DECISION PROCESS FOR SELECTING THE DRAFT PREFERRED ALTERNATIVE

DECISION PROCESS TO DRAFT PREFERRED ALTERNATIVE

This document describes the process to reduce/refine the alternatives and select the draft preferred alternative. The draft preferred alternative will be the alternative that CALFED agencies believe would best fulfill the CALFED Bay-Delta Program's mission, given environmental, technical, and economic considerations.

The process begins with 17 alternative variations to meet the Program objectives for the Bay-Delta system. Through a narrowing and evaluation process, a draft preferred alternative will be developed near the end of 1997 for inclusion in the draft programmatic EIR/EIS. Following revisions after public comment, a final preferred alternative will be selected and included in the final EIR/EIS near the end of 1998.

Summary of Decision Process

Information necessary for selection of a draft preferred alternative will come from several ongoing efforts (see Attachment I for more detail) including:

- Impact analysis
- Prefeasibility studies
- Other institutional input (such as ESA consultations, etc.)
- Implementation strategy (assurances plan, financial plan)
- Technical workgroups

As these efforts progress, the amount of information available to make decisions about each of the alternatives will increase and become more refined. Each step in the process may result in changes in some or all of the initial 17 alternatives. It is conceivable that the alternatives evaluated in Step 2 of the process and the eventual draft preferred alternative will differ in some way from the original 17 alternatives. The process is designed to make use of this information as it becomes available and includes two basic steps:

Step 1 - Alternatives Narrowing - The intent of this step is twofold: (1) eliminate or modify those alternatives that have technical problems; and (2) reduce the number of alternatives that achieve the same Delta conveyance function. By looking primarily at engineering/technical feasibility and costs, some conveyance configurations (and associated alternatives) can be eliminated or modified to improve performance.

Step 2 - Detailed Evaluation - The intent of this step is to array information about how well each of the remaining alternatives meets the Program objectives and solution principles, and to array the resultant impacts attributable to each alternative. The alternatives with the higher relative ranking will be compared for overall balance and inherent tradeoffs using the solution principles. The information will be used by

CALFED agencies and stakeholders to compare and contrast the alternatives leading to selection of a draft preferred alternative. As more information becomes available from impact analysis, prefeasibility studies, technical workgroups, etc., efforts outlined in Step 1 will be repeated to determine if additional alternatives should be eliminated or modified.

Step 1 - Alternative Narrowing

The intent of this step is twofold: (1) eliminate or modify those alternatives that have technical problems; and (2) reduce the number of alternatives that achieve the same Delta conveyance function.

The alternatives narrowing is not intended to provide the detailed evaluations necessary to select the draft preferred alternative. This step provides a "coarse" screen for the alternatives which can be eliminated or modified based on the available information. Program solution principles have been applied throughout development of the 17 alternative variations and will also be used in their evaluations. Not enough information will be available for complete evaluation with solution principles until Step 2. However, the evaluation contained in this alternative narrowing step can be considered a "coarse" application of the "implementable" solution principle.

The focus of Step 1 is on the Delta conveyance used with each alternative. Most alternatives have unique conveyance configurations that can be compared and evaluated in this narrowing process. Current recommendations from technical workgroups, modeling results, prefeasiblity studies, preliminary information from impact analysis and other information will be used in the evaluation. The following criteria will be used in the alternative narrowing step:

Identify and eliminate technical problems (technical problems not evident when the alternatives were formulated and which severely limit an alternative's success);

- Identify alternatives with engineering/technical problems which must be resolved for the alternatives to proceed.
- Modify each alternative, if possible, to remove the technical problems.
- If modifications to the alternative can not solve the problem, the alternative is not practicable and will be eliminated.

Reduce the number of alternatives (that achieve the same Delta conveyance function);

- Identify alternatives that meet Program objectives approximately the same and achieve the same Delta conveyance function.
- Use engineering/technical and cost evaluations to compare the Delta conveyance. Consider adverse impacts of each alternative. If the one alternative has significantly higher costs for conveyance and/or greater adverse impacts, it is not practicable and will be eliminated from further consideration.

- Repeat above analysis with other alternatives.

Step 1 will be completed in August 1997. The procedure will eliminate those alternatives with major technical problems and those that are not cost effective compared to similar performing alternatives. The procedure will retain those alternatives that represent unique solutions to problems in the Bay-Delta system. The key to this step is documentation of the information and the reasoning behind eliminating or modifying each alternative.

Step 2 - Detailed Evaluations

This step will simultaneously consider how well each alternative meets the Program objectives, the resultant beneficial or adverse impacts, and how well each meets the solution principles. This step focuses on the differences between the alternatives while recognizing that many portions of the alternatives are the same. Key information will be ranked and displayed for each alternative.

Looking simultaneously at all the information on how well the alternatives meet the objectives, impacts, and solution principles would make selection of a preferred alternative very difficult due to the large amount of information. Many portions of the alternatives do not vary from one alternative to another. Therefore the performance of certain aspects of the alternatives will be the same for some Program objectives and impacts. For example, one objective for ecosystem quality is to "**Increase Amount of High Quality Tidal Slough Habitat** to allow increased primary biological production". Each alternative includes the same target of 100 to 150 miles for restoration of tidal slough habitat. Therefore, there is no difference between the alternatives for this objective and no need to focus on the information to help select a draft preferred alternative.

On the other hand, there are aspects that do differ between alternatives and it is these aspects, or distinguishing characteristics, that will be used to select the draft preferred alternative. The distinguishing characteristics between the alternatives are the ones dependent on the storage/conveyance configurations and on the resultant water flows.

Several characteristics have been identified for each of the four CALFED problem areas that distinguish areas where the alternatives may differ. Attachment II shows how each of these distinguishing characteristics are linked to objectives, impacts, and solution principles. Following are the distinguishing characteristics and the criteria that will be used to provide the needed information to distinguish the alternatives:

Water Quality

All alternatives include a program to reduce the total pollutant load entering the Delta and to manage the timing of pollutant discharges. The major water quality characteristics

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which may vary by alternative are:

- **In-Delta water quality.** - In-Delta water quality may get better or worse depending on the method for Delta conveyance. Delta Simulation Model (DSM) runs will model Delta salinity distributions under a wide range of hydrologic conditions for each alternative. The DSM will also model Delta circulation (flow patterns) which affects salinity and related water quality parameters. The complex salinity and flow relationships will be evaluated to determine relative performance of each alternative.

- **Export drinking water quality.** - Water exported for drinking water could have better or worse water quality. Diversion location and information from the DSM runs will be used to estimate bromide levels as an indicator of export water quality. The DWR disinfection byproducts model will be used to estimate organic carbon concentrations at key export locations. Alternatives with the lowest estimated bromide levels and total organic carbon at key diversion locations will be given preference in the ranking.

Ecosystem Quality

All alternatives include approximately the same level of habitat restoration, screening of unscreened non-project diversions, environmental flow, and other improvements described in the Ecosystem Restoration Program Plan. The major ecosystem quality characteristics which may vary by alternative are:

- **Export diversion effects on fisheries.** - Export diversion effects on fisheries could get better or worse. The number of project diversions and the locations and the amount of water diverted at each location varies by alternative. A relative qualitative ranking will depend on the species commonly present at the diversion location, timing at which endangered species are present, the flexibility in diversion timing provided by storage and multiple intakes, protection for upstream and downstream migrants, and the total quantity and timing of exported flow. The qualitative assessment will provide the highest rank to the alternative with the fewest negative diversion effects on the aquatic environment.

- **Delta flow circulation.** - The Delta Simulation Model results show Delta circulation (flow patterns) which affects movement (transport) of fish and entrainment. A relative qualitative assessment will provide the highest rank to the alternative with the greatest net benefit to fishery resources.

- **Storage and Release of Non-environmental Water.** - Water stored and released for non-environmental uses may provide some indirect fisheries/habitat benefits or adverse impacts. Model runs of system operations will provide a coarse measure

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of expected changes in flow patterns. The timing and degree of these changes will determine the extent to which fisheries or habitats will benefit or incur adverse impacts. Consideration of changes in flows (e.g. Sacramento and San Joaquin River flows) to transport fish to the Delta will be considered. A relative qualitative ranking will be developed.

Levee System Integrity

Protection for in-Delta land use, infrastructure, and water quality is essentially the same for all alternatives. The location and configuration of levees may vary somewhat to accommodate the habitat and conveyance features for each alternative but these changes do not result in different levels of protection or risk to the system. The major system integrity characteristic which may vary by alternative is:

- **Risk to export water supply facilities and operations.** - Risk to water supply facilities and operations can change depending on the method of Delta conveyance. While the levee system integrity program seeks the same level of protection for all alternatives, risk to the export water supply is lessened by alternatives using an isolated Delta conveyance. The alternatives with the lowest risk to water supply will be given the highest ranking.

Water Supply Reliability

The major water supply characteristics which may vary by alternative are:

- **Water supply opportunities.** - Water supply opportunities will vary among the alternatives. Modeling runs of system operations (DWR Simulation Model) provide estimates of the water supply opportunities for each alternative. Relative comparisons of the increase, or decrease, in water supply opportunities will be used to compare the alternatives. In general, CALFED will give greatest consideration to changes in average annual water supplies, rather than water supply indicators focusing on dry or critical period supplies.

- **Water transfer opportunities.** - Water transfer opportunities will vary among the alternatives. Modeling runs of system operations will be used to estimate the physical capacity (upper limit) of the export facilities available to facilitate water transfer with each alternative. The amount of water that the market may be willing to transfer for different water costs will be estimated to provide another estimate of the water potentially transferable with each alternative. Relative comparisons of the increase, or decrease, in transferable water will be used to evaluate the alternatives. The highest rank will be given to the alternative with the best match between transport opportunity and demand for transfers.

- **System operational flexibility.** - System operational flexibility may vary among the alternatives. A relative qualitative ranking will depend on the diversion location(s), the flexibility in diversion timing provided by storage and multiple water diversion intakes. The qualitative assessment will provide the highest rank to the alternative with the most flexibility for water supply operations.

- **South Delta channel stages.** - The south Delta channel stages (water levels) may vary among the alternatives. A relative qualitative ranking will depend on the location of the intakes for the south Delta pumping plants, conveyance configuration, and the use of flow barriers. Delta Simulation Model runs will also show Delta circulation as mentioned above under water quality.

Other Distinguishing Characteristics

- **Total costs. -** Total costs will vary among alternatives. Capital and operating costs will be estimated from prefeasibility analyses. All costs will be annualized or capitalized for a relative ranking of the alternatives; alternatives with the lowest cost will be given the highest rank. This analysis will be performed under the assumption that the financial principles remain the same for each alternative but that a preliminary indication of cost breakdown between the general public and user groups may be available.

- **Assurances and effectiveness.** - Assurances and effectiveness may vary among the alternatives. A relative qualitative ranking will give the highest rank to the alternative judged to have the best assurance package.

- **Habitat disturbance.** - Habitat disturbance from implementing each alternative will vary. This information will be available directly from the impact analysis for the EIR/EIS. The highest rank will be given the alternative with the least habitat disturbance.

- **Land use changes.** - Land use changes will vary by alternative. This information will be available directly from the impact analysis for the EIR/EIS. This will be a summary including such items as the amount of agricultural land that goes out of production due to the implementation of the Program, etc. The alternatives will be given relative rankings. The highest ranking will be given to the alternative with the least land use change.

- **Socio-economic impacts.** - Socio-economic impacts will vary among the alternatives. The highest rank will be given the alternative with the least socio-economic impacts (such as impacts on commercial and recreational fishing, farm workers, and other third party impacts).

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- **Consistency with the solution principles.** - Solution principles embody the balancing (considering tradeoffs and incremental differences between alternatives) of all the distinguishing characteristics. The relative qualitative rankings of the alternatives against the solution principles will consider each alternative cost, assurances, ability to satisfy the Program objectives, and to minimize impacts.

A need for additional distinguishing characteristics may become apparent as more detailed information on benefits and adverse impacts is developed. Attachment II provides more information on how alternative performance will be displayed for Program objectives, impacts, and solution principles.

The decision-makers will be provided with a matrix (decision matrix) containing information on how alternatives perform on key issues (distinguishing characteristics, objectives, impacts, solution principles) of interest. The decision matrix will be developed using several supporting matrices containing more detailed information. These supporting matrices will provide a through documentation and summary of how results were derived.

A recommended draft preferred alternative will be included with the decision matrix. This effort will require simultaneously examining how well alternatives meet the Program objectives, the resultant impacts, costs, assurances, and solution principles in a balanced fashion. Selection of a recommended draft preferred alternative will be based on the collective judgement of CALFED staff and CALFED agencies.

Attachment I
Concurrent Efforts

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Concurrent Efforts

The information necessary for the narrowing and evaluation process will come from several concurrent efforts under the umbrella of the programmatic EIR/EIS. As these concurrent efforts progress, the amount of information available to make decisions about each step of the narrowing and evaluation process will increase and become more refined. These efforts include the following.

Impact Analysis

The primary technical evaluations during Phase II of the CALFED Bay-Delta Program will be the impact analyses for the programmatic EIR/EIS. The impact analyses will examine the differences between the alternatives (including the existing condition and the no-action alternative) at the program level of detail and present the information for decisions on a broad range of alternatives. The impact analyses will provide understanding on how the storage and conveyance components interact with the other components that make up the alternatives, including ecosystem restoration, water quality, levee system integrity, and water use efficiency.

The main purpose of the impact analyses is to compare and contrast the alternatives rather than to optimize sizes, select specific configurations, or select specific sites for any actions within the alternatives. In many cases, the impact analysis will simply provide descriptions of how conditions would be different between the existing condition, the no-action, and the programmatic alternatives. Impact analysis will cover hundreds of individual variables which fall into 26 resource areas:

- Fisheries and Aquatic
- Vegetation and Wildlife
- Surface Water Hydrology
- Groundwater Hydrology
- Riverine Hydraulics and Delta Hydrodynamics
- Water Management, Facilities, and Operations
- Flood Control Operations
- Levee System
- Water Quality
- Agricultural Economics
- Municipal and Industrial Water Supply Economics
- Fish, Wildlife, and Recreation Economics
- Power Production and Energy Economics
- Regional Economics
- Land Use
- Flood Control Economics
- Geomorphology and Soils
- Air Quality

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- Noise
- Visual
- Traffic and Navigation
- Cultural Resources
- Social Well Being
- Public Health and Environmental Hazards
- Recreation
- Utilities and Public Services

Analytical methods for use in identifying the potential impacts for these resources were discussed at a workshop in April 1997. The workshop packet and summary of comments and answers from that workshop contain descriptions of the methods. Depending on availability of adequate analytical information to assess the impacts, the evaluation may be a quantitative assessment (Modeling analysis, etc.), or a qualitative assessment (professional judgement). Reports for each resource area will summarize and compare the impacts for each alternative.

Impact analysis began in March 1997. Preliminary information on potential impacts will initially be available in administrative drafts of impact reports in July 1997 and will be used in Step 1. The impact analyses are scheduled for completion by fall 1997 and will be used in Step 2.

Prefeasibility studies

Prefeasibility studies will be conducted for the storage and conveyance, water quality, levee system integrity, and ecosystem restoration components; studies for storage and conveyance are currently underway and the others will start soon. These studies will provide more detailed information than that obtained from the impact analyses for the programmatic EIR/EIS.

The prefeasibility studies provide more detailed information on costs, water supply, flows, water quality, site impacts, and other factors for representative combinations of components. For example, the feasibility of implementing offstream storage to enhance water supply opportunities depends on the actual locations available for development such as topography, geology, environmental concern, proximity to a water supply source, and existing conveyance facilities.

While the impact analyses will evaluate a broad range of facility sizes, the prefeasibility studies provide information for additional sizes within that range. For example, if the range of north of Delta storage is 1 million acre-feet to 3 million acre-feet for an alternative, then the impact analysis will include examination of benefits and adverse impacts for the low and high end of the range, and perhaps an additional analysis at the mid-range. The prefeasibility analyses will provide additional detail that may lead to narrowing the range of sizes for the preferred alternative (for example, down to the 1 million acre-feet to 1.5 million acre-feet range).

The programmatic EIR/EIS will primarily display benefits and adverse impacts of the alternatives and will include only program level costs for the ends of the range being studied. The

prefeasibility studies will provide more detailed cost information to assist the stakeholders and decision makers in their considerations on the "preferred alternative". Storage/conveyance prefeasibility studies have been prepared for a range of potential reservoirs and conveyance concepts. These concepts representative of the range of the types, costs, and impacts of facilities which have been historically identified. They are structured so they can be fit together in different ways or modified to form the storage and conveyance portions of each alternative. Prefeasibility studies for Delta conveyance concepts include:

- Chain of Lakes
- Isolated East Delta Conveyance
- Multiple Intakes Delta Conveyance
- Isolated Sacramento Ship Channel Conveyance
- Through Delta Conveyance 1 (large habitat with conveyance) and Through Delta Conveyance 2 (alternate size and location for large habitat with conveyance)
- South Delta Program
- North Delta Program

Prefeasibility studies for storage concepts include:

- In-Delta Storage
- Cottonwood Creek Reservoir
- Lake Berryessa Enlargement
- Los Banos Grandes Reservoir
- Millerton Lake Enlargement
- Montgomery Reservoir
- Orestimba Reservoir
- Red Bank Reservoir Complex
- Shasta Lake Enlargement
- Sites/Colusa Reservoir
- Thomes-Newville Complex
- Los Vaqueros Enlargement

Prefeasibility studies for other conveyances are:

- Chico Landing Intertie
- Delta-Mendota Canal Enlargement
- Lake Berryessa Intertie
- Mid Valley Canal - North and Main
- Tehama-Colusa Canal Enlargement (Including new intake)
- Tehama-Colusa Canal Extension

Draft prefeasibility reports on these storage and conveyance facilities are be available for comparing alternatives in July 1997. Prefeasibility studies on the actions included in the ecosystem program (ERPP), water quality program, water use efficiency program, and levee system integrity program will continue into mid-1998. Preliminary information from these

studies will be available in October 1997.

Reservoir Site Screening

Each alternative includes a relatively specific method for Delta conveyance. However, for storage, the alternatives include more generic descriptions that do not identify specific sites. For example, surface storage can be identified as being upstream of the Delta in the Sacramento or San Joaquin River basins, aqueduct storage (to distinguish storage of exported water from surface storage tributary to the Delta in the San Joaquin basin), or in-Delta storage.

To sort through the many potential reservoir sites, a screening process is being conducted to identify the most promising sites to carry forward with the alternatives. The sites will initially be screened based on engineering feasibility and cost and a "red-flag" review to eliminate sites with excessive problems. This screening will not arrive at a selected site for each type of storage but will identify a reduced set of the most promising sites. Information on the results of this initial screening will be available in the fall of 1997. The screening process does not provide new information for narrowing alternatives towards a draft preferred alternative, but its does contribute to going forth with a narrow set of potential sites in the preferred alternative.

Other institutional input

A programmatic 404(b)(1) analysis is being prepared. The package will document the process for developing and narrowing the broad range of alternatives beginning in Phase I of the CALFED Bay-Delta Program and continuing through Phase II. A draft of the package will be included with the public draft programmatic EIR/EIS. The final document will be prepared in 1998. The preparation of the 404(b)(1) document is essentially a documentation of the reservoir site screening and alternatives narrow and evaluation. It does not provide new information for narrowing alternatives towards a draft preferred alternative, but its approval does allow going forth with the preferred alternative.

A draft format and methodology for preparing a programmatic Habitat Conservation Plan (HCP) will also be included with the public draft programmatic EIR/EIS. The HCP is being prepared in compliance with the Endangered Species Act to assess the impacts of the proposed action on preservation, conservation, and enhancement of fish and wildlife resources. The programmatic HCP will be prepared in 1998. The HCP does not provide new information for narrowing alternatives towards a draft preferred alternative, but provides for more efficient coordination with the EIR/EIS process and ultimate selection of a preferred alternative.

Assurances Plan

The assurances work group is evaluating five alternative management structures and an array of tools to help assure that a preferred alternative will be implemented and operated as agreed. The management structures include:

- **Informal Coordination Among Agencies** - Existing state and federal agencies implement the Bay-Delta Program. A CALFED-like collaborative effort among the state and federal agencies assures coordination in implementation.

- **Ecosystem Restoration Joint Authority** - A Joint Authority consisting of the USFWS, NMFS, and DFG would be formed to implement the ecosystem restoration component of the CALFED Program.

- **Ecosystem Restoration Joint Authority and Operations Joint Authority** - Two new joint authorities would be formed to implement the ecosystem restoration component and to operate the state and federal water project Delta facilities as well as new storage and conveyance facilities. The ecosystem restoration joint authority would be formed as described above. The operations joint authority would be formed by DWR and USBR.

- **Delta Ecosystem Restoration Agency** - A new agency would be formed in order to oversee implementation of the ecosystem restoration component.

- **Ecosystem Restoration and Operations Agency** - A new agency would be formed to implement the ecosystem restoration and water supply reliability components.

The tools that may be coupled with these alternative management structures include:

- state and/or federal legislation
- voter referenda
- regulations
- administrative agency orders
- contracts
- easements
- financing mechanisms
- physical constraints

The workgroup will continue to refine the differing means of assuring the preferred alternative. A draft of their preliminary recommendations will accompany the draft programmatic EIR/EIS. Broad information showing some unique assurances packages for the various alternatives is expected to be available to assist in selection of the preferred alternative.

Financial Plan

The financial workgroup is evaluating structures for a financial plan and have developed a set of financial principles relating to allocation of costs to Program beneficiaries. The following principles do not currently help distinguish the alternatives or select a draft preferred alternative. However, they do provide reasonable guidance for development of the financial plan and

eventual cost allocation. The principles which will guide the final cost allocation are:

- Consistent
- Fair
- Flexible
- Inexpensive
- Rational
- Reliable
- Sufficient
- Understandable

Work will continue on refining the financial plan with the final recommended plan available in 1998. Final cost allocation will not be known until the final EIR/EIS near the end of 1998. However, a preliminary indication of cost breakdown between the general public and user groups may be available to assist in selection of a draft preferred alternative in fall 1997.

Technical Workgroups

Technical workgroups continue to provide more refined input to the process in several areas:

- Ecosystem Restoration
- Water Quality
- Levee System Integrity
- Water Use Efficiency
- Water Transfers
- Assurances
- Financial
- Fish Screening

These groups continue to meet periodically. Information developed by the workgroups may be used in Steps 1 and 2.

As these concurrent efforts progress, the amount of information available to make decisions within each step of the narrowing and evaluation process will increase and become more refined.

Attachment II
Supporting Documentation

Supporting Documentation

This section provides more information on Step 2, Detailed Evaluation. While Step 2 uses **distinguishing characteristics** to manage the amount of information used in the comparisons between the alternatives, backup information will be available on how well each alternative meets the program objectives, the resultant impacts of each alternative, and application of the solution principles. The 16 distinguishing characteristics actually represent a consolidated set of the objectives, impacts, solution principles, and other data (costs, assurances, etc.) that make the most difference in selection of a draft preferred alterative. Following is more detail on information that will be documented for selection of the draft preferred alternative.

Rank How Well Each Alternative Meets the Program Objectives

All alternatives are intended to meet the Program objectives. However, the 17 alternative variations provide different ways of meeting the Program objectives. Due to the different alternative configurations, one alternative may meet some objectives better than other alternatives but may not meet other objectives as well.

Early in Phase I of the Program, CALFED staff, agencies, and stakeholders identified a number problems in the Bay-Delta system. Objectives were also developed to solve problems for the ecosystem, water quality, levee system vulnerability, and water supply reliability. Approximately 133 objectives and subobjectives were identified by the process. However, most of these can be further divided into several geographic areas or by different water year types. Considering all these divisions, approximately 260 objectives and subobjectives must be considered.

Since many parts of the alternatives are identical, the performance of all alternatives will be the same for some Program objectives and subobjectives. The rankings for these objectives have little influence on selection of a draft preferred alternative and will be documented and temporarily set aside to simplify alternative comparisons. The analyses will concentrate on ranking and comparing alternatives based on the performance for objectives and impacts that are addressed by the distinguishing characteristics of the alternatives (see discussion on pages 4-7 of the *Decision Process to Draft Preferred Alterative*) that are different between alternatives. Depending on availability of adequate analytical information to assess how well an alternative meets a Program objective, the evaluation may be a quantitative assessment (Modeling analysis, etc.), or a qualitative assessment (professional judgement).

Of more than 260 objectives and subobjectives, approximately 32 objectives and subobjectives may vary by alternative. These are primarily objectives that change with water flow or other changes associated with the storage and conveyance configurations. The following tables show the objectives and subobjectives which vary by alternative and the distinguishing characteristics that provide information for each.

Ecosystem Quality Objectives

Ecosystem Quality Objectives that Vary by Alternative	Distinguishing characteristics which provide information
A. **Improve and Increase Aquatic Habitats** so that they can support the sustainable production and survival of native and other desirable estuarine and anadromous fish in the estuary.	Export Diversion Delta Flow Circulation Storage and Release of non-eniro water
5. **Provide Sufficient Transport Flows** at the proper times to move eggs, larvae, and juvenile fish from spawning habitats to nursery habitats in the Delta and Bay.	Same as above
c. **Reduce the Transport of Young Fish from North to South across the Delta** and the entrainment of fish in the Delta to increase the survival and abundance of estuarine and anadromous species.	Same as above
6. **Reestablish Appropriate upstream and downstream movement** of anadromous and estuarine fish.	Same as above
a. **Enhance Upstream Migration of Adult Salmonids** through the Delta.	Same as above
b. **Increase Successful Outmigration of Juvenile Fish** through the Delta.	Same as above
c. **Enhance Upstream Migration of Adult Estuarine Fish** into the Delta and river spawning areas.	Same as above
7. **Improve the Productivity of the Bay-Delta Aquatic Habitat Food Web** to support sustainable populations of desirable fish (and other) species.	Same as above
a. **Reduce Entrainment** of biological productivity throughout the aquatic food web.	Export Diversion
d. **Increase the Residence Time of Water in Delta Channels** to increase plankton productivity and reduce undesirable algal-mat growth in the Delta.	Delta Flow Circulation
8. **Reduce Concentrations of Toxic Constituents and Their Bioaccumulation** to eliminate their adverse effects on populations of fish and wildlife species.	Delta Flow Circulation Storage and Release of non-eniro water
B. **Improve and Increase Important Wetland Habitats** so that they can support the sustainable production and survival of wildlife species.	Storage and Release of non-eniro water
C. **Increase population health and population size** of Delta species to levels that assure sustained survival.	Export Diversion Delta Flow Circulation Storage and Release of non-eniro water

1.	**Contribute to the recovery** of threatened, endangered or species of special concern.	Same as above
2.	**Increase populations** of economically important species.	Same as above

Water Quality Objectives

Water Quality Objectives that Vary by Alternative			Distinguishing characteristics which provide information
A.	Provide good water quality in Delta water exported for **Drinking Water** needs.		In-Delta water quality Export drinking wq
	3.	**Minimize the Cost of Treating** Delta water and continue to meet the existing drinking water quality standards.	Same as above
	5.	**Improve Raw Water Quality** and/or treatment to comply with stricter future drinking water regulations.	Same as above
B.	Provide good Delta water quality for **Agricultural** use.		Same as above
	1.	Improve or manage water quality to **Maintain or Improve Agricultural Economic productivity** by reducing water quality contaminants that reduce crop productivity on lands receiving Delta water, reduce cropping choices, or increase costs.	Same as above
C.	Provide good Delta water quality for **Industrial** use.		Same as above
	1.	**Reduce Industrial Treatment and/or Production Costs.**	Same as above
D.	Provide good Delta water quality for water **Recreational** use within the Delta.		In-Delta water quality
	1.	**Reduce Health Risk** to recreationists.	Same as above
E.	**Provide improved Delta water quality for Environmental needs.**		Same as above

Water Supply Reliability Objectives

Water Supply Reliability Objectives that Vary by Alternative	Distinguishing characteristics which provide information
A. **Reduce the conflict among beneficial water users** and **improve the ability to transport water** through the Bay-Delta system.	Water supply opportun. Water transfer opp. System op. flexibility So. Delta channel stage
1. **Maintain adequate Bay-Delta system supplies to meet the existing and future short- and long-term in-Delta beneficial use needs.**	Same as above
2. **Improve Bay-Delta system export water supply and timing to help meet reasonable existing and future short-term and long-term needs.**	Same as above
3. Improve the adequacy of Bay-Delta water to meet short-and long-term expected needs for **Delta outflow** (see Ecosystem Quality section).	Water supply opportun. Water transfer opp. System op. flexibility
B. **Reduce the uncertainty of Bay-Delta system water supplies** to help meet short- and long-term needs.	Same as above

Levee System Integrity Objectives

Levee System Integrity Objectives that Vary by Alternative	Distinguishing characteristics which provide information
B. **Manage the risk to water supply facilities and operations** in the Delta from catastrophic inundation of Delta islands.	Risk to water supply facilities and operations
2. **Manage the risk of interruption of export water supply** which can result from sudden catastrophic island inundation and the resultant salinity intrusion. (See Water Supply Objective Statement).	Same as above

Rank How Well Each Alternative Minimizes the Resultant Impacts

The process to rank the alternatives by the least adverse consequences will come directly from the impact analysis for the programmatic EIR/EIS. Reports for each of 26 resource areas will summarize and compare the impacts for each alternative. The alternatives which minimize adverse consequences will be provided the highest ranking.

Several distinguishing characteristics for the alternatives were outlined in the accompanying *Decision Process to Draft Preferred Alternative* report. The information for most of these will come directly from the impact analysis. The habitat disturbance, socio-economic impacts, and land use distinguishing characteristics summarize the major impacts for use in selection of a draft preferred alternative.

Decision Matrix

The decision-makers will be provided with a matrix (decision matrix) containing information on how alternatives perform on key issues (distinguishing characteristics, objectives, impacts, solution principles) of interest. The decision matrix will be developed using several supporting matrices containing more detailed information. These supporting matrices will provide a through documentation and summary of how results were derived.

The decision matrix will provide comparisons of alternatives and a summary of important information needed for selection of a draft preferred alternative in one display. For each alternative, the decision matrix will indicate how it is judged to perform with respect to important impacts, Program objectives, and solution principles. A matrix, with supporting information, showing alternative performance for the distinguishing characteristics will provide a compact way to compare the major alternative differences.

Recommended Draft Preferred Alternative

A recommended draft preferred alternative will be included with the decision matrix. This effort will require simultaneously examining how well alternatives meet the Program objectives, the resultant impacts, costs, assurances, and solution principles. Selection of a recommended draft preferred alternative will be based on the collective judgement of CALFED staff and CALFED agencies considering the following:

- Alternatives that rank highest against the Program objectives.
- Incremental differences between the additional cost incurred or the additional adverse impacts incurred by an alternative which meets the Program objectives better than another alternative. For example, one alternative may meet the Program objectives slightly better than another alternative but may have much higher costs or much higher adverse impacts. The incremental costs, impacts, and benefits should be considered in seeking a reasonable balance.
- Uncertainty in analytical methods. In addition, there is an understanding that the

more an alternative departs from current measurable conditions, the more uncertain the ultimate success. Therefore, the ability to adaptively manage the various portions of the alternatives will be considered.

The best alternative will be the one that contributes highly to achieving the Program objectives, with manageable (can reasonably be mitigated) adverse impacts, at a reasonable cost, and meets the Program solution principles in a balanced fashion. The recommended draft preferred alternative and the decision matrix and supporting information will go to the CALFED agencies for selection of the draft preferred alternative.

ALTERNATIVE NARROWING PROCESS EXAMPLE — ALTERNATIVE 3C

Alternative Narrowing Process
Example
Small Isolated Delta Conveyance Facility
Alternative 3C

Alternatives 3C and 3A are identical except for the type of isolated facility used to convey 5,000 cfs from a diversion on the Sacramento River at Hood to the Clifton Court Forebay. Alternative 3C proposes a pipeline option for the isolated facility, while alternative 3A proposes an open canal.

The objectives of both alternatives are the same. Both alternatives propose new "best feasible technology" fish screens at Hood, North and South Delta Improvements, no new storage, CVP & SWP improvements, similar operational policies and the four common programs.

The differences lie in the details of the isolated facility. Although the alignments of the isolated facilities in both alternatives are the same, the pumping plants, conveyance types, siphons, bridge and utility relations, right-of-way, environmental impacts, and costs differ. These differences are discussed below:

Pumping Plants

Both pumping plants would lift up to 5,000 cfs into the conveyance facility. Alternative 3A would utilize a single low lift (10 feet) pumping plant located within the first two miles of the canal. To overcome the hydraulic head loss in the pipeline conveyance option, alternative 3C requires a pumping plant with lift capability of 150 feet. The increased operating lift would substantially increase operating and energy cost. The annual energy cost for the canal option pumping plant is around $1 million per year, whereas the pipeline option is around $12 million per year. Given that the site acreage for the two pumping plants are about the same there would little differences in environmental impacts between the two plants.

Conveyance Types and Environmental Impacts

Alternative 3A proposes a conveyance facility that is an unlined canal resembling the existing channels in the Delta. The 44-mile canal would generally consist of a trapezoidal section with gentle side slopes and a top width of around 340 feet and a depth 27 feet. The pipeline facility in alternative 3C would consist of three side-by-side buried 18 foot inside diameter concrete pipelines. The total distance of the pipeline route is approximately the same as the canal

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alignment. The construction activities to bury the pipeline would disturb about half the acreage as the canal. The impacted area in each option would be mitigated on a replacement of in kind land on a 1 to 1 acreage ratio.

Siphons

In order to convey water across rivers and sloughs, the open canal option in alternative 3A would require 11 inverted siphons. The siphons would cross under four major rivers and seven sloughs. The pressurize buried pipeline in alternative 3C would cross under the same waterways. The environmental impacts of these crossings would be similar for both alternatives.

Bridge and Utility Relocations

For the open canal option in alternative 3A, bridges would be constructed over the canal for all county roads, state highways, and railroad crossings. In alternative 3C the pipeline will cross under the same facilities. The construction impacts of the two methods would be similar; however, the elevated bridges across the canal would have more visual impact than the buried pipeline.

Right-of-Way

The right-of-way width for the open canal option would be 1,000 feet for the 44-mile length and would include a total acreage of 5,330 acres. The majority of the disturbed land would be agricultural. Much of the acreage would be used for spoil disposal which could be converted into wildlife habitat. The pipeline option in alternative 3C would require a right-of-way of approximately 2,515 acres of land, about half the acreage required by alternative 3A. The impacted area in each option would be mitigated on a replacement of in kind land on a 1 to 1 acreage ratio.

Costs Comparison

The following table compares the capital cost of the two alternatives. The costs were derived from the references listed in the table and were adjusted to include the mitigation acreage. Each item in the table includes contingencies and engineering, legal, and project administration costs.

Although the table displays a single number for comparison purposes, the costs are preliminary and should be expressed as a range -10% to +25%.

Costs of the canal option are as of March 1997. Where as the cost for the pipeline were estimated

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one year earlier in January 1996. The escalation of cost between the two dates has little impact on this comparison.

Isolated Delta Conveyance Facility (5,000 cfs) ($Millions)		
Cost Item	**Canal[1]**	**Pipeline[2]**
Intake Facilities	$152	$132
Pumping Plant	46	125
Bridge & Culverts	42	
Canal (includes Right-of-Way Costs)	288	
Siphons	226	
Pipeline (includes Right-of-Way Costs)		1,735
Mitigation (cost adjusted to $10,000/ac)	53[3]	25[3]
Planning (permitting, EIR/EIS, etc)	50	50
Total Estimated Capital Cost:	$857	$2,067

1) CALFED Bay-Delta Program, "DRAFT - Facility Descriptions and Update Cost Estimates for Isolated Delta Convey Facility", March 28, 1997
2) CALFED Bay-Delta Program, "DRAFT - Preliminary Evaluation of 5,000 cfs Isolated Transfer Facility using Buried Pipeline", January 29, 1996
3) Mitigation cost added on a 1:1 replacement ratio for the full right-of-way acreage

These costs show that the pipeline option would cost about two to three times that of the canal. In addition, the pipeline energy requirement is $11 Million more per year that the canal. Using a three percent discount rate for 30 years would result in a capitalized cost of approximately $220 Million more for the pipeline option.

Other Considerations

There are a few possible tradeoffs between the two conveyance options. Two of the more significant are:

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- The open canal option offers the potential for recreation and waterfowl habitat areas, whereas wildlife habitat could be established over the top of the buried pipeline option.

- It would be much easier to increase the capacity of the canal at some future date than to increase the capacity of the pipeline option.

Since the disturbance impacts associated with the canal and pipeline will be mitigated, the preference in the first tradeoff would depend on the point of view of the reader. The second tradeoff can be minimized by a good assurance package for the operation of the facility. These tradeoffs appear to be minor compared to the major cost difference between options.

Recommendation

Given that the alternatives 3A and 3C are identical except for the conveyance method, the environmental impacts of both alternatives can be mitigated so that the difference between the impacts are slight, and the conveyance method in 3C costs 2 to 3 times that of 3A, it is recommended that alternative 3A adequately represents the alternative concept and alternative 3C be dropped from consideration.