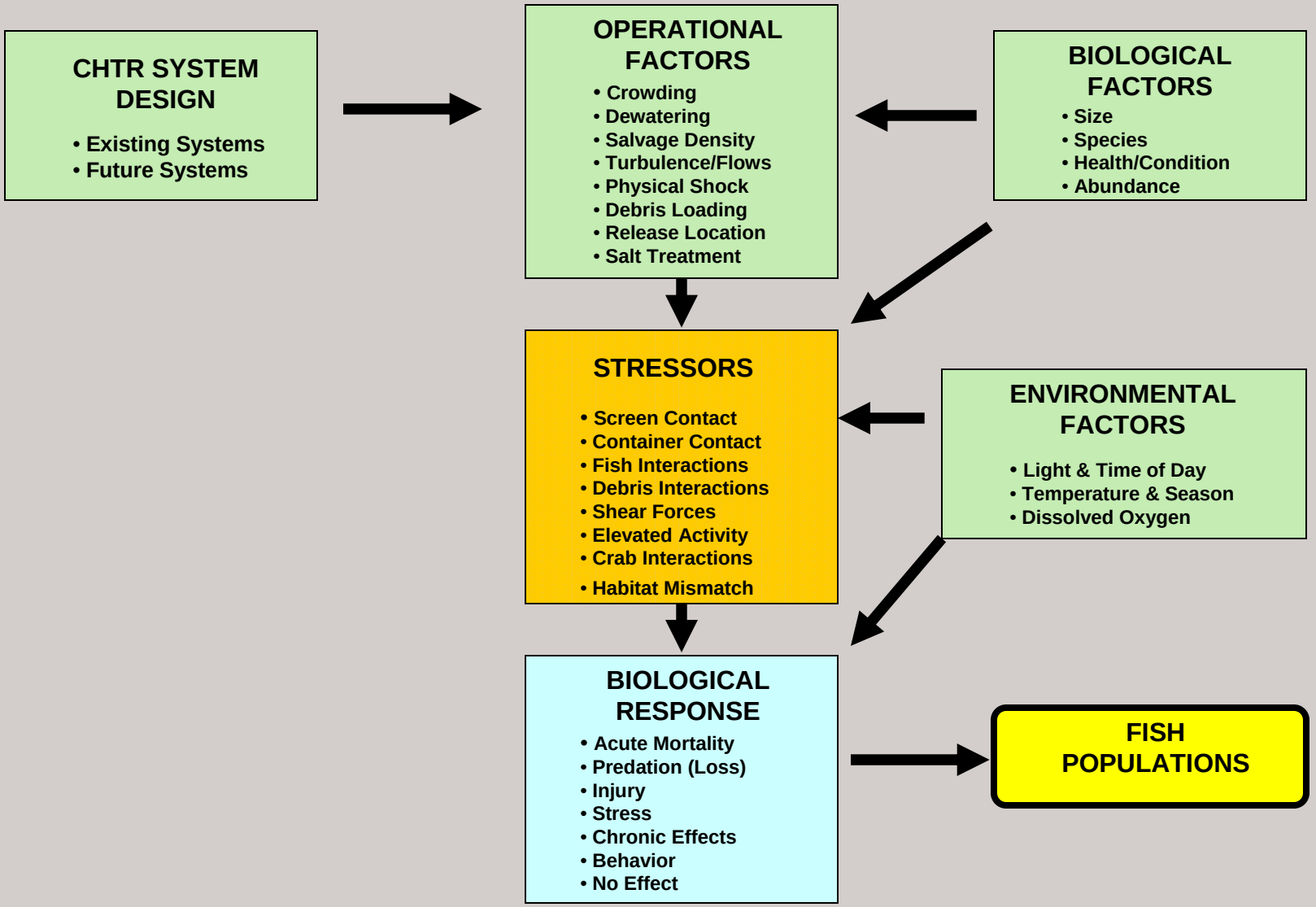
Collection, Handling, Transport, and Release (CHTR) Effects on Delta Smelt at the Southern Delta Export Facilities

California Department of Fish and Game
California Department of Water Resources
US Bureau of Reclamation
UC Davis

Why do we need to study CHTR?

- Fixing the SDFF is high priority
- New screens to protect delta smelt are expensive
- Screening means salvaging fish; CHTR is necessary
- Knowledge on the survival of DS in CHTR is weak
- High mortality may limit the efficacy of new screens
- Lack of survival rates for delta smelt = barrier to decision making

CHTR Impacts on Fishes
(Direct and Indirect Effects)

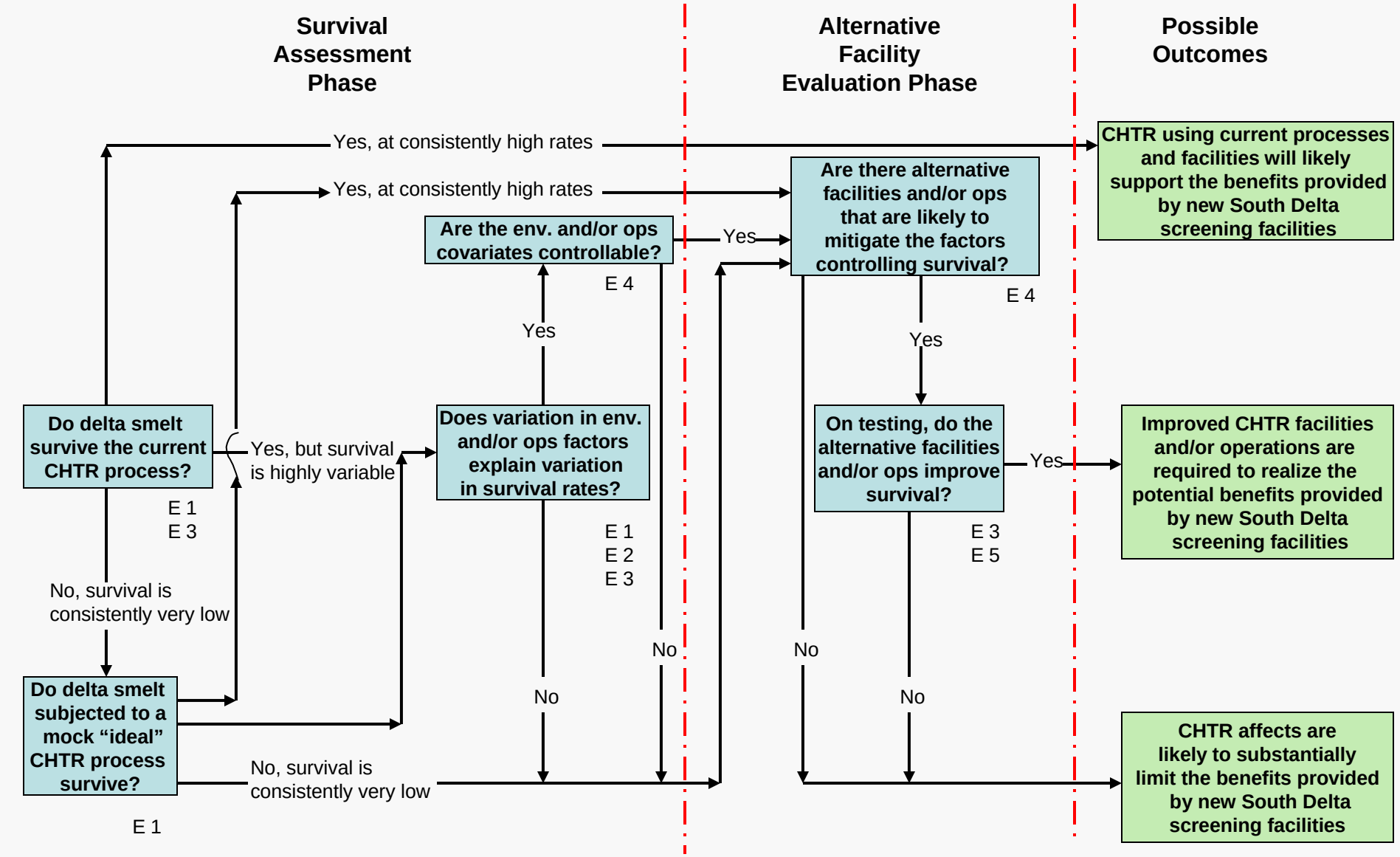


Dept of Fish and Game 5-10-03 rwf

What is the CHTR Program?

- Five study elements proposed:
  - *Acute mortality and injury rates of DS exposed to CHTR*
  - *Fish predation in CHTR*
  - *Diagnostic indicators to predict adverse effects on salvaged DS*
  - *New technologies feasibility study*
  - *Pilot testing and evaluation of promising CHTR methods*
- Study elements will be implemented in parallel

Figure 1. CHTR Decision Pathways and the Role of CHTR Evaluation Program Elements in Decision Making



E1 – Acute M & I
E2 – Predation
E3 – Diagnostic Ind. & Sub Lethal Effects
E4 – Alternatives Identification
E5 – Facility Pilot Testing

Who are involved with this program?

DFG Central Valley Bay Delta Branch:

- Conduct three study elements, lead agency for program, biological expertise
- Bob Fujimura, Pat Coulston, Jerry Morinaka, Geir Aasen, Virginia Afentoulis, Steve Foss, Robert Vincik, Derek Stein, Ramiro Soto

DFG Biometrics Section:

- Statistical design and interpretation
- John Geibel, Phil Law

DWR Fish Facilities Program:

- Conduct two study elements on new technologies evaluations, contract support
- Roger Churchwell

Montgomery Watson and Harza Engineering:

- Biological and tech expertise for new technologies elements as directed by DWR
- Neil Schild (R. Churchwell)

USBR Denver Research Team:

- Collaborative research on holding tank evaluations, loading methods, test methods
- Charles Liston, Mark Bowen, Cathy Karp, Brent Mefford

Who are involved with this program?

USBR Tracy Research Team:

- Test site for CHTR work, tech support (marking, rearing, and testing methods)
- Brent Bridges, Johnson Wang, Rene Reyes, Lloyd Hess

UCD Delta Smelt Aquaculture Project:

- Source of test fish, pre treatment holding, tech support (handling techniques)
- Bradd Baskerville-Bridges

UCD Fish Physiology Program:

- Collaborative research on stress indicators work, tech support (clinical methods)
- Don Portz, Joe Cech

DWR Division of Engineering:

- Design and construction of testing facilities at Skinner Fish Facility
- T.C. Liu, Gordon Enas, Tim Talbert

DWR Delta Field Division:

- Test site for CHTR work, logistical and facilities support
- Jerry Raasch, Jim Odom

Who are involved with this program?

California Bay Delta Authority:

- Fiscal and programmatic support and management for program
- Ron Ott, Darryl Hayes
- Scientific review and oversight by Science Panel staff

Central Valley Fish Facilities Review Team:

- Primary technical team responsible for study plan development and review
- Bill O'Leary, Jim Buell, Dan Odenweller, Ron Silva, Don Kurosaka, Lee Bartoo

Other Management or Technical Teams:

- Provides additional technical review or input
- Tracy Fish Test Facility Technical Teams, Clifton Court Forebay Tech Advisory Team, IEP Management Team

What are the program elements?

(Survival Assessment Phase)

- Acute Mortality and Injury of CHTR Exposed DS
  - Jerry Morinaka, Principal Investigator

Element 1: Acute Mortality and Injury of Salvaged DS in CHTR

- Release and recovery of cultured delta smelt

  - risks with wild fish alone
- Examine the rates of wild entrained DS
- Test adults in winter and juveniles in spring
- Hold live fish up to 48 hours
- Control groups

What are the program elements?

(Survival Assessment Phase)

- Predation Evaluation
  - Led by Geir Aasen,
    Principal Investigator

Element 2: Predation Loss of Salvaged DS Associated with CHTR

- Unmeasured loss source
- Measure fish predation rate during CHTR process
- Sample wild entrained predatory fish
- Stomach content
- Digestion rates

What are the program elements?

(Survival Assessment Phase)

- Diagnostic Indicators to Predict Adverse Effects to Salvaged DS
  - Led by Virginia Afentoulis,
    Principal Investigator

Element 3: Diagnostic Indicators to Predict Adverse Effects to Salvaged DS

- Examine delayed mortality or sub lethal impairment.
- Tool for measuring long-term survival
- Examine cultured and wild fish for abnormal levels of three blood parameters
- Examine chronic stress responses such as:
  - Swimming performance
  - Reproductive success
- Collaboration with UCD & USBR

What are the program elements?

(Alternative Facility Evaluation Phase)

- Feasibility of Alternative Technologies
  - Led by Roger Churchwell, DWR
  - Phase 1

Element 4: Feasibility of New Concepts for CHTR

- Synthesize current information of new technologies for CHTR
- Identify promising methods or concepts
- Determine the feasibility of these concepts
- Integrate early results
- Focus on handling, transport, release systems, and release sites
- Most promising concepts = pilot testing in next phase

What are the program elements?

(Alternative Facility Evaluation Phase)

- Pilot Testing and Evaluation of New Technologies
  - Led by Roger Churchwell, Principal Investigator
  - Phase 2

Element 5: Pilot Test New Technologies for CHTR

- Pilot test and evaluate new and promising new CHTR technologies
- Possible study areas:
  - transportable holding tanks
  - new loading methods
  - barge transportation
  - alternative release methods
- Use similar methods of biological evaluations

Current Program Status and Schedule

Work Plan Development and Review

- Two draft documents are awaiting release to IEP Management Team, IEP Coordinators, and Central Valley Fish Facilities Review Team.
- Three other draft document are being edited.
- Summer 2003

Program Planning and Preparations

- DFG: general design of testing facilities evaluations; equipment procurement, refining testing procedures; pilot testing
- DWR: construction plans and contracts for building the testing facilities
- DWR and UCD are working on expanding hatchery facilities to provide test fish
- UCD and USBR: development of collaborative tests at the TFCF
- Remainder of 2003

Program Implementation

- Formal testing = winter and spring of 2004 and 2005
- Preliminary data analysis and reporting = summer and fall of 2004 and 2005
- Adaptive investigations based on 2004 results = 2005
- Final report writing and recommendations = winter and spring of 2006
- Integration into TFTF or other ongoing SDFF programs

Fish Collection, Handling, Transport, and Release Evaluation Program: *Acknowledgements*

California Department of Fish and Game:

- Bay Delta: Virginia Afentoulis, Geir Aasen, Jerry Morinaka, Pat Coulston, Steve Foss, Jim Orsi, Sonny Olaso, Robert Vincik, Derek Stein, Chuck Armor, Perry Herrgesell, Juan Vallin
- Biometrics: Phil Law, John Geibel

Department of Water Resources:

- DES: Roger Churchwell, Nicole Darby, Roger Padilla, Andrew Frankel
- DOE: Don Kurosaka, T.C. Liu, Gordon Enas, Tim Talbert
- DFD: Jerry Raasch, Jim Odom

U.S. Bureau of Reclamation:

- Denver: Charles Liston, Mark Bowen, Cathy Karp, Brent Metford, Ray Bark
- Tracy: Brent Bridges, Johnson Wang, Rene Reyes, Lloyd Hess, Ron Silva

U.C. Davis:

- Bradd Baskerville-Bridges, Don Portz, Joe Cech, Cincin Young

California Bay Delta Authority:

- Ron Ott, Darryl Hayes, Kim Taylor, Sam Luoma

Management and Technical Teams:

- CVFFRT, CCFTAT, TFTF TTAT, NDFFTT, IEP Management Team, Delta Smelt Project Work Team
- Dan Odenweller, Jim Buell, Tina Swanson, Matt Nobriga, Ted Sommer, Bruce Herbold, Bill Bennett, Mike Chotkowski, Lee Bartoo, Zach Hymanson, Diana Jacobs

Any questions?

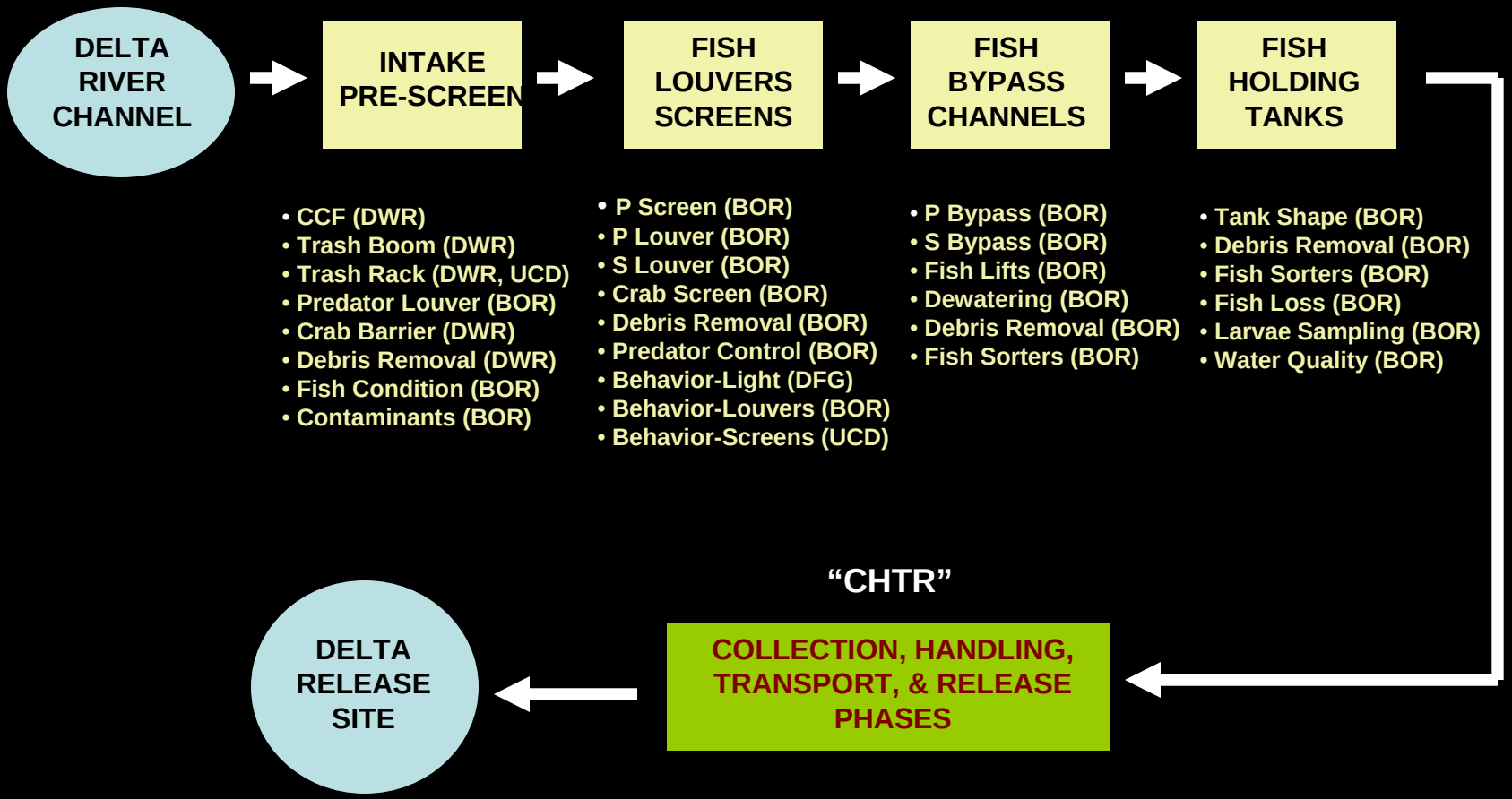
The End

Additional Backup Slides

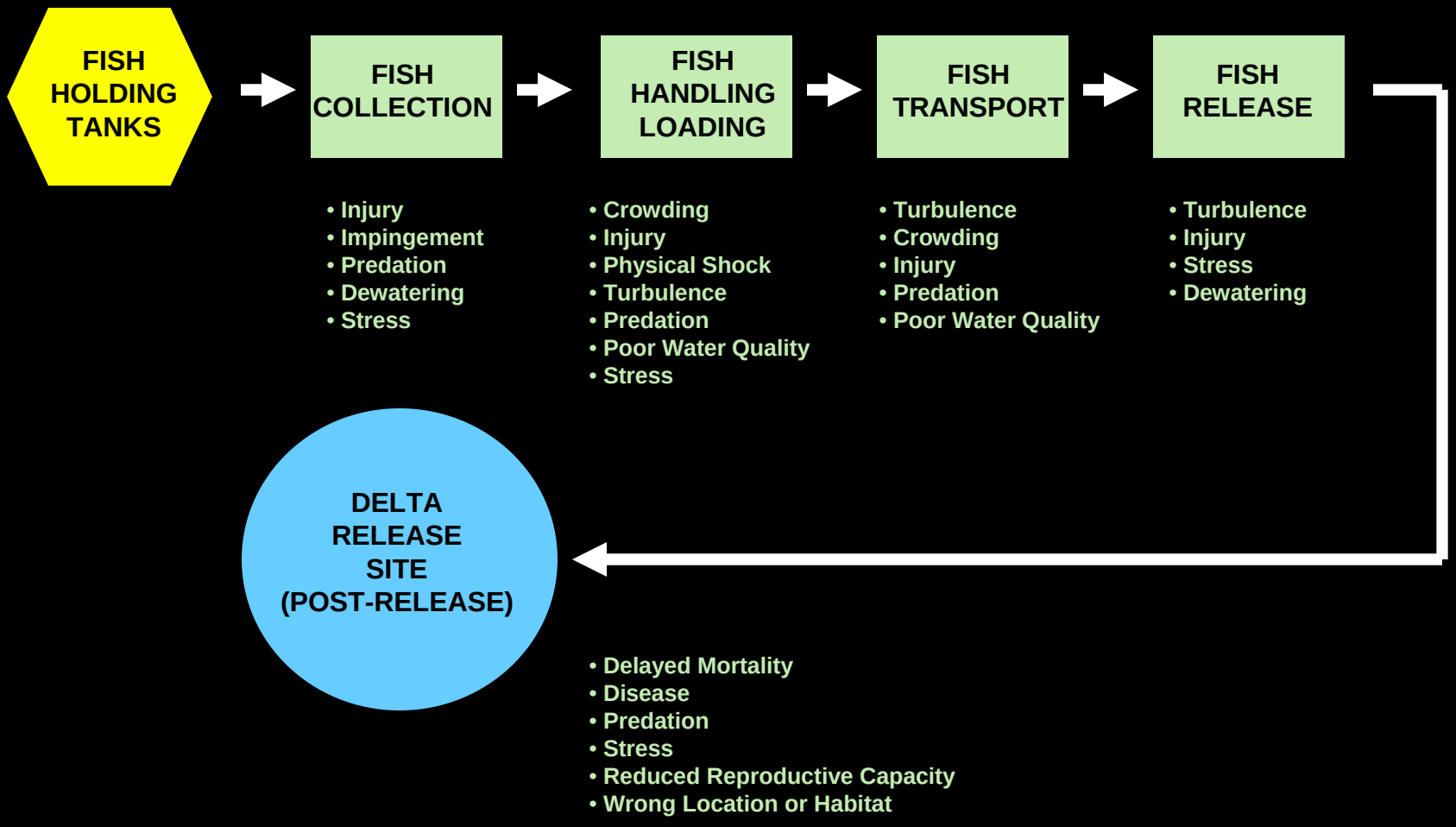
Proposed CHTR Program

- Identified five key questions
- Literature reviews
  - Fish transport
  - Stress indicators
  - Past DS survival results
- Enhance DS Aquaculture
  - Expanded culturing facilities
  - Additional personnel
- Procure personnel and resources
- Plan and implement 5 study elements to answer
- What are the acute mortality and injury rates in existing CHTR processes?
- What is the predation loss in the existing CHTR processes?
- Can new methods improve the survival of salvaged DS?
- Can diagnostic indicators be used to measure adverse effects to DS?
- What new CHTR concepts are feasible?

South Delta Fish Salvage Facility



"CHTR" PROCESSES



Past Studies: CHTR and Delta Smelt

- Limited focused data exists
- Little published ATT
- Limitations of past studies
- Wild adult smelt: few fish
- Adult DS results
- Juvenile DS results

Monthly Delta Smelt Salvage for CVP + SWP Combined

Year	Feb	May
1992	757	1980
1993	1190	16789
1994	174	31877
1995	481	0
1996	1290	30399
1997	80	32828
1998	24	4
1999	1466	58929
2000	5491	35721
2001	3870	13134

Preliminary data from Steve Foss 8-28-02 DFG