Appendix D
DEIS/EIR List of Commentors, Thematic Responses, Comments and Responses to Comments

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APPENDIX D

DEIS/EIR List of Commentors, Thematic Responses, and Comments and Responses to Comments

This appendix consists of three sections: (D1) a listing of the commentors responding to the Trinity River Mainstem Fishery Restoration DEIS/EIR, (D2) thematic responses, and (D3) public comments and the agencies' responses to those comments.

The public comment period for the DEIS/EIR began on October 19, 1999, and was scheduled to end on December 8, 1999 (64 FR 56364). However, the Service extended the comment period until December 20, 1999 (64 FR 67584). On December 27, 1999, the Service reopened the public comment period until January 20, 2000 (64 FR 72357). A complete listing of the agencies, organizations, and individuals who received the DEIS/EIR is shown in Appendix D1.

Appendix D2 contains the thematic responses to comments. After analyzing a number of comments, the agencies determined that numerous organizations and individuals were submitting comments that were substantially similar in their subject matter and the concerns they raised. As a result, the agencies developed thematic responses to specifically address those comments and to avoid repetition of responses and cumbersome text duplication.

While the vast majority of comments came from California, comments were also received from Washington D.C. and states including, but not limited to, Idaho, Montana, Nevada, Oregon, and Wyoming. Appendix D3 contains a complete list of the comments received and the agencies' responses to public comments.

A total of 1,009 letters and 5,436 preprinted postcards were received during the public comment period. In addition, a number of oral comments were received during the public hearings held in November 1999. The transcripts of these hearings are included in Chapter 5 as Attachment 3. Individual responses were not developed for issues raised at the hearings, as such issues were typically presented as statements and/or such issues have been addressed in Appendieces D2 and D3.

The comments provided during the meeting and in the postcards and the letters received required a total of 7,761 responses by the agencies. Among the letters received, approximately half were generated as either form or modified form letters. Generally, the oral comments and comments presented within the majority of the form letters and preprinted postcards required no more than ten individual responses, thus representing a small fraction of the total responses presented in this FEIS/EIR. By far, the majority of the responses presented in Appendix D3 were necessitated by comments received in the non-form letters submitted by interested individuals and organizations including, but not limited to: the irrigation districts, local water boards, municipalities and county agencies, state and federal agencies, and recreation and environmental groups.

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Appendix D1
List of Commentors

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APPENDIX D1

LIST OF COMMENTORS

Federal Agencies

U.S. Department of Agriculture

Forest Service, Klamath National Forest, Michael P. Lee, Designated Federal Official

U.S. Department of Commerce

National Oceanic and Atmospheric Administration, Pacific Fisheries Management Council, Jim Lone, Chairman

U.S. Department of Energy

Western Area Power Administration, P. Nannette Englebrite, Resource Planning Team Lead

U.S. Department of the Interior

Bureau of Indian Affairs, Pacific Region, Sacramento Area Office, Ronald M. Jaeger, Regional Director

Bureau of Reclamation, Native American Affairs Office Adrienne Marks, Policy Analyst

U.S. Fish and Wildlife Service, Klamath Fishery Management Council, Keith Wilkinson, Vice Chair

U.S. Environmental Protection Agency

Region IX, David Farrel, Chief, Federal Activities Office

State Legislature

Senator Wesley Chesbro, Senate District 2 (with 11 additional signatories)

Senator John Burton
Senator Tom Haydon
Senator Patrick Johnston
Senator Byron Sher
Senator John Vasconcellos
Assemblyman Mike Honda
Assemblyman Fred Keeley
Assemblywoman Kerry Mazzoni
Assemblywoman Virginia Strom-Martin
Assemblyman Howard Wayne
Assemblywoman Patricia Wiggins

Senator K. Maurice Johannessen, Senate District 4

State Agencies

State of California

Department of Fish and Game, Broddick L. Ryan, Chief Deputy Director

Department of Transportation, Caltrans District 2, Andrea Redamonti, Local Development Review

Department of Water Resources, Division of Planning and Local Assistance, William J. Bennett, Chief

Governor’s Office of Planning and Research, State Clearinghouse, Terry Roberts, Senior Planner

The Resources Agency of California, Mary D. Nichols, Secretary for Resources

Indian Tribes

Nor-Rel-Muk Nation, Raymond Patton, Tribal Chair
Karuk Tibe of California, Robert B. Rohde, Natural Resources Manager
Yurok Tribe, Susan Masten, Chairperson

Hoopa Valley Tribal Members

William Alfkin
Jolene R. Ames
Blanche Ammon
Rodney P. Ammon, Jr.

Beverly Bailey
Don W. Bailey
Michael Bailey
Charlene Baldy
Keith B. Baldy
Lyle Baldy, Sr.
Kathleen Beeson-Casebier
Diane Beeson-Reed
Sandra Begay
Carl Begay, Jr.
Wanda Benedict
Leonard Bilancos
Loni Billings
Oscar L. Billings
Brook Blake
Sharomali Blake
Richard C. Blake, Jr.
Rick Bradberry
Idell Brock
Darcey L. Brown
Katherine Brown-Hascock
Vernon Bussell, Jr.

Esther Caligrove
Harold Cambell, Sr.
Catherine Campbell
Marie Campbell Muller
Jandre L. Campoy
Duane B. Carpenter
Emogene Carpenter
Joseph Lyle Carpenter
Lila Carpenter
Tina Carpenter
William Carpenter III
Leo Carpenter, Sr.
Eric Casteonsda
Delores Clark
Mekila Clark
Randy Clark
Charlene Colegrove
Christopher F. Colegrove
Colette A. Colegrove
Dana Colegrove

Jacqueline Colegrove
Joanna C. Colegrove
Joie Colegrove
Leslie Colegrove
Rocky Colegrove
Rudy Colegrove
S. Colegrove
S. Billy Colegrove
Alfred Colegrove, III
Al Colegrove, Jr.
Gary R. Colegrove, Jr.
Gary R. Colegrove, Sr.
Kimberly Colegrove-Stephens
Robert D. Cooke
Penny L. Cordova
Janice L. Davis
Kimberly Davis
Rick L. Davis
Roland D. Davis
Ulyssen Davis
Vernon Davis
Arnold Davis, Jr.
Helen Davis-Thomas
Connie Donahue Flores
Verna E. Doolittle
Arlen Doolittle, Sr.
Evonne Sherry Downs Wolff
Sylvia & Scott Drumright

Carole Farlan
Julie Farnum
Dawn M. Ferris
Dephine Fountain
William Frank, III

Kimberly D. Gray
Albert Gray, Jr.
Walter O. Gray, Jr.

Ricky L. Hall, Sr.
Charles Hayden
Edmund D. Hayden
Edward M. Henderson
Leon Hinshaw
Clinton F. Hoaglen
Michele Hodge
David C. Hortler
Marilyn Hortler
Carmen Hostler
Keith Hostler
Sandra Hostler
Bonnie Hostler-Martin

Alberta Jackson
Bonnie Jackson
Harold N. Jackson
Shawna Jackson
Laura Jackson Ferris
P. Jackson, III
Tonya James
Darrell Jones
Glenn E. Jones
Jason P. Jones
Lizabeth Jones
Rhonda Jones
Samantha Jones
Floyd George Jones, Jr.
Sharon Jordan

Tanee Kane
Jena Kelsey

Kevin A. Lane
Barbi Jo Leach
Harriet Leach
John Leach, Sr.
Cindy Leach-Searle
Carolyn Lee
Linda Lee
Harmon E. Lewis
Clarence Lewis, III
Clarence J. Lewis, Sr.
Bear Little
Marilyn Louise Blake
Sharon Luna

Jana Maloney
Ryan Markussy
Jason J. Marsahall
Charlene Marshall
Eugene Marshall
Jacqueline H. Marshall
Jeff Marshall

Joe Marshall
John J. Marshall
Karen Marshall
R.K. Marshall
Richard C. Marshall
Steve Marshall
Robert Marshall, Sr.
Wallace Martin, Jr.
Jacalyn Martins
Michael Masten
Michelle Masten
Robert Masten
Roger A. Masten
Stanley Masten
Peter Masten, Jr.
Glenda Masten Johnson
Nancy Masten-Redenius
Viola Master
Myrtilla Masterson
Leonard Maston, Sr.
Holly Matill
Lyle D. Matilton
Clyde Matilton, Jr.
Billy Matiltos
Frances Maunder
Rose McCardie Blum
Kevin McConnelly
Floriene C. McCovey
Gordon McCovey
Howard McCovey
Jacob McCovey
Leslie McCovey
Taihioochi McCovey
Nihhho McCovey, Sr
Judith A. McCovey Hatter
Phyllis McCovy-Robbin
Colleen McCullough
Henry B. McCullough
Joseph McDaniel
Julie McIntosh
Juli A. McKennen
Lare T. McKennon
Mark G. Mellon
Ralph Miguelena
Corene Migueleno
George Moon
Hyh Moon, Jr.

Fred A. Moon, Sr.
Marjorie Moon Anthony
Delores Moon Mercado
Ervin Mortin, Sr.
Gary E. Mosier
Thomas Mosier
Leland S. Muro
Peg Murray

Gary Nelson
Ronald W. Nelson
Mildred Nixon
Nicole C. Nixon
Carole Nixon-Baldy
Ethel Nixon Garcia
Ken Norton
Kenes Norton
Jack Norton, III

Howard O’Neil
Tanya Orcutt

Tere Peard-Salkeld
Lelannette M. Perry
Ralph Peter, Jr.
S. Peters
Christine Phillips
Jaime S. Pike
Virgil Pole, Jr.
Ronald Dean Powell, Sr.
Alyson Pratt
Billie Pratt
Edward D. Pratt
Farrah R. Pratt

Linda M. Rhoads
Frank Richards
Anthony Risling
Barbara E. Risling
David Risling
Kenneth O. Risling
Lois J. Risling
Lyn Risling
Mary J. Risling
Wilma B. Risling
Anthony Risling, Jr.
L. A. Risling, Jr.

Laurence Risling, Sr.
Ronnie C. Robbins
Julie Robertson

Richard Sanderson
Louise Sansoe
Angela Schnoor
Kathleen Rose Scott
Bonnie L. Sergeys
Michael E. Sergeys
Carmen Sherwood
Richard D. Skaggs
Delane L. Slatr, Jr.
Geuna Starritt
Clarissa Stones
Lee Summall
Martin Sung
Paula Syira
Cindy Sylva

Brenda Tamerris
Lawrence Taylor
Leonard Taylor
Mary Teovusie
Tracy Thomas
Darlene Titus
Francine Traversie

Debra Ulibarri

David L. Vigil
Shelly Vigil-Ammon

Harold Walfinberger
James Wallace
Caleb Whit
Wendall White, Sr.
Ken Williams
Lonnie L. Wilson
John S. Wolfinburger

1 letter with initials M. K. C.
1 letter with 19 Signatories
66 letters with Illegible Signatures

Colleges and Universites

- California State University, Sacramento, William E. Avery, PhD.
- Southwestern College, Steven J. Bossi

Environmental and Recreational Organization

- Albion River Watershed Protection Association / Friends of Salmon Creek
  - Sierra Club—Mendocino Lake Group, Linda Perkins
- American Whitewater, John T. Gangemi
- California Trout, Board of Governors, Nick Di Croce
- Cal Trout Member
  - Michael Lindquist
  - Michael P. Buckingham
- California Floaters Society, Suzanne A. Tollefson, Legal Advisor
- California Sportfishing Protection Alliance, Robert J. Baiocchi, Consultant
- Citizens for Better Forestry, Joseph Bower
- Conejo Valley Flyfishers, L.E. Martin III, DVM
- Environmental Defense Center
  - Spreck Rosekrans, Senior Analyst
  - Brian Trautwein, Environmental Analyst
- Federation of Fly Fishers, Daniel A. McDaniel
- Fly Fishers for Conservation
- Fly Fishing Outfitters, Peter Woolley
- Flycasters, Inc., Mondy Lariz
- Friends of Alhambra Creek
- Friends of the Trinity River
  - Letter with 11 Signatories on behalf of the Environmental Water Caucus
  - Byron Leydecker, Chair
- Gold Country Flyfishers, R.J. Broda, Chairperson
- Gold Country Paddlers, Paul Clark, Conservation Chair
- International Rivers Network, Elizabeth Brink, Associate Coordinator
- Maidu Group of the Mother Lode Chapter, Alice Q. Howard, Conservation Chair
- Marin Conservation League, Kathy Lowrey, President
- Salmon & Steelhead Recovery Coalition, Jud Ellinwood, Coordinator
- San Joaquin River Group, Allen Short, Coordinator
- Santa Clara Valley Audubon Society, Craig Breon, Environmental Advocate
- Santa Cruz Fly Fishermen, Thomas R. Deetz, M.D., Conservation Chair
- Shasta Paddlers, Kevin Lewis, Conservation Director
- Shasta Tehama Bioregional Council, Melinda Brown, Chair
- Sierra Club, Redwood Chapter
  - Margaret Pennington, Chair
  - Teresa C. Tucker, Executive Committee
- Six Rivers Paddling Club, Carol Krueger
- Stanislaus Fly Fishermen, Inc., John T Murphy, Conservation Chairman
- The Northcoast Environmental Center, Tim McKay, Executive Director

Trout Unlimited, Stephen D. Trafton, California Policy Coordinator
World Stewardship Institute
Steven K. Hon
Dean Schneider
J. Devin Stubblefield

Municipalities and Counties

City of Redding, Robert C. Anderson, Mayor
County of Del Norte, Board of Supervisors, David Finigan, Chairman
County of Humboldt, Board of Supervisors, Stan Dixon, Chairman
Humbolt County Fish and Game Commission, Denver Nelson
Shasta County Board of Supervisors, Glenn Hawes, Chairman
Trinity County Board of Supervisors, Ralph Modine, Chairman
Trinity County Counsel/Board of Supervisors, Jim Smith, Former Supervisor
c/o David Hammer, Counsel

Irrigation Districts and Power and Water Management Agencies

California Urban Water Agencies, Byron M. Buck, Executive Director
Central Valley Project Water Association
Jason Peltier, Manager
Serge Birk, Aquatic Biologist
Clear Creek Community Service District, Char Workman-Flowers, General Manager
Northern California Power Agency, George Fraser, General Manager
Northern California Water Association, Dan Keppen, Member and Government Relations
San Benito County Water District, John S. Gregg, District Manager
Sacramento Municipal Utility District, Brian Jobson, Principal Power Contract Specialist
Sacramento Regional Wastewater Treatment Facility, T. Wendell Kido, District Manager
San Luis Delta-Mendota Water Authority
Tehama-Colusa Canal Authority, Arthur R. Bullock, General Manager/Civil Engineer
Trinity County Public Utilities District, Board of Directors, Richard Adkins, President
Westlands Water District, James Snow, Assistant to the General Manager

Industry Associations

California Farm Bureau Federation, Brenda Jahns Southwick, Associate Counsel

Pacific Coast Federation of Fishermen's Associations, W.F. Zeke Grader, Jr., Executive Director

State Water Contractors, John C.Coburn, General Manager

Public Interest Groups

League of Women Voters, Byrd A. Lochtie, President

Interested Individuals

Gene Avery
Lois Avery
Sue Ayers
Clint Adams
Gene A. Adams
Mark Adams
Nathan Adams
Robert Adams
Suzanne Adams
Wade Adams
Berta Addeman
Frederick Adler, MD
Patricia M. Adler
Meor Adlin
Mika Adlin
Jenn Adolphson
Valentino Adrino
Noel Agajan
Elenore Agenbroad
Don Ager
Steve Ager
Nick K. Aghazarian
Nicole L. Aghazarian
Maria Agozzino
Beth Ahels
Adam Aikman
Jerry L. Aikman
Martha & Jerry Aikman
Roger and Anne Akin and Weiss
Michael J. Alaimo
Hank Alamecke, Jr.
Carl Andre Ethylmae Alberigi
Mark Alderette
Jack Alderfer
Sally Aldinger
Jeff Aldrich, President
Carlo Alesandrini
Daphne Alexander
Susan Alexander
Wanda B. Alexander
Susan Alger & Scott Altenhoff
Matt Allaire
Adam Allegretta
Audrey Allegretta
Mark Allegretta
Barbara Allen
Dr. Ethan R. Allen
Florence Allen
George H. Allen
Graham L. Allen
Julie Allen
Miriam Allen
Marilyn Allen
Mary Elizabeth Allen
R. Allen
Roland Allen
Thomas W. Allen
Richard Alley
Robert Allred
Joerg Olson Allstate
Andrew Alm
Emily Alma
George Almeida
Karen Altavas
Adam H. Althoff
Cathy W. Altholt
Priscilla Alvarez
Tony Alvarez
James A. & Elizabeth L. Amaral
Anthony Ambrose
Christine Ambrose
Diane Ambrosim
Jan Ambrosini
John D. Amdon
Bradley Ames
Phillip Amoor
Bradley Amos
Deborah S. Amshoff
Scott Amundson
Linda C Andersen
Ted Andersen
Barbara Anderson
Brooks Anderson
Byron Anderson
Carla Anderson
Clayton Anderson
Colin Anderson
Craig Anderson
Dennis Anderson
Don Anderson

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Frances Anderson
Gary Anderson
Jennifer & John Anderson
Kenny Anderson
Kent Anderson
Mary Anderson
Randi Anderson
Richard Anderson
S.P. Anderson
Steve Anderson
Darren Andolina
Carl Andre
Mark Andre
Norma Leah Andres
Donna Andrews
Hilary & George B. Andrews
Michael C. Andrews, DSM
Steve Andrews
Judy & Don Andrich
Ron Angell
Ron & Margaret Angell
David S. Angelo
Jackie Angulo
Philip H. Annoti, Jr.
Charles Anthony
Ron Antipa
Tom Antoon
Jerry Apana
Jack Appleyard
George Arabian
Angela Arbeloa
Frank Arbeloa
James Archibald
John Archibald
Kathy Archuleta
Ken Archuleta
William V. Archuleta
Jolelyn Arelt
Stephen Arelt
Valerie Arelt
Shawn Arik
Bobbie Armir
Summer Armstrong
Susan Armstrong
Tom Armstrong
L. M. Arndt
Carol A. Arnold

Sidney Arnold
Bob & Yvette Aron
Robert A. Aronson
Lesli Artman
Dok Arvanites
John Aryanpur, MD
Yvonne A. Ascher
Charmon Ashby
Bruce Ashley
Patricia Ashley
Ronald K. Ashley
Evelyn Ashton
Mary-Jane Ashton
Jerry Aspinall
Angie Astey
Dr. James D. Athina
Tom Atmore
Michael Attie
Suzanne Aubin
S. Augustin
Ray Austin
Marianne Austin-McDeimon
Belle Avery
Gene Avery
Lois Avery
Carol Y. Avila
Leslie Ayers
Sue Ayers
Knute Ayheus-Johns
Kathy Azainoff

Arthur A. Babad
Amy Baboalal
Jared Babula
Barney Baby
Alice L. Bachelder
Dan Bacher
Gary Backman
John W. Bacon
Daniel Baer
Janet Baer
Maria Baggett
Trish Bagley
Jennifer Bailey
Jonathan Bailey
Laura Bailey
Mark Bailey

Mark & Melinda Bailey
Richard M. Bailey
Steven C. Bailey
Richard Baily
Lauren Baiocchi
Alan Baird
James A. Baird
David Baker
David W. Baker
Jane Baker
Kimberly Baker
Rod & Cris Baker
Roy Baker
Stephen Baker
Anne-Marie Bakker
Oscar Balagner
Carole Balala
Joseph Baldanzi
Dolores Baldwin
George F. Baldwin
P. Thomas Baldwin
Star J. Baldy
Bernice K. Bales
Leslie Balestrere
Dorothy Ball
Elizabeth Ballinger
Brian Ballman
Julie Balot
Laurel Balyeat
Stephanie Bandy
Beanard Bang
Joseph F. Bania
Christina Banker
Garrett Banker
Gary Banker
Grant Banker
Jilly Banker
Tamara Banker
David J. Banks
Charles Baracco
Steve Barager
Jose Barambler
John Barba
Linda Barba
Gary E. Barbato
Don Paul Barbe, MD
Lyn Barber
Roger Barber
Jo Ann Barberi
Michele Barberi
Grant A. Barbour
Marilyn J. Bardet
Clarence Barger
Gary S. Barisone
Roger Barker
L. Lone Barker IV
W. D. Barkhuff
Ronald Barklow
Carole Barlas
Irene Barnard
Tony Barnard
Douglas F. Barnes
Fred A. Barnes
James M. Barnes
Susan Barnstein
Bertha L Barocco
John W. Barr
Kathryn A. Barratt
Raymond W. Barratt
John Barrena
Dorie Barrett
Ralph Barrett, DVM
Virginia Barrett
Tim & Lynn Barris
Alan D. Barron
Charlene Barron
John Barry
Katie Barry
Marion R. Barry
Mike Barry
Thomas Barry
Cristine Barsanti
Vincent Barsi
Hannah Bartee
Pat Barthel
Alan L. Bartl
Gene Bartlett
Mary L. Bartlett
Pamela Barto
James E. Barto
James H. Bartz
Brian Basor
Jim Basye
Mary Kathryn Bates

Harold J. Bates, Jr.
Stuart Batin
Thomas Batori
Eugene J. Battaolia
Dave Bauer
Greg Baum
Michael Baum
Fred Baumann
Kim Baurceatel
Tanya Baxter
Kenneth Bays
Barbara Bazan
Charles H. Beach, MD
Dennis Beall
Andrew Beam
Roy F. Beaman
Christy Beard
Mary & Philip Beard
Karen Beatty
Tom Beatty
Monique Beaupre
Scott Beaver
Charles A. Beazell
William E. Becher, Jr.
Sandy Bechtold
Diane Beck
Henry Beck
Kerrol Beck
Nicole Beck
Susan Beck
Tom Beck
Bruce Becker
James C. Becker
Janice Bedayn
Rod Bedayn
Sally L. Beer
Cheryl Beers Ash
Brendan Behan
Erik C. Bell
Grant Bell
Sean Bell
Samuel P. Belline
Dennis Bellinger
John G. Bellini
Joel Bellon
Laurie Belton
Chris A. Beltran
Richard Bend
Cheryl Benedickt
Alison Benedict
Jolene Benfield
James F. Bennett
Jean M. Bennett
John Bennett
Keith & Atsuko Bennett
Reid Bennett
Tom Bennett
Rick Bennetts
David Benoit
Susan Benoit
Bryan Benson
Craig Benson
Curtis W. Benson
Elizabeth D. Benson
JoAnn Benson
R. W. Benson
William P. Benson
Julia Bent
Kathleen Bentler
Bree Benton
Elise Benveniste
Bill Beoghly
Cindy Beraldo
Rudy Beran
Millie & Frank Beranek
Bette Ann Berg
Rasjedah Bergere
John Berges
Siarra Bergmann
Mark Bergstrom
Bruce Berkowitz
Marie Bernath
Lynn Berner
Rhonda Berney
Anne Bernstein
Emelia Berol
Jay Berry
Lyndall E. Berry Scott
Alexis Bertauche
Tom Bertetta
Richard Bertoli, Jr.
Leon Berzins
Rodney J. Bessolo
Jacu Best

James Bettinger
Arthur Bettini
Arthur J. Bettini
Keith Beverly
Loni Beyer
Scot Beyer
Cathy Bianchi
Bill Bickert
Jarych S. Bielavicy
Margaret J. Bielawig
C.J. Biesanz
David Biesanz
Joseph Bigas
Paul Bigelow
Bigfoot Campground, James Munro
Justin Biggs
Leanne Biggs
Pete Biggs
Rick Biggs
Rebecca Biglow
Marcie Bilderback
Eileen Bill
Christel Billes
Larry Billings
Marg Billings
Susan Billings
Melinda Bimberg
C. Hins Binfaw
David R. Binning
Jack Binns
Louis Biocca
Rose Bird
Bill Birmingham
Jessie Bishop
Olive R. Bishop
Ruth Bitton
Mads Bjerre
Ann Black
Cory Black
Monte Black
Patricia L. Black
Stephen Black
Gary Blacksmith
Mary Blackstone
Jennifer Blackwelder
Paul E. Blackwell
Dr. Julian Blair
Rebecca J. Blair
Mark Blake
Otter Blake
Shawnali Blake
Todd Blake
Esther R. Blanchard
Richard A. Blanchard
Wm. L. Blanckenburg
John Blandford
C. J. Blaney
Adam & Julie Blanford
Matt Blank
R. Blanqules
John Blayney
John Blevins
Laurie Bliss
George A. & Ruth R. Blitz
S. Blizman
Diane Bloch
Ann Blocker
Craig Blomberg
James T. Blomquist
Charles H. Bloom & Family
Richard Bloom
Shirley Bloom
Jennifer Bloome
Kate Blubaugh
Becky L. Blytte
Ralph Boatman
Mary Bobillot
Catherine Bobo
Grahame Bobo
Marjorie Boehm
Eleonore Boese
Sean Bogue
Patricia Bohannon
Mary Bohnemeyer
Stephen Bohnemeyer
Paul Bohrer
Donald Boivin
R. Allen Bok
Erwin Bol
David & Geneva Bold
Berta Bollinger
Tim Bollinger
Benjamin Bolt
Randy J. Bolt

John Bolton, MD
K.W. Bolton
Fred S. Bonati
Marcheta Bondle
Carlo Bongio
Willilam M. Bonnell
Rebecca Bonneville
Allen Bonslett
Jim Boodens
David Bookout
James Boone
John C. Boone
Howard G. Booth
Earl Bootier
Jeff Borreil
Jacklyn T. Bort
Chandra Bossand
Virginia Boswell
Jane Bothwell
Robert D. Botley
Penny Botula
Cher Bouchard
Allison & Dave Boucher
Dave Boucher
Jeannette Boudreau
Paola & Kenneth Bouley
Henry A. Bourget
Chip Bouril & Penny Proteau
Doug Boutocao
Lee Van Boven
Al E Bowen
Keyshan Bowen
M. M. “Skip” Bowen
Lynn Bower
John & Vivian Bowers
Mark Bowers
Leal Bowitz
Lee & Dee Bowker
Jeffery Bowman
Jonathan H. Bowman
Josh Boyce
Brooks Boyd
Carol Boyd
Don Boyd
Jeanne Boyd
Kevin Boyd
Lynn Boyer
Sarah Boyer
Darrell Boyle
Patricia Boysen
Carroll Braas
David Braas
Clarence Bracey
D. Bradburn
Annette Braddon-Walker
Brad Braddon-Walker
Carlton Bradford
Jay D. Bradford
A. Freeman Bradley, Jr.
Rachelle Bradly
Craig W. Bradshaw
Deborah Brady
Heather Brady
David Brage
Darren Bragg
Richard Bragg
Shaun Bragg
Kitty D. Braggleman
Susan Braito
Richard Brakken
J. Braman
Elfrieda Branch
Pam Branch
Thomas L. Branch
Thomas L. & Pamela A. Branch
Per Brandin
John Brandlin
Pat Brandlin
Brigitte F. Brandriff
Roger H. Brandt
Robbie Brandwyne
Kevin Branstetter
Al Brauer
Mr. & Mrs. A.S. Braun
Betty Braver
Brian Bray
Don Breaux
Alice E. Breckenridge
Amy E. Brennan
Robert D. Brent
Robert W. & Nancy S. Brestin
Jerome Brewer
Rebecca C Brewer
Robert Brewer

Bill Breyer
Katherine Bridgeman
Derrell Bridgman
Marie-Angela Bridi
Brent Briggs
John Briggs
John Brigham
J. Brinkerhoff
Cynthia Brinkhurst
Bob Brinton
Susan Briski
James Brobeck
Robert Brockman
Margaret Broda
Jim Brooker
Gloria Brooks
Karen Brooks
Bernelda Brown
Chris Brown
Diane C Brown
Dorothy S. Brown
Frank Brown
G.L. “Larry” Brown
George L. Brown
Josh Brown
Krista K. Brown
Marcus Brown
Melinda Brown
Omar Brown
Peter Brown
Phil Brown
Ralph L. Brown
Richard W. Brown
Steve L. Brown
William J. Brown
Cecilia Browne-Rosefield
William Browning
Robert Brownstein
Alice Bruce-Curphey
Michael Bruce
Richard Bruce
Daniel Bruck
H. Ralph Bruggerman
Michael Brundage
J. Brunner
Gene Bruns
Craig Brunsial
Robert Brunstal
Ed Brush
Rod Brush
Chelsea Bryan
Mike Bryant
Patrick D. Bryant
Sarah Bryant
Bob Bryden
Chris Bryer
James V. Buatti
Harry G. Bubb
Harry S. Bubb
J. Buchanan
Eric Buchner
Dan Buckley
Jacqueline Bucknell
Larry Buckreus
John Buddenbaum
Carol Budds
Carol Budzinski
Tom Budzinski
Douglas Bue
Jeff Bue
Stuart M. Bueller
Michael T. Buffo
Kent R. Bulfunch
Steven Bull
John Bullock
Andrew Bunwell
J. A. Burchfiel
Edmond T. Burgan
Adrian Burgeson
Claudia A. Burgess
Duncan & Judy Burgess
Harriet Burgess
David Burghardt
Andy Burk
Kathryn M. Burk
Christopher H. Burke
Ellen Burke
Jennifer S. Burke
Victor Burke
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Andrew Youngmeister
Katherine Youngmeister
Simon Yu
Susan Yule
Larry Yuva

4 Letters with First Name Only
- Klaus and Paula
- Linda V.
- Petunia
- Viviana

14 Letters with Illegibile Signatures
6 Letters with Multiple Signatories
- 3 Signatories
- 5 Signatories
- 6 Signatories
- 7 Signatories
- 8 Signatories
- 13 Signatories

16 Letters with No Signature

Zac Zachary
William J. Zahary
Jack Zajac
Rhea G. Zaks
Sandra Zaliosky
Elisabeth Zall
Bob Zamfall
Alfred R. Zashe
Janice Zaske
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Appendix D2
Thematic Responses

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APPENDIX D2

Thematic Responses

Fisheries Resources Thematic Responses

Many of the comments received on the DEIS/EIR focused on the Trinity River fishery resources analysis. The thematic responses listed below were written to address comments and clarify misconceptions and misunderstandings held by a number of reviewers. In general, the information and analyses presented in the DEIS/EIR remain fundamentally unchanged.

For convenience, thematic responses have been categorized based on general topics that garnered comments in the following manner:

Fisheries information and studies developed prior to the DEIS/EIR

- The Basis for Fisheries Analyses Performed in the DEIS/EIR

Approach used to evaluate alternatives

- Method Used to Evaluate Alternatives – Trinity River System Attribute Analysis Methodology (TRSAAM)
- Linkage Between Physical Processes, Fish Habitat, and Fish Populations

Additional Alternatives Presented by Commentors

- Alternatives Recommended by Commentors: Additional Mechanical Restoration and Alternative Flow Schedules
- Increasing Effectiveness of Releases by Accounting for Storm Flows

Other Factors Affecting Fisheries

- Comparison of Population Trends in Unregulated Rivers (Smith River and South Fork Trinity River) and the Mainstem Trinity
- Role of the Trinity River Hatchery
- Predator Control as a Means for Increasing Population

The Basis for Fisheries Analyses Performed in the DEIS/EIR

Several reviewers stated that the information collected on the Trinity River over the past 15 years was not used effectively in the DEIS/EIR. Others made comments regarding the Preferred Alternative and its relationship with the TRFES.

The lead agencies disagree with the assertion that information collected over the past 15 years was not effectively used in the DEIS/EIR. The information contained in the DEIS/EIR contains the most contemporary research pertaining to salmonid population restoration, much of it specific to the Trinity River. Additionally, the Trinity River Flow Evaluation Study (TRFES) was the culmination of the best available data relevant to providing recommendations for the restoration of Trinity River anadromous fishery resources to the Secretary of the Interior. These recommendations were then evaluated as one alternative in the DEIS/EIR. Information from the TRFES, in addition to information collected by the California Department of Fish and Game (CDFG), the Hoopa Valley Tribe, and the Yurok Tribe, was used for impact analysis as appropriate. These studies are the most recent and best available data for the Trinity River.

Ecological systems are extremely complex. Biologists and managers have often been unable to pinpoint and address the specific limiting factor, or have addressed the most limiting factor only to discover another factor now impedes the desired restoration. Acknowledging this complexity, restoration efforts have moved toward addressing fundamental problems with ecosystems to fix larger habitat issues. Inriver restoration, restoring normative flows to restore ecosystem processes/habitats and the populations that depend on them, is highly commended in academic/scientific circles. Restoring ecosystem processes is much more likely to address all native species concerned than examining the needs of a single life stage of a particular species (see thematic response "Linkage Between Physical Processes, Fish Habitat, and Fish Populations"). An ecosystem perspective and restoration not only addresses the needs of adult spawners, but also eggs, sac-fry, juveniles, and smolts of all salmonids, as well as geomorphic processes and riparian vegetation cycles that provide habitat for the native species of fish and wildlife in the Trinity River Basin.

Summary of the TRFES

The TRFES is a summary document of the studies that have been conducted since the 1981 Secretarial Decision with recommended actions to restore the anadromous fishery resources of the Trinity River. It is not meant to be an all-inclusive document, but to present the studies that were critical to the development of the recommendations for the restoration of Trinity River anadromous fisheries.

The overall restoration strategy of the TRFES (see Chapter 7 of the TRFES) is based on the assertion that anadromous salmonids in the Trinity River evolved in a dynamic and sinuous alluvial river channel, and this channel has become relatively straight and static because of the Trinity River Division (TRD) operation. If naturally produced salmonid populations are to recover, therefore, the habitat on which they depend must be rehabilitated. The TRFES concludes that the most practical strategy to achieve fish habitat recovery is a management approach that integrates riverine processes and instream flow-dependent needs (see Figure 7.1 in the TRFES). This ecosystem restoration approach physically reshapes selected channel sections, regulates sediment input, and prescribes reservoir releases to (1) allow fluvial processes to reshape and maintain a new dynamic equilibrium condition and (2) provide suitable fish habitat (e.g., depth, velocity, and water temperatures).

This strategy does not strive to recreate the pre-TRD mainstem channel geomorphology. Several sediment and flow constraints imposed by the TRD cannot be overcome or completely mitigated. Therefore, the new alluvial channel geomorphology will be smaller in scale, but it will exhibit almost all of the dynamic characteristics of the 10 necessary alluvial attributes (presented in Chapter 4.8 and Appendix H of the TRFES), and should sustain at least a two-fold increase in salmonid smolt production over current levels.

Several individual key studies and evaluations provided the basis and rationale of the TRFES recommendations. They include:

(1) habitat preferences of salmon and steelhead, and estimates of the relative amounts of preferred habitats at various dam releases

(2) an evaluation of fish habitat change and fish use at channel rehabilitation projects

(3) water and sediment interactions and river channel shape (fluvial geomorphology)

(4) water temperature needs of salmon and steelhead, and dam releases necessary to meet those needs

(5) a juvenile salmon production model to evaluate habitat limitations

The results of these individual studies were evaluated by an interagency group of natural resources scientists and managers (representing U.S. Fish and Wildlife Service [Service], U.S. Bureau of Reclamation [Reclamation], National Marine Fisheries Service [NMFS], CDFG, Hoopa Valley Tribe, U.S. Geological Survey [USGS], and U.S. Department of the Interior [DOI]) at three week-long meetings. This group, using the best available data and information, integrated the study results to develop the final recommendations. These recommendations included variable dam release schedules, a channel rehabilitation program (initiated by mechanical means and maintained by flow), gravel supplementation, and an Adaptive Environmental Assessment and Management (AEAM) program. The rationale and science supporting the recommendations and key results are summarized below.

Habitat Preferences

PHABSIM (physical habitat simulation) was considered a state-of-the-art methodology in the 1980s and is still used today as a management tool. PHABSIM is a methodology/model that attempts to quantify fish habitat by certain criteria, such as depth, velocity, substrate, and cover relative to flow (cubic feet per second [cfs]). The model compares the habitat preferences of an individual fish species/life stage to the amount of preferred habitat for that species/life stage available over a range of flows. The model uses this information to

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produce an index of the relative amount of habitat (habitat availability) for specific life stages at specific flows.

Using PHABSIM, habitat availability of all freshwater life stages of chinook, coho, and steelhead was modeled on the Trinity River (see Section 5.1 and 5.2 of TRFES for detail). These habitat availability indices in the existing channel (integrated with temperature and life history components) were used to establish the spawning/rearing base flows recommended for much of the year. Although the actions of the Preferred Alternative will change the channel shape and alter the habitat-flow relationships, these indices represented the best available and most complete data from which to generate a base flow recommendation. Habitat availability for all species and life stages that could be affected by flow releases were considered for the final recommendations.

Evaluation of Restoration Projects

Comparison of habitat availability indices in the existing channel and at channel rehabilitation sites indicated that the existing channel produces unstable amounts of habitat over a wide range of flows while the channel rehabilitation sites provided stable amounts of habitat over the same range of flows (see Section 5.2 of TRFES for detail). The consequences of unstable quantities of habitats are an increase in the likelihood that fish will be subject to unfavorable habitats resulting in increased mortality during dam spills or tributary accretion. When the amount of habitat decreases as flows increase, an increase in stress (and therefore susceptibility to disease, parasites, and sub-optimal growth), exposure to predation, and competition for the limited and fluctuating quantity of preferred habitat can occur. This results in the creation of a short-term survival “bottleneck.” Hence, creating stable quantities of habitat would likely improve physical condition and increase survival of the early life stages and subsequent adult returns.

Evaluation of the Physical River Channel

Studies of the fluvial geomorphologic mechanisms of the Trinity River system provided necessary information on the hydrology and physical processes that shape and form the Trinity River channel and create salmonid habitats within it (see Chapter 4 of TRFES for detail). Prior to the TRD, the Trinity River channel was characterized by gently sloping point bars. (For a summary description of channel changes that have taken place, see Section 3.2.1 Geomorphology in the DEIS/EIR). To gain a better understanding of what the Trinity River looked like prior to the TRD and how fish used the available habitat, nine pilot channel rehabilitation projects were built in the mainstem channel. These projects were designed to recreate point bars similar to those that existed before TRD operations led to the development of sediment berms along the channel. Point bars are important in providing the low velocity habitats used by salmonid fry life stages. Investigations of point bars revealed that they serve as building blocks of alternate bar sequences, which in turn provided the riffle-pool–run sequences that are known to provide the wide diversity of habitats needed by salmonid species and their different life stages.

To identify the cause-and-effect relationships that created the highly diverse and dynamic habitats beneficial to salmonids, the hydrology, geomorphology, and sediment budget of the Trinity River were analyzed. Examination of the historic hydrology (1912-1995) revealed two annual events important to the maintenance of riverine habitats (prior to TRD): (1) high winter floods and (2) a snowmelt hydrograph. Historically, winter floods scoured the channel and routed coarse and fine sediments through the river system, and scoured vegetation off the gravel bars. Prior to the TRD, the snowmelt hydrograph provided increased flow to moderate water temperatures that aid emigrating smolts and immigrating adults, and inundated point bars to keep seed germination high on the flood plain. Evaluations provided estimates of the different historic types and degrees of geomorphic events that occurred in different water-year classes. It was found that all of these events and the sequence of these events were important for the riverine habitat maintenance in the Trinity River.

Based on scientific studies of the Trinity River (McBain and Trush, 1997; Section 5.4 in the TRFES), the physical processes and associated biological and ecological functions of these processes were identified (see Appendix H of the TRFES), and flow thresholds were determined. The key results of these studies indicated that (1) flow has to be sufficient in magnitude and duration to scour, transport, and deposit sediment throughout the river system; (2) flow is important to balance the sediment load, whereby the amount of gravel transported downstream by a given flow is roughly equivalent to that amount being input (e.g., from the tributaries); and (3) a continuous supply of coarse sediment needs to be added to the mainstem in areas where tributary input does not exist (i.e., directly below the dam).

Water Temperature Model

The Stream Network Temperature Model (SNTEMP), developed by the Service, was calibrated for the Trinity River and used to assess temperature-flow relations and recommend flows to meet target temperature criteria (see Section 5.5 of TRFES for detail). The SNTEMP model was calibrated over a broad range of hydrologic and meteorological conditions, using a weekly time-step. Given a dam release magnitude, water temperature, and hydrometeorological conditions (including tributaries), the model predicts water temperatures from Lewiston Dam to its confluence with the Klamath River at Weitchpec. The model was used to identify TRD releases to meet water temperature criteria/targets for specific life stages of salmon and steelhead.

The SNTEMP model was used to identify Trinity River flow levels necessary to meet desired water temperature criteria for outmigrating salmonid smolts at the mouth of the Trinity River at Weitchpec for target dates during the spring and early summer. In extremely wet, wet, and normal water years, optimal smolt temperatures were sought, while in dry and critically dry water years, marginal water temperatures were sought. Differential temperature targets between select year-class groups were recommended to provide for variability and synchronicity of thermal regimes within the basin. SNTEMP, in combination with empirical data, was also used to evaluate temperature objectives established by the North Coast Regional Water Quality Control Board (NCRWQCB) for adult salmonids that over-summer (hold) in the river prior to spawning in the fall. The TRD dam releases were recommended to assure that temperature regimes were met under most meteorological conditions. The maintenance of cool water temperatures downstream of the

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dams in the summer is necessary to provide suitable holding habitat that is no longer available.

Juvenile Salmon Production Model

The salmon production potential model, SALMOD, which was developed by U.S. Geological Survey—Biological Resources Division (USGS-BRD) for the Trinity River, was used to identify possible factors limiting production of chinook salmon in the Trinity River (see Section 5.6 of TRFES for detail). The model uses output from PHABSIM and SNTEMP models and other factors that are considered to limit chinook salmon production. The model output provides estimates of relative production (in numbers of smolts) given a set of conditions evaluated by the model. Model input conditions include increasing or decreasing adult escapement, variable dam releases, and water temperatures. Sensitivity analyses provided insight into factors potentially limiting production of salmon in the Trinity River. In general, the SALMOD model results indicated that (1) habitat conditions in the current channel severely limit the chinook salmon production potential of the Trinity River, and (2) increased rearing habitat is critical to restore and maintain salmonid populations. Although the information produced by SALMOD does have its limitations (it only accounts for the first 25 miles downstream of Lewiston Dam, does not include the future benefits of a rehabilitated channel and restored fluvial process, and only addresses chinook salmon juvenile production), it does provide useful information on current limiting factors to salmonid production.

TRFES Recommendations

The integration of these studies identified five different water-year classes, the physical and biological processes/objectives that were accomplished during each of these year classes, and specific thresholds necessary to meet those processes. These thresholds were integrated with salmonid temperature criteria (SNTEMP) and the examination of the flow-habitat relations (PHABSIM) for each water-year class. A different hydrograph was created for each of the five water-year classes (see Sections 8.1, 8.2, and 8.3 in the TRFES). Each hydrograph can be divided into the following basic components: (1) the summer/fall period to provide adult holding habitat; (2) the fall/winter period to provide adult spawning and fry/juvenile rearing habitat; (3) the period during the spring to provide outmigration flows, temperature, and geomorphic peaks; and (4) the period with a descending hydrographic limb following peak flows. Mechanical channel rehabilitation was recommended to initiate the necessary channel shape change, which would otherwise require dam releases of at least 30,000 cfs. Sediment supplementation was recommended to re-establish the coarse sediment supply now blocked by the TRD.

Another important recommendation of the TRFES is the AEAM program, whereby studies are conducted that test hypothesis related to the results of the foundation studies previously described (see Sections 8.4, 8.5, and Appendix N and O of TRFES for detail). Through this program, studies are systematically conducted to evaluate and update management actions. The program offers a rigorous method of learning from the outcomes of management actions as experiments to guide future management.

In summary, the TRFES recommendations (and therefore the Preferred Alternative with the addition of the watershed restoration portion of the Mechanical Restoration Alternative) move away from single species management of salmon toward a more ecological or holistic system approach (e.g., Ward and Stanford, 1995; Stanford et al., 1996; Poff et al., 1997). The approach provides for the direct biological needs of spawning chinook salmon, which the original 120,500 acre-foot (af) allocation was based on, and the freshwater habitats that are necessary for chinook, coho, and steelhead to complete their life cycle. This approach is expected to succeed where other efforts toward the restoration of salmon have, by and large, failed. These failures can often be attributed to restoration efforts focusing on one particular life stage of one species.

Relationship of the TRFES to the DEIS/EIR and the Preferred Alternative

The DEIS/EIR focused on describing a reasonable range of alternatives that meet the purpose and need for the action. One of those alternatives incorporated the recommendations from the TRFES. Several alternatives were evaluated to determine their ability to restore and maintain natural production of anadromous fish on the Trinity River downstream of Lewiston Dam (see Section 1.2.1 of the DEIS/EIR). The DEIS/EIR also discloses the anticipated benefits and impacts associated with implementing each of the alternatives for several issue areas.

The Preferred Alternative incorporates the recommendations identified in the TRFES, plus additional watershed restoration activities as described in the Mechanical Restoration Alternative (see Section 2.1.6, page 2-26 of the DEIS/EIR). Screening criteria were used in the selection and development of the existing Preferred Alternative, which is the alternative that best meets the purpose and need while minimizing adverse impacts (see Section 2.1.1 of the DEIS/EIR). Details of the technical and scientific basis of the TRFES recommendations were not repeated in the DEIS/EIR to avoid redundancy, to present all alternatives in a similar manner, and to focus on the results of the impact analysis. Review comments for the TRFES were received and addressed on the TRFES prior to its finalization. Reference to the TRFES is made throughout the document regarding the science supporting the flow schedules and mechanical restoration activities of the Preferred Alternative, and as an aid to the interested reader in finding further detail.

References

McBain, S. and W. Trush. 1997. Trinity River Channel Maintenance Flow Study Final Report. Prepared for the Hoopa Valley Tribe, Trinity River Task Force. November.

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Stanford, J. A., J. V. Ward, W. J. Liss, C. A. Frissell, R. N. Williams, J. A. Lichatowich, and C. C. Coutant. 1996. A general protocol for restoration of regulated rivers. Regulated Rivers: Research and Management 12: 391-413.

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Ward, J.V., and J.A. Stanford. 1995. Ecological connectivity in alluvial river ecosystems and its disruption by flow regulation. Regulated Rivers: Research and Management 11: 105-119.

Method Used to Evaluate Alternatives—Trinity River System Attribute Analysis Methodology (TRSAAM)

Many reviewers commented on the Trinity River fishery resources assessment model, TRSAAM, that was used to evaluate the potential of each alternative to restore the fishery resources of the Trinity River. The basic content of their comments were: (1) TRSAAM did not provide adequate information for decision-making; (2) TRSAAM ignored biological factors and there was no link between attribute scoring and populations goals, carrying capacity, and biological linkages; (3) the assumptions of TRSAAM are “questionable,” weighting the individual attributes / objectives should have been considered, and the institutional record associated with TRSAAM should have been disclosed; (4) TRSAAM was biased towards the Preferred Alternative and the Preferred Alternative was developed using TRSAAM; (5) TRSAAM was not peer-reviewed and it should be replaced with a different methodology, such as SALMOD; and (6) TRSAAM should have examined safety-of-dam spills and accounted for tributary accretion.

Summary

The Fish and Channel Restoration Team (FCRT) was tasked with evaluating the fishery resource restoration potential of the alternatives developed by the lead agencies. The FCRT consists of fishery biologists, hydrologists, geomorphologists, and harvest management experts familiar with the Trinity River system. Team members represent various agencies including U.S. Fish and Wildlife Service (Service), National Marine Fisheries Service (NMFS), U.S. Geological Survey (USGS), U.S. Forest Service (USFS), California Department of Fish and Game (CDFG), Western Area Power Administration (Western), Hoopa Valley Tribe, Yurok Tribe, and Karuk Tribe.

SALMOD. When proposed alternatives were finalized, the only salmon production assessment model specific to the Trinity River was SALMOD, developed by USGS. The FCRT considered using SALMOD for impact analysis but decided that the model was limited in several important regards: it models only chinook salmon; it accounted for only 25 miles of river downstream of Lewiston Dam; it addressed only a portion of the year; the model did not assess the physical processes that create and maintain habitats important for the restoration of salmonid populations; and it required the extensive use of habitat-flow relationships, which were not available for describing future channel conditions. Given these limitations, the FCRT determined that SALMOD was not the appropriate tool for alternative analyses.

TRSAAM. The FCRT undertook the development of the Trinity River System Attribute Analysis Methodology (TRSAAM) model to assess restoration potential of the Trinity River fishery resources for each alternative (see Section 3.5, page 3-170 of the DEIS / EIR and Appendix B, Attachments B2, B3, B12, and B13). TRSAAM assesses the potential of each

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alternative to restore a functioning alluvial river and to create and maintain the habitats (by mechanical means or flow) necessary for the restoration of anadromous salmonid populations.

The attributes/objectives evaluated in this analysis directly address environmental conditions that are necessary for the success and productivity of various aquatic components of the Trinity River ecosystem, in particular salmonids. TRSAAM includes several components that have direct linkage to the biological needs of all freshwater life stages of salmonids. Attributes/objectives have direct linkages to biological needs and the desired physical processes, and biological responses are summarized in Attachment A to this thematic response. The rationale for managing physical processes to restore fish populations is further explained and justified in thematic response “Linkage Between Physical Processes, Fish Habitat, and Fish Populations.”

Attribute/objective scores reflect the predicted ability of alternatives to support ecological processes. In general, high scores are associated with “natural” processes such as flooding, as these influence complex and wide-spread interactions between sediments, organic debris, and vegetation. Restoration efforts relying on mechanical means such as bulldozers or hand labor are inherently limited in terms of what can be accomplished and where benefits can be achieved. In cases such as achieving adequate water temperature conditions in the lower river, “snowmelt flood” releases from upstream dams are the sole viable alternative. The scoring of the majority of the attributes/objectives is based on specific frequencies and thresholds of flow and/or mechanical manipulations (presence or absence). The attributes/objectives and data used in TRSAAM are from McBain and Trush (1997) and USFWS and HVT (1999), both of which were peer-reviewed. These two documents represent and summarize the best data available for the Trinity River. Also, the thresholds for most of the attributes/objectives in TRSAAM are based on empirical science specific to the Trinity River. Modeled results or results from other published literature were used when empirical data specific to the Trinity River were not available; hence, the FCRT used analyses founded on the best available information and analytical tools to analyze the impact of alternatives on fishery resources of the Trinity River.

Assumptions and Scoring. All assumptions for the TRSAAM model (listed on page 3-171 of the DEIS/EIR) were extensively discussed and then agreed to by members of the FCRT. These assumptions were then applied equally to all alternatives evaluated. Differential weighting of attributes/objectives was discussed by the FCRT. The group’s final conclusion was that there was no way to establish attribute weights that could be decisively defended because the complexity of ecological interactions confounded FCRT efforts to identify credible weighting factors. Therefore, the FCRT concluded there was no persuasive way to calculate discrete weights. Some reviewers commented that the scoring system of (0, 1, 2) used in TRSAAM was too narrow a range to allow accurate comparative analysis or that TRSAAM exaggerated the differences between the alternatives. TRSAAM was developed for impact analysis to distinguish between alternatives, and each alternative was evaluated equally, relative to the No Action Alternative. Therefore, this analysis meets the requirements of the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA), and development of a different scoring system is unnecessary.

Safety-of-Dam Releases. For the TRSAAM model, the FCRT chose to evaluate the flow releases as scheduled. Safety-of-dam releases were not evaluated due to the sporadic nature of these events and the uncertainty of relying on chance events to restore anadromous fish populations and their habitats. Currently, the Operations Criteria and Plan (OCAP) for the Central Valley Project (CVP) provides that the Trinity River Division (TRD) is operated to avoid uncontrolled spills. Because each of the alternatives places different demands on TRD storage, the frequency by which safety-of-dam releases would occur also differs. For alternatives that increase releases to the Trinity River (e.g., the Preferred Alternative), the frequency of safety-of-dam releases decreases (see "Summary of Spills at Trinity Dam: Trinity Dam Restoration DEIS/EIR Flow Alternatives" in Appendix A of the DEIS/EIR). For further detail on safety-of-dam releases, see thematic response "Increasing Effectiveness of Releases by Accounting for Storm Flows."

Tributary Accretion. The attributes/objectives explicitly account for tributaries in terms of sediment input and temperature. The peak threshold flows identified for the attributes/objectives recommendations account for the amount of sediment input from the tributaries based on water-year class and provide a peak flow necessary to route this fine and coarse sediment input through the river system as a functional alluvial system. The peaks are different in each water-year class because distinct processes are targeted for each. Also, sediment input from tributaries is well correlated with water-year class. For instance, lesser peak flows are able to transport the relatively small volumes of sediment yielded to the mainstem from tributaries under drier conditions. SNTEMP, the temperature model calibrated for the Trinity River and used to identify flows necessary for smolt outmigration in the Trinity River Flow Evaluation Study (TRFES), also models tributary accretion. Hence, tributary accretion is accounted for in terms of balancing sediment input and meeting temperature objectives and criteria. Additionally, the TRFES divides the mainstem Trinity River into three different sections. Each section has different goals and objectives (see Chapter 8 of the TRFES) to identify appropriate management goals within each reach. For further detail on accretion, see thematic response "Increasing Effectiveness of Releases by Accounting for Storm Flows" and Responses 5306-9 and 5313-6.

Development of the Preferred Alternative and TRSAAM. Because the best available scientific information for the Trinity River was also used to develop recommendations contained in the TRFES, the perceived bias is understandable, but there was no intention to pre-select an alternative. If TRSAAM was the only tool used to select a preferred alternative, then the Maximum Flow Alternative would have been selected because it received the highest rating. The TRSAAM model was used to evaluate all alternatives after each alternative was developed. Representatives from the four lead agencies examined the TRSAAM output, as well as the outputs from several other models in different issue areas (such as hydropower, agriculture, and Sacramento River temperature model). The co-leads then developed the Preferred Alternative from two separate alternatives (see Section 2.1.1 of the DEIS/EIR).

Additional documentation on TRSAAM, its methodology and assumptions, and the scoring of attributes/objectives can be found in the DEIS/EIR Appendix B, Attachments B3, B4, B12, and B13.

Why TRSAAM Was Used

The modeling efforts conducted to assess the environmental effects of implementing the various alternatives represent use of the best and most appropriate science available. TRSAAM provides pertinent information for the decision-makers to distinguish the effects of the proposed alternatives on the fishery resources in the Trinity River. All alternatives were evaluated equally, allowing the decision-maker to objectively evaluate the environmental merits of each alternative in regard to the stated purpose and need. As such, these efforts more than satisfy the analytical requirements under both NEPA and CEQA.

TRSAAM was one of many models used for impact analysis for various issue area resources (see Figure 3-1, page 3-3 of the DEIS/EIR). Given the wide range of alternatives and all of the various models and subsequent impact analysis, the lead agencies believe there is sufficient information to make an informed decision.

References

McBain, S. and W. J. Trush. 1997. Trinity River Channel Maintenance Flow Study Final Report. Prepared for the Hoopa Valley Tribe, Trinity River Task Force. November.

USFWS & HVT (U.S. Fish and Wildlife Service and Hoopa Valley Tribe). 1999. Trinity River Flow Evaluation Final Report; June. Arcata, CA.

Attachment A. Attributes of Alluvial River Ecosystems: Physical Processes and Biological Responses (Source: USFWS & HVT 1999, Appendix H).

Attribute No. 1.
Spatially Complex Channel Morphology

No single segment of channelbed provides habitat for all species, but the sum of all channel segments provides high-quality habitat for native species. A wide range of structurally complex physical environments supports diverse and productive biological communities (Anderson and Nehring, 1985; Sullivan et al., 1987; Bisson et al., 1988; Hill et al., 1991).

***Desired Physical Responses*:**

- An alternate bar morphology extending upstream from the present alluvial transition zone near Indian Creek.
- Development of a functional floodplain, now missing from the post-TRD channel morphology.
- Asymmetrical cross-sections in a meandering channel with a sinuous thalweg pattern.

***Desired Biological Responses (if all annual hydrograph components are provided*)

- Riparian community with all stages of successional development.
- No loss of riparian habitat with channel migration.
- Diverse salmonid habitat available for all life stages over wide-ranging flows, flood and baseflow (Hill et al., 1991; Reeves et al., 1996 in Poff et al., 1997).

Attribute No. 2.
Flows and Water Quality Are Predictably Variable

Inter-annual and seasonal flow regimes are broadly predictable, but specific flow magnitudes, timing, duration, and frequencies are unpredictable because of runoff patterns produced by storms and droughts. Seasonal water-quality characteristics, especially water temperature, turbidity, and suspended-sediment concentration, are similar to those of regional unregulated rivers and fluctuate seasonally. This temporal Apredictable unpredictability@ is a foundation of river ecosystem integrity (Hill et al., 1991; Poff et al., 1997; Richter, 1997).

Objectives for Physical Processes:

- Inundate lower alternate bar features during dispersion of riparian plant seeds.
- Provide variable water depths and velocities over spawning gravels during salmonid spawning to spatially distribute redds.
- Inundate broader margins of alternate bars, including backside scour channels, to create shallow slack areas between late winter and snowmelt periods for early life stage of salmonids and amphibians.
- Provide a favorable range of baseflows for maintaining high-quality juvenile salmonid rearing and macroinvertebrate habitat within an alternate bar morphology.

- Provide late-spring outmigrant stimulus flows.
- Rapid post-snowmelt recession stage to strand/desiccate seedlings initiating/establishing on alternate bar surfaces.

Desired Physical Responses:

- Restore physical/riparian processes associated with a snowmelt peak and recession hydrograph components below Lewiston Dam.
- Optimize available physical habitat for anadromous salmonids for all seasons.
- Restore periodic inundation of the floodplain and groundwater dynamics.

Desired Biological Responses (if all annual hydrograph components provided):

- Elimination of most woody riparian cohorts from exposed surfaces of alternate bars.
- Establishment of early-successional riparian communities on floodplains and terraces.
- Improved anadromous salmonid egg survival.
- Natural seasonal timing of hydrograph components to complement life-history requirements of native plants and animals.
- Greater channel complexity, more habitat, and higher water quality for all freshwater life-history stages of salmonids.
- Increased macrobenthic invertebrate productivity.

Attribute No. 3.
Frequently Mobilized Channelbed Surface

Channelbed framework particles of coarse alluvial surfaces are mobilized by the bankfull discharge (Leopold et al., 1964; Richards, 1982; Nelson et al., 1987) , which occurs on average every 1 to 2 years.

Objectives (every two of three years as an annual maximum):

- Achieve incipient condition for general channelbed surface.
- Surpass threshold for transporting sand through pools.
- Scour 1- to 2-year-old seedlings on alternate and medial bars.
- Frequently mobilize spawning gravel deposits.

Desired/Diagnostic Physical Responses:

- Mobilize surface tracer rocks (D_{84}) in general channelbed surface and exposed portions of alternate bars.
- Reduce coarseness of surface layer above Indian Creek.
- Reduce sand storage in riffle/run habitat and pools.
- Create local scour depressions around large roughness elements.
- Mobilize spawning gravel deposits several surface layers deep.

Desired Biological Responses (if physical processes achieved):

- Higher survival of eggs and emerging alevins by reducing fines (Tagart, 1984; Sear, 1995; Poff et al., 1997).
- Greater substrate complexity in riffle and run habitats for improved macroinvertebrate production (Boles, 1976; Nelson et al., 1987; Ward, 1998).
- Scour 1-and 2-year-old woody riparian seedlings along margins of alternate bars.

- Greater habitat complexity (micro-habitat features).
- Deeper pool depths/volumes for adult fish cover and holding (Platts et al., 1983; Nelson et al., 1987; Sullivan et al., 1987; Bisson et al., 1988; Barnhart and Hillemeier, 1994).

Attribute No. 4. Periodic Channelbed Scour and Fill

Alternate bars are scoured deeper than their coarse surface layers by floods exceeding 3- to 5-year annual maximum flood recurrences. This scour is typically accompanied by re-deposition, such that net change in channelbed topography following a scouring flood usually is minimal.

Objectives for Physical Processes:

- Rejuvenate spawning gravel deposits.
- Kill 2- to 4-year-old seedlings establishing on alternate bar surfaces.
- Deposit fine substrate onto upper alternate bar and floodplain surfaces.

Desired Physical Responses:

- Close to dam, reduction in surface-to-subsurface D_{50} and D_{84} particle-size ratios.
- Significant scouring (several surface layers deep) of most alluvial features, including steeper riffles.
- Formation of alternate bar sequences upstream from Indian Creek.
- More alternate bars and developing bar sequences downstream from Douglas City.
- Increased diversity of surface particle-size distributions.
- Greater topographic complexity of side channels associated with alternate bars, especially distal portions.
- Increased pool depths for fish habitats (Nelson, 1987).

Desired Biological Responses (if physical processes achieved):

- Improved anadromous salmonid spawning and rearing habitat (Hill et al., 1991).
- Reestablishment of dynamic riparian plant stands in various stages of succession on higher elevations of alternate bars.
- Mortality of 3- to 4-year-old saplings on alternate bar surfaces to discourage riparian plant encroachment and riparian berm formation.
- Rehabilitation of habitat for riparian-dependent amphibian, bird, and mammal species.

Attribute No. 5. Balanced Fine and Coarse Sediment Budgets

River reaches export fine and coarse sediment at rates approximately equal to sediment inputs. The amount and mode of sediment storage within a given river reach fluctuates, but channel morphology is sustained in dynamic quasi-equilibrium when averaged over many years (Sear, 1994; Poff et al., 1997).

Objectives for Physical Processes:

- Reduce fine sediment storage in the mainstem.
- Maintain coarse sediment storage in the mainstem.
- Route mobilized D_{84} through alternate bar sequence every two of three years, on average.
- Prevent mainstem accumulation of tributary bed material.
- Eliminate bedload impedance reaches.

Desired Physical Responses:

- D_{84} tracer rocks should negotiate alternate bar sequences; i.e., larger particles from upstream riffles should not accumulate in downstream pools.
- Reduced storage of fine sediment in riparian berms.
- Eliminate aggradation, and encourage slight degradation of bed elevation at tributary deltas (smooth-out longitudinal profile through these reaches).
- Increases pool depths.
- Maintains physical complexity by sustaining alternate bar morphology.

Desired Biological Responses:

- Improves and maintain spawning and rearing habitat quality without reducing quantity (Poff et al., 1997).
- Increases adult salmonid cover and holding (Nelson et al., 1987).
- Reduces riparian berms.

Attribute No. 6.
Periodic Channel Migration

The channel migrates at variable rates and establishes meander wavelengths consistent with regional rivers with similar flow regimes, valley slopes, confinement, sediment supply, and sediment caliber (Williams and Wolman, 1984; Chien, 1985, in Poff et al., 1997; Sullivan et al., 1987; Johnson, 1994).

Objectives for Physical Processes:

- Promote bank erosion in alluvial reaches.
- Floodplain deposition every 3 to 5 years.
- Create channel avulsions every 10 years on average.
- Encourage meander wavelengths 8 to 10 bankfull-widths long.
- Stored sediment in the floodplain is slowly released downstream.

Desired Physical Responses:

- Maintain channel width while channel migrates.
- Create sloughs through infrequent channel avulsions.
- Create side channels through frequent alternate bar reshaping.
- Increase meander amplitude and expression of the thalweg.
- Create water temperature variability within alternate bar sequences.
- Increase input of large woody debris along channel margins.

Desired Biological Responses (if all physical objectives achieved):

- Diverse age class structure in stands of cottonwood and other species dependent on channel migration.
- Full range of several stages in riparian plant communities.
- Increased habitat quality and quantity for native vertebrate species dependent on early successional riparian forests (Hartman, 1965; Bustard and Navver, 1975; Sullivan et al., 1987).
- High flow refuge and summer thermal refugia for amphibians and juvenile fish provided in rejuvenated scour channels.
- Increased habitat complexity by input of large woody debris from eroding banks.

Attribute No. 7.
A Functional Floodplain

On average, floodplains are inundated once annually by high flows equaling or exceeding bankfull stage. Lower terraces are inundated by less frequent floods, with their expected inundation frequencies dependent on norms exhibited by similar, but unregulated river channels. These floods also deposit finer sediment onto the floodplain and low terraces (Leopold et al., 1964; Sullivan et al., 1987; Poff et al., 1997; Ward, 1998).

Objectives for Physical Processes:

- Inundate the floodplain on average once annually.
- Encourage local floodplain surface deposition and/or scour by less frequent but higher floods.
- Have floodplain construction keep pace with floodplain loss as the channel migrates across the river corridor.
- Provide sufficient channel confinement to maintain hydraulic processes (Attributes Nos. 3 and 4).

Desired Physical Responses:

- Maintain channel width as river migrates.
- Increase hydraulic roughness and greater flow storage during high-magnitude floods.

Desired Biological Responses (if all physical objectives achieved:

- Increased woody riparian overstory and understory species diversity, compensating for woody riparian stands lost along outside banks of eroding meander bends.
- Keeps physical processes conducive for maintaining early-successional riparian dependent species, especially for birds and amphibians.

Attribute No. 8.
Infrequent Channel-Resetting Floods

Single large floods (e.g., exceeding 10- to 20-year recurrences) cause channel avulsions, widespread rejuvenation of mature riparian stands to early-successional stages, side channel formation and maintenance, and off-channel wetlands (e.g., oxbows). Resetting floods are as critical for creating and maintaining channel complexity as are lesser magnitude floods (Sullivan et al., 1987; Poff et al., 1997; Ward, 1998).

Objectives for Physical Processes:

- Form/Reshape alternate bar surfaces every 10 to 20 years, on average.
- Improve bedload routing by minimizing impedance of bedload transport past tributary deltas.
- Eliminate or minimize extent mature riparian vegetation stands on alternate bar surfaces and floodplains every 10 to 20 years.
- Deposit fine substrate on lower terrace surfaces once every 10 to 20 years.
- Provide infrequent deep scour high on alternate bars and on the floodplain.
- Construct and maintain (rejuvenate) natural side channels.
- Scour and redeposit entire alternate bar sequences every 10 to 20 years.

Desired Physical Responses:

- Deep scour (several D_{84} surface layers deep) in most alluvial features, including steeper riffles.
- Significant channel migration and infrequent channel avulsion.
- Alternate bar scour and redeposition.
- Extensive removal of saplings and mature trees in riparian stands.
- Increase complexity of natural side channels.

Desired Biological Responses (if physical processes achieved):

- Improve anadromous salmonid spawning and rearing habitats.
- Increase adult fish cover and holding habitat (Nelson et al., 1987).
- Create dynamic riparian stands in various stages of succession on higher elevations of alternate bars.
- Control populations of 3- to 4-year-old saplings on alternate bar surfaces close to channel center, and scour stands of mature riparian vegetation.

Attribute No. 9.
Self-Sustaining Diverse Riparian Plant Communities

Natural woody riparian plant establishment and mortality, based on species life history strategies, culminate in early- and late-successional stand structures and species diversities (canopy and understory) characteristic of self-sustaining riparian communities common to regional unregulated river corridors (Beschta and Platts, 1986; Ligon et al., 1995; Poff et al., 1997).

Objectives for Riparian Processes:

- Prevent woody riparian plant encroachment.
- Maintain early-successional woody riparian communities.
- Remove mature riparian trees established in the riparian berms.
- Eliminate widespread presence of riparian berms.
- Rehabilitate off-channel wetland communities.

Desired Biological Responses (if all physical objectives achieved):

- Floods periodically scour seedlings and saplings.
- Channel migration initiates new riparian cohorts.
- Channel avulsion creates oxbows and off-channel wetland habitats, initiating diverse patches of riparian stands.
- Woody riparian overstory and understory species diversity and age class distribution increases in floodplains.
- Greater habitat availability for wildlife dependent on early seral stages of riparian plant communities.

Attribute No. 10.
Naturally-fluctuating Groundwater Table

Inter-annual and seasonal groundwater fluctuations in floodplains, terraces, sloughs, and adjacent wetlands occur in a manner similar to that in regional unregulated river corridors (Stanford et al., 1996; Ward, 1998).

Objectives for Physical Processes:

- Naturally fluctuating seasonal groundwater elevation and surface-water elevations in scour channels and off-channel wetlands.

Desired Physical Responses:

- Maintenance of off-channel habitats, including overflow channels, oxbow channels, and floodplain wetlands.

Desired Biological Responses (if physical processes achieved):

- High diversity of habitat types within the entire river corridor (Poff et al., 1997; Ward, 1998).

Linkage Between Physical Processes, Fish Habitat, and Fish Populations

Some reviewers commented that there is no sound basis for the assertion that increases or improvements in salmonid habitat will result in increased fish production. Several commentors also criticized the DEIS/EIR, stating that the Preferred Alternative would not achieve the goals of the Trinity River Restoration Program (TRRP) and that the belief that restoring a functioning alluvial river would restore salmonid populations was a "leap of faith." The lead agencies disagree on both counts. Restoring the physical processes that produced the inriver habitats prior to the construction of the dam (i.e., the environment in which Trinity River salmonids evolved) will recreate and maintain the habitats necessary for healthy fish populations—healthy rivers support healthy fish populations. This premise is not a leap of faith, but an application of a recent paradigm shift not only in fisheries resources but all in natural resources management.

To further demonstrate this, a deterministic habitat capacity analysis was conducted to assess the ability of the Preferred Alternative to achieve the chinook spawning escapement goals of the TRRP. This deterministic approach was conducted to provide information independent of, but complementary to, the Trinity River System Attribute Analysis Method (TRSAAM) analysis of the Preferred Alternative and the stochastic analysis conducted using the U.S. Geological Survey—Biological Resources Division (USGS-BRD) salmon production model, SALMOD, that was developed specifically for the Trinity River (USFWS & HVT, 1999).

Rationale Behind the Focus on Physical Processes

The shift towards holistic management aimed at restoring natural processes, rather than focusing on individual species, is a result of management acknowledging that past efforts have failed to reverse the demise of salmonid stocks. Kauffman et al., (1997) states that nearly "85 percent of historical Pacific Northwest anadromous salmon stocks are either extinct, endangered, threatened or of special concern (National Research Council [NRC], 1996). The threat to aquatic biodiversity in North America is greater than the threat to terrestrial diversity (Naiman et al., 1995). To date, not a single aquatic species has been delisted through the Endangered Species Act procedures… An unprecedented need exists for ecological restoration of riparian ecosystems and their closely associated aquatic ecosystems." Kauffman et al., (1997) continues, "By shifting the focus to the integrity of ecological processes and functions, we are more likely to successfully attain the restoration both of habitat and species of interest." This strategy is repeated in the Aquatic Conservation Strategy (ACS) of the Northwest Forest Plan, which states: "The ACS must strive to maintain and restore ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian dependent species and restore currently degraded habitats (USFS and BLM, 1994)."

Recent literature acknowledges the past failures of single-species management and promotes a more holistic approach to avoid similar failures in the future (USFS and BLM, 1994; Kauffman et al., 1997; Beechie and Bolton, 1999). This holistic approach to fishery resource restoration focuses on managing physical processes that diagnose and address the cause(s) of population declines resulting from habitat degradation, instead of treating the symptoms of the degradation (e.g., NRC, 1996; Stanford et al., 1996; Kauffman et al., 1997; Poff et al., 1997; Beechie and Bolton, 1999). This type of approach applied to the restoration of salmon populations acknowledges that salmon evolved in rivers where a diverse array of habitats were maintained and recreated by dynamic long-term processes (Kauffman et al., 1997; Peterson and Reid, 1984; Benda, 1994; Abbe and Montgomery, 1996 as cited in Beechie and Bolton, 1999).

As shown in the Trinity River Flow Evaluation Study (TRFES), management must address the overall integrity of the river system by identifying physical processes that result in desired biological responses. For example, managing for flows that move, sort, cleanse, and redeposit spawning gravels provides appropriate substrate for salmon redds. The presence of appropriate substrate (in combination with other factors such as appropriate depth and velocity) provides a place for adult salmon to spawn their eggs. Gravels cleansed of fine sediment, such as sand (which is the result of scour, a physical process) allow sufficient percolation of water through the gravel to provide enough oxygen to the egg/sac-fry for proper development, removal of waste materials, and successful emergence (i.e., fry are not trapped in gravel by fine sediment). Clean gravels increase egg-to-fry survival, improve overwintering habitat for juvenile salmonids, and increase habitat for invertebrates (prey items for fish), all of which are biological responses that result from flushing fine sediment from coarse sediment (a physical response).

Each alternative was assessed for its ability to meet thresholds of the physical processes identified in the geomorphology section of the DEIS/EIR (Section 2.3). In addition, several biological thresholds (especially temperature associated) were also assessed for each alternative. This methodology was deemed appropriate to identify impacts to fish, wildlife, and riparian plant communities because these physical processes affect and shape the biological communities and habitats that will be present. In addition, data specific to the Trinity River mainstem and its tributaries were available for such methodology (McBain and Trush, 1997; USFWS and HVT, 1999). The types and availability of habitat determine what species and life stages will be successful. This is true for all species because all species within a community interact. While habitat can be managed for chinook fry, if that management does not provide appropriate conditions for the invertebrates that chinook fry feed upon, there will be no net increase in chinook salmon populations. The restoration of all salmonid species is much more likely when habitat and community (food web) integrity is restored (USFS and BLM, 1994; Kauffman, 1997; Beechie and Bolton, 1999).

Once habitat integrity is restored, salmonid numbers are likely to increase because of their resilience and ability to produce many young. Anadromous salmonids are highly prolific, producing 1,500-6,000 eggs per female. In biological terms, species that produce large numbers of offspring with no or relatively little parental care or energy expenditure are referred to as "r-selected" species in terms of their life history strategy. These types of species produce large numbers of eggs to assure perpetuation of the species despite years when environmental conditions are somewhat unfavorable, and have the potential to produce large numbers of offspring when conditions are favorable. R-selected species are typically able to fully use the carrying capacity of their habitat under each individual year's conditions. Once the degraded habitat has been restored on the Trinity River, it is expected that naturally produced salmonid populations will be able to fully use these habitats, and healthy and robust populations will once again exist.

Ability of the Preferred Alternative to Meet Trinity River Restoration Program Goals

To assess the ability of the Preferred Alternative to meet TRRP goals, available inriver habitat was analyzed for the current and rehabilitated channel. This analysis investigated the habitat capacity for chinook salmon spawning, fry and juvenile rearing, and expected adult spawners in the upper 27.3 miles of the Trinity River below Lewiston Dam. This reach of the river was selected because of data compatibility of the habitat assessments conducted by the Service (USFWS & HVT, 1999) and the chinook salmon spawning distribution data collected by the California Department of Fish and Game (CDFG, 1992a; 1992b; 1994; 1995; 1996a; 1996b). General computational steps conducted for this assessment are presented in Attachment A at the end of this thematic response. However, it should be noted that it is difficult to demonstrate direct cause-effect relationships between habitat and population because of the dynamic nature of the systems involved (hydrology, climate, etc.). This analysis applies standard fish habitat techniques and measured data from the Trinity River to assess how improved habitat would benefit fish populations.

Potential Juvenile (Smolt) Production

Habitat Availability

Habitat availability estimates were obtained from PHABSIM modeling for the upper 25.7 miles of the Trinity River from Lewiston Dam to the confluence of Dutch Creek (USFWS & HVT, 1999, Table 1). Chinook salmon habitat availability data (for spawning, fry rearing, and juvenile rearing life stages) in the existing channel at a dam release of 300 cfs were used in this analysis because this is the recommended spawning and rearing flow for the Preferred Alternative (DEIS/EIR, 1999; USFWS & HVT, 1999).

An estimate for the amount of habitat available for the Preferred Alternative was made by multiplying estimates of existing rearing habitat by 1.93. This was the factor for increased habitat measured at the Steiner Flat channel rehabilitation site following its completion (USFWS, 1997; USFWS & HVT, 1999). This assumes that increases in rearing habitat will also occur in areas adjacent to where mechanical reshaping of the channel will occur as a result of the restoration of fluvial processes. Although channel rehabilitation projects do increase spawning habitat, data to account for increases in spawning habitat are not available, so it was assumed, for this analysis, that spawning habitat would remain the same. Therefore, estimates of spawning habitat will underestimate potential redd capacity of the upper mainstem Trinity River after channel restoration activities are implemented.

Because of the differences in lengths of the river covered by the habitat availability data (25.7 miles) and the spawning escapement data (27.3 miles), the measured habitat data were

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TABLE 1
Chinook Habitat Availability, Capacity, and Potential Production for the Upper Mainstem Trinity River

	Step	Existing Channel	Unit	Source	Rehabilitiated Channel	Unit	Source
a	Measured Spawning Habitat (25.7 mi)	349,986		USFWS&HVT 99			USFWS&HVT 99
b	Measured Fry Habitat (25.7 mi)	1,297,704		USFWS&HVT 99			USFWS&HVT 99
c	Measured Juvenile Habitat (25.7 mi)	4,654,342		USFWS&HVT 99			USFWS&HVT 99
d	Spawning Habitat (27.3 mi)	370,985	sq ft	= a x 1.06	370,985	sq ft	= d
e	Fry Habitat (27.3 mi)	1,375,566	sq ft	= b x 1.06	2,654,842	sq ft	= e x 1.93
f	Juvenile Habitat (27.3 mi)	4,933,603	sq ft	= c x 1.06	9,521,853	sq ft	= f x 1.93
g	Area per Redd	51	sq ft	Bartholow	51	sq ft	Bartholow
h	Fry per Redd	1,400	fry	Bartholow	1,400	fry	Bartholow
I	Fry Rearing Area	0.25	sq ft	Bartholow	0.25	sq ft	Bartholow
j	Juvenile Rearing Area	2	sq ft	Bartholow	2	sq ft	Bartholow
k	Redd Capacity	7,300	redds	= d/g	7,300	redds	= d/g
l	Potential Fry	10,220,000	fry	= k x h	10,220,000	fry	= k x h
m	Fry Capacity (Habitat)	5,502,000	fry	= e/l	10,619,000	fry	= e/l
n	Juvenile Capacity (Habitat)	2,467,000	juvenile	= f/j	4,761,000	juv	= f/j
o	Smolt Production (SRF) (Table A1)	3,158,000	smolt	= n x 1.28	6,094,000	smolt	= n x 1.28
p	Adult Spawning Escapement (Table A2)	13,000	adults	= o x 0.0041	25,000	adults	= o x 0.0041

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multiplied by 1.06 (27.3/25.7) in order to extrapolate to the reach of the river with spawning escapement data, but no habitat availability data.

Habitat Capacity Estimates

Habitat capacity estimates were calculated by dividing the habitat availability by the area requirements for redds, fry, or juveniles (Table 1). An estimate of potential fry was calculated by multiplying the number of redds by the number of fry produced per redd.

Habitat Capacity in the Existing Channel Habitat

Based on the existing channel/habitat conditions, the upper 27 miles of the mainstem Trinity River, at any one time during the spawning season, can support approximately 7,300 chinook redds (Table 1). While approximately 10.2 million emergent fry would be produced from this number of redds, there is only sufficient fry rearing habitat to support approximately 5.5 million fry (54 percent of the potential production) at any one time. Rearing habitat, therefore, is a limiting factor in this reach of the Trinity River. The limited availability of shallow, low-velocity habitat required by salmonid fry has been well documented (USFWS, 1994; USFWS, 1997; USFWS & HVT, 1999). Although all fry do not emerge at the same time because of the protracted spawning period for chinook salmon (mid-September to December), the current channel configuration and condition does not provide sufficient habitat to support a significant portion of the potential production. Approximately 2.5 million juvenile chinook could rear in the existing channel.

Habitat Capacity in a Rehabilitated Channel Habitat

As with the existing channel analysis, approximately 7,300 redds can be accommodated by existing spawning habitat that would result in the production of approximately 10.2 million fry (Table 1). Increases in rearing habitat, resulting from mechanical rehabilitation activities and increased flows to maintain and create additional rearing habitat, would be sufficient to support 10.6 million chinook fry (104 percent of the potential production of fry) and 4.8 million chinook juveniles.

Potential Smolt Production from a Rehabilitated Channel

The protracted emergence of salmonid fry as a result of the prolonged spawning season allows for sequential rearing of fry and juvenile salmonids. This allows rearing habitats to be “re-used” as emergent fry grow and seek deeper and higher-velocity waters as they enter more mature life stages (emergent fry - fry - juveniles - smolts). Data generated by SALMOD and juvenile habitat capacity data for the existing channel were used to account for sequential rearing and smolt production of chinook salmon (Table A1). These data suggest production would be 1.28 times greater than the static habitat capacity estimate. Using this information, approximately 6.1 million juvenile chinook would be produced in the rehabilitated channel throughout the rearing season.

Trinity River Restoration Escapement Goals—Projected Spawning Escapement/Redds and Projected Returning Spawners

Spawning Escapement with Restored Rearing Habitat

From the projected 6.1 million juvenile chinook produced from a restored channel, approximately 25,000 adults spawners would be expected to return to the 27-mile reach from Lewiston Dam to the Junction City weir, of which 24,200 (96.7 percent) would spawn in the mainstem. The spawner escapement estimate is based on the average smolt-to-spawning adult ratio (0.41 percent) for Trinity River Hatchery fingerling chinook releases (Table A2). Although this escapement level would exceed the capacity of the existing channel, increases in spawning habitat due to channel restoration activities would increase spawning habitat to an unquantified level, which would be able to accommodate additional spawners. In addition, as spawning populations increase, the distribution of spawners would change, with greater proportions spawning in downstream and tributary areas.

Trinity River Restoration Program Goals

The chinook natural spawning escapement goals of the TRRP are 62,000 fall chinook and 6,000 spring chinook (USFWS, 1983). Trinity River salmon spawner distribution data indicate that 44.2 percent of fall chinook spawn above the Junction City weir (Table A3), and 96.7 percent of the chinook that spawn above the Junction City weir spawn in the mainstem (CDFG 1992a, 1992b, 1994, 1995, 1996a, 1996b). While small numbers of spring chinook do spawn in the major tributaries of the Trinity River (South Fork, New River, Canyon Creek, North Fork), it was assumed that all spring chinook spawning occurs above the Junction City weir. Using this distribution of natural spawning escapement and the TRRP spawning escapement goals, approximately 32,300 (5,800 spring and 26,500 fall) chinook salmon would be expected to spawn in the mainstem Trinity River from Lewiston Dam to the Junction City weir. With attainment of the TRRP spring and fall chinook escapement, this number of spawners would produce approximately 16,200 redds, exceeding the current spawning capacity of 7,300 redds (Table 1).

The estimated mainstem spawner escapement based on smolt production from a restored channel geomorphology of 24,200 adults represents 75 percent of the TRRP chinook salmon spawning escapement goals for this reach of the river.

Conclusions

This analysis indicates that the projected adult spawning returns resulting from juvenile production in a rehabilitated channel would achieve 69 percent of the TRRP goals for this upper 27 miles of the Trinity River. In addition to the increase in rearing habitat addressed in this analysis, several important factors that will increase salmonid freshwater survival, and ultimately adult returns, were not accounted for. These factors include the effects of decreased sedimentation on egg/fry survival and invertebrate production, increased smolt survival resulting from more favorable outmigration temperatures and quicker travel time during outmigration, and decreased disease mortality resulting from less favorable conditions for pathogens. The magnitude to which these factors will potentially increase production and adult returns is unknown at this time.

The primary factor limiting chinook production in the upper Trinity River is the lack of sufficient fry and juvenile rearing habitat that resulted from habitat degradation and the change in channel geomorphology caused by the construction and operation of the Trinity River Division of the Central Valley Project (USFWS, 1994; USFWS & HVT, 1999). Increases in rearing habitat resulting from channel rehabilitation will be able to support substantially more fry and juvenile chinook salmon than can be supported by the existing habitat conditions.

In addition to increasing fry and juvenile rearing habitat, channel rehabilitation projects are expected to increase spawning habitat. Restoration and maintenance of alternate bar sequences with their associated pool-riffle sequences and the supplementation of spawning gravel will create spawning habitat the does not currently exist (USFWS & HVT, 1999; Appendix G, Plates 3 and 4). Although the magnitude of spawning habitat that will be provided by the channel rehabilitation projects has not been quantified, chinook salmon have been observed spawning on these project sites, supporting the hypothesis that these activities will provide increased spawning habitat.

This analysis focuses on chinook salmon because they have the most extensive database pertaining to life-history parameters and habitat. Channel rehabilitation and increased flows will provide diverse habitats (pool-riffle-run sequences), similar to what existed prior to the Trinity River Division. Because these were the habitats that provided the necessary habitats for all three anadromous salmon species, similar increases in habitat and population levels are expected for coho salmon and steelhead.

The interactions between biological and physical processes that affect salmonid production are extremely complex. Although it is recognized that these interactions exist, data to quantify their effects are limited. The above analysis does not account for many of the complex interactions that ultimately determine production. Its utility is to provide a general view of habitat bottlenecks, provide a general assessment of the potential of attaining restoration goals, and identify areas to focus restoration efforts.

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Attachment A. Computational Steps for Assessing Chinook Salmon Habitat Availability, Habitat Capacity, Potential Production, and Potential Adult Returns for the Preferred Alternative of the Trinity River DEIS/EIR.

Habitat Availability	Determine the habitat availability from Lewiston to the Dutch Creek confluence for spawning, fry rearing, and juvenile rearing in the existing channel at recommended dam release.
	Perform distance adjustment to make reach for the habitat data consistent with the reach for the spawning escapement data.
	Perform rearing habitat (fry and juvenile) adjustment to reflect changes in habitat availability caused by channel rehabilitation activities.
Habitat Capacity	Determine habitat capacity of the existing and rehabilitated channel by dividing the habitat availability by the density factors for each life stage.
Potential Production	Expand habitat capacity production estimate by the sequential rearing factor, which accounts for the “re-use” rearing habitats by fry and juveniles as they grow larger and use different habitats.
TRRP Spawning Escapement	Determine the proportion of Trinity River Basin fall chinook salmon that spawn in the upper Trinity River (Lewiston to Junction City weir). Assume all spring chinook in the upper Trinity River spawn above Junction City weir.
	Estimate the number of chinook that would spawn in the Trinity River above the Junction City weir if the TRRP’s escapement goals were met by multiplying the proportion spawning in this reach by TRRP’s goals.
Preferred Alternative Spawning Escapement	Determine projected spawning escapement for the Preferred Alternative of the Trinity River EIS/EIR by multiplying the projected juvenile (smolt) production in the upper 27 miles of the Trinity River for a rehabilitated channel by the average smolt-to-adult return ratio for Trinity River Hatchery chinook.

TABLE A1
Estimated Chinook Salmon Smolt Production (millions of fish) Generated by SALMOD Used to Calculate Sequential Rearing Factor (SRF) Resulting from Sequential Spawning/Emergence/Rearing of Salmonids for the Trinity River from Lewiston Dam to Dutch Creek (RM 25.7)

	Smolt Production[a]	Instantaneous Juvenile Capacity in Existing Channel[b]	SRF[c]
Existing Habitat with 33,000 Spawners	2.95	2.33	1.27
Existing Habitat with 68,000 Spawners	2.98	2.33	1.28
Average			1.28

[A] Data source: USFWS & HVT, 1999; Table 5.23, weighted average by water-year class.
[B] Instantaneous habitat capacity based on PHABSIM data (USFWS & HVT, 1999).
[c] SRF calculated by dividing smolt production by instantaneous juvenile capacity

TABLE A2
Trinity River Hatchery Fall Chinook Fingerling CWT Release and Recovery Data, and Adult Spawner Return Ratio (KRTAT Cohort Reconstruction, 1999)

Brood Year	No. Released	No. Spawning Adult Returns[a]	Spawner Return Ratio (percent)
83	182,178	1,280	0.70
84	178,016	1,273	0.72
85	186,598	1,752	0.94
86	198,722	70	0.04
87	157,227	63	0.04
88	190,574	79	0.04
89	184,549	18	0.01
91	203,622	657	0.32
92	169,981	2,003	1.18
93	199,789	132	0.07
Average			0.41

[a] Number of spawning adult returns includes CWTs recovered at TRH and estimated numbers spawning in the mainstem Trinity River.

TABLE A3
Numbers of Trinity River Fall Chinook Spawning in the Trinity River above the Willow Creek Weir (WCW) and Junction City Weir (JCW) [a]

Return Year	1989	1990	1991	1992	1993	1994	Average
No. Above WCW	29,445	7,682	4,867	7,139	5,898	10,906	
No. Above JCW	16,346	2,931	4,088	3,148	2,742	4,012	
Proportion above JCW	0.5551	0.3815	0.8399	0.4410	0.4649	0.3679	0.442 [b]

[a] Data Sources: (CDFG, 1992a, 1992b, 1994, 1995, 1996a, 1996b).

[b] Average was calculated excluding 1991 because of the skewed spawning distribution during that year.

Alternatives Recommended by Commentors: Additional Mechanical Restoration and Alternative Flow Schedules

Many reviewers took issue with the range of alternatives that use flows for fishery restoration. Others took issue with the amount of mechanical restoration proposed and suggested that more mechanical restoration should be recommended, usually with a corresponding decrease in instream releases. The majority of commentors requested that flow releases be increased to at least 70 percent of unimpaired flow. It is assumed that these commentors based their assertion on the "Tennant Method," a shorthand approximation for determining optimum flow releases. These commentors typically stated "I support … flow regime which allows the Trinity River to keep at least 70 percent of its flow" or "I support a diversion of no more than 30 percent of the natural water flow from the Trinity River Basin." Although many of these comments stated that "science has determined that a river system needs 70 percent of its yield to remain healthy," they provided no supporting information or scientific rationale, although some commentors specifically mentioned the Tennant Method.

While the Tennant Method is an appropriate "first generation" analysis for setting interim flow standards when data are sparse, this method is not appropriate for establishing flow recommendations for the Trinity River for which a site-specific flow study was conducted to determine appropriate activities, including flow levels necessary to restore and protect fishery resources. Also see thematic response titled "The Basis for Fisheries Analyses Performed in the DEIS/EIR."

Some commentors suggested that harvest management or greater mechanical manipulation would be appropriate to restore fisheries and reduce the flow necessary in the Trinity River. Two "non-flow" alternatives considered in the DEIS/EIR were the Harvest Management and Mechanical Restoration Alternatives. Harvest management was considered but rejected as a potential alternative as discussed in the DEIS/EIR (see page 2-38). A major focus of the DEIS/EIR was flow and mechanical habitat restoration because many of the other factors that influence salmonid populations are already addressed by other natural resource management processes and/or agencies (Forest Plan process, Total Maximum Daily Load (TMDL) process, Pacific Fisheries Management Council (PFMC), Klamath Fisheries Management Council (KFMC), U.S. Bureau of Land Management (BLM), U.S. Forest Service (USFS). The fully analyzed Mechanical Restoration Alternative would hold existing instream flows and water exports constant.

The Mechanical Restoration Alternative comprised the No Action flow schedule (2,000-cfs peak flow and 340 taf/yr, or approximately 35 percent of the annual water volume entering Trinity Reservoir) and called for construction of 47 rehabilitation sites, which would then be maintained mechanically (Section 2.1.6, page 2-26 of the DEIS/EIR). Existing and additional watershed restoration actions (generally considered mechanical), such as continuing

Hamilton Ponds operations, were also recommended. In contrast, the Maximum Flow Alternative advocates a rehabilitated channel created by a 30,000-cfs peak flow in extremely wet years to remove the riparian berm with channel maintenance by flows alone. The Mechanical Restoration Alternative continues the current level of diversions to the Central Valley, whereas the Maximum Flow Alternative eliminates virtually all diversions to the Central Valley.

Forty-seven potential rehabilitation sites are identified (see revised Figure 2-4 in Section 2.3 of the FEIS/EIR) for mechanical restoration along the mainstem Trinity River. These sites are included in all alternatives that identify mechanical restoration as a component, whether or not these sites are subsequently maintained mechanically or by flows. All potential channel rehabilitation sites have been identified in the section of the Trinity River from Lewiston Dam to the confluence with the North Fork Trinity River, so there is no opportunity to construct more channel rehabilitation projects as several commentors asserted.

While some mechanical actions can improve local stream channel complexity (as identified and recommended in the Preferred Alternative), these efforts alone are temporary in nature and cannot duplicate the processes that occur with additional flow. High flows are necessary to create deeper pools, establish riffle: pool sequences, scour undercut banks, clean gravels, diversify particle size distributions, and regenerate floodplain riparian vegetation in a more proper form and function throughout the mainstem. Mechanical restoration without consideration of the physical and ecological processes can be costly to maintain or fail outright (Frissel and Nawa, 1992; Kauffman et al., 1997 as cited by Beechie and Bolton, 1999). The Mechanical Restoration Alternative may re-shape localized channel segments that initially appear in an alluvial river, but these segments would require perpetual maintenance and frequent reconstruction. Additionally, floodplain maintenance would not occur at all in areas other than channel rehabilitation sites if flow is not increased.

The Mechanical Restoration Alternative does not prescribe geomorphic thresholds vital to creating and sustaining alluvial river geomorphology. Recommended peak flows not to exceed 2,000 cfs cannot mobilize the general channel bed or spawning gravel deposits, will not redistribute fine bed material to rebuild floodplains, will eliminate groundwater recharge of the floodplain and channel corridor, and cannot route coarse sediment contributed from tributaries. Alternating bars would not be formed, then periodically reshaped; and riparian vegetation would rapidly encroach on all contemporary alluvial features. Mechanical actions cannot reproduce or sustain these alluvial prerequisites to a healthy river. Natural processes mediated by variable flows are essential for restoring river ecosystems (Ligon et al., 1995; Stanford, 1996), and this same perspective is adopted in the Preferred Alternative.

The mainstem has continued degrading since construction of the dams. The Mechanical Restoration Alternative will not reverse this trend, but only provide relief at selected locations. As riverine habitats continue to degrade, more riverine-dependent species will likely decline, making additional Endangered Species Act (ESA) listings possible. Such listings make continued mechanical manipulations more restrictive and expensive as the number of permits and additional surveys increases to ensure ESA-listed species are not adversely affected. Restoration of the physical processes and associated riverine habitats will likely prevent future ESA listings and will help recover species currently listed.

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The Sacramento Municipal Utility District (SMUD) provided comments that recommended additional mechanical manipulations and alternative flow schedules (see SMUD Comment Letter 5311). The alternative recommended by SMUD would decrease instream release volumes from those recommended by the Preferred Alternative of the DEIS/EIR while "Supplementing increased peak flows with non-flow habitat restoration techniques, including mechanical removal of tributary sediment bars and dredging…" Instream release volumes for this alternative range from 340 taf to 528 taf, averaging 423 taf, compared to the recommended release volumes of the Preferred Alternative, which range from 369 to 815 taf, and average 595 taf.

Many of the flow decreases recommended by SMUD would not meet biological objectives necessary for the recovery of the fishery resources of the Trinity River. With decreased peaks and durations as recommended by SMUD, many desired geomorphic processes would not occur, especially if the peak is capped at 6,000 cfs. While this 6,000 cfs "cap" does limit gravel loss in the reach below the dam (which can be corrected by coarse sediment augmentation), it greatly limits or prevents some physical processes from occurring (Table 8.2 in the TRFES).

SMUD states that their alternative would "reduce impacts to the power, water, and Central Valley fisheries by more than 50%," but they do not provide any fisheries information or water resources information to support their statement, only data on power impacts. SMUD also states that their phased implementation "would rely on data (rather than speculation associated with the preferred alternative) to determine flow levels." The flow levels identified in the Preferred Alternative (TRFES) are based on current data and are designed to meet specific objectives. SMUD does not present any information refuting these objectives.

Many of the same functions that would be lacking in the Mechanical Restoration Alternative (listed above) would also be lacking in the SMUD proposal due to decreased flows. In addition to the lack of positive functions under this alternative, there would be continual negative impacts from ongoing mechanical maintenance. These negative impacts are reiterated in comments received from the California Department of Fish and Game (CDFG). CDFG states, "The department opposes the Mechanical Alternative because the minor benefits provided to the fishery of the Trinity River do not out weigh the perpetual impacts to riparian habitat." CDFG states that the continual disturbance of sites "will preclude providing suitable habitat for self-sustaining populations of amphibians, birds and mammals" (see CDFG Comment Letter 6314, page 5, Section C). These perpetual impacts to riparian habitat and species would also occur under the SMUD alternative due to the need for continual mechanical maintenance (also see specific comments to the SMUD alternative, Comment Letter 5311).

When the SMUD alternative was evaluated using the Trinity River System Attribute Analysis Method (TRSAAM), as all other alternatives were, the proposal resulted in a score of 0.47 (35 of 74 possible) (see page 3-170 of the DEIS/EIR for a description of TRSAAM). This compares poorly to scores of 0.66 for the Preferred Alternative and 0.81 for the Maximum Flow Alternative. This is likely an overly optimistic evaluation of the SMUD proposal because high scores were given some of the attributes/objectives for mechanical maintenance approaches (e.g., removal of 2-year-old seedlings), but this approach ignores many of the detrimental effects of continued disturbance of the riparian/aquatic environment (see specific responses to the SMUD Comment Letter 5311 for further description).

For those reviewers who only focused on impacts within the Central Valley, it is important to note that implementation of the Mechanical Restoration Alternative would result in some significant ongoing, permanent impacts related to water quality, and potentially some disruption of riparian habitats, depending on the frequency of mechanical maintenance, in the Trinity River Basin (see comments provided by CDFG pertaining to the Mechanical Restoration Alternative, Comment Letter 6314). The lead agencies believe that the alternatives discussed in detail in the DEIS/EIR are adequate, provide a reasonable range of options, and did not rely too heavily on increased flows as a means of improving the Trinity River fisheries.

Over a period of years, and based on very detailed and lengthy scientific studies, the expert scientists working for the lead agencies determined that increased flows are essential to improving fishery resources and are more effective than non-flow means. To the extent that increased flows in the Trinity River require environmental or economic tradeoffs in the Central Valley, the Secretary of the Interior (Secretary) will take such tradeoffs into account when making policy decisions regarding restoration of the Trinity River's fishery resources. The decision as to how to balance various tradeoffs is properly made by the Secretary, who is entitled to an environmental document that provides a range of alternatives best calculated to meet the purpose and need of the project. The DEIS/EIR fulfills that function. It provides a whole range of fully developed alternatives, as well as discussions of why certain other alternatives were not addressed in the same level of detail.

Also see thematic response titled "No Action Alternative/Existing Conditions Scenario and Range of Alternatives."

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Increasing Effectiveness of Releases by Accounting for Storm Flows

Several reviewers stated that winter flood flows and safety-of-dam releases should be used to achieve fluvial geomorphic objectives and the corresponding spring releases be accordingly reduced.

Releasing high flows from the Trinity River Division (TRD) to augment high flows provided by tributaries downstream of Lewiston Dam falls into three classes:

1. **Piggy-backing floods**: These releases would be intentionally timed to coincide with downstream tributary flood peaks. To time dam releases with tributary flood peaks would require a predictive model(s) on expected tributary flood peaks generated by incoming storm systems. Piggy-backing dam releases would need to occur between November and March to coincide with rainfall and rain-on-snow storm events in tributaries downstream of Lewiston Dam.

2. **Percent inflow releases**: These releases would be based solely on a percentage of the rate of inflow into Trinity Reservoir. The 40 percent alternative in the Trinity River DEIS/EIR is based on releasing a 40 percent average of the previous 7-day's inflows, generating a stair-step release pattern with a 7-day frequency. The highest inflows into the TRD (and the correspondingly largest releases into the Trinity River) would occur between November and March to coincide with rainfall and rain-on-snow storm events in the watershed upstream of the TRD. The success of timing dam releases with downstream tributary flood peaks would depend on the length of averaging (7-day versus 3-day versus 1-day) TRD inflows; the longer the averaging period, the longer the lag-time between storm event and dam release, thus the lesser benefit to downstream flow augmentation. In other words, the longer the averaging period, the less chance there would be to piggyback on tributary floods. Therefore, a shorter averaging period would generate larger dam releases, as well as greater piggy-backing benefits.

3. **Safety-of-Dams releases**: These flow releases are in response to Safety-of-Dams (SOD) release criteria from Trinity Dam, and have typically occurred during January and February in wetter water years. The SOD releases have typically been 6,000 cfs, but were as high as 14,500 cfs in 1974. These flow releases are in response to SOD release criteria, and would not be scheduled for restoration purposes.

While the timing of high flows in winter is a natural event (as evidenced from unimpaired Trinity River at Lewiston streamflow hydrographs), releasing flows in the magnitude needed to achieve geomorphic and riparian objectives (6,000 to 11,000 cfs) since development of the TRD would most likely result in significant scour mortality of that year's cohort of incubating chinook and coho salmon eggs. This would be particularly true in reaches where channel geomorphology has not been rehabilitated (i.e., riparian berm removal and floodplain formation) because (1) the berm forces many of the redds to be constructed in the center of the channel, and (2) the riparian berm focuses scouring forces

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between the riparian berms. Detailed hydraulic measurements at un-rehabilitated sites (Wilcock et al., 1995) and rehabilitated sites (McBain and Trush, 1997) have shown that rehabilitation greatly moderates scouring forces and distributes those forces more equally across the channel. Until the channel rehabilitation program is completed and a more thorough evaluation of chinook and coho salmon spawning patterns and scour potential is completed, the risk of release-induced losses to chinook and coho salmon production precludes recommending high flows during this period and would be contrary to the take prohibitions of ESA-listed coho salmon. This is explicitly recommended as part of the Adaptive Environmental Assessment and Management (AEAM) program, as discussed in Appendix O of the TRFES:

"No high-flow releases are planned [for the fall/winter storm hydrograph], but synchronization of peak releases with stormflows should be evaluated through the adaptive management program to assess opportunities to maximize benefits of high-flow releases while conserving water."

Evaluation of piggy-backing releases and the percent inflow releases cannot be conducted until the AEAM program is developed, channel rehabilitation projects are implemented, and as our understanding of discharge/redd scour improves. This knowledge will allow us to better predict the potential negative impacts of winter high flows on chinook and coho salmon cohort production.

There have been suggestions that when SOD releases occur, spring high flows should be decreased because the SOD flow would have potentially achieved physical objectives for that water year. The concept of SOD releases receiving some sort of "ecological credit" was carefully considered in development of the Trinity River Flow Evaluation recommendations/Preferred Alternative. Flow recommendations of the Preferred Alternative are based on quantitative management objectives, including flow magnitude, flow duration, and timing. Therefore, the ecological benefit of an SOD release of 11,000 cfs for 10 days in December does not equal the ecological benefit of a 10-day 11,000-cfs release during the spring snowmelt period. For example, if an 11,000-cfs SOD release occurs in January of an extremely wet water year, achieving bed mobility, bed scour, and sediment transport objectives for that year, the magnitude and duration of the spring release could be reduced from the 5-day 11,000-cfs release. However, spring biological objectives, such as meeting smolt temperature criteria and preventing riparian seedling germination low on alternate bar surfaces, would still require some portion of the snowmelt runoff hydrograph.

SOD releases from Trinity Dam have occurred in 8 of 35 years (see Appendix F of the TRFES), but these releases have not been of significant magnitude or frequency to achieve many of the fluvial restoration objectives needed to restore or maintain the mainstem habitat. Under the Preferred Alternative, the frequency of SOD releases will decrease by 36 percent compared to No Action, primarily because of lower end-of-year reservoir storage levels (see Appendix A of the DEIS/EIR). Therefore, the insufficient magnitude of SOD releases and expected low frequency may only provide limited ecological benefits in the future.

Further consideration of the potential benefits of SOD releases must only be considered based on sound scientific information and within a science-based AEAM program.

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Comparison of Population Trends in Unregulated Rivers (Smith River and South Fork Trinity River) and the Mainstem Trinity

Several reviewers stated that the declines of Trinity River salmonid populations are not due to the construction and operation of the Trinity River Division (TRD). They stated that salmonid populations in the Pacific northwest generally have declined, and the TRD is not the cause of the current low populations of Trinity River salmonids. Commentors also asserted that salmonid populations in the Smith River, California, have also dramatically declined, and this is a watershed that is fairly intact and does not have any dams on it. They also stated that the same is true for the South Fork Trinity River populations.

Empirical evidence does not support the idea that the dams on the Trinity River bear little responsibility for decline of the anadromous fishery. Within 10 years after the completion of the TRD, the negative effect of these dams and their operation on the salmonid resources of the TRD was recognized (Hubbell, 1973; Trinity River Basin Fish and Wildlife Task Force, 1977). Land management activities, dam construction and operation, and harvest were identified as the three primary factors that have caused declines in anadromous salmonid populations in the Trinity River (USFWS, 1980). Measures have been initiated or taken to address the watershed and fish harvest factors, but the operations of the TRD have yet to be addressed. The Trinity River Basin Fish and Wildlife Restoration Program initiated many watershed restoration activities, especially in Grass Valley Creek. In addition, since the early 1980s, the fisheries that harvest Trinity River Basin salmon and steelhead have been intensively managed and regulated.

No pre-TRD data exist to compare population trends between the Trinity River and the Smith River or South Fork Trinity River. If escapement data for the Smith River and the Trinity River displayed the same trends (i.e., the data were correlated), then the assertion made by the commentors that the dam was not the primary cause for the salmonid population decline on the Trinity River may have some validity, but this assertion is not supported by the available data. Using hatchery-return data as a surrogate for natural populations, the commentors' assertion that the Smith River populations, unaffected by a dam, have experienced similar declines is unfounded. Concerning the decline of salmonid populations in the South Fork Trinity River, these declines have been attributed to habitat degradation resulting from poor land management activities and have also been affected by TRD operations to the extent that these operations have negatively influenced mainstem temperature regimes.

Smith River

Salmonid populations experience large variations in population size due to a variety of natural and human-induced factors. Natural factors include freshwater habitat conditions caused by floods and drought and oceanic conditions. Human-induced factors include water diversions, watershed disturbances, instream habitat disturbances, and harvest (Pearcy, 1992; Bisson et al., 1997). Salmonids exhibit varied life-history patterns and are relatively fecund (r-selected species), so that when conditions are favorable they experience large population growth, and when environmental conditions are unfavorable they experience population suppression.

If oceanic conditions were the primary reason for the decline in salmonids populations, then it would be expected that the abundance of hatchery populations would show similar trends. As long as the watersheds where the hatcheries were located were fairly close and the stocks had similar oceanic distribution, the stocks from different watersheds would be exposed to similar oceanic conditions, and the influence of variable freshwater environmental conditions would be minimized because of stable rearing habitat provided by the hatcheries.

Rowdy Creek Hatchery (RCH) is located on a tributary to the Smith River, and Trinity River Hatchery (TRH) is located below Lewiston Dam. To evaluate if Smith River populations and Trinity River populations were experiencing similar declines in population, a comparison of hatchery fall chinook returns was conducted, using returns to Rowdy Creek Hatchery and Trinity River Hatchery-produced fish. Comparable escapement data only exists for the period from 1982 through 1995, so comparisons of long-term population trends, especially prior to the construction of the Trinity River Division, is impossible.

Although data are limited, the statistical analysis of the relationship between fall chinook populations from Rowdy Creek Hatchery on the Smith River and Trinity River Hatchery indicates that the trends in spawning escapement are not related (the correlation between spawning escapements is poor and not statistically significant [$r = -0.042$, $p=0.886$]) (Figure 1). If escapement data for the Smith River and the Trinity River displayed the same trends (i.e., the data were correlated), then the assertion made by the commentors that the dam was not the primary cause for the salmonid population decline on the Trinity River may have some validity; but this assertion is not supported by the available data.

South Fork Trinity River

While there are no dams or large diversions on the South Fork Trinity River, declines have occurred in some fish populations in this basin. The South Fork watershed has undergone substantial impacts due to past and continuing land management practices. The South Fork Trinity River is listed as an impaired water body by the U.S. Environmental Protection Agency (EPA) because of excessive sediment input.

Species of concern in the South Fork Trinity River include spring and fall chinook, summer and winter steelhead and coho salmon, and Pacific lamprey. Historic documentation of these stocks is limited; however, there is some information from the early 1960s and anecdotal accounts that give some idea of the declines that these stocks have undergone in the past several years.

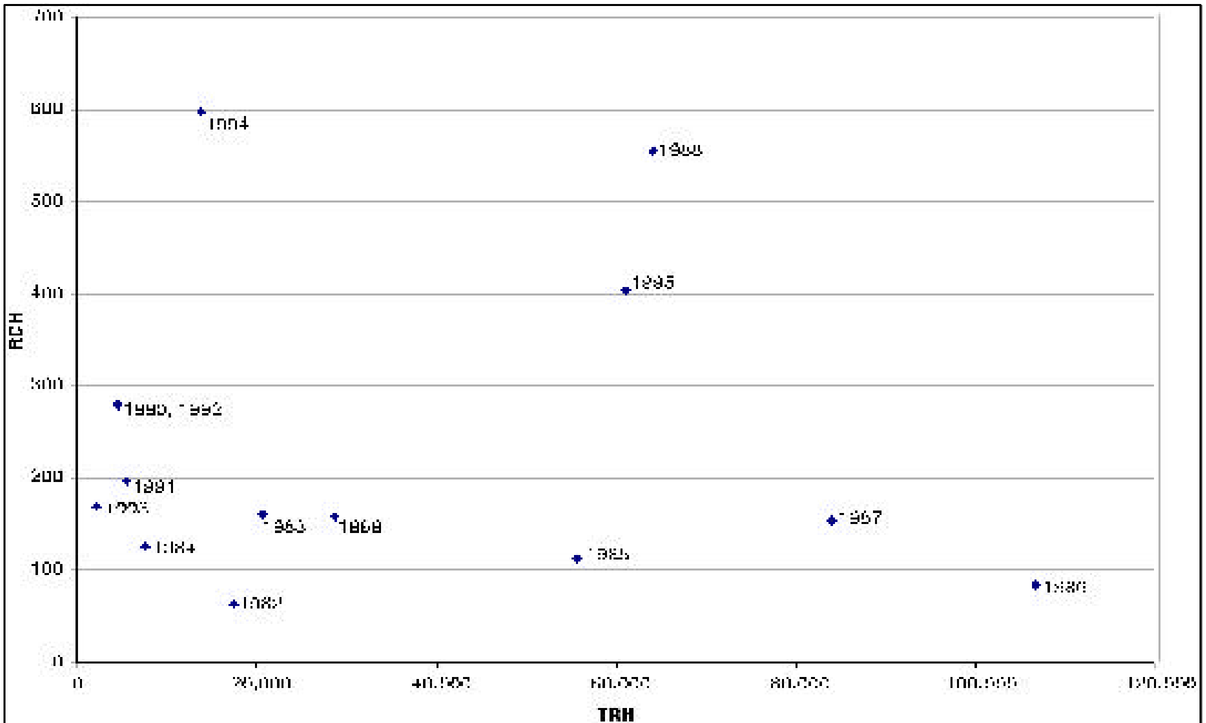

FIGURE 1
ROWDY CREEK HATCHERY (RCH) FALL CHINOOK SPAWNING RETURNS AND TRINITY RIVER HATCHERY (TRH) PRODUCED FALL CHINOOK SPAWNING RETURNS, 1982-1995
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR

Chinook

Data exists that indicate that spring chinook populations have declined greatly since the early 1960s. California Department of Fish and Game (CDFG) surveys estimated a population in 1963 between 7,000 and 10,000 (Healey, 1963 as cited in PWA, 1994) and a 1964 population of 11,600 (LaFaunce, 1967) in the upper South Fork. Fall chinook numbers have ranged from 3,300 (including jacks) in 1964 (LaFaunce, 1967) to a low of 345 fish in 1990 (PWA Table 2-2, 1994). As recently as 1997, the fall chinook estimate was 1,210 fish based on CDFG helicopter redd surveys of the lower river (CDFG, 1998).

Steelhead

As reported by Pacific Watershed Associates (PWA), there are indications that summer steelhead may never have been abundant in the South Fork. However, reported numbers are extremely low. Population data are very limited for winter steelhead, although it is assumed that their numbers have declined based on angler interviews and anecdotal information from citizens living in the South Fork basin (PWA, 1994). The CDFG estimated that there were 2,326 winter steelhead in 1991 and 3,500 in 1992 in the South Fork (CDFG as cited in PWA, 1994).

Coho

As with steelhead, very little data exist for coho salmon in the South Fork, although anecdotal reports site coho adults in tributaries near Hyampom. Stream surveys from 1952 (Coots, 1952 as cited in PWA, 1994) indicate juvenile coho salmon were present in tributaries. Though historical population information is not available for comparison to current estimates, current numbers are considered extremely low (PWA, 1994).

Pacific Lamprey

Population data for lamprey are non-existent. There are accounts from residents that lamprey runs would occur in the Hyampom area during spring, and adults would die in early summer (PWA, 1994). It may be assumed that factors that have resulted in declines of other anadromous runs have likely contributed to declines in lamprey populations because there is some overlap in habitat use with salmonids, particularly by spawning adults.

Summary: South Fork Trinity River

There is evidence that other anthropogenic impacts to the South Fork basin have contributed to the declines of most fish runs. The geology of much of the mainstem South Fork watershed is highly unstable, and much of the basin is susceptible to extensive erosion. Clear-cut logging followed by the flood of 1964 contributed vast amounts of sediment into the mainstem South Fork and several tributaries. In some locations, up to 24 feet of sedimentation occurred during the flood (PWA, 1994).

The EPA reported that the dominant process of sediment delivery to the basin is mass wasting (landslides and debris flow) and that most landslide activity during the period 1944-1990 occurred between 1960 and 1975 (EPA, 1998). This report also states that road-related sediment delivery has continued to increase from 1944 to the present.

PWA (1994) reported that there appears to be an inverse relationship between the amount of sand and fine sediment in pools and the density of juvenile salmonids in many South Fork sub-basins. They suggest habitat in the basin is one factor limiting salmonid production and that long-term sediment control will be an important component of fish population recovery.

Pool volume was the physical parameter most closely related to spring chinook densities according to Barnhart and Hillemeier (1994). They reported that pool volume did not appear to be limiting spring chinook populations during 1992 and 1993 surveys. However, they did conclude that holding habitat could be limiting if a large spring chinook run occurs during a low water year.

Although there are no dams on the South Fork, it is evident that other disturbances to fish habitat have contributed to declines in numbers. One of the main components of the Trinity River Restoration Program has been an effort to reduce erosion in tributary basins that contribute high amounts of fine sediment to the mainstem Trinity River. Without these efforts and appropriate land management practices in the future, success of habitat and fishery restoration efforts would be limited.

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Role of the Trinity River Hatchery

Several reviewers provided comments pertaining to the operation of Trinity River Hatchery (TRH), its potential role in increasing salmonid populations, the impacts of hatchery-produced fish on naturally produced fish, and implementation of hatch-box programs. The purpose of TRH is to mitigate for the loss of salmonid production from habitats upstream of Trinity Dam. Additionally, Section 2(a)(1)(c) of the 1984 Trinity River Basin Fish and Wildlife Management Act (P.L. 98-541), as amended by P.L. 104-143, states that Trinity River Hatchery is not to impair "efforts to restore and maintain naturally reproducing anadromous fish stocks within the Basin." Increased hatchery production was identified during public scoping as a potential alternative to meet the purpose and need to restore and maintain natural production downstream of Lewiston Dam. However, increased hatchery production does not do this because by definition, hatchery fish are not naturally produced (see Section 2.2.6, page 2-41 of the DEIS/EIR).

The DEIS/EIR states that "naturally producing populations are self-sustaining" (see page 3-158 of the DEIS/EIR). Increasing hatchery production to increase the numbers of spawners does not create a naturally producing population that is self-sustaining, but creates a "put and take" fishery. The TRH itself has mitigation goals for each of the three salmonid species, but these goals are different from the inriver spawner escapement goals for naturally produced salmonids as developed by the Trinity River Restoration Program (TRRP). Hatchery-produced fish (the F-1 generation) that opt to spawn in the river instead of returning to the hatchery are not considered naturally produced (they were produced at the hatchery) and do not contribute to the TRRP's inriver spawner escapement goals. However, if their offspring survive (the F-2 generation) from eggs in the river to adult, this F-2 generation is considered naturally produced and do contribute to the TRRP's inriver goals (see pages 3-157 and 3-158 of the DEIS/EIR for an explanation of the TRRP goals for both inriver escapement and hatchery return and definition of terms used in relation to hatchery- and naturally produced fish). The F-2 generation will not significantly increase the number of spawners in subsequent years because habitat for fry has been found most limiting.

The DEIS/EIR discusses potential adverse effects of hatchery operations on natural production and suggests approaches to eliminate or minimize any adverse effects (see Appendix B, page B-8 of the DEIS/EIR). The available information that includes the numbers of hatchery fish spawning inriver and therefore competing with naturally produced fish is disclosed (see pages 3-158 to 3-160 of the DEIS/EIR; Appendix B, Attachment B1, Tables B1-2, B1-3, B1-4, and B1-5). At this time, there is insufficient information specific to the genetics of hatchery/naturally produced interactions of Trinity River salmonids to effectively evaluate the potential problem. These actions were not ignored, but acknowledged, and kept constant across all alternatives for impact analysis. Recent changes in TRH guidelines (1996) have been adopted to reduce/minimize potential negative impacts. These new guidelines have not been implemented for a sufficient time to be thoroughly evaluated. Fry and juvenile rearing habitat has been identified as greatly limiting the restoration of naturally produced fish. Hence, an informed decision to restore salmonid habitat by implementing the Preferred Alternative and continuing to evaluate the hatchery operations through the Adaptive Environmental Assessment and Management (AEAM) plan is a prudent and rational approach to restoring the natural salmonid production in the Trinity River.

Relocation of TRH to reduce any potential negative impacts of hatchery fish on naturally produced fish was not identified in the initial public scoping for the DEIS/EIR, and was not an alternative considered in the DEIS/EIR. Presently, the effects of hatchery-produced fish on naturally produced fish are not well understood within the Trinity River system. While hatchery fish spawning inriver has been identified as a potential problem in years with large numbers of adults returning to the river, the hatchery has recently adopted (1996) new operational guidelines to reduce such impacts. These new guidelines include (1) accepting all adults into the hatchery, (2) not exceeding hatchery production goals, and (3) releasing hatchery smolts at a time that minimizes their competition with naturally produced smolts. Changes in hatchery operations are likely to reduce any impacts to naturally produced fish without the additional expense of relocating the hatchery. Relocation of TRH will not increase habitat and will not improve the spawning success in the 40 miles below Lewiston if habitat degradation is not reversed. The channel will continue to be channelized, coarse sediment (including spawning gravels) will not be available, redd scour is likely to continue with the current channel configuration, and fry habitat will still be largely limited.

Hatch-box programs to increase salmonid production would not increase natural production and would create a situation where naturally produced fry would be competing with hatch-box fry for very limited fry rearing habitat. This would not be an increase in natural production as identified in the purpose and need, and defined in recent legislative mandates Central Valley Project Improvement Act. These types of activities also do not address the root of the problem, which is degraded freshwater habitat (BLM, 1995; USFWS and HVT, 1999). Hatch-box facilities can be beneficial as a short-term solution when spawning habitats or spawners are limited. However, the best available data and information indicates that salmonid rearing habitat is much more limiting than spawning habitat (Section 5.6 in the TRFES). Increasing fry production without increasing corresponding inriver habitat carrying capacity and addressing factors that degrade rearing habitat will not increase natural production in the mainstem Trinity River.

Some reviewers requested that additional information be made available, specifically the numbers of hatchery fish spawning inriver. Available information can be found in Appendix B, Attachment B1, Tables B1-2, B1-3, B1-4, and B1-5 for spring chinook salmon, fall chinook salmon, coho salmon, and steelhead from 1983 to 1997, although data is not available in all years for all species. Trends for numbers of hatchery fish to naturally produced fish spawning inriver are discussed in the DEIS/EIR (see pages 3-158 to 3-160 of the DEIS/EIR) and diagramed for fall chinook, which has the most complete data set (see Figure 3-36 of the DEIS/EIR).

References

BLM. 1995. Mainstem Trinity River Watershed Analysis. U.S. Department of the Interior, Bureau of Land Management, Redding Resource Area, Redding, CA.

USFWS & HVT (U.S. Fish and Wildlife Service and Hoopa Valley Tribe). 1999. Trinity River Flow Evaluation Final Report; June 1999. Arcata, CA.

Predator Control as a Means for Increasing Population

Some reviewers commented that salmon production is limited by predation, and some reviewers specifically called for an alternative that would reduce sea lion and seal populations to increase salmon returns. While these marine mammals, as well as other animals, are known to prey on various life stages of salmon and steelhead, the best available science indicates that freshwater habitat is largely limiting the production potential in the Trinity River (BLM, 1995; USFWS and HVT, 1999). A predator-control alternative approaches the problem of salmon production in the same manner as the Harvest Management Alternative, but while the Harvest Management Alternative proposed to reduce salmon mortality through the implementation of increased harvest restrictions, a Predator Control Alternative would decrease salmon mortality by decreasing predator populations.

Analysis of the Harvest Management Alternative showed that reducing harvest to meet escapement goals did not increase salmonid production (see Sections 2.2.2 and 2.2.5, pages 2-38 through 2-40 of the DEIS/EIR; and Appendix B, Attachment B15) because it did not address freshwater habitat limitations. A Predator Control Alternative would be ineffective for the same reasons and was also eliminated from consideration (see Section 2.2.5, page 2-40 of the DEIS/EIR). Reducing salmon mortality by decreasing predator populations, such as sea lions and seals, will not address the habitat conditions that limit salmonid production in the Trinity River and would also raise Marine Mammal Protection Act issues.

References

BLM. 1995. Mainstem Trinity River Watershed Analysis. U.S. Department of the Interior, Bureau of Land Management, Redding Resource Area, Redding, CA.

USFWS & HVT (U.S. Fish and Wildlife Service and Hoopa Valley Tribe). 1999. Trinity River Flow Evaluation Final Report; June 1999. Arcata, CA.

Analysis Methods for Central Valley and Delta Fishery Resources

Some reviewers questioned the use of particular models, as well as methodology used to identify potential impacts to Central Valley and Delta fisheries related to reduced Trinity exports. To assess and distinguish the effects of the proposed alternative on the fishery resources within the Central Valley and Delta within the context of the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) analysis, it was necessary to identify a set of methods that were reasonable and effective for a large geographic area and a diverse fishery resource. As summarized in the DEIS/EIR (Section 3, page 3-172 for anadromous and page 3-181 for native and non-native fishes), the methods used to evaluate and assess alternatives included Reclamation's Sacramento River Salmon Mortality Model (LSALMON2) and changes in flows into the Sacramento River and the Sacramento/San Joaquin Delta (Delta). A detailed description of the methods for impact analysis regarding the diverse set of fishery resources in the Central Valley are in Appendix B, Fishery Resources of the DEIS/EIR (page B-36 for anadromous salmonids; page B-65 for other native anadromous fishes; page B-79 for resident native fishes; and page B-93 for non-native fishes). Also see the thematic response titled "Use of Water Delivery and Related Models."

It is important to note that the analysis conducted and presented in the DEIS/EIR represented a "worst-case" analysis, in that **any** identified negative change with regard to water quality, temperature, or mortality (given the particular indicator used for each model) was identified as a potentially significant impact. Because at the time the DEIS/EIR was released for public review the results of the completion of necessary ESA consultation were not yet known, the DEIS/EIR conservatively identified such impacts as "unavoidable" in Chapter 4 Other Impacts and Commitments. Since the issuance of the Public DEIS/EIR, ESA consultation has been completed and biological opinions finalized (under separate cover). Implementation of the Preferred Alternative is not likely to jeopardize delta smelt, Sacramento splittail, bald eagle, and northern spotted owl (per the U.S. Fish and Wildlife Service's [Service] Biological Opinion [BO]) or Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead, and Southern Oregon/Northern California Coast coho salmon (per the National Marine Fisheries Service's [NMFS] BO) given the implementation of reasonable and prudent measures specified in each BO and listed in the thematic response titled "Mitigation to Listed Species/ESA Consultation."

In recent years, the primary and established tool for evaluating the effects of water projects on anadromous salmonids in the Central Valley has been the LSALMON2 model. This model has been used for many years as the primary evaluative tool to assess impacts of water projects within the mainstem Sacramento River. The Biological Assessment of long-term effects of the Central Valley Project Operations Criteria and Plan (CVP-OCAP) and the subsequent Biological Opinion issued by NMFS (1993) relied on the LSALMON2 model to evaluate CVP project impacts.

As discussed in the DEIS/EIR, the LSALMON2 model was used to estimate the projected losses of the egg and fry life stages of chinook salmon in the uppermost portion of the Sacramento River. This is where and when eggs and fry are most vulnerable (U.S. Bureau of Reclamation [Reclamation], 1991). As shown in Table 3-15 of the DEIS/EIR, the model estimated that for the implementation of the Maximum Flow, Flow Evaluation, or the Percent Flow Alternative, some species of chinook salmon would be potentially affected by increased water temperatures. This approach is consistent with the NMFS' approach to management and focus on water temperatures. Lacking established habitat-flow relations to evaluate the impacts of the DEIS/EIR's alternatives on other non-salmonid anadromous species such as sturgeon, it was necessary to identify and employ an alternative assessment methodology. Reclamation's PROSIM model was used given its accepted use as a modeling tool (see the thematic response titled "Use of Water Delivery and Related Models"). The data are limited in their ability to precisely assess impacts to fishery resources given a monthly time-step is used to estimate the volume of water at discrete locations along the Sacramento River (e.g., Keswick, Grimes, and Verona) and the Delta (inflow and outflows). Given this limitation, the CEQA/NEPA impact assessment evaluations examined the differences in the magnitudes of monthly streamflows within the Sacramento River at those discrete locations. This approach resulted in identifying specific months and locations where an alternative differed from the No Action Alternative by more than 10 percent. The primary and underlying assumption was that a streamflow reduction of greater than 10 percent at a particular location along the Sacramento River and inflows and outflows in the Delta, as compared to the No Action Alternative, would be sufficient to reduce habitat quantity and/or quality to an extent that would significantly affect fish species. This assumption was very conservative. It is likely that reductions in streamflows much greater than 10 percent would be necessary to significantly (and quantifiably) reduce habitat quality and quantity to an extent detrimental to fishery resources.

For other native fishery resources occupying the lower Sacramento River and the Delta, a methodology similar to that for the non-salmonid anadromous species in the Sacramento River was employed. The changes in monthly streamflows within the Sacramento River for each alternative were compared to the No Action Alternative. For an assessment of impacts of each alternative to native fishery resources in the Delta, inflows and outflows to the Delta, the ratio of Delta inflow to export flows, and the physical position of X2 (the location of water with a concentration of two parts-per-thousand [ppt] in the Bay-Delta estuary) within the Delta compared to the No Action Alternative, see page B-79 in Appendix B.

Finally, to evaluate the impacts of alternatives on non-native fishery resources, a comparison of changes in monthly streamflows at locations in the Sacramento River, changes in monthly Delta outflow, Delta inflow to export ratios, and the changes in the position of X2 in the Delta were compared to the No Action Alternative (see page B-93 in Appendix B). Collectively, the evaluation of the changes of these flow parameters provided a comprehensive set of tools to assess the impacts of alternatives on fishery resources in the Central Valley, which, at present, represent the best scientific tools available to assess the environmental effects of the alternatives.

References

National Marine Fisheries Service. 1993. Biological Opinion for the Operation of the Federal Central Valley Project and the California State Water Project. 12 February.

U.S. Bureau of Reclamation. 1991. Appendices to Shasta Outflow Temperature Control: planning Report/Environmental Statement: Appendix A. USDI/BOR/Mid-Pacific Region. November 1990, Revised May 1991.

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No Action Alternative/Existing Conditions Scenario and Range of Alternatives

Several reviewers expressed concerns with the assumptions made for the National Environmental Protection Act (NEPA) No Action Alternative, as well as the California Environmental Quality Act (CEQA) Existing Conditions scenario. A number of comments were also received on the range of alternatives.

Under NEPA, the No Action Alternative is used as the baseline to which all alternatives are compared. No Action assumptions under NEPA generally include the continuation of management practices and programs absent the proposed project or action (*Memorandum: Questions and Answers about the NEPA Regulations [Forty Questions]*, 46 Fed. Reg. 18026 (March 23, 1981) as amended, 51 Fed Reg. 15618 [April 25, 1986]). Conversely, under CEQA, the proposed project and alternatives are typically compared to the existing condition rather than future conditions (CEQA Guidelines, 15125, subd. (a)). Given this document is a joint Environmental Impact Statement/Environmental Impact Report, the Preferred Alternative, and each of the other alternatives, are compared to both the No Action Alternative per NEPA, as well as to existing conditions, per CEQA. This analysis, which held all No Action/Existing Condition assumptions constant across each alternative to ensure a consistent and objective result, is presented in Chapter 3 of DEIS/EIR. The discussion below identifies the primary assumptions involved in the development of each.

In addition to using the No Action Alternative and existing conditions as a baseline from which to compare alternatives, NEPA and CEQA also require that a range of feasible alternatives be identified that are capable of meeting the objectives of the proposed project. Under NEPA, the identification of a purpose and need for a proposed action drives the development of alternatives, which must be "rigorously explored and objectively evaluated"(40 C.F.R. 1502.14(a) *Forty Questions No 1(a)*). CEQA is similar in that the range of alternatives is driven by attaining "most of the basic objectives of the project" (CEQA Guidelines Section 15126.6(a)). The identification of a reasonable range of alternatives is also discussed below under "Range of Alternatives."

NEPA No Action Alternative

As described on pages 2-4 through 2-11 of the DEIS/EIR, the No Action Alternative reflects anticipated conditions in the year 2020 and includes projections concerning future growth and associated water demands and changes in land use (this alternative also serves as the CEQA "No Project" alternative). The California Department of Water Resources (DWR) Water Plan Update (Bulletin 160-93) was used as the basis of these projections. The Bulletin is commonly used as a source of information and projections with regard to current and future conditions, as evidenced by its use in a number of completed and ongoing environmental documentation and planning efforts throughout the state.

While stakeholders may debate about the precise accuracy of some of the assumptions contained within the Bulletin, its use allows a consistent comparison of alternatives, the ability to quantitatively assess the potential effects related to water availability and deliveries, and is consistent with the methodology used for other major environmental documents including the Central Valley Project Improvement Act (CVPIA) Programmatic EIS (PEIS) and CALFED PEIS. All other components of the No Action Alternative were only included if they represented approved programs that had obtained all environmental clearances and permits, as stated on page 2-4 of the DEIS/EIR. As indicated in Chapter 2 of this FEIS/EIR, Changes to the DEIS/EIR, the erroneous statement on page 2-6 stating that the No Action flow schedule is in part due to provisions in the CVPIA has been deleted.

The No Action instream flows for the Trinity River of 340,000 acre-feet (af) were assumed because of the 1981 and 1991 Secretarial Issue documents on Trinity River flows (Andrus and Lujan Decisions, respectively). These documents assume a minimum instream flow of 340,000 af pending implementation of the final secretarial flow decision. A minimum instream flow of 340,000 af was fully evaluated under NEPA in the 1980 “EIS on the Management of River Flows to Mitigate the Loss of the Anadromous Fishery of the Trinity River, California” and the 1991 Environmental Assessment for the Lujan Decision. Some reviewers raised concerns over the inclusion of certain assumptions in the No Action Alternative, including the provisions of the CVPIA. The provisions of the CVPIA were not included in the No Action Alternative because a Record of Decision (ROD) had not been signed prior to the issuance of the Trinity River Restoration DEIS/EIR. The federal lead agencies did not want to treat as a “given” a major federal action for which full NEPA compliance is not yet final. Regardless, the inclusion of CVPIA-related provisions and assumptions would not affect the impact analysis with respect to the comparison of alternatives and rankings, given the No Action assumptions would again be fixed. Furthermore, the potential degree of impact of the implementation of the CVPIA and the proposed action is quantitatively analyzed and described in Chapter 4 Other Impacts and Commitments of the DEIS/EIR. Thus, the DEIS/EIR does reveal the extent to which CVPIA implementation would contribute to long-term impacts in the year 2020.

Some comments suggested that the use of DWR Bulletin 160-93 data was inappropriate given the 160-93 data includes projections related to land retirement as a result of the implementation of CVPIA. DWR Bulletin 160-93 was the most up-to-date information available at the time the DEIS/EIR was initiated. Additionally, DWR Bulletin 160-98, which is the most recent DWR Bulletin and was released in 1998, used the same planning horizon (2020). Urban growth projections were actually reduced somewhat in Bulletin160-98, thus, the use of Bulletin 160-93 projections provides a very conservative estimate of urban water demand. In an effort to not underestimate environmental effects, the lead agencies used the more conservative estimates from DWR Bulletin 160-93.

Retirement of privately owned irrigated lands attributable to CVPIA-related projections (assumed in Bulletin 160-93 to be approximately 30,000 acres of drainage-impaired lands) was not included in the No Action Alternative (additional land retirement identified as part of CVPIA is discussed in Chapter 4.1 Cumulative Impacts in the DEIS/EIR). As shown on page 2-5 of the DEIS/EIR, land retirement assumptions were limited to proposed state programs. Table 2-2 of the DEIS/EIR lists the key operations, policies, and regulatory requirements assumed in the No Action Alternative.

As stated on page 3-62 of the DEIS/EIR, the greatest increases in overall CVP water demand are assumed to occur north of the Delta in association with municipal and industrial (M&I) water rights and water service contracts with the CVP's American River Division. Additionally, demands on the State Water Project (SWP) are projected to require additional exports in response to increased SWP M&I demands. Key assumptions identified on page 2-7 of the DEIS/EIR related to operation of the CVP include continuing to meet the existing biological opinions for winter chinook salmon and delta smelt through adherence to the CVP Operation Criteria and Plan (CVP OCAP), the Coordinated Operations Agreement (COA) governing CVP and SWP operation, and meeting the water quality provisions of the Bay/Delta Accord Principles of Agreement.

Subsequent to the modeling analyses conducted for the Draft EIS/EIR, California Court of Appeal for the Third Appellate District struck down a portion of the Monterey Agreement signed by the Department of Water Resources and State Water Project (SWP) contractors in 1994. The agreement amendments changed the prior method of allocating water supply deficiencies, which reduced supplies to agricultural contractors before those to urban contractors were cut. The No Action and all other Trinity alternatives assume the Monterey Agreement is in place, and SWP supplies are allocated among agricultural and municipal and industrial (M&I) contractors evenly in proportion to their entitlement. The Monterey Agreement, as simulated in the No Action Alternative, has no effect on the level of SWP delivery, rather it only affects the delivery allocation to contractors south of the Delta once an overall delivery level has been determined. Therefore, the Monterey Agreement does not have any impact on the amount of water the SWP exports from the Delta. The amount of water exported is a function of demand, available supply, and export restrictions.

Accordingly, it is not anticipated that this court decision will have any significant impact on the results of the modeling analyses conducted for the Draft EIS/EIR.

CEQA Existing Conditions

The CEQA-required comparison of each alternative to existing conditions is also presented in Chapter 3 Affected Environment and Environmental Consequences of the DEIS/EIR. The Existing Conditions scenario was developed to allow for quantitative analysis with regard to water supplies and associated issue areas including agriculture and M&I impacts, but at an "existing" level of development, rather than the NEPA no action-assumed future level of development.

The existing conditions baseline used for the CEQA analysis assumed a 1995 level of population, land use, and associated water demand. The year 1995 was used as the existing conditions baseline because it correlates to timing of filing of the Notice of Preparation (NOP) by Trinity County (see CEQA Guidelines Section 15125(a)). The year 1995 is also when the Bay/Delta Accord (actually signed December 15, 1994) was initially implemented. The primary differences between the Existing Conditions scenario and the No Action Alternative are that the assumptions described above related to increased CVP demand north of the Delta, and SWP demand south of the Delta are not included. Accordingly, and as identified in a number of places in the DEIS/EIR, much of the impact identified for many of the issue areas when comparing each alternative to the Existing Conditions scenario is attributable to growth assumed to occur between 1995 and the year 2020 (i.e., the incremental difference between the population, land use, and water demands assumptions for the Existing Conditions scenario versus the No Action Alternative). In essence, much of the impact shown when comparing the alternatives to existing conditions is not attributable to the alternatives.

As stated above under "NEPA No Action Alternative," instream flows for the Trinity River were assumed to be 340,000 af/year because of the 1981 and 1991 Secretarial Issue documents (Andrus and Lujan decisions, respectively).

Range of Alternatives

As described in Chapter 2 Description of Alternatives of the DEIS/EIR, the alternatives developed and analyzed were formulated from public input, scientific information, and professional judgment, in a manner consistent with NEPA and CEQA. The alternatives carried through for analysis were deemed to meet the stated purpose and need on page 1-4 of the DEIS/EIR to "restore and maintain the natural production of anadromous fish on the Trinity River mainstem downstream of Lewiston Dam." In addition, the CEQA-related goals and objectives of the proposed action are listed on pages 1-4 and 1-5 of the DEIS/EIR and include objectives specific to Trinity County concerns including the following:

- Minimize high Trinity River water levels that would displace large numbers of residents from their homes
- Maximize the potential to attract recreationalists to Trinity County
- Minimize avoidable impacts to recreational activities on Lewiston and Trinity Reservoirs
- Protect County of Origin and Area of Origin water rights
- Comply with state and federal water quality objectives
- Comply with the Trinity County General Plan

In addition to meeting the NEPA purpose and need and the County's CEQA-related objectives, alternatives were developed to provide a range of potential actions as called for by both NEPA and CEQA (40 CFR 1505.1(e) and CEQA Guidelines Section 15126.6(a), respectively). The alternatives analyzed range from the State Permit Alternative that would result in decreased Lewiston Dam releases averaging approximately 10 percent of Trinity Reservoir inflow (and an associated export of 90 percent), to the Maximum Flow Alternative, which would use all of the inflow into Trinity Reservoir and completely eliminate water exports. Additionally, the Mechanical Restoration Alternative was developed to present an alternative that would assist in restoration through purely mechanical means, with no increase in instream flows. Finally, the Percent Inflow Alternative represents an operational approach whereby a fixed percentage of inflow into Trinity Reservoir would be released from Lewiston Dam. This range in flows, exports, and approaches represents a very broad range of potential actions to allow decision-makers the opportunity to understand the issues and impacts associated with each in determining which alternative or combination of alternatives to implement.

Alternatives Determined to be Infeasible

A number of other alternatives were also examined that were determined to be infeasible or inconsistent with the purpose and need and, therefore, were not analyzed in detail. The "Considered but Eliminated" alternatives are presented, along with the reason for their elimination in the DEIS/EIR on pages 2-35 through 2-42, Section 2.2 Alternatives Considered but Eliminated.

Over the course of the DEIS/EIR's development, many public comments were received that an alternative to remove Trinity and Lewiston Dams should be included. Such an alternative was considered to have merit with regard to long-term restoration and meeting the purpose and need of the proposed action, but was eliminated because the environmental impacts, foregone benefits, extremely long time frame, and costs associated with removing the dams were deemed excessive. This conclusion was not supported by the Yurok and Karuk Tribes, as described in Section 5.1 of the DEIS/EIR.

A harvest management alternative was also suggested by many to be a viable alternative or part of an alternative. Potential management approaches beyond the existing Pacific Fishery Management Council and Klamath Fishery Management Council plan processes were assessed, concluding that habitat, not the number of spawning adults, is the limiting factor in the production of anadromous fish in the Trinity River. The results of the assessment, which included three potential methods to assess the effectiveness of restricting harvest, are summarized on pages 2-38 through 2-40 of the DEIS/EIR, and presented in detail in Appendix B. Other alternatives suggested through public input and/or developed by the project team are also discussed in DEIS/EIR Section 2.2, Alternatives Considered but Eliminated.

Some reviewers suggested that other alternatives be analyzed. For instance, a very large number of reviewers have proposed an alternative that would release 70 percent of the inflow into Trinity Reservoir and only export the remaining 30 percent of the total inflow volume. It is important to note that these suggested alternatives fall within the range of alternatives that have been analyzed in detail. The identification of the broad range of alternatives analyzed in the DEIS/EIR in no way precludes the Secretary of the Interior from selecting a hybrid alternative from those identified, or a different alternative from those that were analyzed given such an alternative falls within the range of impacts identified in the DEIS/EIR. As stated on page 2-3 of the DEIS/EIR: "Associating certain actions with certain alternatives in a DEIS/EIR does not preclude hybridizing alternatives in an ROD; both NEPA and CEQA allow decision-makers to integrate components from various alternatives if desired," given that such an alternative would result in no greater impact than those addressed in the DEIS/EIR.

Mitigation to Listed Species/ESA Consultation

A number of reviewers asserted that the DEIS/EIR improperly deferred analysis and mitigation to listed species. In that the potential adverse effects to listed species identified in the DEIS/EIR are the subject of consultation under Section 7 of the Endangered Species Act (ESA), with both the U.S. Fish and Wildlife Service (Service) and National Marine Fisheries Service (NMFS), it was entirely appropriate to defer describing specific minimization actions until the consultations had been completed. Dialogue between the action and regulatory agencies often results in the development of minimization measures to reduce or eliminate adverse effects to listed species. Further, the Service and NMFS could not begin formal consultation until the action for consultation had been described in detail. This process was initiated with the release of the DEIS/EIR, and has been subsequently completed. Public comment will contribute toward finalization of the proposed alternative. For California Environmental Quality Act (CEQA) purposes, the County will consider the FEIS/EIR, Record of Decision (ROD), and additional findings when certifying the EIR portion of the EIS/EIR. The certified FEIS/EIR, then, will address mitigation in more detail than is found in the DEIS/EIR.

The DEIS/EIR took a conservative "worst-case" approach per CEQA related to potential impacts to listed species, as presented in Chapter 3 Affected Environment and Environmental Consequences, specifically Sections 3.5 Fishery Resources and 3.7 Vegetation, Wildlife, and Wetlands. Impacts to potentially impacted listed aquatic species (Central Valley winter-run and spring-run chinook salmon, steelhead, Sacramento splittail, and Delta smelt) are all identified as potentially significant given modeled temperature and flow impacts. Impacts to terrestrial species such as the bald eagle and northern spotted owl were found to be less than significant. Development of biological opinions (BO) by the Service and NMFS included review of the same data used to prepare the DEIS/EIR, as well as additional data where appropriate.

Per the Service's Biological Opinion (2000; under separate cover), implementation of the Preferred Alternative is not likely to jeopardize delta smelt and Sacramento splittail or adversely modify critical habitat for delta smelt. The Service has concurred with the determination that implementing the Preferred Alternative will not likely adversely affect the bald eagle and northern spotted owl. It is anticipated that delta smelt and Sacramento splittail will be adversely affected by implementing the Preferred Alternative and that incidental take may be affected in manner or extent not analyzed in the March 6, 1995 Biological Opinion on the Long-term Operation of the CVP and SWP. Therefore, the following reasonable and prudent measure to minimize the effects of incidental take was developed:

1. U.S. Bureau of Reclamation (Reclamation) shall minimize the effects of reoperating the Central Valley Project resulting from the implementation of the Preferred Alternative within the Trinity River Basin on listed fish in the Delta.

Implementation of this measure will be non-discretionary.

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Per the NMFS' Biological Opinion (2000; also under separate cover), implementation of the Preferred Alternative is not likely to jeopardize Southern Oregon / Northern California Coast (SONCC) coho salmon, Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, or Central Valley steelhead. The NMFS does anticipate that SONCC coho salmon habitat adjacent to and downstream of the channel rehabilitation projects associated with the Preferred Alternative may be temporarily degraded during construction. Construction of these projects, which will create a substantial amount of additional suitable habitat, may temporarily displace an unknown number of juvenile coho salmon but is not expected to result in a lethal take. The NMFS does not anticipate that the implementation of the proposed action will incidentally take Central Valley spring-run chinook or Central Valley steelhead, but that the Preferred Alternative will result in a minute increase in the level of Sacramento River winter-run chinook incidentally taken in all years except critically dry years. In such years, Reclamation would be required to reinitiate consultation per the existing Winter-run Central Valley Project Operations Criteria and Plan to develop year-specific temperature control plans. Implementation of the following reasonable and prudent measures specified in the NMFS BO to minimize the effects of incidental take shall be non-discretionary and will result in minimizing impacts of incidental take of SONCC coho salmon and Sacramento River winter-run chinook salmon in all years including critically dry years:

The Service and Reclamation shall:

1. Implement the flow regimes included in the proposed action (as described in the DEIS / EIR, page 2-19, Table 2-5) as soon as possible.

2. Ensure that NMFS is provided the opportunity to be represented during implementation of the Adaptive Environmental Assessment and Management program.

3. Ensure that the replacement bridges and other infrastructure modifications, needed to fully implement the proposed flow schedule, are designed and completed as soon as possible.

4. Periodically coordinate with NMFS during the advanced development and scheduling of the habitat rehabilitation projects described in the DEIS / EIR.

5. Complete "the first phase of the channel rehabilitation projects" (U.S. Fish and Wildlife Service and U.S. Bureau of Reclamation, 2000) in a timely fashion.

6. Implement emergency consultation procedures during implementation of flood control or "safety of dams" releases from Lewiston Dam to the Trinity River.

7. In dry and critically dry water-year classes, Reclamation and Service shall work cooperatively with the upper Sacramento River Temperature Task Group to develop temperature control plans that provide for compliance with temperature objectives in both the Trinity and Sacramento Rivers.

Implementation of these measures will be non-discretionary.

References

National Marine Fisheries Service. 2000. Biological Opinion for the Trinity River Mainstem Fishery Restoration EIS and its effects on Southern Oregon / Northern California Coast coho salmon, Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, and Central Valley steelhead. Southwest Region. October.

U.S. Fish and Wildlife Service. 2000. Reinitiation of Formal Consultation. Biological Opinion on the Effects of Long-term Operation of the Central Valley Project and State Water Project as Modified by Implementing the Preferred Alternative in the Draft Environmental Impact Statement / Environmental Impact Report for the Trinity River Mainstem Fishery Restoration Program. Also, a Request for Consultation on the Implementation of this Alternative on the Threatened Northern Spotted Owl, Northern Spotted Owl Critical Habitat, and the Endangered Bald Eagle within the Trinity River Basin and where Applicable, Central Valley Reservoirs. Sacramento, CA. October.

U.S. Fish and Wildlife Service and U.S. Bureau of Reclamation. 2000. Biological assessment for those actions in the preferred alternative of the proposed preferred Trinity River mainstem fishery restoration program that may effect listed species and their critical habitat. Enclosure to a June 5, 2000, letter from M. Spear, USFWS, and L. Snow, BOR, to R. McGinnis [sic], NMFS. June 5, 2000. 36 pp.

Exclusion of CVPIA from the No Action Alternative

The National Environmental Policy Act (NEPA) requires that all alternatives be "rigorously explored and objectively evaluated"(40 C.F.R. 1502.14(a) *Forty Questions No 1(a)*) and compared to a No Action alternative that addresses anticipated future conditions. As discussed in the thematic response titled "No Action Alternative/Existing Conditions Scenario and Range of Alternatives," the provisions of the Central Valley Project Improvement Act (CVPIA) were not included in the No Action Alternative because a Record of Decision (ROD) on full implementation of CVPIA was not signed at the time the public draft was completed, inclusion of such provisions would not affect the comparison of alternatives, and several aspects of CVPIA have been the subject of litigation over the past several years. In essence, if the CVPIA-related provisions were included in all alternatives, the increment of impact of each alternative in comparison to the No Action Alternative would be identical to that which is identified in the DEIS/EIR.

Accordingly, the impacts of implementation of CVPIA, along with other foreseeable future actions are presented in Section 4.1, Cumulative Impacts, of the DEIS/EIR, and are supplemented in the additional discussion included in Chapter 2, Changes to the DEIS/EIR, in this FEIS/EIR. Considering the uncertainty associated with what the final decision on CVPIA will be, it is clearly appropriate to assess reasonably foreseeable effects associated with CVPIA in the cumulative effects analysis. The uncertainty and speculative nature of the implementation of portions of the CVPIA prior to the ROD being signed at the time the Trinity Public DEIS/EIR was issued, namely, the management of water related to Section 3406 (b)(2) of the CVPIA, is underscored by the reviewers themselves as evidenced by Comment 5314-93, "The authority [sic] recognizes that it may not be feasible to model the accounting system that Department of Interior is using for (b)(2) implementation. " An additional analysis using the October 5, 1999 Decision on Implementation of Section 3406(b)(2) of the CVPIA is provided in Chapter 2 of the FEIS/EIR, Changes to the DEIS/EIR. The additional analysis was not provided in the DEIS/EIR because the DEIS/EIR was released prior to the decision on implementation of Section 3406(b)(2). The level of anticipated impact (i.e., significance) associated with implementation of 3406(b)(2) for all issue areas addressed in the DEIS/EIR remains the same as in the DEIS/EIR.

From a California Environmental Quality Act (CEQA) standpoint, there is no question that it was appropriate not to assume CVPIA implementation as part of the No Project analysis. CEQA Guidelines Section 15126.6(e)(2) provides that a No Project alternative shall discuss "existing conditions" and "what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and available infrastructure and community services." Because there is not yet an approved ROD for the CVPIA, it would have been inaccurate for Trinity County, as CEQA lead agency, to assume full CVPIA implementation as part of "current plans." In any event, the inclusion of CVPIA implementation in the cumulative impact analysis provides readers with information regarding how that implementation, along with other activities foreseeable in 2020, would affect the environmental resources relevant to the Trinity River Mainstem Fishery Restoration project. (See thematic response titled “Cumulative Impacts Analysis.”)

Requests for Recirculation

A number of reviewers have stated that the DEIS/EIR is deficient in some way and thus must be recirculated. The lead agencies strongly disagree that the DEIS/EIR is deficient and must be recirculated. Contrary to the reviewers' assertions, the DEIS/EIR represents a thorough, carefully developed environmental analysis using the best information available allowing for meaningful public comment. Additional information has been added to the FEIS/EIR in responses to public comment; however, this information is mainly for clarification purposes and does not represent significant new information requiring recirculation (see Responses 5313-11 through 5313-18 and thematic responses titled "No Action Alternative/Existing Conditions Scenario and Range of Alternatives" and "Cumulative Impacts Analysis").

"Recirculation" is a term commonly associated with the California Environmental Quality Act (CEQA), rather than the National Environmental Policy Act (NEPA). The NEPA equivalent of recirculation is the preparation of a "Supplemental EIS." The NEPA regulations adopted by the Council on Environmental Quality (CEQ) state that a federal agency must prepare a supplement to either draft or final environmental impact statements if:

> "(i) The agency make substantial changes in the proposed action that are relevant to environmental concerns; or
>
> (ii) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts."
>
> (40 C.F.R. Section 1502.9 (c)(1).)

In addition, a federal agency "[m]ay also prepare supplements when the agency determines that the purposes of [NEPA] will be furthered by doing so." (Id., subd. (c)(2).) The law is clear, however, that a federal agency "need not supplement an EIS every time new information comes to light after the EIS is finalized." (Marsh v. Oregon Natural Resources Council, 490 U.S. 360, 373 [1989].) Rather, such an obligation occurs only where the new information is "significant." The CEQ regulations do not define this term. As a result, a federal lead agency must determine for itself whether the new evidence is significant. (State of Wisconsin v. Weinberger, 745 F.2d 412, 417-418 (7th Cir. 1984).) Whether the new information is significant turns on its qualitative and quantitative value under the circumstances of the particular project. (Sierra Club v. Marsh, 714 F.Supp. 539, 569 (D.Me.), *on reconsideration*, 744 F.Supp. 352 (D.Me. 1989), *appeal dismissed*, 907 F.2d 210 (1st Cir. 1990).)

To trigger the requirement to prepare a supplemental EIS, the new information must paint a "*seriously* different" picture of the project's environmental impacts. (Sierra Club v. Froehlke, 816 F.2d 205, 210 (5th Cir. 1987) (emphasis in original).) Another court stated:

> "[T]he principal factor an agency should consider in exercising its discretion whether to supplement an existing EIS because of new information is the extent to which the new information presents a picture of the likely environmental consequences

> associated with the proposed action not envisioned by the original EIS. The issue is whether the subsequent information raises new concerns of sufficient gravity such that another, formal, in-depth look at the environmental consequences of the proposed action is necessary."
>
> (State of Wisconsin v. Weinberger, supra, 745 F.2d at page 418; see also Township of Springfield v. Lewis, 702 F.2d 426 (3d Cir. 1983).)

As these legal authorities make clear, the determination whether to prepare a supplemental EIS should turn on whether the new information paints a "seriously different" picture of the project's environmental effects, as compared to the picture painted by the Draft EIS. Here, none of the new information in the Final EIS rises to that level.

CEQA has its own standards governing recirculation. These are set forth in CEQA Guidelines section 15088.5, which state in pertinent part as follows:

> "[a] lead agency is required to recirculate an EIR when significant new information is added to the EIR after public notice is given of the availability of the draft EIR for public review under Section 15087 but before certification."

"Significant new information" is limited to information showing that:

> (1) A new significant environmental impact would result from the project or from a new mitigation measure proposed to be implemented.
>
> (2) A substantial increase in the severity of an environmental impact would result unless mitigation measures are adopted that reduce the impact to a level of insignificance.
>
> (3) A feasible project alternative or mitigation measure considerably different from others previously analyzed would clearly lessen the significant environmental impacts of the project, but the project's proponents decline to adopt it.
>
> (4) The draft EIR was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded."
>
> (CEQA Guidelines, section 15088.5, subd. (b).)

The new information included in the FEIS/EIR does not include anything that triggers recirculation under these standards. In particular, the final document does not reveal any new significant effects, or substantial increases in previously identified significant effects. Nor can any reviewer credibly assert that the DEIR portion of the Draft environmental document was "so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded."

Mitigation for Significant Impacts

A number of reviewers have proposed adding further mitigation measures to the project to further reduce some of its environmental impacts. For example, the California Department of Conservation has suggested that, to mitigate impacts to agricultural areas whose water supplies may be reduced, the FEIS/EIR should explore the feasibility of providing "compensation for the loss of irrigated farmland by the purchase of conservation easements on other irrigated farmland of equivalent quality and quantity." A number of reviewers have mistakenly asserted that the lead agencies must describe and implement measures to mitigate for all identified significant impacts. Other reviewers have asserted that reliance on Central Valley Project Improvement Act (CVPIA) and CALFED constitutes inadequate mitigation; and some reviewers assert that the DEIS/EIR offers no mitigation for significant impacts.

It is important to remember to view the Trinity River Fishery Restoration Project in its appropriate context. This project is essentially mitigation for the substantial environmental degradation that has taken place on the mainstem Trinity River since construction and operation of the Trinity River dams. The lead agencies are proposing to implement a program that is expected to result in substantial environmental benefits. The most prominent benefits include restoring the ecological processes of the Trinity River, its fish populations, and the Tribes that depend on Trinity River resources as part of their cultural identity. Additionally, there are several ongoing programs in the Trinity River Basin that are expected to improve environmental conditions for fish, wildlife, and people. These include major programs such as the President's Northwest Forest Plan, the Five Counties Coho Conservation Plan (see page 4-8 of the DEIS/EIR), Lower Klamath Restoration Partnership (page 4-10 of the DEIS/EIR), Changes in California Forest Practice Rules (page 4-10 of the DEIS/EIR), and Total Maximum Daily Load (page 4-9 of the DEIS/EIR). Major programs are also being initiated in the Central Valley of California, the most prominent being CVPIA and CALFED. Implementation of these programs is also expected to result in substantial environmental benefits to fish and wildlife resources throughout the Central Valley and Delta in addition to balancing water use for human needs.

As would be expected with any project of the magnitude of the Trinity River Mainstem Fishery Restoration Project, there are other effects to the human environment associated with the very positive environmental effects of implementing the fishery restoration activities as detailed in the DEIS/EIR. Regarding the significant impacts noted in the DEIS/EIR, it is important for reviewers to understand that under NEPA (40 CFR 1502.16(h)), federal agencies are required to identify and discuss means to mitigate adverse effects but are not obligated to implement those identified measures. Federal agencies can decide to implement actions resulting in significant impacts so long as the agency has assessed the environmental ramifications of doing so. (Robertson v. Methow Valley Citizen Council, 1989. "NEPA…simply prescribes the necessary process for preventing uninformed, rather than unwise, agency actions…. If the adverse environmental effects of the proposed action are adequately identified and evaluated, the agency is not constrained by NEPA from deciding that other values outweigh the environmental costs.")

Because water is a finite resource, the partial restoration of the Trinity River will "cause" some impacts for which there is simply no mitigation. The same water molecule cannot flow down the Trinity and also flow down the Sacramento. Thus, the nature of this project is such that mitigation for all impacts simply is not possible. Even so, the DEIS/EIR does offer a number of mitigation measures, which represent the lead agencies' best efforts to formulate mitigation where possible.

Unlike NEPA, CEQA requires the adoption of any "feasible" mitigation measures that can substantially lessen or avoid the significant effects of a proposed project. In the context of the Trinity River Mainstem Fishery Restoration Project, the key question for any proposed mitigation measure is whether the measure may be "feasible" within the meaning of that term as defined in CEQA.

The CEQA Guidelines define "feasible" as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, *legal*, social, and technological factors." (CCR, title 14, § 15364 [emphasis added].) As the California Legislature has made clear, CEQA does not grant public agencies any powers beyond those they already enjoy pursuant to their organic powers or enabling legislation. (Public Resources Code, § 21004.) Thus, proposals that agencies have no regulatory power to impose are "legally" infeasible. (See Kenneth Mebane Ranches v. Superior Court (1992) 10 Cal.App.4th 276, 291-292; Concerned Citizens of South Central Los Angeles v. Los Angeles Unified School District (1994) 24 Cal.App.4th 826, 842.)

Although Trinity County has acted as the CEQA lead agency in preparing the DEIS/EIR document, it is important to understand Trinity County's role in the scope of the fishery restoration efforts. The County has no direct regulatory authority over any aspect of the overall project other than in issuing the permits that will be required for channel modification and gravel reintroduction projects occurring within Trinity County. The County, then, simply has no ability to require that, for example, the U.S. Bureau of Reclamation (Reclamation) obtain conservation easements in existing agricultural areas within the Central Valley as a means of mitigating the loss of agricultural water supplies in other areas. Reclamation in complying with NEPA and other federal laws, must determine for itself whether to pursue such mitigation strategies. (See also 40 C.F.R. § 1503.4 [scope of obligation to respond to comments in FEIS].)

As explained in the DEIS/EIR, there is some chance that the California State Water Resources Control Board (SWRCB) may eventually take action as a "responsible agency" with respect to the project (see DEIS/EIR pages 1-21 and 5-3). Although the federal lead agencies do not require the SWRCB's permission to implement the proposed "flow decision," Trinity County retains the option of pursuing a still-pending 1990 petition with SWRCB as a means of obtaining formal changes to Reclamation's Trinity River water permits.

If the County were to pursue its pending petition, and the SWRCB were to modify Reclamation's Trinity River water permits, the effect of such actions would be to formally integrate the terms of the Department's flow decision into documents that have the force of state water law. (See California v. United States [1978] 438 U.S. 645, 650, 665-669, 674-679; Pub. L. No. 102-575 [Oct. 30, 1992], § 3406[b].) If and when the SWRCB reviews any such petition from Trinity County, SWRCB, as a responsible agency subject to CEQA, will have to decide whether particular proposed measures, such as those proposed by the California Department of Conservation, are “feasible” within the meaning of CEQA. Such determinations will turn, in part, on the SWRCB’s assessment of the reach of its own regulatory powers. The SWRCB might well conclude that it lacks the power to regulate activities traditionally seen as involving “land use” issues.

Some reviewers have misunderstood the purpose for which the DEIS/EIR mentioned ongoing water planning efforts such as CALFED and CVPIA. The DEIS/EIR mentions those efforts because they are clearly relevant to some of the issues implicated by the Trinity River Mainstem Fishery Restoration Project. Thus, the DEIS/EIR states in a number of locations, including page 3-119, that actions contemplated under the ongoing CALFED and CVPIA programs “could” assist in addressing water supply and demand related concerns and that “none of these actions would be directly implemented as part of the alternatives discussed in (the) DEIS/EIR.” While it is recognized that many of the programs identified in the DEIS/EIR attributable to the CALFED and CVPIA programs could indeed result in increasing supplies and/or limiting demands so as to minimize potential impacts of decreases in Trinity exports (e.g., both the CVPIA and CALFED environmental documents assume increased Trinity flows), relying on such programs is considered to be too speculative at present. Accordingly, any water-supply induced impacts that are projected to result in significant secondary impacts to resources such as groundwater are disclosed in Section 4.3 Irreversible and Irretrievable Commitments of Resources and Significant Impacts that Would Remain Unavoidable Even After Mitigation as significant, unavoidable impacts. In other words, the DEIS/EIR nowhere relies on CALFED or CVPIA programs as a basis for claiming that project impacts have been, or could be, mitigated.

However, the document does propose mitigation measures for impacts on fisheries, water quality, vegetation, and wildlife. Specific mitigation measures are identified in the DEIS/EIR; examples related to potential turbidity impacts are identified in Section 3.4 Water Quality (page 3-148), and habitat and vegetation impacts are identified in Section 3.7 Vegetation, Wildlife, and Wetlands (pages 3-241, 3-256, and 3-260). These are further explained in responses to other comments such as responses to Comment Letter 5313 and thematic response titled “Mitigation for Listed Species/ESA Consultation.” Consultation under Section 7 of the ESA (under separate cover) has provided measures for mitigating impacts to particular listed species. Implementation of the Preferred Alternative is not likely to jeopardize delta smelt, Sacramento splittail, bald eagle, and northern spotted owl (per the Service’s Biological Opinion [BO]) or Sacramento River winter-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead, and Southern Oregon / Northern California Coast coho salmon (per the NMFS’ BO) given the implementation of reasonable and prudent measures specified in each BO and listed in the thematic response titled “Mitigation to Listed Species/ESA Consultation.”

Implementation Funding and Relationship to Repayment, Reimbursement, and the CVPIA Restoration Fund

A number of reviewers representing environmental, tribal, water, and power interests raised concerns about the effects on existing repayment programs and commitments (including the surcharges to the Restoration Fund) from implementing any of the DEIS/EIR alternatives. The implementation of any of these alternatives, including the Preferred Alternative (or hybrid alternative potentially selected by the Secretary of the Interior), require funding for successful implementation. Concerns were raised during the public review of the DEIS/EIR that such costs could be borne by Central Valley Project water and power users. In response to these concerns, the lead agencies have requested that the Solicitor provide guidance as to which costs of implementing the Preferred Alternative are reimbursable and which are not. We are expecting his opinion in the very near future. In an effort to provide full disclosure, however, the Department of the Interior notes that estimated annual program costs range from approximately $12 million in the first and subsequent years to a high of $17 million in the second year (increase due primarily to infrastructure improvements such as bridge replacements). Depending on the outcome of the Solicitor's analysis, the reimbursable obligation would be a percentage (anywhere from zero percent to 100 percent) of these costs. Any reimbursable obligation would then be allocated among commercial power, irrigation, and municipal and industrial user groups in the following manner:

Commercial Power (57.6 percent)
Irrigation (35.9 percent)
Municipal and Industrial (6.5 percent)

These percentages were derived from the plant-in-service allocation of the Trinity River Division currently in place.

Powerplant Bypass

Several reviewers expressed concerns that Trinity Powerplant bypasses through the auxiliary outlet for temperature control were not analyzed for losses in power generation or benefits in meeting temperature objectives in the Trinity and Sacramento Rivers. The DEIS/EIR on page 3-149, and Technical Appendix A "Trinity Dam Auxiliary Outlet Releases" describe the auxiliary releases as a potential mitigation measure for temperature control in the Trinity and Sacramento Rivers. These auxiliary releases would occur during dry periods of low reservoir storage when water releases from the Trinity Powerplant are too warm to meet downstream temperature requirements.

As identified in Section 3.4 Water Quality, Table 3-8 of the DEIS/EIR, temperature violations under the Flow Evaluation/Preferred Alternative would be less than the No Action Alternative in all year classes. This is due to the higher carryover storage level assumption made for the alternative (600 thousand acre-feet [taf] versus 400 taf for the No Action Alternative) as well as the shift in timing of exports (exports would be shifted to the summer/fall period in comparison to the No Action Alternative export pattern). As such, bypasses would be less likely to be needed than under the No Action Alternative. However, given the comments received and the projected impacts identified for the other alternatives, the lead agencies have further evaluated bypass operations for temperature control benefits and costs to CVP power customers. See thematic response titled "Power Analysis" with regard to the potential effects of reduced power generation associated with bypass operations.

Trinity Powerplant bypasses for temperature control are not "normal" operating procedures for operation of the TRD in the sense that auxiliary releases for temperature control do not occur every year. Trinity Powerplant bypasses are not specifically mentioned in the existing Central Valley Project Operations Criteria and Plan (CVP-OCAP) as an operating procedure for temperature control. However, Trinity Powerplant bypasses were used by Reclamation in 1977, 1991, and 1992 to protect Trinity River and Sacramento River fisheries from adverse water temperatures. Trinity bypass operations may be used again in the future, regardless of which alternative is selected by the Secretary of the Interior (Secretary), although the frequency of bypasses would vary by alternative (see Table 2). The following documents and examples confirm the use and benefit of Trinity auxiliary releases for temperature control:

- The Biological Assessment for Reclamation's Long-term Central Valley Project Operations Criteria and Plan (dated October 1992) states on page 5-3, bullet 4: ***"Release water from the low level outlet at Trinity Dam when effective for temperature control***."
- In 1992 when the Trinity Bypass was used, there was a Biological Opinion in affect on the CVP from National Marine Fisheries Service (NMFS). When NMFS made a finding that the selected operation that included the Trinity bypass was compliant with the Biological Opinion, it confirmed the use of the bypass as a ***"reasonable and prudent measure"*** to conserve the species (consistent with the Biological Assessment).

- In 1991 and 1992 when the Trinity Bypass was used, U.S. Bureau of Reclamation (Reclamation) submitted the selected temperature control plan to the State Water Resources Control Board (SWRCB) pursuant to implementation of Water Right Orders 90-05 and 91-01. The operation and plan were accepted by the SWRCB, which affirmed that the Trinity Bypass was a ***"controllable factor***" that could be used to help attain temperature objectives in the Trinity and Sacramento Rivers.

Analysis Approach

As described above, bypasses are not a standard operating procedure. Historically, bypasses have been implemented when reservoir storage has dropped below 750 taf (between July 1 and September 30) or even 1,000 taf (October) depending on specific conditions. Accordingly, the analysis modeled the potential for such bypasses, given these carryover storage thresholds for each alternative, including existing conditions. Given such bypasses would only occur in particularly dry and/or "extreme" conditions, this approach should be viewed as a "worst-case" analysis. The modeling assumes that when bypasses are warranted, 100 percent of the Trinity Reservoir releases are directed through the auxiliary outlet works up to a maximum capacity of approximately 2,000 cubic feet per second (cfs) (pursuant to Reclamation's bypass capacity rule curves that relate maximum auxiliary bypass capacity to reservoir stage). Actual future operations may vary according to actual conditions such as reservoir storage, weather conditions, volume of cold water available, etc. Table 1 identifies the number of months when bypasses were modeled to occur (i.e., the 750 taf and/or 1,000 taf threshold were exceeded) for each alternative. In general, the majority of bypasses identified were projected to occur in October given such months are the beginning of the water year (i.e., the reservoir would typically be at its lowest level during the year).

TABLE 1
Frequency of Bypasses During July through October of Simulation Period (1922-1990)

Flow Alternative	Total Number Bypasses (months)	Bypasses as Percentage of Time (for July through Oct period only) %
No Action	38	13.8
Maximum Flow	31	11.2
Flow Evaluation	26	9.4
Percent Inflow	32	11.6
Existing Conditions	38	13.8
Cumulative Effects (600 taf)	40	14.5
Cumulative Effects (400 taf)	73	26.4

Trinity River temperature modeling was performed using the RTM, BETTER, and SNTEMP models as described on pages 3-134 and 3-135 of the DEIS/EIR. The Sacramento River Salmon Mortality Model ("LSALMON2"developed by Reclamation) was used to evaluate Sacramento River salmon mortality. The Sacramento River Basin Temperature Model ("LSACTEM3" developed by Reclamation) was used to evaluate Sacramento River temperature-related impacts. A more detailed description of the models used is presented in Technical Appendix A Water Resources/Water Quality. The thematic response "Use of

Water Delivery and Related Models" summarizes the use of these models and the key assumptions used.

Cost of Bypassing Trinity Powerplant

Historically, Reclamation has occasionally made low-level releases at Trinity Dam to assist in meeting downstream water temperature requirements during particularly dry years. During such releases, all of the water that would normally pass through the power turbines is bypassed, and the generators are shut down.

The removal of Trinity generation eliminates firm load-carrying capacity and the ability to provide any operating reserves for the 4-month period between July and October. Data developed for the No Action Alternative indicates that the Trinity Powerplant contributes an average of 85 Megawatts (MW) of firm load-carrying capacity per month during the 4-month period noted. In addition, the powerplant could contribute approximately 20 MW of operating reserves during each month of the dry period. Since this capacity would be lost during the most severe times when it is needed most, it can be assumed an alternate source of firm load-carrying capacity would be needed. Applying the replacement capacity value used in the DEIS/EIR ($8.99/Kilowatt [kW] per month) the net impact associated with the loss of this capacity would be approximately $3,200,000 for the 4-month period. This additional cost would be incurred in any year with potential bypasses because the potential for bypass operations eliminates the reliable use of the Trinity Powerplant. The reduction in average energy for any of the potential bypass months over the period of record would not significantly alter the above cost estimate because the average generation for all months would not be notably changed.

To determine the value of a hydropower project, traditional power planning practices dictates an examination of the CVP during the worst hydrologic conditions. This examination determines the project's ability to meet load. Due to the nature of the capacity being lost, the generation at Trinity will no longer be available to meet the capacity needs of the power grid under traditional hydropower planning criteria. If generation were completely lost at the Trinity Powerplant for 4 months in the driest years, Trinity Powerplant would no longer be considered available to carry load under the planning criteria and would lead to a need for new capacity to be added to the system or purchased from the market.

Summary of Results

The following summarizes the anticipated benefits of implementing bypasses for each alternative, as well as the cumulative condition, for the Trinity and Sacramento Rivers.

Trinity River

Table 2 shows modeled results for compliance with Trinity River temperature objectives contained in the "Water Quality Control Plan for the North Coast Region." As shown in this table, bypasses could provide benefits with regard to some alternatives, while others (e.g., the Percent Inflow and Maximum Flow Alternatives) would be generally unaffected. Interestingly, the greatest potential for improvement was identified for the No Action and

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Existing Conditions scenarios. Such additional bypasses were not assumed to occur in the DEIS/EIR given, as described above, bypasses have been implemented, but only in particularly dry conditions. Regardless, the analysis confirms that while bypasses clearly can provide additional benefits, either:

1. No appreciable benefits would occur for Maximum Flow (even with this alternative's substantial releases during certain times of the year, water does not move quickly enough through Lewiston Reservoir to avoid warming; the other alternatives avoid this phenomenon by exporting water to the Central Valley, resulting in water moving through the reservoir more quickly) or Percent Inflow (due to the relatively low release rates associated with this alternative, particularly in critically dry and dry years).
2. Benefits could be realized for the Flow Evaluation (Preferred Alternative) in critically dry years, but even without bypasses this alternative remains superior to the No Action Alternative.

The projected cumulative condition was modeled using an assumed Trinity Reservoir carryover storage level of 400 taf and 600 taf (also see thematic response titled "Cumulative Impacts"). Table 2 also shows that bypasses could play a substantial role in decreasing temperature-related effects, particularly with regard to the cumulative condition and the 400 taf carryover storage limit.

Sacramento River

Table 3 shows modeled results for compliance with Sacramento River temperature requirements found in the 1993 Biological Opinion for winter-run chinook salmon, while Table 4 shows the associated modeled results for Sacramento River chinook salmon relative mortality. As shown in these tables, bypasses for any of the alternatives (including for the two cumulative conditions) would have no to very limited benefits to Sacramento River fisheries in general. However, in some years (usually dry), bypasses did result in temperature decreases during August - November ranging from 0.50°F to 1.00°F . These decreases translated into some small reductions in salmon losses in some years (generally 3 percent or less). In particular, a No Action reduction of 15 percent was identified to occur in 1935 for the spring-run salmon. As such, while on average benefits were not found to be substantial, bypasses were found to be useful in individual, generally dry years.

As identified in Section 3.3 Water Resources of the DEIS/EIR on pages 3-52 and 3-54, temperature compliance problems and associated fish mortality can occur as a result of the warming of water in Whiskeytown Reservoir before it is conveyed into the Sacramento River at Keswick Reservoir. As discussed above, bypasses may be able to assist in aiding operations with regard to temperature compliance in particularly dry years.

A detailed memorandum at the end of this thematic response from Tom Stokely to Greg Kamman provides additional information relating to bypass analysis.

TABLE 2
Modeled Trinity River Temperature Violations With and Without Trinity Bypasses
(Percentage of Violations by Representative Year Class)

Alternative	Year Type	No Bypasses (%)	Bypasses (%)
No Action	Extremely Wet	0	0
	Wet	0	0
	Normal	2	0
	Dry	24	24
	Critically Dry	78	5
Maximum Flow	Extremely Wet	73	73
	Wet	28	28
	Normal	28	28
	Dry	29	29
	Critically Dry	29	28
Flow Evaluation	Extremely Wet	0	0
	Wet	0	0
	Normal	1	0
	Dry	1	0
	Critically Dry	6	0
Percent Inflow	Extremely Wet	53	53
	Wet	74	74
	Normal	86	87
	Dry	87	87
	Critically Dry	100	100
Existing Conditions	Extremely Wet	0	0
	Wet	0	0
	Normal	3	0
	Dry	0	0
	Critically Dry	84	4
Cumulative Effects (600 taf minimum storage)	Extremely Wet	0	0
	Wet	0	0
	Normal	8	0
	Dry	12	0
	Critically Dry	9	0
Cumulative Effects (400 taf minimum storage)	Extremely Wet	0	0
	Wet	0	0
	Normal	29	0
	Dry	41	0
	Critically Dry	71	6

[a]Year classes used for the BETTER model include 1983 (extremely wet), 1986 (wet), 1989 (normal), 1990 (dry), and 1997 (critically dry).

TABLE 3
Total Number of Sacramento River Temperature Violations:
Trinity Auxiliary Outlet No Bypass and Bypass Conditions (1922-1990 Simulation Period)

Flow Alternative	No Bypass Simulations	Bypass Simulations
No Action	77	78
Maximum Flow	110	110
Flow Evaluation	99	99
Percent Inflow	97	97
Existing Conditions	69	69
Cumulative Effects (600 taf)	103	104
Cumulative Effects (400 taf)	96	96

TABLE 4
Percent Change In Temperature-related Losses of the Early Life Stages of Anadromous Salmonids in the Sacramento River:
Comparison Between Trinity Dam Auxiliary No Bypass and Bypass Conditions (1922-1990 Simulation Period)

Flow Alternative	Fall Run	Late-fall Run	Winter Run	Spring Run
No Action	-0.1	0.0	-0.1	-0.3
Maximum Flow	0.0	0.0	0.0	0.0
Flow Evaluation	0.0	0.0	-0.1	0.0
Percent Inflow	-0.1	0.0	-0.1	-0.1
Existing Conditions	-0.1	0.0	0.0	-0.2
Cumulative Effects (600 taf)	-0.1	0.0	0.0	-0.2
Cumulative Effects (400 taf)	-0.1	0.0	0.0	-0.2

MEMORANDUM

To: Tom Stokely, Trinity County Planning Department
From: Greg Kamman, Kamman Hydrology & Engineering
Date: February 16, 2000
Subject: Trinity Dam Auxiliary Bypass Analysis

This memorandum presents the results of an analysis to evaluate when auxiliary bypasses should be initiated at Trinity Dam in an effort to reduce downstream Trinity River temperatures and decrease violations with SWRCB temperature objectives. In addition, this memorandum summarizes the results of the Bureau's temperature modeling analysis to evaluate auxiliary bypass effects on the Sacramento River.

How to Determine Bypasses

Based on analysis of previous temperature modeling results for proposed flow study alternatives, an operational rule for low-level auxiliary bypasses was developed from the relationship between Trinity Lake storage level and observed compliance with downstream temperature objectives. From these data, it was observed that temperature compliance is met for the period July 1 through September 30 during all year-types and for the majority of alternatives when Trinity Lake storage is at or above about 750 TAF (see Figures 1 and 2). No temperature compliance versus end-of-month storage relationship was observed for the Percent Inflow and Maximum Flow alternatives during the July through September period. It appears that these two alternatives don't provide enough river releases to meet downstream temperature objectives, regardless of release temperature and/or reservoir storage values. During October (after the temperature compliance point shifts from Douglas City to the North Fork Trinity River), very few violations occur under the Cumulative Effect and Flow Evaluation alternatives when reservoir storage is at or above 1000 KAF (see Figure 1). This October relationship does not exist for the remainder of the alternatives as releases are just too low leading to consistent violations, regardless of Trinity Lake storage (see Figure 2). Thus, based on this analysis, temperature model simulations were completed which included low-level bypasses when Trinity Lake storage drops below 750 TAF during the months of July, August and September and below 1000 TAF during the month of October. These model runs assume that 100% of the Trinity Lake releases were directed through the low level bypass pursuant to bypass capacity rule curves that relate maximum auxiliary bypass capacity to reservoir stage. Based on these criteria, Table 1 presents the frequency of auxiliary bypasses, by Alternative, that would have occurred during the 1922 through 1990 simulation period.

TABLE 1: Frequency of Bypasses during July through October of Simulation Period (1922-1990)

Flow Alternative	Total Number Bypasses (months)	Bypasses as Percentage of Time (for July through Oct period only)
No Action	38	13.8%
Percent Inflow	32	11.6%
Maximum Flow	31	11.2%
Flow Study	26	9.4%
Existing Conditions	38	13.8%
Cumulative Effects (600 TAF)	40	14.5%
Cumulative Effects (400 TAF)	73	26.4%

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Effects on Trinity River Temperatures

Auxiliary bypasses were evaluated using the temperature models (Reclamation's Trinity River Temperature Model, BETTER, and SNTEMP) to determine if there was a decrease in the number of violations with downstream Trinity River temperature objectives. Compliance with downstream temperature objectives was determined using the USFWS's median hydrometeorological evaluation criteria. In short, incorporating low-level bypasses into TRD summertime operations effectively reduce temperature violations for many of the alternatives and evaluation scenarios. Presented below are summaries of how each alternative performed at meeting Trinity River temperature objectives under auxiliary bypass operations. Results are presented on Table 2.

1) No Action Alternative: Without bypasses, the temperature violations occurred only 2% of the time under the normal year-type, 24% of the time during the dry year, and 78% of the time under the critically dry year-type. Under the simulated bypass criteria, bypasses were implemented during the normal and critically dry year-types with violations being eliminated during the representative normal year-type and reduced to 5% during the critically dry year-type. Because no bypasses were simulated during the dry year-type (i.e. Trinity Lake storage did not drop below 750 TAF during July through September or 1000 TAF during October), violations remain at 24%.

2) Cumulative Effects: Violations were eliminated when bypasses were implemented during the normal, dry, and critically dry year-types under the 600 TAF minimum Trinity Lake storage level scenario. Without bypasses, violations occur 8%, 12%, and 9% of the time, respectively. Similarly, there were significant improvements under the 400 TAF version; violations were eliminated during normal and dry year-types and significant decreases in violations (from 71% to 6%) during the representative critically dry year-type.

3) Flow Study Alternative: Under non-bypass conditions, there were only a few violations during normal, dry, and critically dry year-types (1%, 1%, and 6%, respectively). However, modeling results indicate that incorporating auxiliary bypasses during these years eliminates all violations.

4) Existing Conditions: Bypasses were implemented during the normal and critically dry year-types (the only years that had violations under non-bypass operations). Violations dropped from 3% to 0% during the normal year-type and from 84% to 4% during the critically dry year-type.

5) Percent Inflow Alternative: Bypasses did not improve compliance with downstream temperature objectives. Under this scenario, bypasses were implemented during the wet, normal, and critically dry year-types with no change in the number of daily violations.

6) Maximum Flow Alternative: Interestingly, bypasses were triggered during the extremely wet year-type as well as the critically dry year-type. Bypass operations did not significantly improve temperature compliance for either of these year-types.

Effects on Sacramento River Temperatures

Auxiliary bypasses were also evaluated to determine if they would have any impact on Sacramento River temperatures. This evaluation, which included simulations of Trinity Dam auxiliary bypass operations, was completed using Reclamation's Sacramento River Temperature Model. Similar to previous analyses, results consisted of tabulating the total number of (monthly) temperature violations on the Sacramento River for each alternative over the 69-year analysis period (1922 through 1990). Model simulation results indicate that bypass operations decrease Sacramento River temperatures slightly (less than 1 degree Fahrenheit). However, these benefits are so slight that they have no effect on the total number of temperature violations on the Sacramento River between bypass and no bypass conditions for all

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TABLE 2: Temperature Violations on Trinity River: Temperature Model Results (percent of violations by representative year-type)

Alternative	Year type	No Bypasses	Bypasses
No Action	ex. wet	0%	0%
	wet	0%	0%
	normal	2%	0%
	dry	24%	24%
	crit. dry	78%	5%
Cumulative Effects (400 TAF min storage)	ex. wet	0%	0%
	wet	0%	0%
	normal	29%	0%
	dry	41%	0%
	crit. dry	71%	6%
Cumulative Effects (600 TAF minimum storage)	ex. wet	0%	0%
	wet	0%	0%
	normal	8%	0%
	dry	12%	0%
	crit. dry	9%	0%
Flow Evaluation	ex. wet	0%	0%
	wet	0%	0%
	normal	1%	0%
	dry	1%	0%
	crit. dry	6%	0%
Existing Conditions	ex. wet	0%	0%
	wet	0%	0%
	normal	3%	0%
	dry	0%	0%
	crit. dry	84%	4%
Percent Inflow	ex. wet	53%	53%
	wet	74%	74%
	normal	87%	87%
	dry	87%	87%
	crit. dry	100%	100%
Maximum Flow	ex. wet	73%	73%
	wet	28%	28%
	normal	28%	28%
	dry	29%	29%
	crit. dry	29%	28%

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alternatives with two exceptions. The Cumulative Effect simulation displayed a small decrease in the number of violations, with 104 violations occurring under no bypass Conditions and 103 violations when bypasses were included. Conversely, under the No Action Alternative, there were a total of 77 violations under no bypass simulations and 78 violations under the bypass simulation. It does not make sense that there would be an increase in temperature violations under bypass conditions that have the net effect of lowering water temperatures on the Sacramento River. Thus, both of these slight changes may be considered to be anomalies, attributable to noise in the Reclamation Temperature Model. A summary of these results, as total temperature violations over the period of record, are presented on Table 3.

TABLE 3: Total Number of Sacramento River Temperature Violations - Trinity Auxiliary Outlet No Bypass and Bypass Conditions (1922-1990 simulation period)

Flow Alternative	No Bypass Simulations	Bypass Simulations
No Action	77	78
Percent Inflow	97	97
Maximum Flow	110	110
Flow Study	99	99
Existing Conditions	69	69
Cumulative Effects (600 TAF)	103	104
Cumulative Effects (400 TAF)	96	96

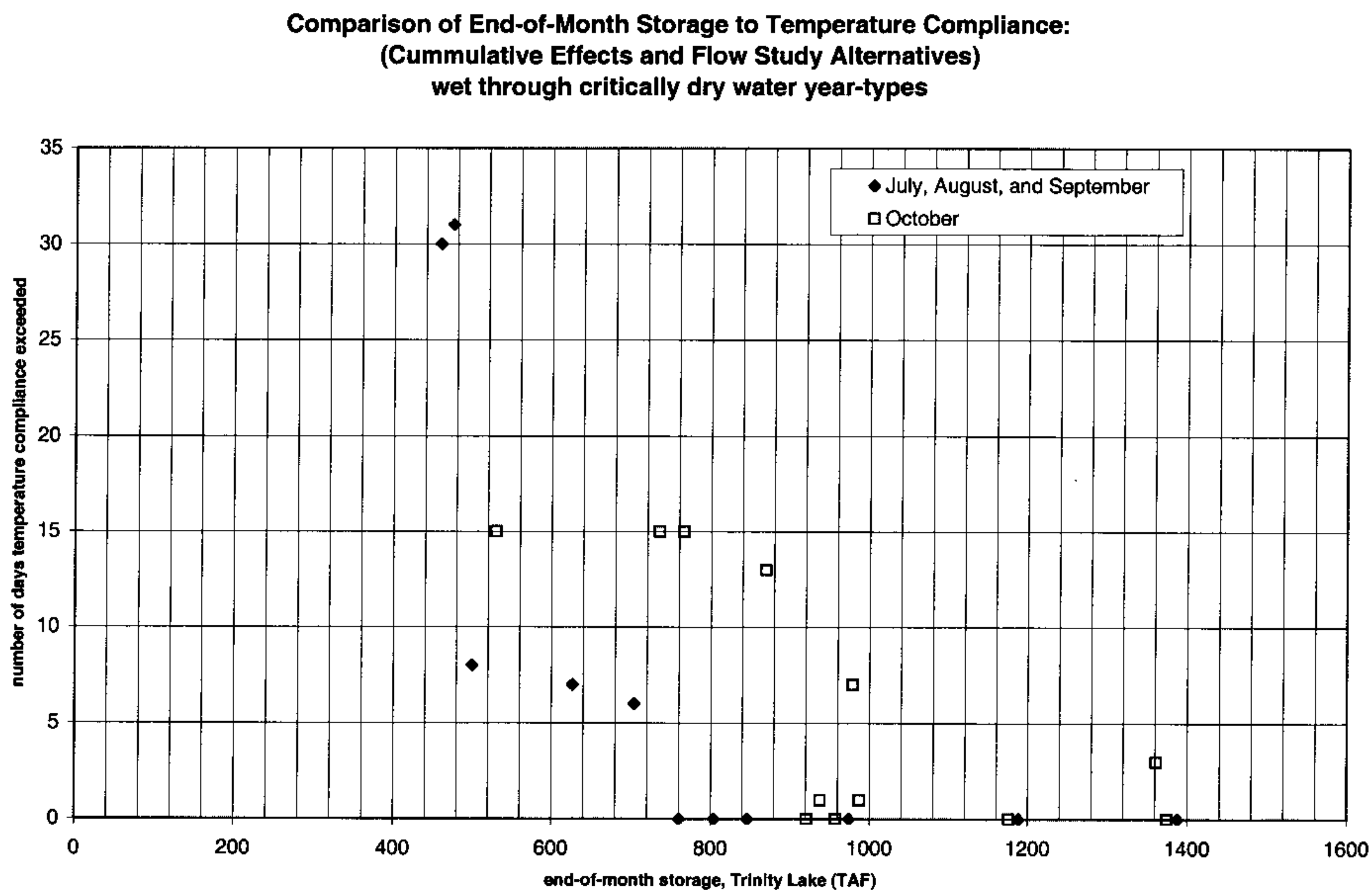
Effects on Sacramento River Chinook Salmon Mortality

The Sacramento River Temperature Model results were also run through the Sacramento River Salmon Mortality Model. This model estimates the temperature effects to chinook salmon eggs and fry for all four salmon runs spawning between Keswick Dam and Woodson Bridge. An important assumption of the Salmon Mortality Model is that increases in salmon egg and fry life-stage mortality are a result of increased Sacramento River water temperature. Similar to the changes in temperature violations discussed above, modeled changes in salmon mortality due to routine bypasses through the Trinity Dam auxiliary bypasses are very small. Table 4 summarizes the salmon mortality model results. These results indicate that auxiliary bypasses have little to no effect on salmon egg and fry mortality on the Sacramento River. However, wherever there is a change, it is always a net decrease in salmon mortality.

TABLE 4: Percent Change in Temperature-related Losses of the Early Life Stages of Anadromous Salmonids in the Sacramento River: Comparison between Trinity Dam No Bypass and Bypass Conditions (1922-1990 simulation period)

Flow Alternative	Fall run	Late-fall run	Winter run	Spring run
No Action	-0.1	0.0	-0.1	-0.3
Percent Inflow	-0.1	0.0	-0.1	-0.1
Maximum Flow	0.0	0.0	0.0	0.0
Flow Study	0.0	0.0	-0.1	0.0
Existing Conditions	-0.1	0.0	0.0	-0.2
Cumulative Effects (600 TAF)	-0.1	0.0	0.0	-0.2
Cumulative Effects (400 TAF)	-0.1	0.0	0.0	-0.2

FIGURE 1



Figures.xls:Figure 1

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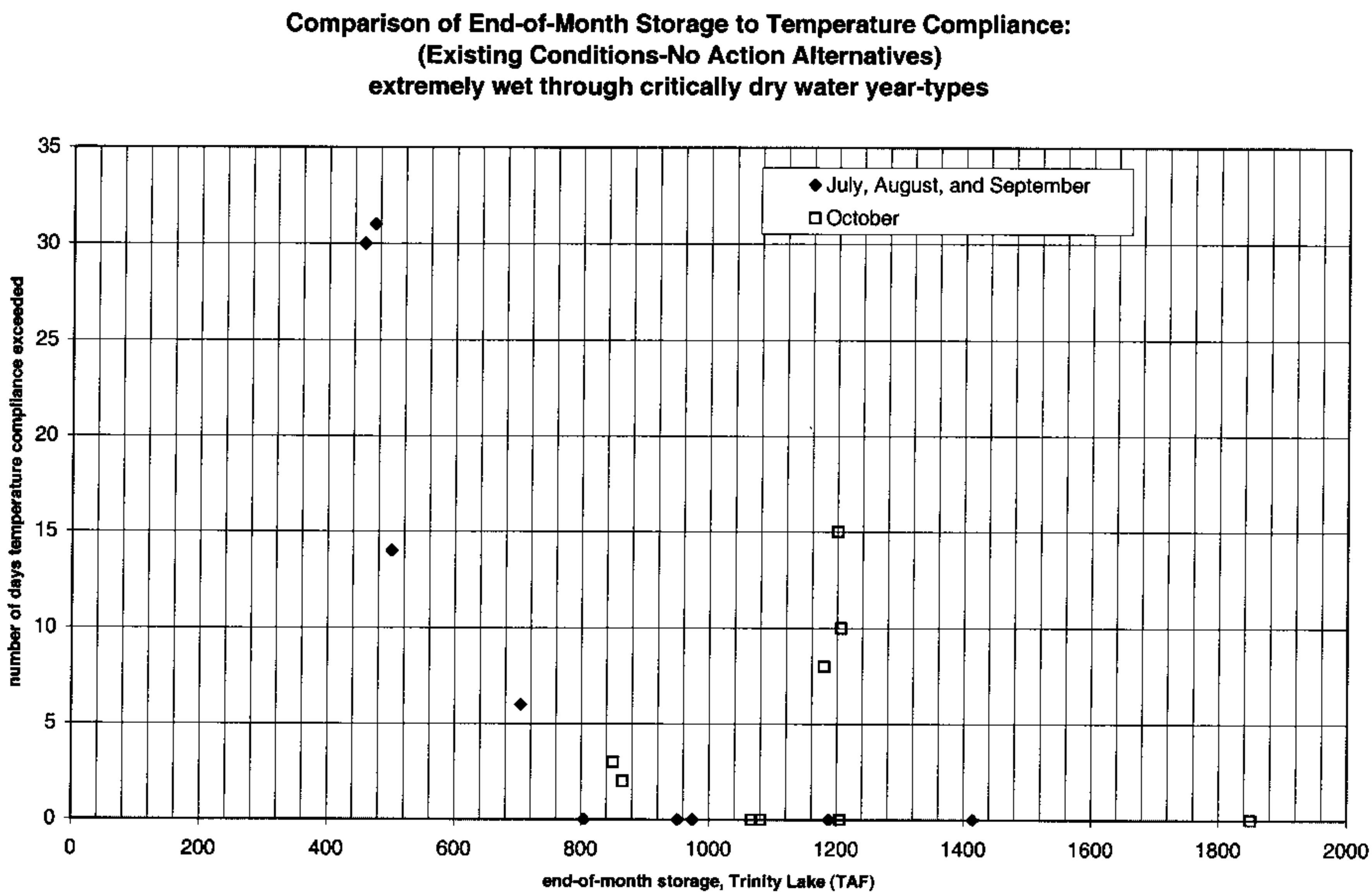
FIGURE 2



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Power Analysis

Several reviewers expressed concerns with the adequacy of the impacts analysis of Central Valley Project (CVP) power resources in the DEIS/EIR. Of particular concern were the cost estimates included in the analysis. This thematic response addresses these concerns and discusses some of the key assumptions made, as well as their sensitivity with regard to influencing the results. Economic impacts to Western Area Power Authority's (Western) First Preference power customers, which were not specifically identified in the DEIS/EIR, are also addressed. The additional analyses presented below confirm that economic impacts associated with some of the alternatives with regard to decreased CVP power generation (and associated assumed air quality impacts given additional use of fossil-fuel-based power generation facilities) would be potentially significant as identified in the DEIS/EIR. Such impacts were very conservatively estimated in the DEIS/EIR, given that the construction of any new fossil-fuel-based generating facility would be subject to air quality permitting requirements that would likely result in no net emissions within the particular region. Further, it should be noted that Western acts as a provider of wholesale electricity. Individual wholesale customers maintain responsibility for maintaining a prudent resource mix and encouraging efficient use of its electrical supplies. In summary, the economic costs discussed below may be greater (or less) than costs identified in the DEIS/EIR given different assumptions, which are in part driven by the continued uncertainty related to market deregulation and gas price fluctuations, but the relative impacts identified in the DEIS/EIR remain unchanged and significant.

CVP Generation in Relation to Total California Generation and Demand.

California's annual energy demand in 1998 was approximately 250,000 gigawatt-hours (GWh) (California Energy Commission, 2000). Demand for energy is projected to grow at approximately 2.0 percent annually between 2000 and 2010, resulting in a projected demand of 320,000 GWh in 2010. Peak demand in California typically occurs in late afternoons during the month of August in response to a string of days with high-temperatures (California Energy Commission, 1999). California's peak demand in 1999 was approximately 51,000 MW and is projected to grow at approximately 1.7 percent annually between 2000 and 2010, resulting in a peak demand of 61,000 MW in 2010. In comparison, total installed capacity of CVP generation is approximately 2,000 MW, although actual capacity is typically less. Actual capacity is less than installed capacity because hydrologic variation and competing uses such as water delivery and environmental requirements reduce the ability of the generators to operate at maximum capacity. The total installed CVP generation capacity of 2,000 MW equates to 4 percent of California demand in 1999, and 3 percent of projected 2010 demand. The TRD accounts for 25 percent (approximately 500 MW) of CVP installed capacity, which equates to approximately 1 percent of current California demand, and less than 1 percent of projected 2010 demand.

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Currently, according to the Western Systems Coordinating Council, approximately 3,700 MW (which represents more than the total generation capability of the entire CVP) of new powerplants (six individual projects in total) in California are either under construction or have gained full regulatory approval. Approximately 7,500 MW of new powerplants (15 projects) have applications under review, and another 2,000 MW of new powerplants (three projects) have begun the application process. The majority of pending and proposed powerplants are natural gas-fired turbines, and a small minority (approximately 100 MW) would be either wind or geothermal powered. All of these powerplants have an anticipated "on-line" date prior to June 2004. Recent demand growth has outstripped current available capacity, leading to several statewide alerts regarding insufficient reserves of available capacity. Completion of additional powerplants is anticipated to help avoid such alerts in the future. Construction of additional generating capacity is taking place, and will continue to take place, independent of any decision regarding the Trinity River Mainstem Fishery Restoration.

A detailed assessment regarding the impact of CVP power supplies on the greater California region was not conducted for the DEIS/EIR, other than what is presented in the Socioeconomics section. It is anticipated that as demand for power increases, additional power supplies will be built to meet the increase in total California demand. As this occurs, the CVP's current total contribution of meeting 4 or less percent of total California electrical demand will constitute a decreasing proportion of the state's overall power generation supply.

Cost of Western Power

Western maintains contracts with "Preference" customers and "First Preference" customers for sale of surplus power. Preference customers are defined as entities eligible to receive power pursuant to the Reclamation Act of 1939 (non-profit organizations financed through the Rural Electrification Act of 1936, municipalities, and public agencies). First Preference customers are a subset of Preference power customers within a county of origin as specified under the Trinity River Division Act of 1955 and the New Melones Act of the Flood Control Act of 1962. By law, 25 percent of the power attributed to the Trinity River Division (TRD) of the CVP must first be offered to Preference customers in Trinity County, and up to 25 percent of the power attributed to the New Melones project must first be offered to Preference customers in Tuolumne and Calaveras Counties. Surplus power is defined as power that exceeds the capacity and energy required to operate the CVP facilities (Project Use). Western could market power to private industries or utilities if surpluses exist in excess of Preference customer demands. Currently, Preference customers' demands consume all of the power marketed by Western; therefore, no surpluses exist, nor are surpluses expected to exist in the foreseeable future. These private industries and utilities are potential "customers" that would not have Preference status nor supplies guaranteed by contract; furthermore, none currently exist, and are therefore not included in the analysis.

For the DEIS/EIR, impacts to CVP Preference power customers were estimated using a two-step process. First, given that Western's operating costs (e.g., payment on facilities, interest on debt) would not change, changes in power output were assumed to result in a change in the per-unit cost of electricity. Consider a very simple example:

> If Western's operational costs are $100 per year and it markets 10,000 kilowatt hours (kWh) of CVP electricity, the cost would be $0.01 / kWh ($100 / 10,000 kWh). If CVP generation available to Western is reduced to 5,000 kWh, the cost would be $0.02 / kWh.

The second step in the process was to estimate the cost (or benefit) to CVP Preference power customers of the change in electricity production. This second step values changes in capacity and energy. It assumes that CVP Preference power customers use cheaper sources of power first, and then add more expensive sources as needed. Continuing the above example:

> If Western had only one customer, and that customer had a total electricity requirement of 10,000 kWh, then the customer would be impacted twice by the reduction in CVP generation noted above. First, instead of paying $0.01 / kWh for CVP power, the customer will now pay $0.02 / kWh, but the total payment remains $100. The second impact on the customer is the shortfall in electrical supply. The customer will have to purchase an additional 5,000 kWh from the market to make up for the reduction in CVP generation. If 5,000 kWh of replacement power is available at $0.05 / kWh, then the total impact to the customer would be the additional cost of electricity $250, ($0.05 x 5,000 kWh), resulting in a blended cost of $0.035 / kWh (($100+$250) / 10,000 kWh) and a total impact, or rate increase, of $0.025 / kWh ($0.035 / kWh – $0.01 / kWh).

Therefore, in the above example, the CVP Preference power customer is (1) paying more per unit for less electricity from Western, and (2) making up for a shortfall by purchasing more expensive electricity from the market. In actuality, Western serves a wide range of customers that each have unique electrical demands and use CVP power for differing proportions of their total power supply. Thus, because value varies both seasonally and daily, a reduction in generation may not equate to a reduction in value if generation occurs more often in high-value periods (i.e., on-peak summer). Further, the net amount of electricity available for Western to market to its customers is affected by the amount of power required by the CVP to operate ("Project Use").

As an example, consider the impacts associated with the Flow Evaluation and Percent Inflow Alternatives. On average, Flow Evaluation would export less water to the Central Valley than Percent Inflow (630,000 acre-feet versus 730,000 acre-feet). However, generation under the Flow Evaluation occurs more often in the summer months, and Project Use decreases due to the reduction in water available. Accordingly, the cost of replacement electricity under Flow Evaluation is less than under Percent Inflow ($5,564,000 / year under Flow Evaluation versus $7,023,000 / year under Percent Inflow). Clearly, commentors relying solely on estimates of power impacts based on acre-foot reductions would miss the nuances of the analysis.

Key Assumptions

The analysis in the DEIS / EIR built off of these assumptions by considering the seasonal nature of hydropower generation as modeled by U.S. Bureau of Reclamation's (Reclamation) PRoject SImulation Model (PROSIM) (typically more generation during high-runoff months in winter/spring) and the daily fluctuations between high demand hours (on-peak) and low demand hours (off-peak). The DEIS/EIR also differentiated between the value of instantaneous ability to meet load (capacity or capability, typically measured in Megawatts [MW]) and generation over time, energy, typically measured in Gigawatt hours [GWh]).

The PROSYM model, which was used by Western, has been used in a number of other planning efforts including preparation of the Central Valley Project Improvement Act Programmatic EIS (CVPIA PEIS) and Western's 2004 Power Marketing Program EIS. For the DEIS/EIR, PROSYM dispatched the electrical generation output of PROSIM into a regional power grid based on the total load of the Northern California Preference power customers. Generally, in the future, power operations on the CVP will be managed to meet Northern California Preference power customers. For valuation purposes, electrical generation was evaluated as firm capacity (called capability in the DEIS/EIR), non-firm capacity (sometimes called "spinning reserve") and energy generated during higher-value (on-peak) and lower-value (off-peak) periods.

Dollar values were assigned to replacement energy based on the assumption that natural gas-fired combined-cycle combustion turbines would likely replace decreases in hydro-power energy production. The cost of electricity from these turbines was estimated by combining the capital cost of building new turbines with the operational cost of fueling them with natural gas and the transmission cost of delivering electricity to the customer, and as such represents a conservative estimate. All of these assumptions are outlined in Attachment F1 of Power Resources Technical Appendix F of the DEIS/EIR. In practice, replacement power could be produced by a mix of power resources. However, each CVP Preference customer is unique in terms of its load characteristics, and the appropriate mix would vary from customer to customer.

General Concerns with the Analysis

Reviewers noted that the cost estimates presented in the DEIS/EIR were not reflective of CVP Preference power customer's current costs. The power analysis in the DEIS/EIR was actually not intended to present actual costs, but rather representative costs that would allow for assessment of the relative impact of the alternatives. Using the replacement cost methodology outlined above, each alternative was assigned a value relative to No Action. For example, an annual additional replacement cost of $5,564,000 (compared to the No Action Alternative) was identified for the Flow Evaluation Alternative in the DEIS/EIR. This represents the change in total annual cost to Preference power customers compared to No Action.

Reviewers suggested that the cost estimates for each alternative were not realistic, and that costs for individual customers were under-reported. Part of this confusion was derived from the use of power costs for economic analysis elsewhere in the DEIS/EIR. To facilitate economic analysis, relative values for each alternative were separated by county according to each county's share of CVP capacity, defined by CVP Preference power customer's Contract Rate of Delivery (CRD). CRD is a commonly used measure of each CVP Preference power customer's relative share of CVP power, largely because the CRD amounts are not disputed. In several counties, however, there is only one Preference power customer (e.g., Trinity Public Utility District [PUD] in Trinity County and City of Redding in Shasta County). These customers in particular noted that the reported costs were not consistent with their independent analysis of the alternatives.

First, it should be emphasized that the separation of costs by counties was done to approximate additional costs by region. When considered regionally (e.g., San Joaquin Valley, Sacramento Valley, Bay Area), the aggregated capacity values are a reasonable measure of power usage across the state. However, when taken individually (especially where there is a single CVP Preference power customer per county) the values may not be representative of an individual customer's cost experience, nor were they intended to be. Instead, the relative values were meant to be used as a comparison between alternatives to determine the significance of changes in CVP generation. The analysis in the DEIS/EIR was not only sufficient for this purpose, but it was a conservative assessment of the environmental effects (potential degradation of air quality) brought about by changes in hydropower generation.

However, to respond to comments, this thematic response provides a supplemental analysis of costs per county separated by each county's share of CVP energy (based on average No Action condition). Although this will not exactly replicate each Preference power customer's costs, it more closely approximates individual customer's experience because energy includes a measure of duration of use, rather than magnitude of use (Megawatt hours [MWh] versus Megawatts [MW]).

Table 1 presents a comparison of the two methods of analysis—allocation by county based on energy (supplemental analysis), versus allocation based on capacity (which was the approach taken in the DEIS/EIR). Table 2 presents a re-allocation of costs per county based on relative share of energy purchased from Western. It should be noted that the total impact of each alternative remains unchanged, but the allocation of costs does vary, with more emphasis on duration of use rather than magnitude of use. Table 2 also includes special consideration of First Preference customers, explained in detail below.

Reviewers also expressed concerns regarding costs to end users (i.e., individual households and businesses), especially those in low-income communities that might be disproportionately affected by increased power costs. Impacts to a CVP Preference power customer's end user is a function of how a Preference power customer sets its retail rates and how much electricity is consumed by an individual end user. Given the wide diversity in the rate structures of Western's customers, it is not feasible to calculate an individual end-user rate impact. Instead, the refined analysis (allocating costs based on energy rather than capacity) presented in Table 2 provides cost estimates that more closely approximate Preference power customer costs and therefore will more closely resemble the magnitude of impact preference customers will experience.

TABLE 1
Comparison of Cost Allocation by Energy Versus Cost Allocation by Capacity

	Supplemental Analysis		Original DEIS/EIR Analysis	
County	**Energy Use[a] (No Action) (MWh)**	**Percent of CVP Energy Used by County %**	**Capacity Available [b] (No Action) (MW)**	**Percent of CVP Capacity Available for Use by County (%)**
Alameda	409,846	6.26	59.6	4.08
Butte	17,953	0.27	11.4	0.78
Calaveras	21,380	0.33	8.4	0.57
Contra Costa	16,340	0.25	6.8	0.46
Fresno	27,257	0.42	7.7	0.53
Glenn	9,081	0.14	4.1	0.28
Kern	134,767	2.06	33.0	2.26
Kings	80,694	1.23	18.7	1.28
Lassen	128,631	1.97	3.0	0.21
Mendocino	30,079	0.46	8.8	0.60
Merced	69,362	1.06	6.7	0.46
Placer	278,721	4.26	69.0	4.72
Plumas	58,655	0.90	22.5	1.54
Sacramento	2,261,839	34.57	381.4	26.10
San Francisco	-	0.00	-	0.00
San Joaquin	129,595	1.98	36.0	2.47
Santa Barbara	21,671	0.33	5.2	0.36
Santa Clara	1,680,377	25.68	522.4	35.76
Shasta	525,607	8.03	127.5	8.72
Solano	138,440	2.12	33.9	2.32
Sonoma	37,711	0.58	4.7	0.32
Stanislaus	76,542	1.17	21.9	1.50
Trinity	78,440	1.20	18.0	1.23
Tulare	13,638	0.21	4.0	0.27
Tuolomne	35,378	0.54	8.8	0.60
Yolo	146,134	2.23	16.2	1.11
Yuba	114,245	1.75	21.6	1.48
Total	**6,542,383**	**100.00**	**1461**	**100.00**

[a] Energy is the amount of CVP-generated electricity available for use by customers, after accounting for Project use.
[b] Based on contract rate of delivery.

TABLE 2
Supplemental Benefits (or Costs) of Changes in Power Production ($1,000) Allocated by County Based on Energy Use

County	No Action CVP Energy Use (MWh)	Percent of County Use (%)	State Permit ($1,000)	Maximum Flow ($1,000)	Percent Inflow ($1,000)	Flow Evaluation ($1,000)
Alameda	409,846	6.26	371	(1,617)	(442)	(344)
Butte	17,953	0.27	16	(71)	(19)	(15)
Calaveras	21,380	0.33	22	(124)	(17)	(29)
Contra Costa	16,340	0.25	15	(64)	(18)	(14)
Fresno	27,257	0.42	25	(108)	(29)	(23)
Glenn	9,081	0.14	8	(36)	(10)	(8)
Kern	134,767	2.06	122	(532)	(145)	(113)
Kings	80,694	1.23	73	(318)	(87)	(68)
Lassen	128,631	1.97	116	(507)	(139)	(108)
Mendocino	30,079	0.46	27	(119)	(32)	(25)
Merced	69,362	1.06	63	(274)	(75)	(58)
Placer	278,721	4.26	252	(1,099)	(301)	(234)
Plumas	58,655	0.90	53	(231)	(63)	(49)
Sacramento	2,261,839	34.57	2,048	(8,922)	(2,439)	(1,901)
San Francisco	-	0.00	-	-	-	-
San Joaquin	129,595	1.98	117	(511)	(140)	(109)
Santa Barbara	21,671	0.33	20	(85)	(23)	(18)
Santa Clara	1,680,377	25.68	1,522	(6,628)	(1,812)	(1,412)
Shasta	525,607	8.03	476	(2,073)	(567)	(442)
Solano	138,440	2.12	125	(546)	(149)	(116)
Sonoma	37,711	0.58	34	(149)	(41)	(32)
Stanislaus	76,542	1.17	69	(302)	(83)	(64)
Trinity	78,440	1.20	79	(455)	(64)	(107)
Tulare	13,638	0.21	12	(54)	(15)	(11)
Tuolomne	35,378	0.54	34	(184)	(32)	(42)
Yolo	146,134	2.23	132	(576)	(158)	(123)
Yuba	114,245	1.75	103	(451)	(123)	(96)
Total	**6,542,383**		**5,937**	**(26,036)**	**(7,023)**	**(5,564)**

Reviewers also questioned the validity of assumptions used to value electricity in the future given the use of gas price forecasts and the evolution of the deregulated electrical market. The new open market created by deregulation has been fluctuating greatly (including rapid fluctuations in the value of ancillary services such as “spinning reserves”), precluding any reasonable forecasts for future prices. It has been assumed that the market will mature and become more predictable over time, but at this time, forecasts of long-run market prices are considered speculative. Accordingly, estimates of absolute dollar impacts provided by commentors may be correct, overstated, or understated. At this time, estimates of replacement power cost provided from the market are difficult to predict when the power market would presumably be more mature.

At the time of the DEIS/EIR analysis, the new deregulated market structure had been in place for a relatively short time, and it was difficult to clearly determine how capacity shortages would be reflected in an hourly energy market (i.e., the California Power Exchange [Cal PX] and the California Independent System Operator [CAISO]). The DEIS/EIR analysis assumed that the combination of energy and capacity values assigned to the generation characteristics of the alternatives would be representative of market pricing once the market achieves balance between load and capacity. The California energy market is still adjusting to deregulation, precluding use of a new methodology.

Reviewers specifically questioned the use of gas price forecasts used in the analysis. Gas prices have also been subject to wide fluctuations recently, and it is not clear when (or if) they will stabilize. Gas prices used in the DEIS/EIR analysis were approximately $2.24 to $2.27/MMBtu at the generator. Recent wellhead prices for gas during January varied from $2.08 to $2.50/MMBtu. Adding in the typical wheeling charges results in a delivered price in the range of $2.40 to $2.90/MMBtu. A comparison of the DEIS/EIR average annual price used in the analysis and the current (winter) prices indicate that overall there has not been a major deviation from the pricing used in the analysis. Further, even if there were a large deviation in gas prices, the relative impact of the alternatives would not change in comparison to No Action. Table 2 was developed using the same gas prices used in the DEIS/EIR. Most recently, gas prices have been spiking in the range of $4.00/MMBtu.

It is also important to note that gas prices are a component of the analysis, but do not account for the entire cost of replacement electricity. Replacement costs are calculated by assuming that replacement capacity would be supplied by new natural-gas fired turbines. Capacity price is based on the capital cost of constructing new facilities. Energy costs are based on the cost of operating the facility, largely the cost of supplying natural gas to the facility. Revised gas prices would affect the magnitude of the impacts, but because gas prices would also affect the No Action and Existing Condition simulations, the relative impact would remain approximately the same.

The approach used in the DEIS/EIR was determined to be a reasonable method for evaluating impacts, and was based on the best available data at the time of analysis. Given recent (and likely continued) market and gas price fluctuation, the replacement cost approach remains valid, although input cost assumptions and forecasts will change over time. There are other approaches that may also be reasonable (some of which were noted by commentors) that yield slightly different values, although these would likely result in similar relative impacts for the scope of analysis.

Individual power customers may be able to assess different impacts to their individual operations. However, in so doing, it is important to include monthly as well as annual changes between the alternatives, because some changes occur in the timing of generation, which also affects value of generation, and therefore impacts to customers. However, because of the wide diversity in the operations of individual customers, it is not feasible to estimate customer impacts for every Western customer affected by the proposed action. Instead, impacts to representative customers are presented in the DEIS/EIR.

It is also important to note that energy and capacity were valued separately. As noted above, energy values were derived from the California market-clearing price for natural gas based on monthly on-peak and off-peak rates. Value of capacity was further separated into “capacity supported with energy” and “capacity without energy.” Capacity with energy is a measure of the reliable capacity (given minimum flow requirements, etc.) of a hydropower resource in a given month. This is an important distinction because the PROSIM data used by PROSYM is in a monthly time-step, and downstream requirements can serve as constraints on available capacity. Unlike a gas-fired turbine, a hydroelectric facility cannot “order” more fuel when supplies run low. For a gas-fired plant, capacity with energy is not typically a concern because as long as there is fuel, the plant can operate. Capacity without energy is a measure of the capacity available for meeting instantaneous load, but not sustainable for an extended period of time. Capacity was valued at $8.99 per kW-month based on the cost of building combined-cycle turbines. Capacity without energy (also called reserves) was valued at 20 percent of that figure. As with the deregulated power market and natural gas prices, the value of ancillary service (capacity without energy) has also been fluctuating recently. Detailed assumptions are outlined in Power Resources Technical Appendix F of the DEIS/EIR.

First Preference Customers

Changes in available CVP power affect Western’s CVP Preference power customer’s differently, based on their respective allocation of CVP power. Trinity PUD is a First Preference customer, giving it special access to CVP power. First Preference customers are offered a percentage of the generation for a particular CVP generator, or set of generators, before the power is offered to other customers. Trinity PUD is eligible for up to 25 percent of the generation of the TRD. Currently, Trinity PUD uses approximately 8 percent of its full entitlement, and load forecasts through 2020 are not anticipated to increase significantly[1]. As long as Trinity PUD is using less than its full entitlement, it will not need to access outside sources of electricity to meet load requirements. In the simplified example above under “Cost of Western Power,” impacts to Trinity PUD are limited to the first-step of the analysis as long as a reduction in Western supplies does not fall below Trinity PUD’s load requirements. Table 3 presents the change in First Preference allocation to Trinity PUD under the alternatives.

Table 3 presents the change in First Preference allocation to Trinity PUD under the alternatives.

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[1] Trinity PUD would need to increase its demand by approximately 300 percent to exceed its current First Preference allotment.

TABLE 3
Modeled Share of Energy Available to Trinity PUD (Average Annual GWh)

	No Action	Maximum Flow	Flow Evaluation	Percent Inflow	State Permit
Total Generation for TRD	1,524.4	552.7	1,257.9	1,374.8	1,740.3
Project Use Supplied by TRD	410.9	148.9	350.6	383.2	454.7
Net Energy Available from TRD	1,113.5	403.7	907.3	991.6	1,285.6
Trinity PUD Allocation (25 percent TRD)	278.4	100.9	226.8	247.9	321.4

In the DEIS/EIR, power impacts to Trinity County were separated out as part of a regional economic analysis. Power impacts did not account for Trinity PUD's First Preference status. A revised analysis specific to Trinity County and its First Preference status follows. The analysis is also relevant for other First Preference customers, which include the Caleveras Public Power Agency and Tuolumne Public Power Agency. Table 4 presents the change in the Western's basic rate that would result from implementation of the various alternatives. The incremental change in basic rate reflects the impact of the various alternatives. That is, the additional cost of electricity attributable to an alternative is the incremental increase in Western rates multiplied by the average energy use of a First Preference customer. Total costs changes are presented in Table 4 for each alternative. Under the Flow Evaluation, Trinity PUD would be subject to approximately $107,000 of additional cost per year compared to No Action. In the DEIS/EIR, this cost was reported as $69,000. The discrepancy results from Trinity PUD's individual load characteristics. It is not constrained by capacity; therefore, its costs are better reflected by energy usage.

TABLE 4
Impact on First Preference Power Customer

Alternative	Percent Change in CVP Available Energy	Western Rate ($/MWh)	Change Compared to No Action ($/MWh)	Percent Change
No Action	N/A	19.0	N/A	N/A
Maximum Flow	(24.4)	24.8	5.80	30.5%
Flow Evaluation	(6.7)	20.4	1.36	7.2%
Percent Inflow	(4.1)	19.8	0.82	4.3%
State Permit	5.6	18.0	(1.01)	-5.3%

CVPIA Restoration Fund and Repayment

Reviewers also raised questions about the impact of reduced power generation on the CVPIA Restoration Fund, both in terms of additional, unreported costs to power customers and as a threat to the continued viability of the Restoration Fund itself. The amount of CVPIA Restoration Fund surcharge paid by power customers is a function of actual water deliveries made to the CVP water contractors. As water deliveries decrease, the surcharge paid by the CVP Preference power customers increases. The total cost of CVP power to Preference power customers would increase if the level of CVPIA Restoration Fund surcharges assigned to the power function increases. While this issue is certainly a major concern to CVP Preference power customers, as well as CVP water users in general, the lead agencies acknowledge the potential for such a scenario to occur, and note that it is beyond the scope of the environmental analysis in the EIS/EIR to attempt to further analyze its economic ramification in light of the wide range of uncertainties with the water sales market and other unknown economic variables associated with this issue. Congress and the Administration is in a continuing debate regarding collection and allocation of the Restoration Fund, increasing the uncertainty surrounding changes to the Restoration Fund. Water deliveries and power generation will be further affected by full implementation of CVPIA, the SWRCB water rights process, CALFED Bay-Delta Program, deregulation of the electrical industry, and other factors noted in Section 4.1 Cumulative Impacts in the DEIS/EIR. The interplay of these processes and organizations on water delivery and power is highly complex in light of the projected growth rates in California, and the impact on rates would be purely speculative.

Potential costs associated with repayment are addressed in the thematic response "Implementation Funding and Relationship to Repayment, Reimbursement, and the CVPIA Restoration Fund."

Description of the Proposed Action/Segmenting

Several reviewers asserted that the DEIS/EIR did not describe the Proposed Action, or some aspects of the Proposed Action, in sufficient detail, and that, as a result, the document did not disclose all impacts. These reviewers thus asserted that the lead agencies were guilty of project "segmenting" or "piecemealing."

The lead agencies disagree with such assertions. It is important to note that, for site-specific components of the Proposed Action (such as channel modifications and dam improvements required under certain alternatives), the DEIS/EIR is a programmatic document, and as such, assesses the overall impacts of implementing portions of the Trinity River Fishery Restoration Program. It is not appropriate or necessary to describe the site-specific details of activities (such as gravel replacement or riparian restoration) that will be tiered (40 CFR 1502.20 and 1508.28, CEQ Guidance Regarding NEPA Regulations at 48 FR 34263) from the programmatic document and receive environmental review on a site-specific basis at a later point in time. As identified in Section 2.1 Alternatives, page 2-21, 24 of the proposed 47 mechanical restoration projects associated with the Flow Evaluation, Percent Inflow, and Mechanical Restoration Alternatives would be built in the first three years, with the remainder built in following years. Each year projects would be evaluated, specific sites selected, and appropriate permits and authorizations acquired prior to initiating construction. Such an approach does not represent a lack of disclosure or deferral of mitigation, but constitutes logical, efficient, and appropriate planning.

There is nothing in either National Environmental Policy Act (NEPA) or California Environmental Quality Act (CEQA) that prohibits lead agencies from preparing documents that serve the dual function of providing project-level analysis for some aspects of a complex project or action and program-level analysis for other aspects. In fact, the practice this common method of dealing with projects or actions where only some aspects require later, more project-specific environmental review. Notably, the discussion of "tiering" within the NEPA Regulations adopted by the Council on Environmental Quality (CEQ) states that the tiering process allows agencies "to focus on the actual issues ripe for decision at each level of environmental review." (40 C.F.R. § 1502.20.) The CEQA Guidelines section on tiering contains similar language. (CEQA Guidelines § 15152(b).) This FEIS/EIR contains enough information for the federal lead agencies to approve a flow decision, but contains only generalized information on channel modification projects and other activities that will be necessary under certain alternatives. In other words, flow will be "ripe for decision" before site-specific channel modification projects will be. The DEIS/EIR recognizes that "second-tier" review will be necessary for individual channel modification projects and other site-specific actions and mitigation required only under certain alternatives.

This is not to say that the DEIS/EIR failed to address the impacts of channel modification projects and similar site-specific actions necessary for certain alternatives. The document identifies the kinds of impacts that such projects are likely to entail, while recognizing that additional, second-tier information must be generated before any site-specific approvals are

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granted (see DEIS/EIR, page 1-23). This represents an efficient and sensible approach to analyzing a project as complex as the proposed flow decision. If the federal lead agencies were to approve a project alternative that did not involve channel modification or dam modifications, then any site-specific information contained in the DEIS/EIR would have been unnecessary to an informed decision. The DEIS/EIR contains enough general information about such individual projects to permit an informed decision on the overall flow decision, even while recognizing that additional site-specific analyses will be required before individual channel modification permits or other site-specific actions are approved.

The concepts of segmentation and piecemealing invoked by the reviewers refer to a disfavored approach to environmental review different from that taken here. In the classic segmentation case under NEPA, a federal agency splits an indivisible action or project into two or more pieces to minimize the environmental consequences of the overall project or action. For example, where a freeway is planned to connect points A and C, going through point B, segmentation may occur if the agency prepares two "Findings of No Significant Impact" (FONSI) for actions consisting of links between points A and B, and points B and C. Unless the connections between A and B, and B and C have "independent utility" in and of themselves, a violation of NEPA may have occurred.

In the classic piecemealing case under CEQA, an agency prepares two negative declarations for a single project consisting of several discretionary approvals. For example, one negative declaration is prepared for a general plan amendment and rezone, while another negative declaration is prepared for a tentative map or variance. Such an approach tends to minimize the overall effects of what should be an indivisible project requiring the various discretionary approvals. Another variety of piecemealing occurs where an agency plans a multi-stage project but fails to analyze the impacts of any phase but the first.

In short, the reviewers have confused the legitimate use of "tiering," as contemplated by the DEIS/EIR, with the different concepts of segmentation and piecemealing. Here, the DEIS/EIR addresses the impacts of channel modification and similar site-specific activities that would only be necessary under some alternatives, but does so in general terms, with a recognition that more site-specific information must be generated before actual permits or other approvals are granted. The DEIS/EIR has not simply avoided any mention or analysis of those later approvals. Nor have the lead agencies narrowly defined their project and action to avoid any mention or recognition of the channel modification projects and other similar site-specific activities.

Use of Water Delivery and Related Models

A number of reviewers expressed concerns with the use and interpretation of the water delivery and system operation models and results used to illustrate and project potential impacts associated with each alternative. As summarized in Section 3.1, Introduction of the DEIS/EIR, a number of predictive models were used to assist in projecting water deliveries and related effects on water quality and habitat for both aquatic and terrestrial species. A description of each model, key assumptions, and use are provided in each section where a given model is used, as well as the associated appendices. The majority of the models used in preparation of the DEIS/EIR were determined to be the best tool available given their use in other large-scale water management studies, including the Central Valley Project Improvement Act (CVPIA) Programmatic EIS (PEIS). The CVPIA PEIS process included an extensive review of potential analytical tools to select the most appropriate tools for the PEIS. An Analytical Tools Workshop was held to give the public an opportunity to provide input on the choice of tools for the PEIS analysis.

The many assumptions related to current and future projected CVP operations were the subject of numerous public stakeholder meetings across the state between 1993 and 1995 as part of the CVPIA PEIS process. (Also see thematic response titled "No Action Alternative/Existing Conditions Scenario and Range of Alternatives," which discusses the primary assumptions made for the NEPA No Action and CEQA Existing Conditions scenarios). As stated in Section 3.3, Water Resources of the DEIS/EIR, other planning efforts of statewide importance where PROSIM (discussed below) and other models used in the DEIS/EIR were included are:

- CALFED
- Consolidated and Expanded Place of Use
- Interim Folsom Re-operation
- American River Water Resources Investigation
- American River Watershed Project
- Water Augmentation
- Water Forum Proposal EIR

The use of PROSIM and other predictive tools is a constant source of debate within the water community. However, these models represent the best tools available, as well as an accepted method of comparing potential actions and alternatives. In particular, the use of the models discussed below to assist in identifying Sacramento River temperature and salmon mortality effects is certainly reasonable given adaptations of these models are used for annual CVP operations by the Sacramento River Temperature Task Group. The Department of the Interior (DOI) believes that use of such models is appropriate and that to have created a wholly new approach, or to have analyzed impacts in an entirely qualitative fashion would have been inappropriate and subject to valid criticism. Absent any suggested better method, DOI believes the extensive modeling of potential impacts for a number of scenarios, including the simulated driest period of record (1928-1934, termed the "dry period or condition") represents a worst-case analysis and is more than adequate for NEPA- and CEQA-related impact assessment.

Models and Their Use

The primary model used to assess projected changes in water deliveries and CVP and SWP operations was U.S. Bureau of Reclamation's (Reclamation) PROSIM model. PROSIM is a monthly planning model used to simulate CVP and SWP operations. The model identifies potential water supply impacts from changes in operational assumptions associated with a proposed project or action. Key simulation results from model runs include CVP and SWP reservoir levels; timing and magnitude of Delta inflows, outflows, and exports; and CVP and SWP deliveries. Given PROSIM is a planning model, results are not presented as "stand alone" output, but rather are used on a comparative basis between an alternative scenario and a base no action simulation. Differences in PROSIM results between alternative simulations are intended to illustrate general trends and interrelationships between system resources.

Simulations of future conditions are based on the assumption that the historic hydrology that was recorded from 1922-1990 is representative of the range of hydrology that may occur in the future. This period is consistent with the future projected 2020 level hydrology developed for DWR Bulletin 160-93 that provides the basis for future land use and water demands. DWR Bulletin 160-93 was the most up-to-date information available at the time the EIS/EIR was initiated. Additionally, DWR Bulletin 160-98, which is the most recent DWR Bulletin and was released in 1998, used the same planning horizon (2020). Urban growth projections were actually reduced somewhat in Bulletin160-98, as such the use of Bulletin 160-93 projections provides a very conservative estimate of urban water demand. In an effort to not underestimate environmental effects, the lead agencies used the more conservative estimates from DWR Bulletin 160-93.

Particularly dry (1928-1934) and wet (1967-1971) periods from the historical record were analyzed separately to provide an indication of the impacts that would be projected to occur given a series of either particularly dry or wet years. Individual and series of years influence the associated carryover storage anticipated at each of the modeled system reservoirs, as well as the amount of water available for contract deliveries or environmental uses. Results of the modeling runs are presented in a number of places in the document, including Table 3-3 in Section 3.3 Water Resources, as well as within the text of Section 3.3 of the DEIS/EIR. The results of other models that use PROSIM output as input include:

- PROSYM (developed by Western Area Power Administration) for power-related impacts (Table 3-49, Section 3-10, Power Resources of the DEIS/EIR)
- Central Valley Production Model ("CVPM" developed by the California Department of Water Resources [DWR]) for agricultural-related impacts (Table 3-45, Section 3.9, Land Use of the DEIS/EIR)
- Central Valley Groundwater and Surface Water Model ("CVGSM" developed by Reclamation, DWR, and the State Water Resources Control Board [SWRCB]) for groundwater-related impacts (Figures 3-22 through 3-31, Section 3.3.2, Groundwater of the DEIS/EIR)

- Sacramento River Salmon Mortality Model ("LSALMON2"developed by Reclamation) for Sacramento River salmon-related impacts (Table 3-15, Section 3.5, Fishery Resources of the DEIS/EIR)
- Sacramento River Basin Temperature Model ("LSACTEM3"developed by Reclamation) for Sacramento River temperature-related impacts [Table 3-9, Section 3.4, Water Quality of the DEIS/EIR]
- Delta Simulation Model (developed by DWR) for Bay-Delta water quality-related impacts (pages 3-141 through 3-148, Section 3.4, Water Quality of the DEIS/EIR)

The actual running of the model requires a number of iterative steps to ensure that the simulation results are consistent with assumed operational constraints. Operational constraints include carryover storage requirements, Delta water quality standards, and timing of releases from CVP and SWP facilities. The primary assumptions included in the No Action Alternative and Existing Conditions scenarios are addressed in the thematic response titled "No Action Alternative/Existing Conditions Scenario and Range of Alternatives." As discussed in the thematic responses referenced above, and as clearly described on page 2-7 of the DEIS/EIR, fundamental assumptions used in the PROSIM modeling effort included meeting the flow and reservoir storage requirements of the 1993 Winter-run Biological Opinion (BO), the 1995 delta smelt BO, and the 1995 Bay/Delta Accord. These requirements are incorporated into the operating logic the model uses to simulate the CVP, in addition to all other agricultural, M&I, and environmental contracts and entitlements.

Subsequent to the modeling analyses conducted for the Draft EIS/EIR, the California Court of Appeal for the Third Appellate District struck down a portion of the Monterey Agreement signed by the Department of Water Resources and State Water Project (SWP) contractors in 1994. The agreement amendments changed the prior method of allocating water supply deficiencies, which reduced supplies to agricultural contractors before those to urban contractors were cut. The No Action and all other Trinity alternatives assume the Monterey Agreement is in place, and SWP supplies are allocated among agricultural and municipal and industrial (M&I) contractors evenly in proportion to their entitlement. The Monterey Agreement, as simulated in the No Action Alternative, has no effect on the level of SWP delivery, rather it only affects the delivery allocation to contractors south of the Delta once an overall delivery level has been determined. Therefore, the Monterey Agreement does not have any impact on the amount of water the SWP exports from the Delta. The amount of water exported is a function of demand, available supply, and export restrictions.

Accordingly, it is not anticipated that this court decision will have any significant impact on the results of the modeling analyses conducted for the Draft EIS/EIR.

Presentation of Results and Use of Data

A number of comments were received that questioned the presentation of results and suggested that a number of potential impacts were masked by "averaging." As described above, the quantitative analysis of anticipated system operations and associated water deliveries and effects on water quality and habitat were presented for dry- and wet-year conditions as well as an average over the simulation period. Contrary to the reviewers'

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assertions, this approach allows readers to see potential impacts in the context of three conditions, only one of which represents an average over the entire period. For some issue/resource areas, such as Section 3.9.2, Agriculture of the DEIS/EIR, only the dry and average period are included because under the wet condition, no impacts were found to occur (essentially during "wet" periods, there is an adequate quantity of water supply to meet all system demands). The dry period represents a worst-case scenario and as such meets the intent of both CEQA and NEPA.

In addition to the anticipated dry-period impacts, other sections of the document present simulated frequency curves to show the projected impacts of each alternative compared to No Action and the Existing Conditions scenario over the entire simulation period. Figures 3-16 through 3-20 of the DEIS/EIR identify the frequency of flows, reservoir storage (Shasta, Trinity, and Folsom), and water deliveries to various water service contractors north and south of the Delta. As shown on Figure 3-15 "How to Read a Frequency Distribution Curve," these figures present information in terms of the percent exceedance for a particular attribute (e.g., acre-feet of storage, or total water deliveries). This same approach is presented in Section 4.1.14 Cumulative Impacts Analysis to show impacts over the entire simulation period. This approach is consistent with the approach used in the CVPIA PEIS, and as such was determined to be a familiar method of presentation for stakeholders who participated in the development of that document and also commented on this DEIS/EIR.

Potential water quality and fishery impacts within the Sacramento River and the Bay-Delta were evaluated by reviewing simulated annual losses associated with each alternative over the simulation period. These numbers were not averaged, but rather reviewed as individual years, as illustrated on page 3-175 of the DEIS/EIR, which shows impacts to various runs of chinook salmon during the simulated dry years of 1924, 1931 through 1935, and 1977. Moreover, impacts to fall, winter, and spring chinook salmon were conservatively identified as significant under CEQA, given at the time the DEIS/EIR was released the results of Endangered Species Act (ESA) consultation were not yet known. Other reviewers, such as the California Department of Fish and Game (CDFG), who have regulatory authority over state-listed species suggested that such a modeled impact was **not** significant. The identification of this impact as significant again illustrates that the DEIS/EIR consistently evaluated impacts in a worst-case manner.

Cumulative Impacts Analysis

A number of reviewers asserted that the cumulative effects analysis was not inclusive enough or did not adequately disclose impacts. The lead agencies disagree with these assertions.

The cumulative effects analysis was developed as a means of arriving at a better decision rather than as an academic exercise in developing a perfect cumulative effects analysis (*Considering Cumulative Effects Under the National Environmental Policy Act*, Council on Environmental Quality, January 1997). For a cumulative effects analysis to help the decision-maker and inform interested parties, it must be limited to effects that can be evaluated meaningfully. Thus, the DEIS/EIR team assessed reasonably foreseeable events within reasonably foreseeable geographic (spatial) and temporal boundaries to present a meaningful impact analysis rather than present an entirely specious, speculative analysis, which could lead to erroneous conclusions. The lead agencies believe the cumulative impact analysis represents a reasonable projection of future conditions including all relevant and foreseeable past, current, and future actions in addition to the proposed action.

Several reviewers suggested other factors be included in the cumulative effects analysis. In response to these comments, Chapter 2 of the FEIS/EIR, Changes to the DEIS/EIR, includes additional quantitative analyses with regard to power resources, M&I land use, water quality, and fishery resources. These analyses simply reinforce the conclusions reached in the DEIS/EIR that impacts to these resources/issue areas would be potentially significant. Other issue areas or suggested analyses that were not conducted were determined to be either too speculative or vaguely defined to allow for any meaningful analysis. Speculating on the level of activity and effects that may occur due to unknown, uncertain, or undefined activities is clearly inappropriate in attempting to provide a meaningful report as the basis for a decision.

Some reviewers suggested that a full analysis of the potential cumulative impacts of maintaining Trinity Reservoir storage at 600,000 acre-feet (af) should be completed. As described in Section 4.1.14 Cumulative Impacts Analysis, a future cumulative condition was modeled to include the Preferred Alternative, all provisions of the Central Valley Project Improvement Act (CVPIA) as they were addressed in the CVPIA Programmatic Environmental Impact Statement (PEIS), and full allocation of all CVP contracts (i.e., assume all contracted water allocations are fully utilized by all contract holders). Given these assumptions, and as stated on page 4-14 of the DEIS/EIR, the modeling effort revealed that simulated storage levels in Shasta Reservoir would be below feasible operating levels during the simulated dry period (1928 through 1934) analyzed through out the document as well as one other critically dry year (1924).

The modeling effort assumed that a condition where Shasta was essentially inoperable would not be considered acceptable given U.S. Bureau of Reclamation would be unable to meet flow requirements related to the biological opinions (BO) for both the winter-run chinook salmon and the delta smelt, 1995 Bay/Delta Accord, as well as agricultural and M&I water deliveries. Consequently, the carryover storage requirement was reduced to

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400,000 af to account for the dry years identified above. The DEIS/EIR states on page 4-14 that impacts associated with the 600,000 af carryover storage scenario would be greater. Indeed, the DEIS/EIR makes quite clear that the collective impact of CVPIA, full contract allocations, and the Preferred Alternative is projected to result in severe operational constraints and associated significant impacts. To further model such impacts, and attempt to model a condition where additional actions would be taken, such as decreasing deliveries to water-rights holders in violation of their existing contracts, was considered much too speculative and thus inappropriate. Accordingly, the project description has been revised in Chapter 2 of the FEIS/EIR, Changes to the DEIS/EIR, to state that a carryover storage level of 400,000 would be maintained associated with the Flow Evaluation and Preferred Alternatives in particularly dry years if deemed necessary to avoid infeasible operations at Shasta Dam.

It is also important to note that, while outside the scope of this document, many agencies and organizations are examining ways to increase water supplies as part of overall water management systems in the Trinity Basin and Central Valley Project.

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Significance Criteria

The National Environmental Policy Act (NEPA) does not require the use of significance thresholds. The significance thresholds found in the DEIS/EIR reflect recent changes in the California Environmental Quality Act (CEQA). Because CEQA requires the feasible mitigation of all significant effects on the environment, it is commonly believed that EIRs must include "thresholds" that identify a level of impact that is "significant." In October 1998, the California Resources Agency issued a new version of its sample "Initial Study Checklist" (it is now found in Appendix G to the CEQA Guidelines). Trinity County relied heavily on Appendix G in formulating the significance thresholds found in the DEIS/EIR. As former Resources Agency General Counsel Maureen Gorsen has explained, Appendix G reflects "federal, state and local laws and regulations containing precise qualitative and quantitative standards that are commonly used thresholds in practice. In addition to providing more clear criteria to lead agencies in determining the significance of particular impacts, the new checklist integrates references to the numerous statutes dealing with specific environmental impacts (e.g., California Endangered Species Act) and standards developed by numerous regulatory bodies focused on particular environmental problems (e.g., San Francisco Bay Conservation and Development Commission, South Coast Air Quality Management District) in dealing with environmental impacts to certain important resources. In so doing, the Guidelines achieve the important statutory goal of integrating the requirements of CEQA with the environmental requirements of other laws."

As noted above, the significance thresholds used throughout the DEIS/EIR are based primarily on Appendix G, but they also reflect CEQA Guideline Section 15065 (mandatory findings of significance) and other accepted sources of professional and regulatory judgment regarding what constitutes significant levels of impacts on various environmental and natural resources. Even if the County has employed differing thresholds in the past, that fact would not bind that agency to continue using the same thresholds indefinitely. This document was prepared with the intent of employing up-to-date significance thresholds derived from CEQA. In any event, the significance thresholds, prepared for CEQA compliance purposes, should be understood to derive from Trinity County, rather than the lead agencies, and are not intended to be applicable to the legal requirements of either U.S. Fish and Wildlife Service (Service), National Marine Fisheries Service (NMFS), or U.S. Bureau of Reclamation (Reclamation) under federal law.

Accordingly**,** the identification of modeled impacts to listed aquatic and terrestrial species as significant in the DEIS/EIR per CEQA**,** even after mitigation**,** does not obligate the Service or NMFS to conclude that such impacts would adversely affect listed species under Endangered Species Act (ESA). The Biological Opinions (under separate cover) prepared by the Service and NMFS specify the anticipated affect of implementing the Preferred Alternative, as well as reasonable and prudent measures that will minimize the effects of incidental take of listed species.

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Reference

Gorsen. 1998. "The New and Improved CEQA Guidelines Revisions: Important Guidance for Controversial Issues." Appendix 6 in Remy et al. Guide to the California Environmental Quality Act (10th ed. 1999). Page 971. October.

Tribal Trust

As stated in the Purpose and Need Statement, page 1-4 of the DEIS/EIR, one of the needs for this action "results from Congress'… (4) confirmation of the federal trust responsibility to protect tribal fishery resources affected by the TRD…" Accordingly, the Preferred Alternative is intended to address part of "…the federal government's tribal trust responsibility to protect the fishery resources of the region's Indian tribes" (see page 3-205 of the DEIS/EIR). See Section 3.6 of the DEIS/EIR for further details.

Tribal Participation in the EIS Process

"Due to the unique federal/tribal relationship, and because of the prominent role the Hoopa Valley Tribe plays in Trinity River issues, the tribe serves as a co-lead for NEPA purposes. In addition, the Karuk and Yurok tribes have been active in developing the DEIS/EIR" (see page 5-1 of the DEIS/EIR). Several public meetings were held in and near Hoopa to seek input from the Native American community on the DEIS/EIR effort. See page 1-22 of the DEIS/EIR for further details. Tribal representation will continue to be sought on all current and future aspects of the restoration effort in the Trinity River.

Public Trust

Some commentors requested that the Final EIS/EIR contain a section that describes the responsibility of the U.S. Bureau of Reclamation (Reclamation) to protect the natural resources of the Trinity River under the State of California's public trust doctrine. The commentors state that the State's laws establish an ongoing trust duty to account for impacts of water allocations on public resources whenever feasible.

To our knowledge, application of the public trust doctrine to the operations of a federal reclamation project would be one of first impression, and thus, we do not believe it would be appropriate to include a section in the final document attempting to define conclusively these unresolved legal issues. As a general rule, Reclamation projects must operate consistent with state laws regarding the control, appropriation, use, or distribution of water used in irrigation, pursuant to Section 8 of the 1902 Reclamation Act, unless doing so would be contrary to federal law. Under the Mono Lake decision, National Audubon Society v. Superior Court of Alpine County, 658 P.2d 709 (Cal. 1983), the California Supreme Court held that the public trust doctrine, as recognized in California, imposes a duty of continuing supervision over the taking and use of appropriated water.

As described in the EIS/EIR, Congress on numerous occasions has addressed the issue of Trinity River Division (TRD) operations and the need to preserve and protect the fish and wildlife resources of the Trinity River. For example, the 1955 Act authorized the TRD as an integrated facility of the Central Valley Project, but also required the preservation and propagation of the Trinity River's fish and wildlife. This latter provision has been interpreted, in concert with the 1955 Act's legislative history, to require that only water that is surplus to the needs of the Trinity River be exported to the Central Valley. Construction and operation of the TRD, however, resulted in substantial impacts to the Trinity River fishery, primarily as a result of insufficient streamflows remaining in the Trinity River. This realization in the late 1970s led to the initiation of the Trinity River flow study by the Department of the Interior (DOI), as well as subsequent legislation from Congress directing the restoration of the Trinity River fishery to levels that pre-date the construction of the TRD so that tribal, sport, and ocean commercial fishermen could enjoy a sustainable fishery resource. Ultimately, the 1992 Central Valley Project Improvement Act called for the completion of DOI's flow study and the implementation of such recommendations, based on the best available scientific data, regarding necessary instream flows and appropriate TRD operations for the restoration and maintenance of the Trinity River fishery. Therefore, to the extent the State's public trust doctrine applies to the TRD, we believe that the Congressional mandates to restore and maintain the Trinity River fishery, and the resulting actions and decisions by DOI taken pursuant to these authorities, are fully consistent with the concepts of the State's public trust doctrine.

Main TOC

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