



REDUCING NEGATIVE INTERACTIONS OF H & W KALAMA STEELHEAD

**WDFW
KALAMA RESEARCH TEAM**

**PAT HULETT
CAMERON SHARPE
CHRIS WAGEMANN
CHRIS GLEIZES**

ACKNOWLEDGMENTS



National Oceanic
and Atmospheric
Administration

National Marine
Fisheries Service

NMFS
WDFW



MITCHELL ACT FUNDING

KALAMA HATCHERY STAFF

WDFW DNA LAB



REDUCING NEGATIVE INTERACTIONS OF H & W KALAMA STEELHEAD

**SEGREGATION OF
SPAWNERS**

BROODSTOCK MGMT

QCR PROTOCOLS

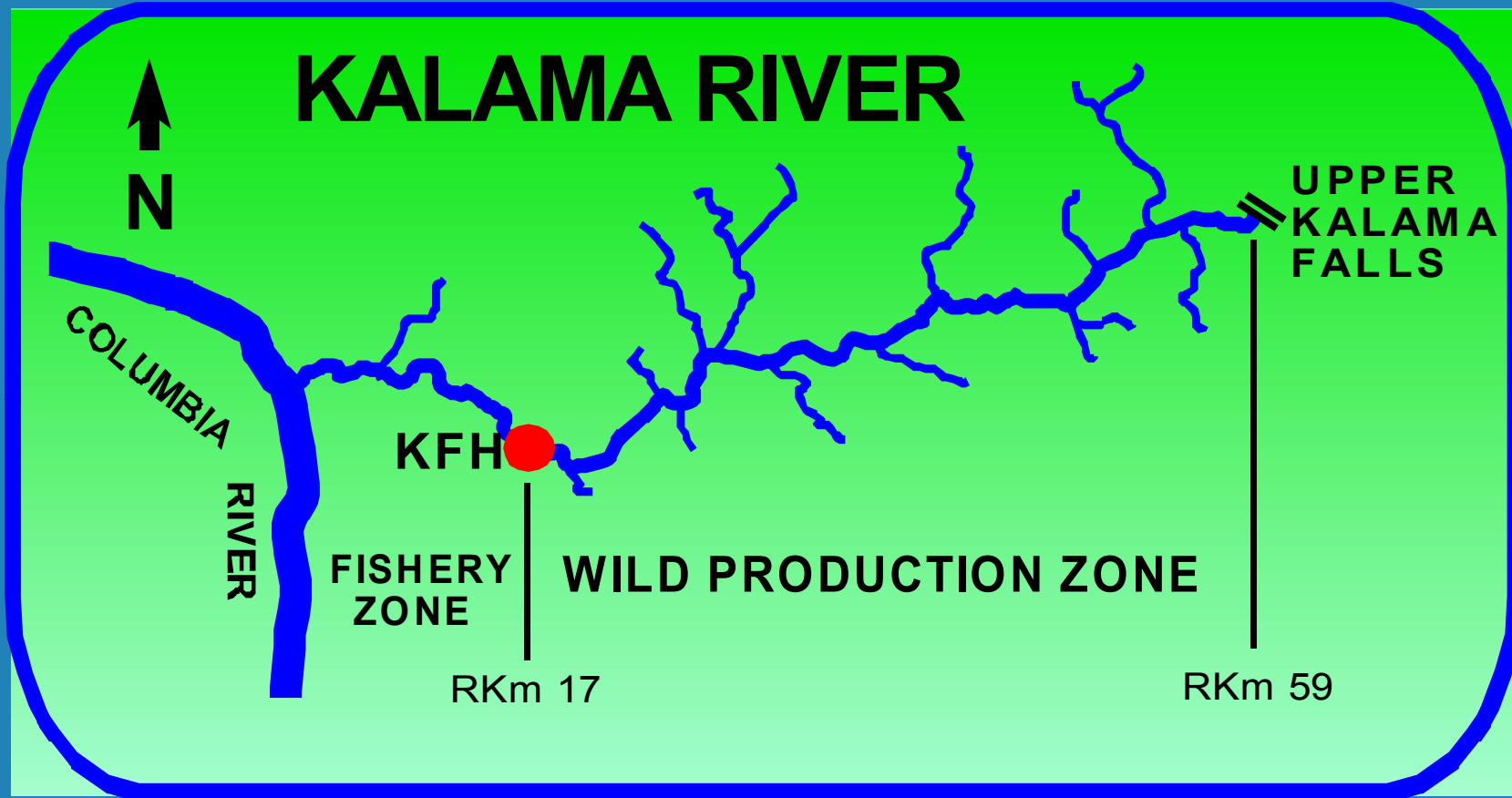
STUDY AREA & STOCKS



HATCHERY – WILD CONFLICT

- **LOW REPRODUCTIVE SUCCESS OF
NON-LOCAL HATCHERY STOCKS**
 - **LIKEWISE: Forks Cr., Hood R.,
Clackamas R.**
 - **GENETIC AND ECOLOGICAL RISKS**
- **RESPONSE? (FOCUS ON GENETICS)**
 - **SEGREGATE**
 - **CHANGE BROODSTOCK (WILD)**

SPAWNER SEGREGATION





WILD BROODSTOCK PROGRAMS: EFFICACY AND RISKS

➤ SUPPLEMENTATION

**INTENTIONAL CONTRIBUTION
TO NATURAL PRODUCTION**

➤ HARVEST

**UNINTENTIONAL CONTRIBUTION
TO NATURAL PRODUCTION**

KALAMA SUMMER STEELHEAD WILD BROODSTOCK PROGRAM

OBJECTIVES

- **PERFORMANCE IN HATCHERY:
BROODSTOCK SURVIVAL
JUVENILE GROWTH, SURVIVAL**
- **JUVENILE OUTMIGRATION
TIMING; SIZE; RESIDUALISM**
- **ADULT RETURN RATES
TO TRAP; HARVEST**
- **REPRODUCTIVE SUCCESS
SPAWNING AMONG WILD FISH**

METHODS AND CHALLENGES

RELATIVE TO ACHIEVING TWO KEY OBJECTIVES OF SUCCESSFUL SUPPLEMENTATION:

- **AVOIDING GENETIC CHANGES
(DOMESTICATION, DRIFT, ETC.)**
- **AVOIDING ECOLOGICAL AND
GENETIC IMPACTS FROM
JUVENILE RELEASES**

STATUS OF SUMMER-RUN WILD BROODSTOCK PROGRAM

- **SPAWNED 19-26 PAIRS EACH IN
1999, 2000, 2001, 2002, 2003**
- **4 BROODS SMOLTS RELEASED;
2003 BROOD REARING**
- **1999 BROOD ADULTS (2-SALT)
RETURNED AND SPAWNED IN 2003
(START OF REPRO. SUCCESS STUDY)
2000 BROOD ADULTS WILL SPAWN
THIS WINTER/SPRING 2004**

**2003 BROOD: SMOLTS IN 2005
RETURNING ADULTS: 2006-2008**



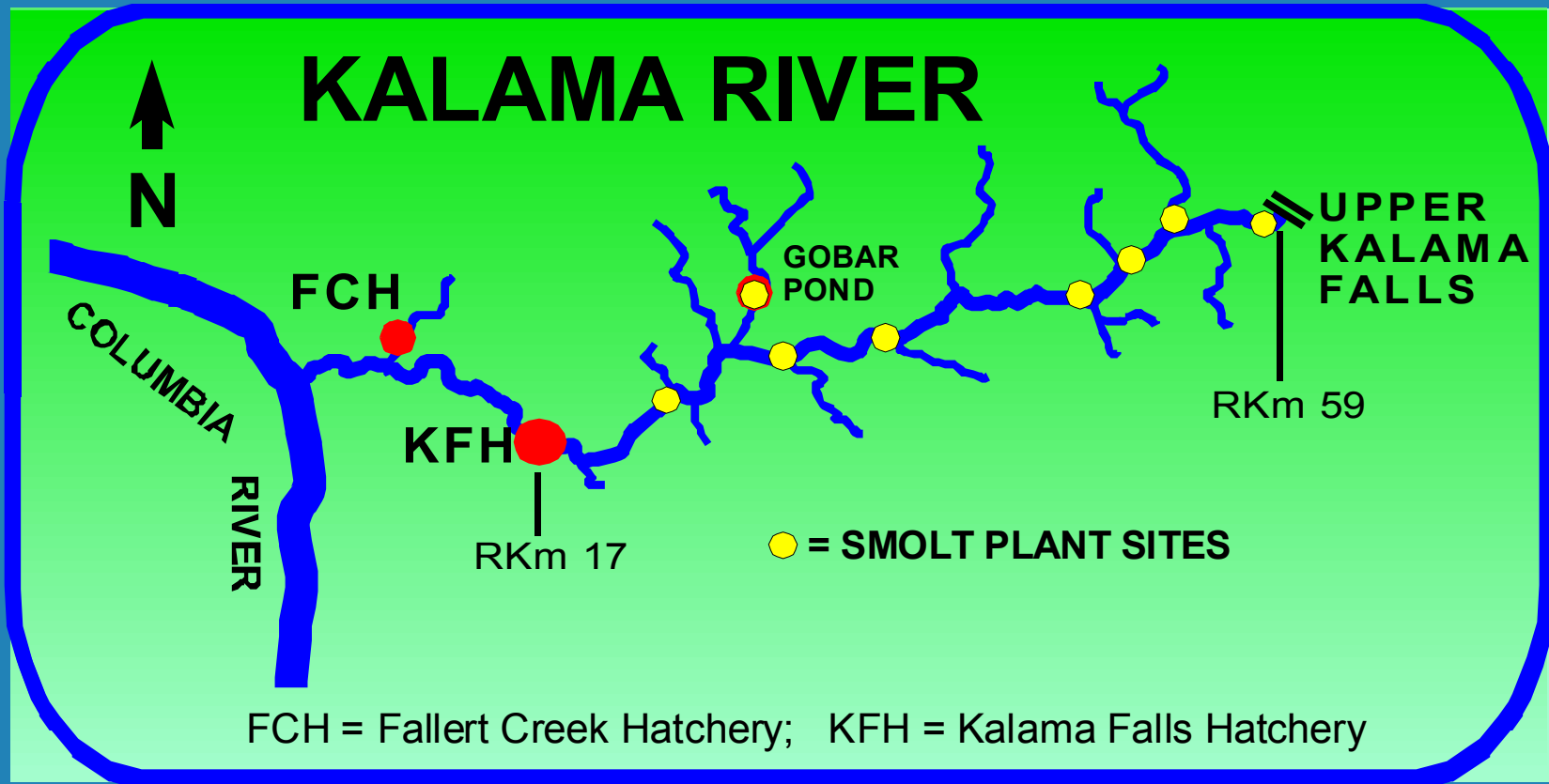
**MEANWHILE:
OTHER PERFORMANCE ELEMENTS**

PRODUCTION PROTOCOL

(Quasi-Conventional Rearing)

- **ADULT COLLECTION (May-Jan.)**
- **SPAWNING (Jan.-May)**
- **STANDARD REARING**
 - **ONE-YEAR SMOLT PROGRAM**
 - **REDUCED DENSITIES**
 - **AGGRESSIVE FEEDING REGIMEN**
 - **SPRING (MAY) SMOLT RELEASE**

SMOLT PLANTS IN KALAMA WATERSHED



RADIO TELEMETRY



CHALLENGE #1

BROODSTOCK COLLECTION

- **OBTAIN TARGET NUMBER AND REPRESENT GENETIC AND LIFE HISTORY TRAITS OF THE RUN**
- **RETAIN Nth MALE AND FEMALE**
 - **FULL SEASON TRAPPING (May-Jan)**
 - **RUN SIZE, SEX RATIO ESTIMATES**

CHALLENGE #2

BROODSTOCK SURVIVAL

- **MINIMIZE STRESS AT COLLECTION**
- **SHADE COVERS OVER 2/3 POND**
- **MINIMIZE DISTURBANCE IN POND**
- **DAILY FORMALIN TREATMENT**
- **SPLIT M & F BEFORE SPAWN**

CHALLENGE #2

BROODSTOCK SURVIVAL

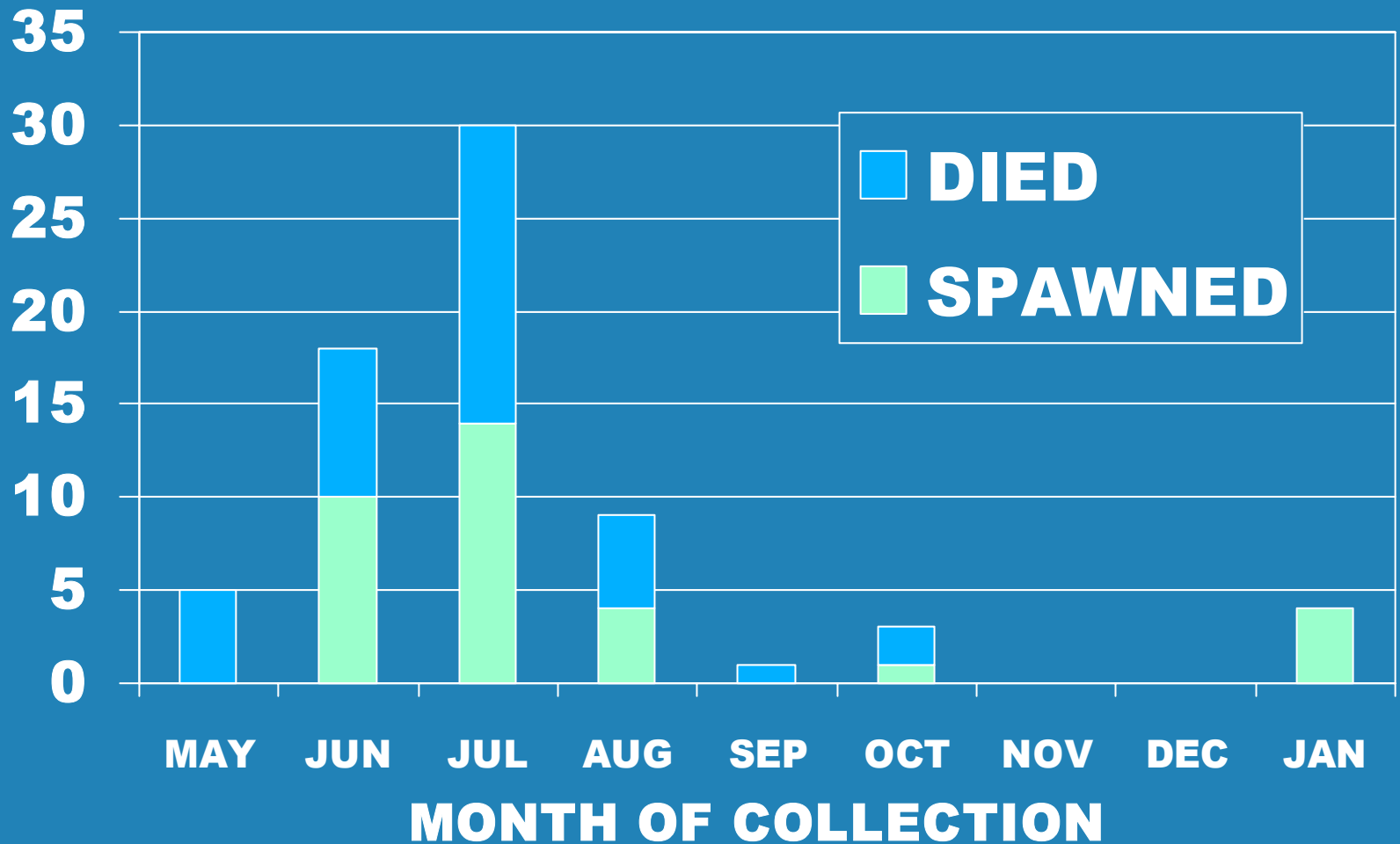
➤ **TARGET = 90%**

➤ **OBSERVED = 71-92%**

47% in 2003

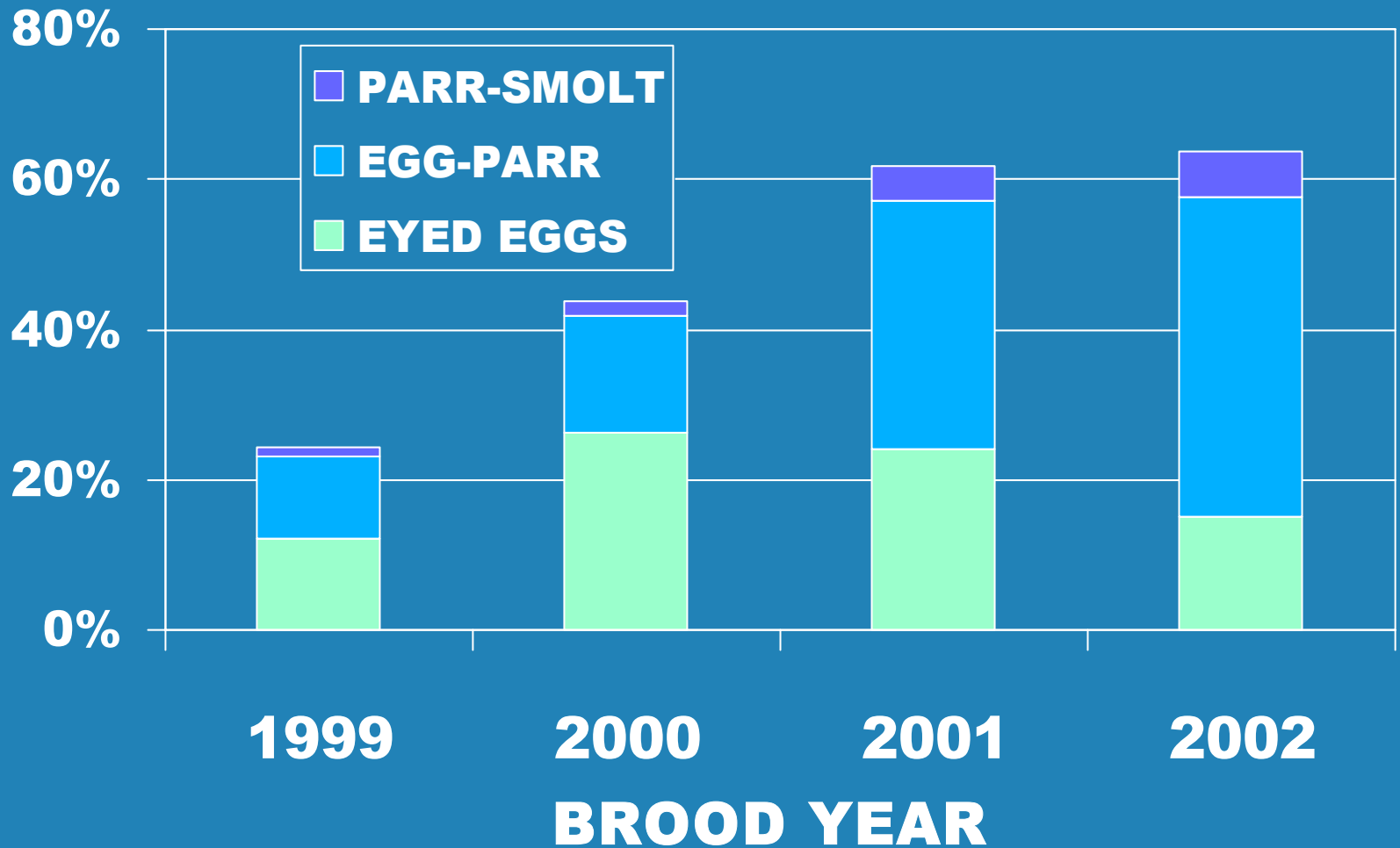
- **INADEQUATE No. BROODSTOCK,
AND SHORT ON MALES (17F, 13M)**
- **MORTALITY RANDOM?**

2003 BROODSTOCK



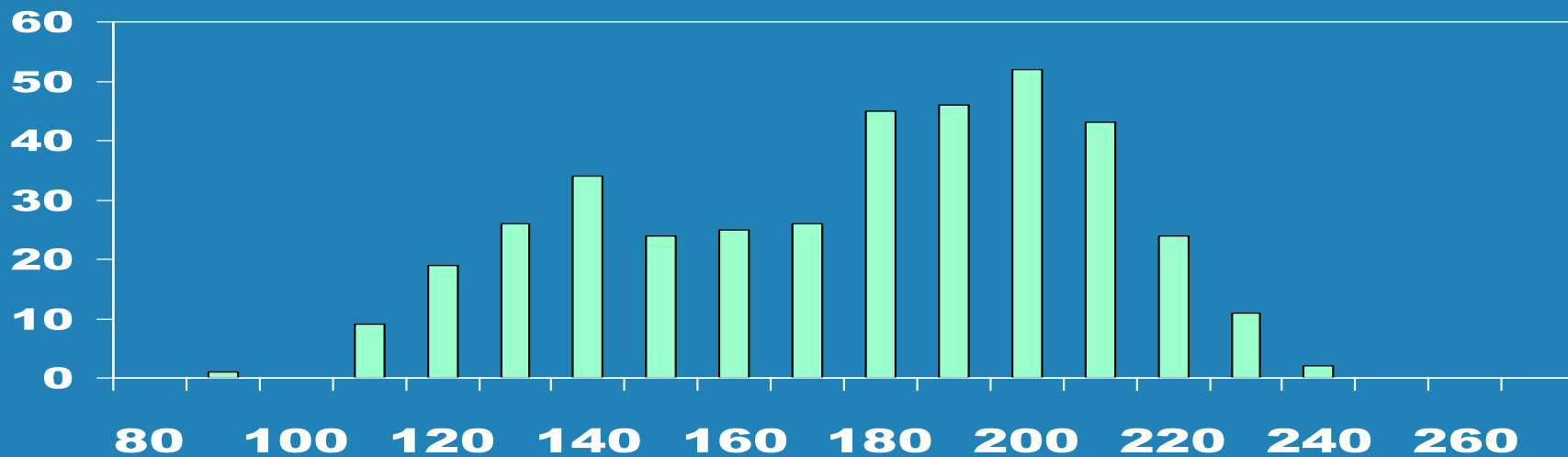
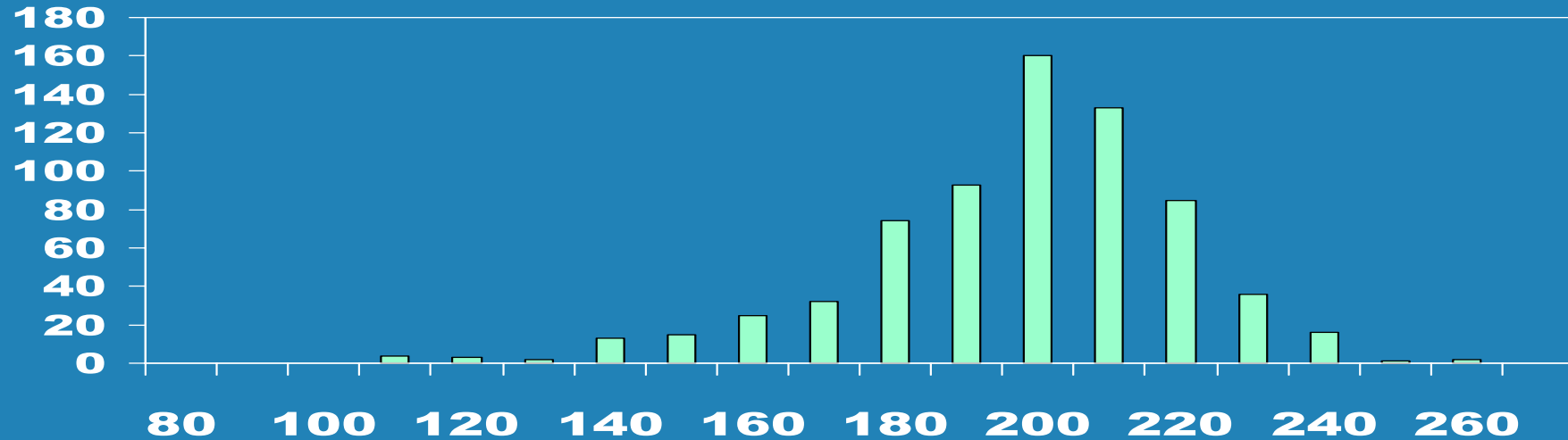
CHALLENGE #3

JUVENILE MORTALITY



CHALLENGE #4 – SIZE AT RELEASE

SMOLTS RELEASED IN 2000, 2001



FL (mm)

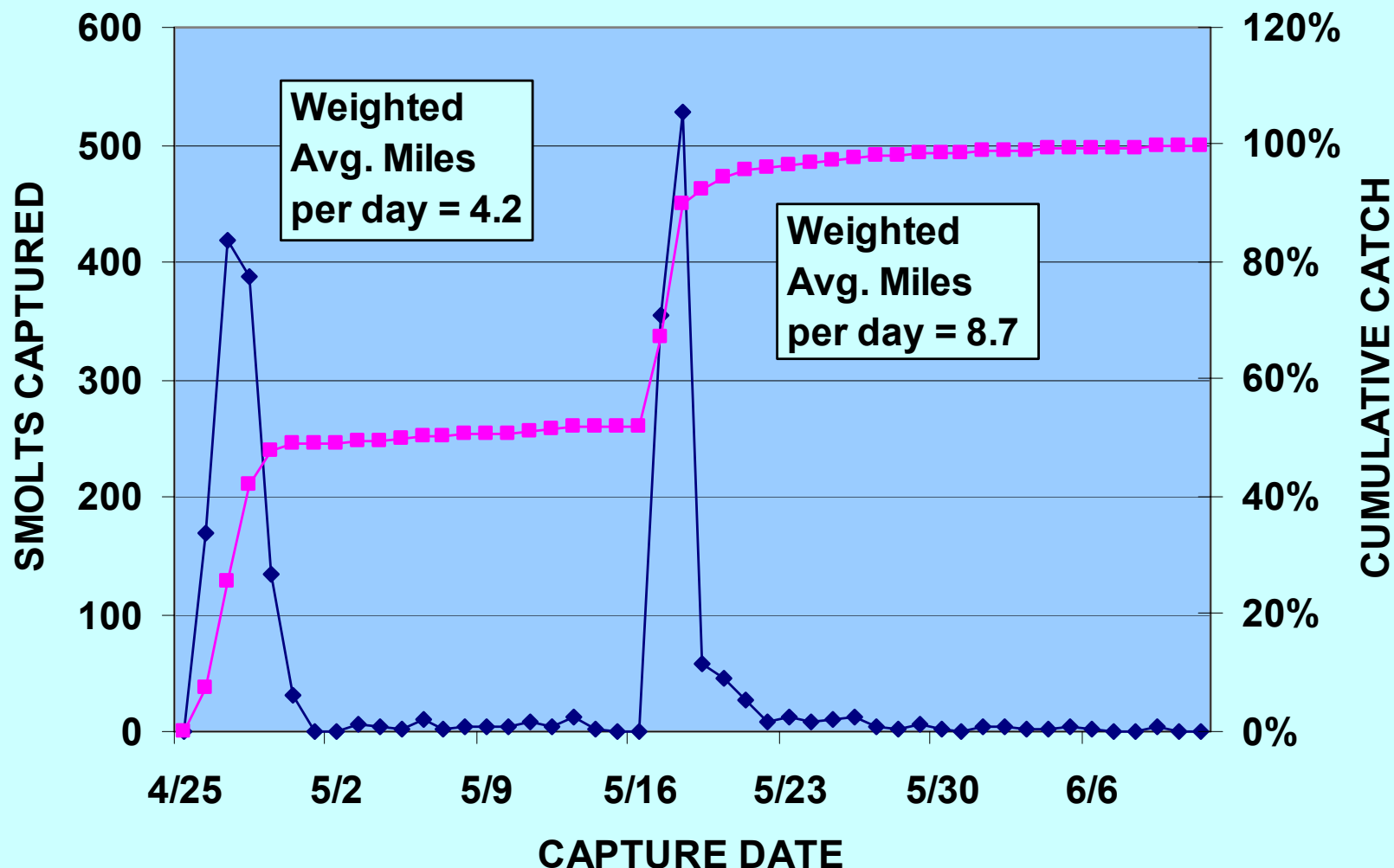
FISH

CHALLENGE # 5 - OUTMIGRATION

2000 Brood Hatchery Summer-run (Wild stock)

4/25/01 Release from sites 10 miles (avg.) above trap

5/17&18/01 Releases from sites 8 miles (avg.) above trap



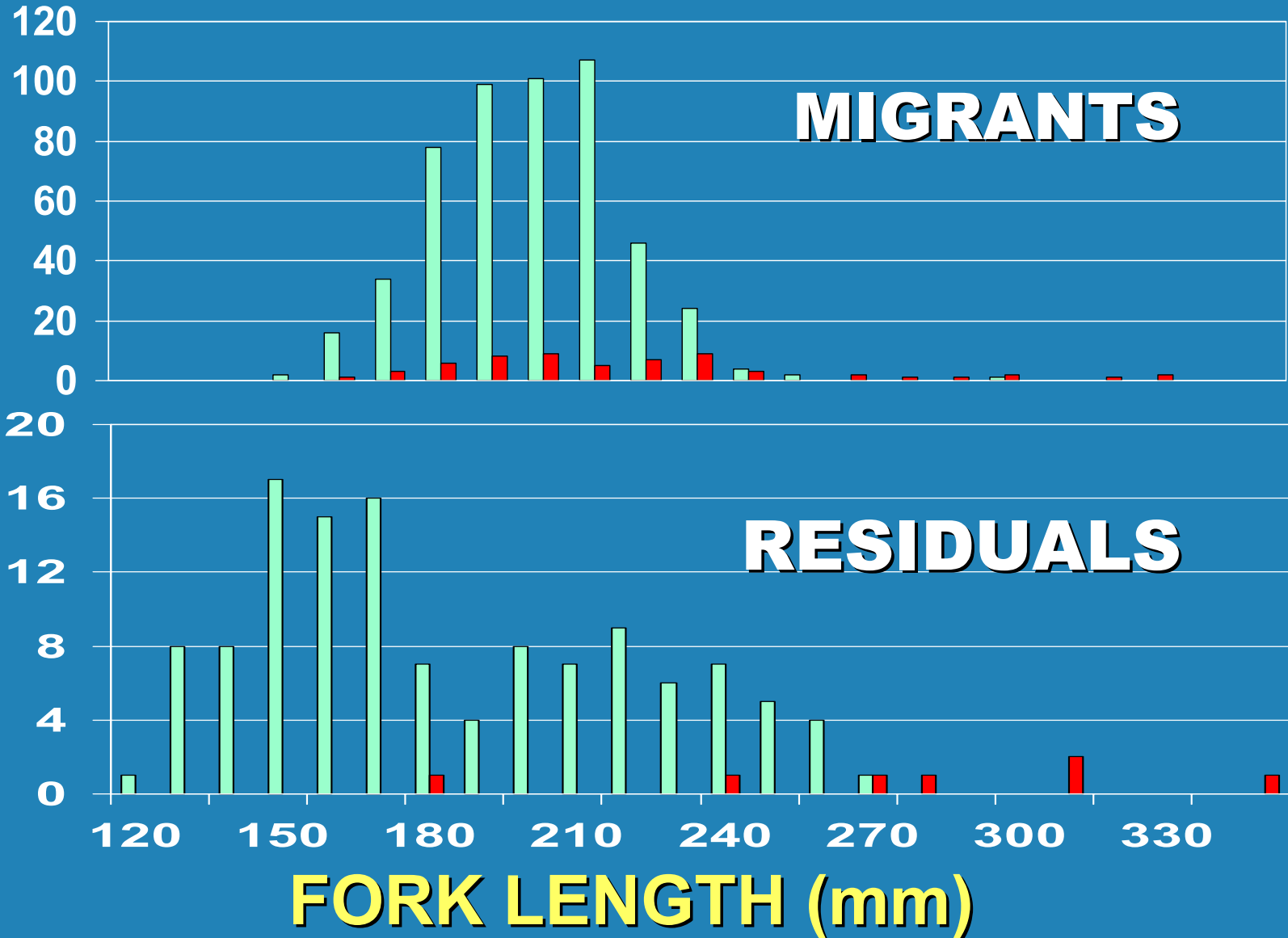
RESIDUAL ROUND-UP

- **WILD BROODSTOCK FISH RESIDUALIZED AT A HIGHER RATE THAN TRADITIONAL STOCKS**
- **RESIDUALS COLLECTED HAD A BIMODAL SIZE DISTRIBUTION**
- **SOME RESIDUALS SURVIVED OVER WINTER AND BEYOND**

MIGRANTS & RESIDUALS

2001 COLLECTIONS: BY '00 & BY '99

FREQUENCY



A photograph of three salmon fish of different sizes lying horizontally on a light blue tarp. The fish are arranged from top to bottom: a small fish, a medium fish, and a large fish. The background shows some green grass and dark soil. The entire image is framed by a thick yellow border.

SMOLT

LARRY

LG RESIDUAL

DARYL

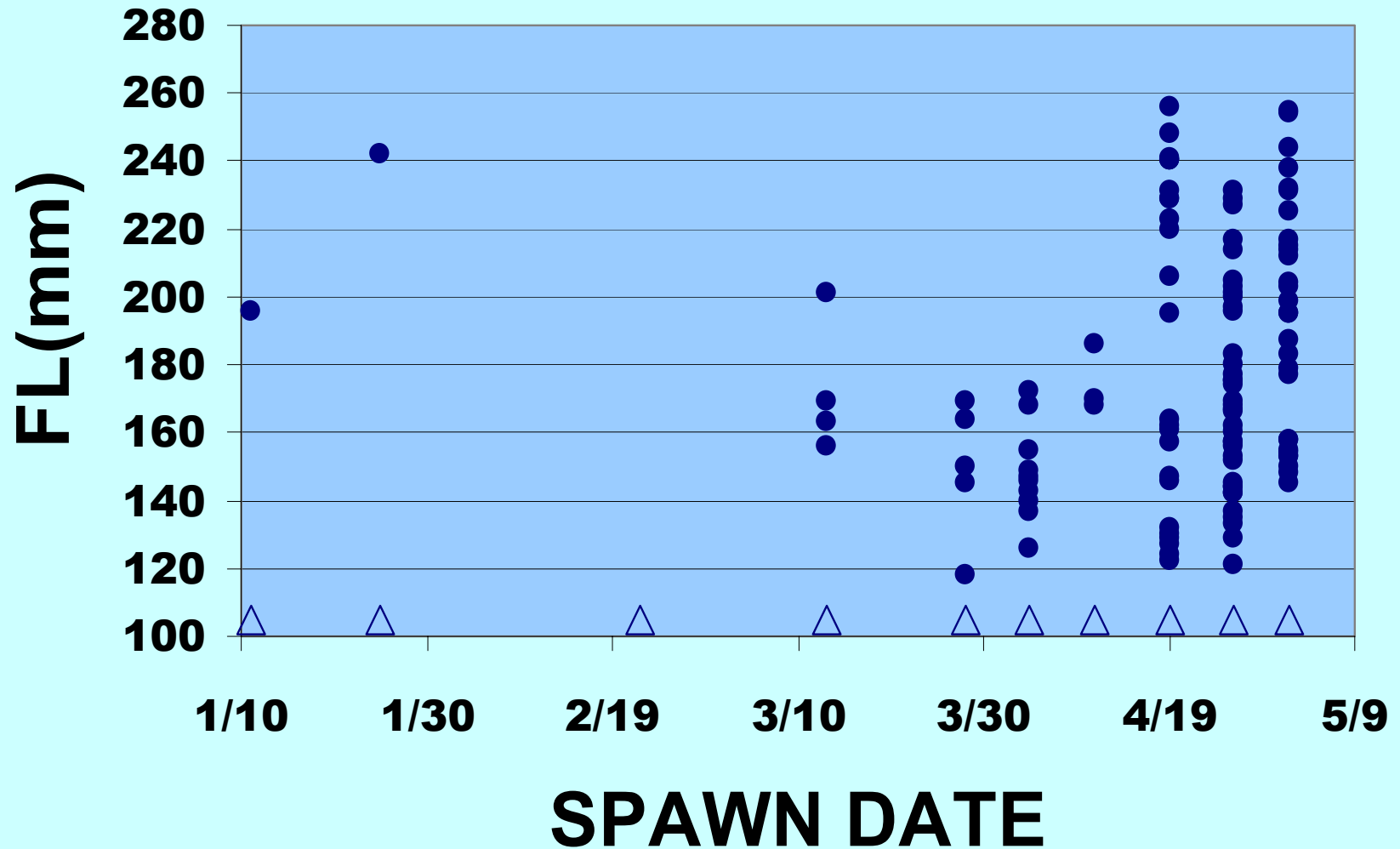
SM RESIDUAL

DARYL

30 12:50 PM

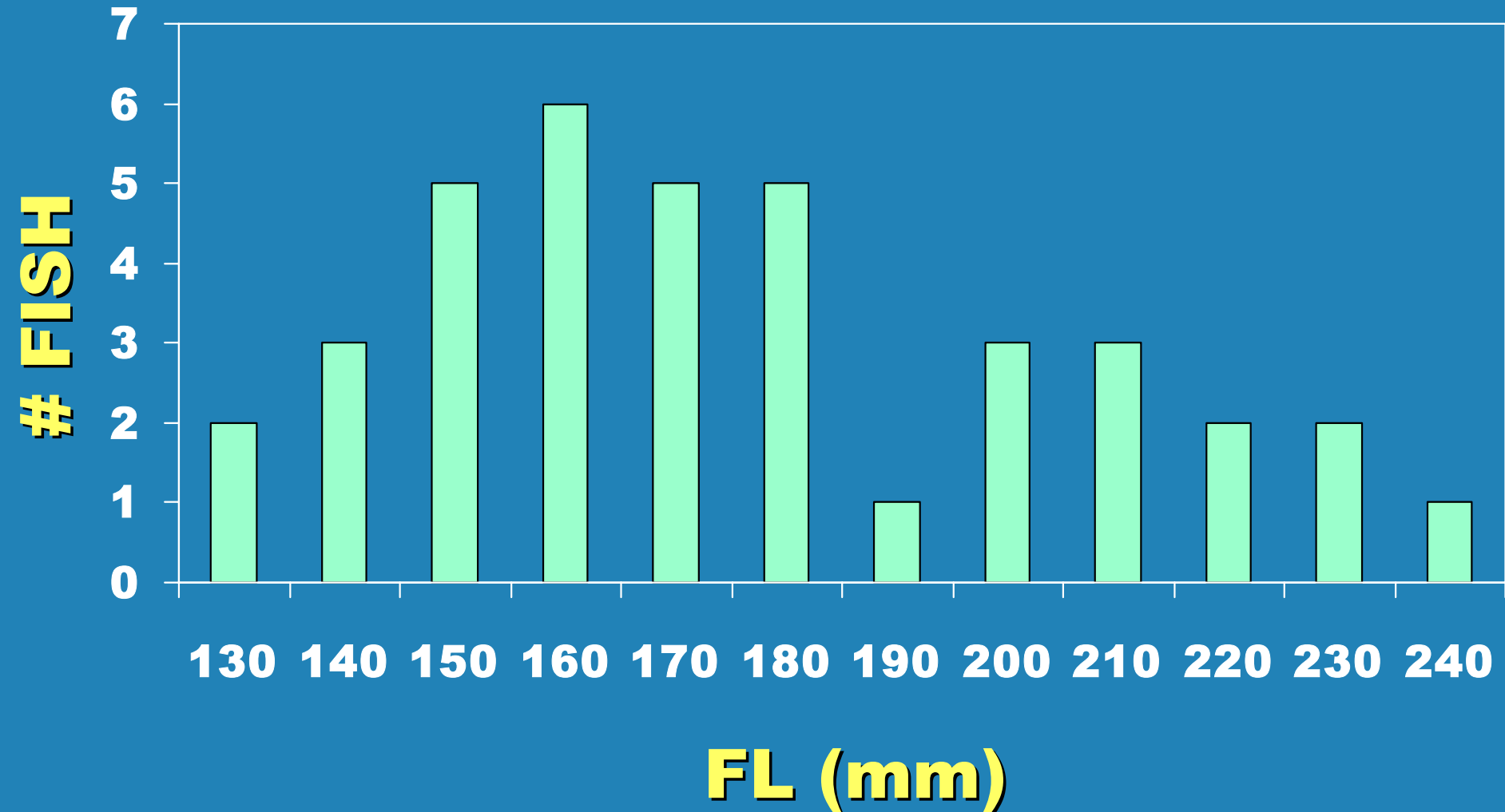
2001 RESIDUALS

(BY 2000; n=116)



SIBLING RESIDUALS

OFFSPRING OF SINGLE FEMALE (APRIL 26)



RESIDUALS:

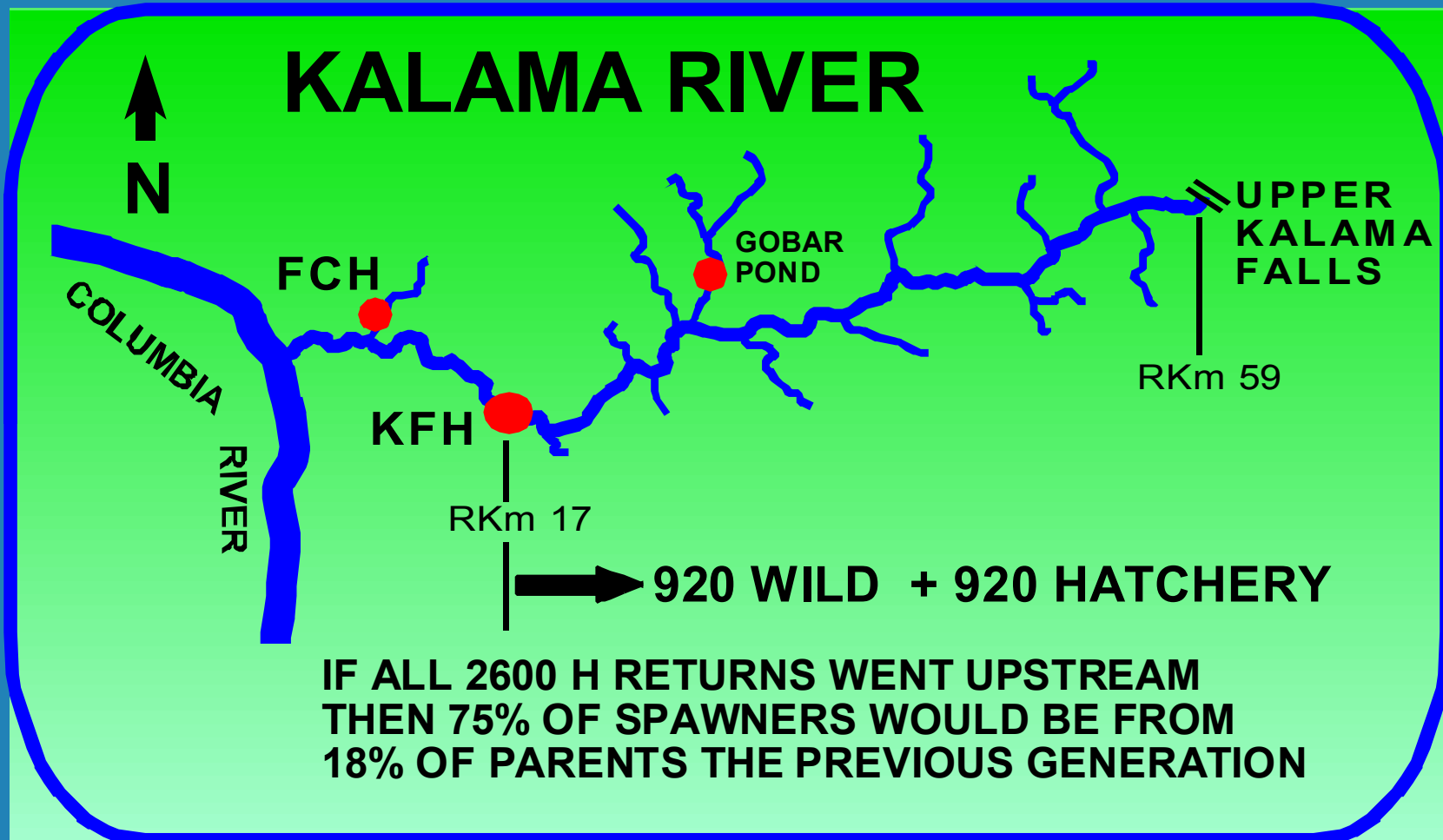
WHAT'S GOING ON?

➤ SIZE MATTERS?

- PROBABLY, BUT VARIATION WITHIN FAMILIES SUGGESTS POSSIBLE GENETIC INFLUENCE; CONTROL BY GROWTH MGMT MAY NOT SUCCEED**

➤ RESIDUALS FROM 2002: PRELIMINARY RESULTS SIMILAR (ANALYSIS CONTINUES)

CHALLENGE #6 – ADULT RETURNS GENETIC SWAMPING: DOWNSIDE OF SUCCESS?



CONCLUSIONS

- **WE GOTTA HAVE A PLAN**
- **CONSERVATION HATCHERY PRODUCTION OBJECTIVES ARE NOT ALWAYS EASY**
- **IF WE DON'T MEASURE RESULTS WE CAN'T TELL SUCCESS FROM FAILURE**
- **TO WIN SUPPORT WE MUST DEMONSTRATE RESULTS**

WHAT YOU DON'T KNOW



CAN HURT YOU