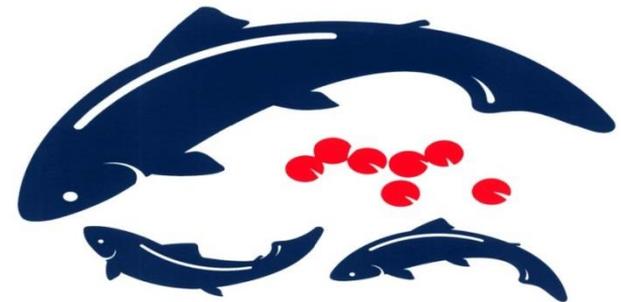


AADAP

Aquatic Animal Drug Approval
Partnership Program



An IDACORP Company



LOWER SNAKE RIVER
COMPENSATION PLAN
Hatchery Program